McIDAS-V User's Guide

Version 1.7

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What is McIDAS-V?

McIDAS-V is a **free**, open source, visualization and data analysis software package that is the next generation in SSEC's 40 year history of sophisticated McIDAS software packages. McIDAS-V displays weather satellite (including hyperspectral) and other geophysical data in 2- and 3-dimensions. McIDAS-V can also analyze and manipulate the data with its powerful mathematical functions. McIDAS-V is built on SSEC's VisAD and Unidata's IDV libraries, and an integrated version of SSEC's HYDRA software package.

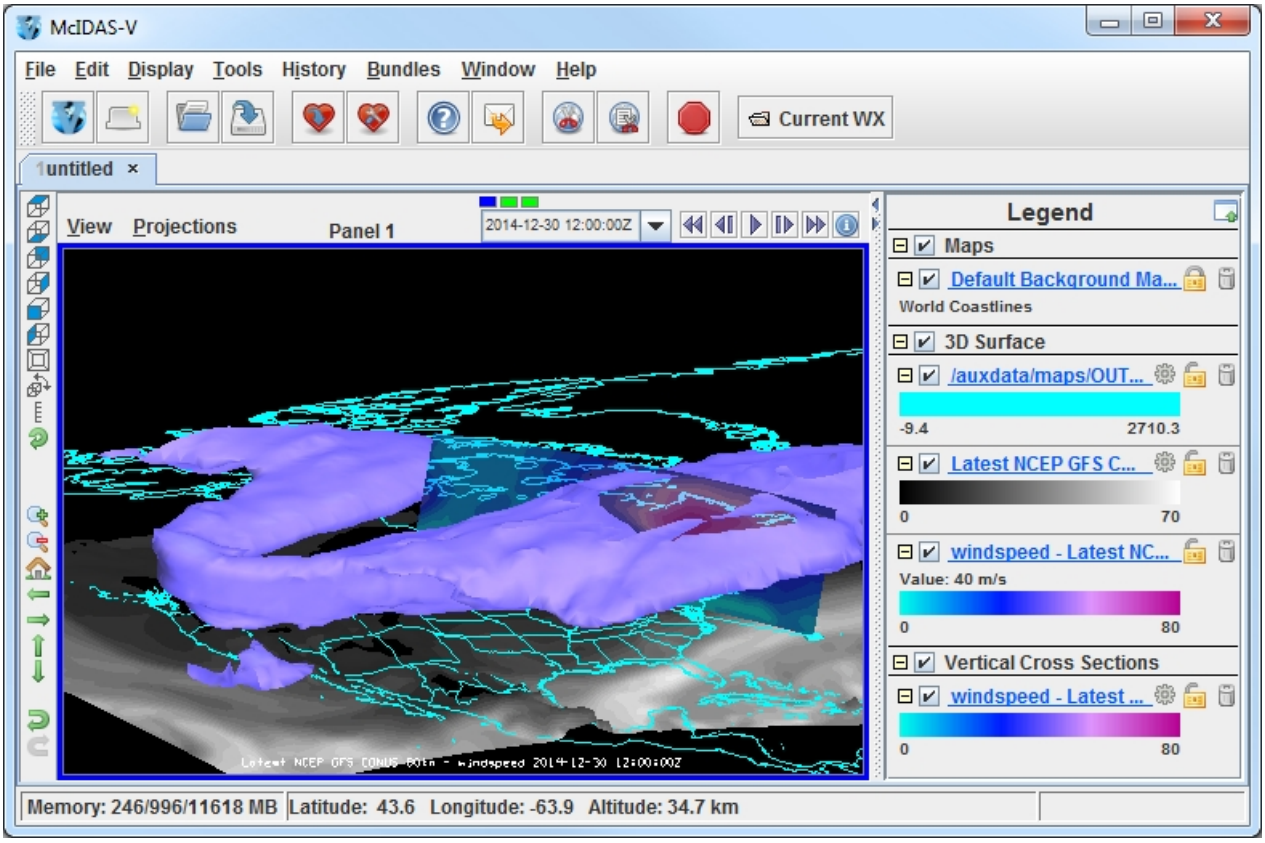

Image 1: The McIDAS-V Main Display Window

This McIDAS-V User's Guide is currently under construction. Once completed, it will describe using the features available in the McIDAS-V application. For a brief description about getting started using McIDAS-V and making displays of common data available, refer to the Getting Started section.

This Guide was originally developed at the Unidata Program Center by the developers of the Integrated Data Viewer (IDV). The first version of the McIDAS-V User's Guide was created from the IDV User's Guide (September 2007) and has since been updated to reflect the changes that have been made to McIDAS-V, IDV, and VisAD (see the Release Notes for details on recent changes).

Development of McIDAS-V is ongoing at the Space Science and Engineering Center (SSEC) at the University of Wisconsin-Madison. The development is driven by the needs of the community of users. Suggestions, comments, and collaboration are welcomed and encouraged. See Documentation and Support for more information. The goal is to provide new and innovative ways of displaying and analyzing Earth science data, as well as provide common displays that many of its users have come to expect.

How can I get McIDAS-V?

See Downloading and Running McIDAS-V for information on how to download McIDAS-V, install McIDAS-V, and run McIDAS-V. For additional information, refer to the latest McIDAS-V training materials.

Overview

- Release Notes
- System Requirements
- Dowloading and Running McIDAS-V
- Data Formats and Sources
- Documentation and Support
- License and Copyright

Release Notes

The items below list the changes in McIDAS-V for the most recent release version. For the release notes of previous versions, see Previous Release Notes.

For a current list of known bugs and requested enhancements, please see the Open Inquiries Report from the McIDAS-V Inquiry System. To view the items currently under development, see the list of Critical Bugs and Critical Development Items.

McIDAS-V
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The items below reflect the changes since the 1.6 release.

Documentation Changes

- **McIDAS-V User's Guide**

Data Changes

- **Image Chooser Speedup**
- **GOES 16 ABI Remote Server**
- **Local Servers**
- **GLM Plugin**

Display Changes

- **ProfileAlongTrack Display**
- **Spanish Characters for High and Low Symbols**
- **Default McIDAS-V Logo**
- **ncdump Output of HYDRA Data Sources**
- **Grid Trajectory Controls**

Other Changes

- **Relative Times Tab Update**
- **Absolute Times Tab Update**
- **Local mcidasv.rbi File Added**
- **Java, Java 3D, JOGL, and NetCDF Versions**
- **Scripting**
- **Great Lakes Location Labels**
- **Range Ring Linking**
- **Shapefiles in Zipped Bundles**
- **URL Redirects**

Under Development

- **JPSS Chooser**
- **Advanced Dvorak Technique Display**

Documentation Changes

McIDAS-V User's Guide

Updated the McIDAS-V User's Guide to contain new features and more detailed content.

Data Changes

Image Chooser Speedup

Improved the speed of the **Satellite>Imagery** chooser when using a dataset of geostationary data. The speed increase will be most noticeable with large datasets, as now only one ADDE call is made to generate the preview image. This improvement will be seen in the **Field Selector** tab of the Data Explorer. Once the band and calibration have been selected, the subset tabs (**Times**, **Region**, and **Advanced**) tabs will appear quicker than in previous versions of McIDAS-V.

GOES 16 ABI Remote Server

Added a new remote ADDE server to the **Satellite>Imagery** chooser (lead.unidata.ucar.edu) that contains realtime remote GOES 16 level 1b data and level 2 products. There are three different datasets on this server for GOES 16 data: EAST, NPGOESR, and RTGOESR. This server is maintained by Unidata.

Local Servers

Updated local ADDE servers on Linux and OS X platforms. In conjunction with this, navigation improvements have been made to GOES 16 ABI and Himawari data loaded via ADDE. For specific information about the local ADDE servers, see Local ADDE Data Manager.

GLM Plugin

Added a new plugin to the Plugin Manager under **Data Sources>GLM NetCDF Files**. After this plugin is installed, local GLM netCDF files can be loaded through the **General>Files/Directories** chooser with the three new data types designed plot event data (GLM Events Data files), flash data (GLM Flashes Data files), and group data (GLM Groups Data files). To plot flash data, select the data file (or multiple data files can be selected at once to create a loop), choose the GLM Flashes Data files Data Type, and click Add Source. Note that the files must be mission-standard format and follow the GRB naming convention, and thus look similar to **OR_GLM-L2-LCFA_G16_s20172151749200_e20172151749400_c20172151749467.nc**. Once in the Field Selector, it is suggested to adjust the time binning settings of the data source. Each point in the data is its own time, and time binning allows for creating a loop where multiple points are plotted at the same time step. For example, Bin Size and Round To can be set to '5 minutes' to create a loop with time intervals of 5 minutes. This data can be plotted using the Point Data Plot display type. Note that new GLM layout models have been added for event, flash, and group data.

ncdump Output of HYDRA Data Sources

Added the ability to view the ncdump output of a HYDRA data source. Once the data source has been added to the Field Selector, right-click on the data source and choose Properties. In the Properties window, there is a new Metadata tab that includes the ncdump output.

Grid Trajectory Controls

Expanded the Grid Trajectory Controls to add the ability to set the trajectory initial area as well as the trajectory form (e.g. Ribbon, Line, Cylinder). A new trajectory form, Points, was also added.

Display Changes

ProfileAlongTrack Display

Improved the controls to display lidar (CALIPSO, CloudSat, and HSRL2) data by making subsetting (geographic and resolution) easier. The ability to plot HSRL2 lidar was added for this release. For more information, see ProfileAlongTrack Controls.

Spanish Characters for High and Low Symbols

Added the ability to change the 'H' and 'L' shapes (High and Low) from the Drawing Controls to 'A' and 'B' for the Spanish words 'Alto' (high) and 'Bajo' (low).

Default McIDAS-V Logo

Added a default McIDAS-V logo to the Display Window Preferences tab of the User Preferences. By default, this logo is positioned at the bottom left corner of each display panel.

Other Changes

Relative Times Tab Update

Updated the Relative Times tab in the Satellite>Imagery, Radar Level II>Remote, Radar>Level III, and Point Observations>Plot/Contour choosers to have a text entry box for the user to enter the number of relative times to load. In the past, users were limited to selecting a maximum of 100 relative times, but this limit has been removed.

Absolute Times Tab Update

Updated the Absolute Times tab in the Satellite>Imagery chooser to have a text entry box for the user to enter the number of absolute times to list in the chooser. In the past, the default was to list the last 100 times, and the only alternative was to list all of the times in the dataset. Now, a user can enter any integer value greater than zero and click the List Images button. As an alternative to a numerical value, entering "ALL" will

return all of the times in the dataset.

Local mcidasv.rbi File Added

Added a mcidasv.rbi file to the user's McIDAS-V directory. This RBI (Resource Bundle for the IDV) file allows for defining the location of different resources used by McIDAS-V. These different resources include color tables, formulas, help tips, etc.. Users can modify this mcidasv.rbi file to customize their sessions to only use specific resources. For example, a user can create a mcidasv.rbi file in a way that the resource used for color tables is only pulled from a sitepath directory (specified by the sitepath argument at startup) and not use the native color tables included with McIDAS-V. This mcidasv.rbi file also allows for user configuration of resources that can't be altered through the user interface, such as help tips. A user can create their own helptips.xml file and point to it in mcidasv.rbi, allowing for McIDAS-V to read and display their own custom help tips. For more information on this, see Site Configuration.

Java, Java 3D, JOGL, and NetCDF Versions

Updated Java from version 1.8.0_45 to 1.8.0_112

Updated Java 3D from version 1.6.0-pre11 to 1.6.0-pre12.

Updated JOGL from version 2.2.3 to 2.3.2.

Updated NetCDF from version 4.6.5 to 4.6.11

Scripting

Added a variety of functionality related to scripting since the release of 1.6. Below is a list of significant changes:

- New functions:
  - Added a new function called setLegendLabel() that sets the Legend Label (the blue text) of the layer in the Legend of the Main Display window.
  - Added a new function called setExtraLegendLabel() that sets the Extra Legend Label (the text below the Legend Label) of the layer in the Legend of the Main Display window.
  - Added a new function called findUnits() that returns the units associated with a data object.
  - Added new functions called getDisplayUnit() and setDisplayUnit() to return and set the unit of a displayed layer.
- New functionality with existing functions:
  - Added a new keyword to annotate() called bgColor, which adds a background color to annotated text. The default is for the text to not have a background.
  - Added new keywords to writeMovie() that allow for defining the number of frames to show per second (framesPerSecond) and how long to show the last frame in the animated GIF (endFramePause).
  - Added a new keyword to captureImage() called index that allows for specifying which frame (index) to capture when multiple frames are displayed in a loop.
- Miscellaneous scripting-related changes:
  - Added a new keyboard shortcut to open the Jython Shell: Ctrl+J
  - Added a new keyboard shortcut to open the Jython Library: Alt+J

Great Lakes Location Labels

Added location labels for the Great Lakes that can be added to the display from the **Display>Plot Location Labels>US>Great Lakes** menu item.

Range Ring Linking

Added the ability to link the Color and Line Width settings in the Range Ring controls between the Range Rings, Radials, and Labels. This makes it easy to set all of the components of the range rings to be the same color and width.

Shapefiles in Zipped Bundles

Added the ability to save shapefiles in zipped bundles.

URL Redirects

Added the ability for McIDAS-V to handle URL redirects in all locations where URLs can be used, including the **General>URLs** chooser. A common case of this would be an HTTP URL that is redirected to HTTPS.

Under Development

JPSS Chooser

Changed the name of this chooser from "Imagery - Suomi NPP" to "Imagery - JPSS".

Added a button to change the listing of fields in the Field Selector between variable names and the long_name attribute of each variable. This button is only available if the variable names and long_name attributes are different.

Added support for the VIIRS Cloud Mask EDR (Environmental Data Record) with the naming convention of VICMO, which was released in March 2017. The same EDR product with the previous naming convention of IICMO is supported as well.

Advanced Dvorak Technique Display

Added a new display type, Advanced Dvorak Technique (Under Development), that provides Advanced Dvorak Technique (ADT) analysis results for local and remote ADDE satellite data. Note that this display type is considered to be under development. Current documentation can be found here: http://www.ssec.wisc.edu/mcidas/software/v/resources/adt/McV_ADT_1p7.pdf.

System Requirements

McIDAS-V should run on any platform that fully supports **Java** and **Java 3D**. It has been tested on **Linux, Mac OS X, and Windows**. AIX and IRIX support the requirements in certain configurations, but have not been tested.

To run McIDAS-V, a system will need to have a minimum of a **500 MHz processor and 512 MB of RAM free**. However, if you are purchasing a new system, it is recommended that an Intel system running McIDAS-V have at least a **2 GHz processor, 4 GB memory (RAM), and at least 1 GB free hard drive space**. Please note that Java on 32 bit operating systems can only utilize 1536 MB, while 64 bit operating systems can utilize all of the available memory. Performance will be better with faster processors and more memory. We have seen the best results with NVIDIA hardware and drivers.

Detailed requirements for the following are listed below:

- Operating Systems
- Graphics Cards and Drivers
- Java Versions
- System Memory and Processor Speed
- Networking

Operating Systems

The chart below lists the software versions, by vendor, that McIDAS-V is known to run on, and that McIDAS User Services tests:

OS	Known to Work	Tested at SSEC [1]
Linux	Red Hat Linux 4.0+	Red Hat Enterprise Linux WS 6.7 (64 bit) Red Hat Enterprise Linux WS 7.2 (64 bit)
Mac OS X[2]	Mac OS X 10.8+	Mac OS X 10.9
Windows	Windows XP, Vista, 7, 10	Windows XP with Service Pack 3 Windows 7 Enterprise

Notes:
[1]The local ADDE servers are distributed as binaries compiled only on these Operating System versions. If you are running versions other than those listed, the local ADDE servers may not work and give you an error message that the "Local Server is not running".
[2]Beginning with McIDAS-V version 1.5, Java 7 was being used. OS X versions 10.6 and earlier do not support Java 7 and therefore McIDAS-V will not work on those versions.

Graphics Cards and Drivers

McIDAS-V works on systems with graphics cards that support OpenGL (all systems) and Direct-X (version 8.0+, Windows only). On Linux, the driver must support GLX, an X windows system extension to OpenGL programs. McIDAS-V also works on systems with stereo graphics cards. We have seen the best results with NVIDIA hardware and drivers, and with the display configuration set to a high screen resolution and the maximum number of colors.

McIDAS-V utilizes the latest developments in graphics cards, drivers and Java3D. If you encounter any problems with system instability (such as using all of the memory or CPU on your machine, or frequent software crashes) or unusual data displays with "torn" or "gray" images, you should make sure you have the **latest driver for your system**. Even if the system is brand new, the driver may not be the most recent version available.

> **Please Note:** We have received reports of McIDAS-V failing to start (i.e., the windows never appear) on some systems using integrated graphics chipsets, including:
>
> - Intel GMA 4500MHD
> - Intel GM965
> - ATI Radeon X300 family (including X550, X1050 and R300)

To determine the brand and driver information of your graphics card, follow the guides for each platform below:

- **Windows**
  - **Windows7/Vista:** From the Start menu, open the Control Panel (click Start->Settings->Control Panel if you have the Classic Start menu). Open the Device Manager. Under the **Display adaptors** tree, you will see your graphics card listed. You can double click on the graphics card for more information.
  - **XP:** From the Start menu, right-click on My Computer, and select Properties. From here, navigate to the **Hardware** tab. Open the Device Manager, and look under the **Display adaptors** tree to see your graphics card. You can double-click on the graphics card for more information.
- **Linux**
  - Open a command terminal and type the following command "lspci -v". The graphics card information will be listed under "VGA compatible controller".

- **Mac OS X**
  - **10.8:** Open the Apple menu and select "About This Mac". Click on the "More Info..." button to open the About This Mac window. The graphics card will list next to **Graphics**.

Once you have determined your graphics card brand and driver information, check the manufacturers web page for information on their updated versions. Here are links to some of the most common graphic card Original Equipment Manufacturers (OEM):

- **NVIDIA**
  - Desktop - http://www.nvidia.com/Download/index.aspx?lang=en-us
  - Laptop - http://www.nvidia.com/object/notebook_drivers.html
- **ATI** - http://support.amd.com/us/gpudownload/Pages/index.aspx
- **Intel** - http://downloadcenter.intel.com/

Java Versions

McIDAS-V runs on any platform that supports:

- **Java** version 1.8+ (non-beta versions only) **AND**
- **Java 3D** version 1.6+; **JOGL** 2.3.2

McIDAS-V is packaged with the following versions included:

	Versions Included with McIDAS-V		
	JRE (Java Runtime Environment)	**Java3D**	**JOGL (Java OpenGL)**
Linux[(1)]	1.8.0	1.6.0	2.3.2
Mac OS X	1.8.0	1.6.0	2.3.2
Windows	1.8.0	1.6.0	2.3.2
other unix	none	1.6.0	2.3.2

The necessary versions of the JRE, Java3D and JOGL are included with the Linux, Mac OS X, and Windows installers. If other platforms fully support Java version 1.8+, Java 3D version 1.6+, and JOGL 2.3.2 they should also work, but have not been tested.

> **Notes:**
> [(1)]The version of the Mesa library that comes with Red Hat Linux may be incompatible with Java 3D packaged with McIDAS-V. If you experience X server crashes when exiting McIDAS-V, you will need to build and install Mesa from source available at http://www.mesa3d.org.

McIDAS-V can be demanding of hardware speed and memory depending on the size of the datasets you wish to work with. It is recommended that the system have a **minimum** of 512 MB of RAM free for McIDAS-V use. Performance is significantly better with 1 GB RAM or more. Please note that 32 bit Java Runtime Environments (JRE) can utilize a maximum of 1536 MB RAM, while 64 bit JREs can utilize all of the RAM available to the operating system (64 bit OS required).

The recommended processor speed will vary by platform. You can run on a system as slow as 500 MHz or even less, but response will be correspondingly reduced. In general, the faster the processor, and the more memory your system has, the better the performance will be.

For reasonable performance, it is recommended that an Intel system running McIDAS-V have at least a **2 GHz processor and 4 GB memory (RAM)**. Performance will be even better with faster processors and more memory.

Networking

McIDAS-V is designed to access data on remote servers on the Internet, as well as from local files. Downloading data from remote servers benefits from a fast connection to the Internet, since many data fields are large.

The following ports are used to access remote data, and must be open through any firewalls or proxies at your location:

- **21 -** FTP
- **80 -** WWW
- **112 -** ADDE servers (imagery, radar, point, and upper air data)
- **8080 -** THREDDS data servers

When accessing local data via <LOCAL-DATA> ADDE datasets, *incoming* ports **8112 - 8122** must be allowed (Windows users may need to explicitly allow this connection). The Local ADDE Data Manager will attempt to connect to ports 8112 to 8122. If port 8112 cannot be connected to, port 8113 will be attempted, and then 8114 and so on.

Downloading and Running McIDAS-V

This page contains information on:

- Downloading McIDAS-V
- Installing McIDAS-V
- Running McIDAS-V
- Setting Memory Usage
- Downloading McIDAS-V Source Code

If there is any trouble downloading and installing McIDAS-V, first check the FAQ, then please report the problem as described to McIDAS-V Support.

For more information on downloading and using McIDAS-V, please see the Installation and Introduction tutorial on the McIDAS-V Documentation Page. Also, see this page for additional tutorials and instructional videos on more advanced subjects.

Downloading McIDAS-V

Check that your system meets the System Requirements for McIDAS-V and download the appropriate package for the following operating systems:

- Linux - 32 bit
- Linux - 64 bit
- Mac OS X - Intel
- Windows

This file is just the installer and can be placed anywhere on your machine. When the installer is run in the next step, the user can then indicate where McIDAS-V should be installed.

Installing McIDAS-V

Start the installer by following the instructions appropriate for your operating system:

- Linux — open a terminal window and run **sh ./<installer>.sh**
- Mac OS X — mount the .dmg and double-click the installer
- Windows — double-click the downloaded **.exe** file
- All other UNIX — open a terminal window and run **sh ./<installer>.sh**

A GUI will walk through the installation steps and allow for creating a program group and/or desktop icon. When McIDAS-V is installed, a McIDAS-V-System directory will be created in the installation directory. This directory contains system files necessary to run McIDAS-V and users should not save files to the McIDAS-V-System directory. The first part of the installation GUI prompts the user to select if the install should update any existing installs, or if McIDAS-V should be installed into a new directory:

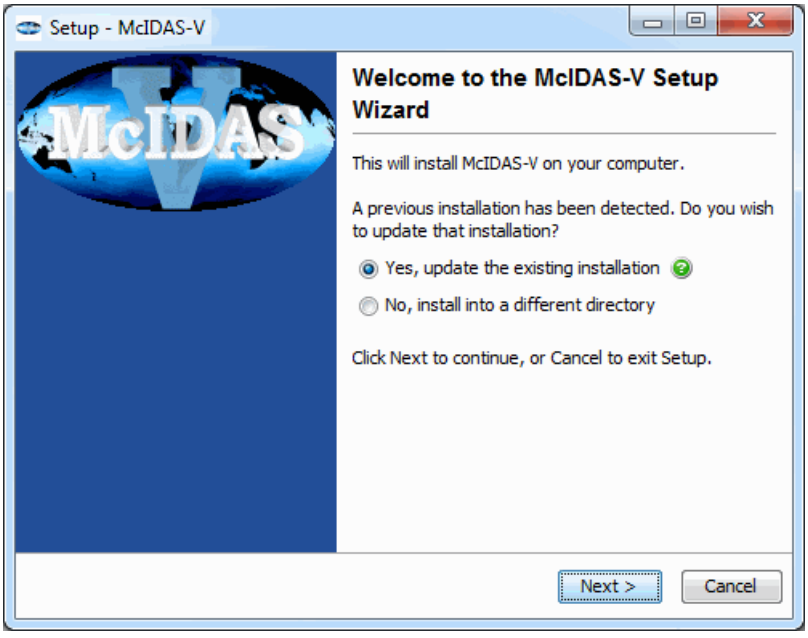

Image 1: Setup Window

Yes, update the existing installation - Installs McIDAS-V into the same directory that McIDAS-V was last installed into. Moving the mouse over the icon notifies the user which directory this is. Using this option will skip the step of the setup where the installation directory would

be selected.

No, install into a different directory - Proceeds with the installation that includes a step where the user selects the installation directory. When selecting the installation directory, the user can either type a directory path into the text field, or use the Browse ... button to open a Select Directory window which lists the directories on the system. From here, the user can select a previously-existing directory, or create a new directory with the New folder button.

Note: Windows users should not install McIDAS-V in the **/Program Files** directory as this can lead to permissions problems.

Note: Users should install and run McIDAS-V as their own user, not as administrator. Installing or running as administrator may lead to problems starting or using McIDAS-V.

If an error occurs, please see the FAQ for information on solutions to common errors reported by users installing and running McIDAS-V. If the error is not listed, please send a support request to McIDAS-V Support.

Running McIDAS-V

On Mac OS X:

Double-click on the McIDAS-V shortcut icon that was created in /Applications.

On Windows:

Double-click on the McIDAS-V shortcut icon that was created on the Desktop.

On all other platforms:

At the UNIX prompt from the McIDAS-V-System directory (where McIDAS-V was installed), run the command: **runMcV**

If an error occurs, please see the FAQ for information on solutions to common errors reported by users installing and running McIDAS-V. If the error is not listed, please send a support request to McIDAS-V Support or use the Support Request Form in the Help menu of McIDAS-V.

Note: When McIDAS-V is first run, a **/McIDAS-V** directory will be created in the user path. This directory contains information about user-specified settings as well as XML files for color tables, projections, etc. that are used by McIDAS-V. Users can write files to this directory.

Setting Memory Usage

By default, McIDAS-V uses 80% of the available memory on your machine. The maximum amount of memory is determined by the operating system. To manually change the amount of memory used by McIDAS-V, edit the **Maximum Heap Size** in the **Advanced** tab of the Preferences by selecting **Edit->Preferences...** from the main menu. The new amount of memory will be saved and used in subsequent sessions. For 32 bit operating systems, it is recommended to set this to no more than 1250 MB. The maximum value for 32 bit operating systems is 1536 MB, while 64 bit operating systems can use all of the RAM available. To change the amount of memory used to a percentage, select the percentage option in the **Advanced** tab of the User Preferences by selecting **Edit->Preferences...** from the Main Display window.

Downloading McIDAS-V Source Code

The source code for McIDAS-V is available for download. For instructions on building McIDAS-V from source, see the Building McIDAS-V from Source document.

Data Formats and Sources

McIDAS-V can read a variety of data formats either from local files or remote data servers (e.g., HTTP, TDS, ADDE). This page contains information about some data sources that work with McIDAS-V.

To connect McIDAS-V to data sources, see Data Sources.

- Supported Data Types and Formats
- Remote Data Servers
- netCDF files
- ASCII Text Point Data
- Miscellaneous

Supported Data Types and Formats

Data Type	Description	Supported Formats	Access Method
Gridded	Numerical weather prediction models, climate analysis, gridded oceanographic datasets, NCEP/NCAR Reanalysis	- netCDF	- local files, HTTP, TDS servers
		- GRIB (versions 1&2)	- local files, TDS servers
		- Vis5D	- local files, HTTP
		- GEMPAK	- local files, TDS servers
Satellite Imagery	Geostationary and polar orbiter satellite imagery, derived satellite products	- ADDE	- ADDE servers
		- McIDAS AREA	- local files, local & remote ADDE servers
		- AIRS	- local files
		- GINI	- local files, TDS servers
		- AMSR-E Level 1b	- local ADDE
		- AMSR-E Level 2a	- local ADDE
		- AMSR-E Rain Product	- local ADDE
		- EUMETCast LRIT	- local ADDE
		- Meteosat OpenMTP	- local ADDE
		- Meteosat Second Generation (MSG) Level 1b	- local ADDE
		- Metop AVHRR Level 1b	- local ADDE
		- MODIS L1b MOD02 (MODIS Level 1b)	- local ADDE
		- MODIS L2 MOD04 (Level 2 Aerosol)	- local ADDE
		- MODIS L2 MOD06 (Level 2 Cloud Top Properties)	- local ADDE
		- MODIS L2 MOD07 (Level 2 Atmospheric Profile)	- local ADDE
		- MODIS L2 MOD28 (Level 2 Sea Surface Temperature Products)	- local ADDE
		- MODIS L2 MOD35 (Level 2 Cloud Mask)	- local ADDE
		- MODIS L2 MODR (Level 2 Corrected Reflectance)	- local ADDE
		- MSG HRIT FD and HRV	- local ADDE
		- MTSAT HRIT	- local ADDE
		- NOAA AVHRR Level 1b	- local ADDE
		- SSMI (TeraScan netCDF)	- local ADDE
		- TRMM (TeraScan netCDF)	- local ADDE
		- Himawari-8 (*.DAT) *	- local ADDE
		- INSAT-3D Imager *	- local ADDE
		- INSAT-3D Sounder *	- local ADDE
		- GOES-16 ABI (Level 1b) *	- local ADDE
Radar	Radar images	- Level II	- local files or TDS (bzip2 compressed or uncompressed)
		- Level III	- ADDE servers, local files or TDS
		- Universal Format (UF)	- local files
		- DORADE	- local files
	Surface observations (METAR and SYNOP), earthquake observations	- ADDE	- ADDE servers
		- netCDF (Unidata, AWIPS/MADIS formats)	- local files
		- Text (ASCII, CSV), Excel spreadsheet	- local files
		- netCDF (RAF convention)	- local files

Point Observational	Aircraft observations		
		- Text (ASCII, CSV)	- local files
	Global balloon soundings	- ADDE	- ADDE servers
		- netCDF (Unidata, AWIPS/MADIS formats)	- local files
		- CMA text format	- local files
		- GEMPAK	- local files
GIS	Data typically used in Geographic Information Systems (GIS)	- ESRI Shapefile	- local files, HTTP
		- USGS DEM	- local files
QuickTime	QuickTime movies (without extensions)	- QuickTime	- local files, HTTP

* The Himawari-8, INSAT-3D, and ABI local servers are currently supported on Linux and OS X platforms

Remote Data Servers

Extensive meteorological and oceanographic data is available from remote data servers for use in research and education. Some of these data have restrictions on their use, see Using Data Acquired via Unidata for that information.

Abstract Data Distribution Environment (ADDE)

Most of the data choosers in McIDAS-V use ADDE as the access method (satellite imagery, Level III radar, surface, and RAOB). The ADDE choosers are pre-configured with a list of available servers. SSEC and the Unidata community each maintain a set of cooperating ADDE servers which serve up real-time and archived atmospheric datasets for use in McIDAS-V. You can use any of these to access the near-realtime data. For more information on accessing data on ADDE servers, see the Data Sources section.

SSEC image datasets include:

- **rci.ssec.wisc.edu**
  - **CIMSSP -** GOES East and West Cloud mask, imager CTP and ECA, and sounder products.

Additional datasets:

- **adde.ssec.wisc.edu***
  - **BLIZZARD -** Archived data from the 1993 Storm of the Century.
  - **CIMSS** - Products derived from one or more channels, made by CIMSS, SSEC.
  - **GINIALL -** GINI images over different regions with different resolutions.
  - **GINICOMP** - GINIEAST AND GINIWEST composites.
  - **GINIEAST** - GOES East images, remapped to conic, Mercator (cylindrical equidistant), or polar projections channel 1.
  - **GINIWEST** - GOES West images, remapped to conic, Mercator (cylindrical equidistant), or polar projections channel 2.
  - **GLOBAL -** Global composite IR and WV images
  - **IMAGEALL -** GOES images, Antarctic composites and Radar.
  - **NEXRCALL -** Composites of radar reflectivity, echo tops, and storm precipitation with different resolutions.
  - **NEXRCOMP** - Composites of NEXRAD imagery (1km, 6km, 10 km radar coded message, 1-hour precipitation total, storm total precipitation).
  - **RTIMAGES** - GOES East and West images in native view, not remapped. Also some global Mollweide images, and an Antarctic composite.
  - **TOPO -** Plots land elevations with different projections using the color scales relevant to the chosen descriptor. The image will remap.
  - **NEXRALL -** NEXRAD imagery of a variety of products for individual sites.
  - **RTNEXRAD -**NEXRAD imagery of a variety of products for individual sites.
  - **RTPTSRC -** Point data from hourly observations, planes, ships, and soundings.
  - **RTWXTEXT -** Text data used to plot front analysis and forecasts.
- **goessouth.unidata.ucar.edu**
  - **SOUTH** - GOES South (GOES-12) imager and sounder coverage of South America.
- **satepsanone.nesdis.noaa.gov**
  - **PUB -** FY2C, METEOSAT-9 (6-hourly) and MTSAT imagery. GOES-East and West imagery and products.
- **lead.unidata.ucar.edu -** Contains many of the datasets as adde.ssec.wisc.edu (above) with additional datasets for GOES 16 data.
  - **EAST -** GOES 16 FD, CONUS, M1, and M2 level 1b data.
  - **NPGOESR -** GOES 16 FD, CONUS, M1, and M2 level 1b data and level 2 products.
  - **RTGOESR -** GOES 16 FD, CONUS, M1, and M2 level 1b data.

You can configure defaults for particular images by creating a custom defaults file. For more information, see Configuring Image Defaults.

*Additional alternate servers include: adde.ucar.edu, stratus.al.noaa.gov, and atm.ucar.edu. These alternate servers have most or all of the datasets listed under adde.ssec.wisc.edu.

THREDDS Data Server (TDS)/OPeNDAP

McIDAS-V can access gridded data (netCDF/GRIB/GEMPAK) and NEXRAD radar data stored on a THREDDS Data Server (TDS) through the OPeNDAP (formerly called DODS) protocol. See Choosing Cataloged Data for more information.

HTTP

Many of the data sources listed in the table above can read files directly from web servers (e.g. Apache) through the HTTP protocol. In most cases,

the server must support the HTTP 1.1 protocol and be configured to set the "Content-Length" and "Accept-Ranges: bytes" headers. See the Choosing a URL for more information.

netCDF files

The Network Common Data Form (netCDF) provides a common data access method for Unidata applications. This format can be used to store a variety of data types that encompass single-point observations, time series, regular grids, and satellite and radar images. The mere use of netCDF by itself is not sufficient to make data "self-describing" and meaningful to McIDAS-V.

Generally, McIDAS-V requires that datasets in netCDF format use metadata conventions to be able to fully understand and geolocate the dataset. These conventions provide documented "best practices". Using conventions with netCDF ensures your data is complete and self-describing, and can be used by others. We recommend you use CF, COARDS, or NUWG conventions for netCDF data files for McIDAS-V, and be sure to follow the best practices noted above.

ASCII Text Point Data

McIDAS-V can read point data and trajectories (aircraft tracks) from comma-separated value (CSV) text files. See the documentation on the Text (ASCII) Point Data Format.

Miscellaneous

There are a couple of data formats that can be of a variety of data types (e.g. Satellite, point) that can be loaded through the local files chooser.

- **GeoTIFF -** GeoTIFF files can be loaded through the local files chooser with the **Tiff files** Data Type.
- **Google Earth (KML/KMZ) -** Google Earth files can be loaded through the local files chooser with the **Google Earth Files KML/KMZ** Data Type.

Documentation and Support

Where to find Help and Support for McIDAS-V

If you are having problems installing or using McIDAS-V, or want to know how to perform a particular task, you have several resources to assist you.

- McIDAS-V Documentation
- Other Sources of Help

McIDAS-V Documentation

The first source of support is this McIDAS-V User's Guide. It contains complete instructions for downloading, installing, running, and using the McIDAS-V reference application and all its features. It also has a Frequently Asked Questions (FAQ) section with answers to many of the most commonly asked questions. The User's Guide can be accessed from the McIDAS-V **Help->User's Guide** menu or online at http://www.ssec.wisc.edu/mcidas/doc/mcv_guide/current/.

Additional documentation is available on the McIDAS-V homepage (http://www.ssec.wisc.edu/mcidas/software/v/), including McIDAS-V training materials (tutorials and data used in training sessions) and McIDAS-V source code.

Other Sources of Help

If you have questions or encounter problems that the McIDAS-V documentation (described above) doesn't provide sufficient help, there are two additional sources of help. They are the McIDAS-V Support Forums and the McIDAS Help Desk.

The McIDAS-V Support Forums contain subject-based forums, each with topics and posts relating to the forum's subject. Only registered users can post on the forums. However, anyone can view the forums and their contents (i.e., visit as an unregistered "Guest").

The McIDAS Help Desk is staffed during business hours with user-support personnel. As noted in the MUG Policy Document, the help desk is supported by the fees paid by the McIDAS Users' Group (MUG) and thus provides advanced-level support for MUG members. For McIDAS-V all users (whether or not a MUG member) are welcome to contact the help desk to report software bugs or suggest improvements (enhancements).

When reporting a bug, first check for related error messages in the Message Console, and include the appropriate error messages in your email message. Also include as much information as you can about how you were running McIDAS-V and what happened, including:

- the version of McIDAS-V that you are using (use the **Help->About McIDAS-V** menu)
- your operating system and version level
- any messages on the console (to see the console, use the **Help->Show Console** menu)
- exact data source and parameter choice
- types of display being made and in use
- the sequence of McIDAS-V actions and choices that caused the problem
- a bundle file that recreates the problem if the data sources are network accessible (optional, but desirable)

Send this information to the McIDAS Help Desk using one of the three methods below.

1. Fill out the support form available from the **Help->Support Request Form** menu. Please include as much information as possible about the problem. *(This is the preferred method.)*
2. Fill out the contact form available on the McIDAS Website. Please include as much information as possible about the problem.
3. You may contact McIDAS User Services or the McIDAS Help Desk by postal mail at the following address:

McIDAS User Services
Space Science and Engineering Center
University of Wisconsin-Madison
1225 West Dayton Street
Madison, WI 53706

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McIDAS-V

Version 1.7

Copyright© 2007-2017
Space Science and Engineering Center (SSEC)
University of Wisconsin - Madison
1225 W. Dayton Street, Madison, WI 53706, USA
http://www.ssec.wisc.edu/mcidas

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McIDAS-V is built on Unidata's IDV and SSEC's VisAD libraries, and
some McIDAS-V source code is based on IDV and VisAD source code.

McIDAS-V is free software; you can redistribute it and/or modify
it under the terms of the GNU Lesser Public License as published by
the Free Software Foundation; either version 3 of the License, or
(at your option) any later version.

McIDAS-V is distributed in the hope that it will be useful,
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You should have received a copy of the GNU Lesser Public License
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Other Licenses

McIDAS-V includes software developed by:

- The University Corporation for Atmospheric Research/Unidata (IDV) (http://www.unidata.ucar.edu/software/idv/)
- The University of Wisconsin-Madison (VisAD) (http://www.ssec.wisc.edu/~billh/visad.html)
- The Australian Bureau of Meteorology (AIFS) (http://ssu1.bom.gov.au/pub/ims/aifs.html)
- The Apache Software Foundation (http://www.apache.org/)
- The Jython project (http://www.jython.org)
- The JDOM project (http://www.jdom.org)
- The ImageJ project (http://rsb.info.nih.gov/ij/)
- The JJ2000 project (https://jpeg.org/jpeg2000/)
- The JFreeChart project (http://www.jfree.org/jfreechart/)
- The JCommon project (http://www.jfree.org/jcommon/)
- The L2FProd.com Common Components 6.9.1 (http://common.L2FProd.com)
- The jnumeric package (http://jnumerical.sourceforge.net/)
- JAMA: The Java Matrix Package (http://math.nist.gov/javanumerics/jama/)
- JTEM: Java tools for experimental mathematics (http://www-sfb288.math.tu-berlin.de/~jtem/numericalMethods/index.html)
- FamFamFam Silk icons (http://www.famfamfam.com/lab/icons/silk/)
- Tango icons (https://en.wikipedia.org/wiki/Tango_Desktop_Project)

Please read the different LICENSE files present in the root directory of the McIDAS-V distribution for restrictions on those packages.

Getting Started

This section describes how to quickly get started using McIDAS-V and making displays of common data.

McIDAS-V Main Windows

There are two main windows in the McIDAS-V application, the Data Explorer window and the Main Display window. Other windows may appear when needed.

Data Explorer

The Data Explorer window is central to McIDAS-V. It is used to choose data sources and parameters to display, the types of displays to make, and times of data to display. More information can be found in the Data Explorer section of the McIDAS-V User's Guide.

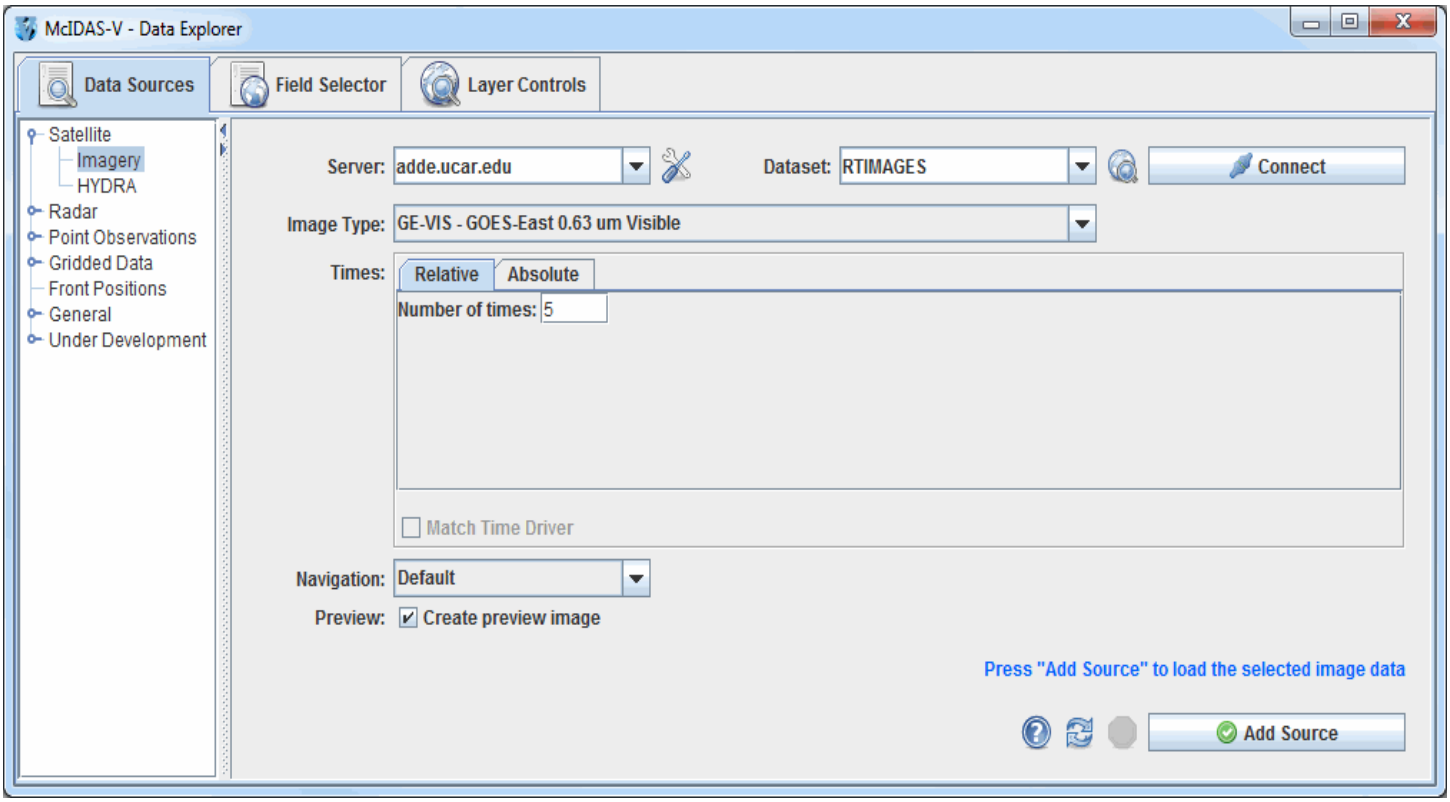


Image 1: Data Explorer Window

Main Display window

The Main Display window includes the McIDAS-V display panels, Legend, Time Animation Controls, viewpoint controls for 3D displays, icons for zooming, panning, and rotating, menus of projections, the main McIDAS-V toolbar, and the main menu bar. More information can be found in Main Display window section of the McIDAS-V User's Guide.

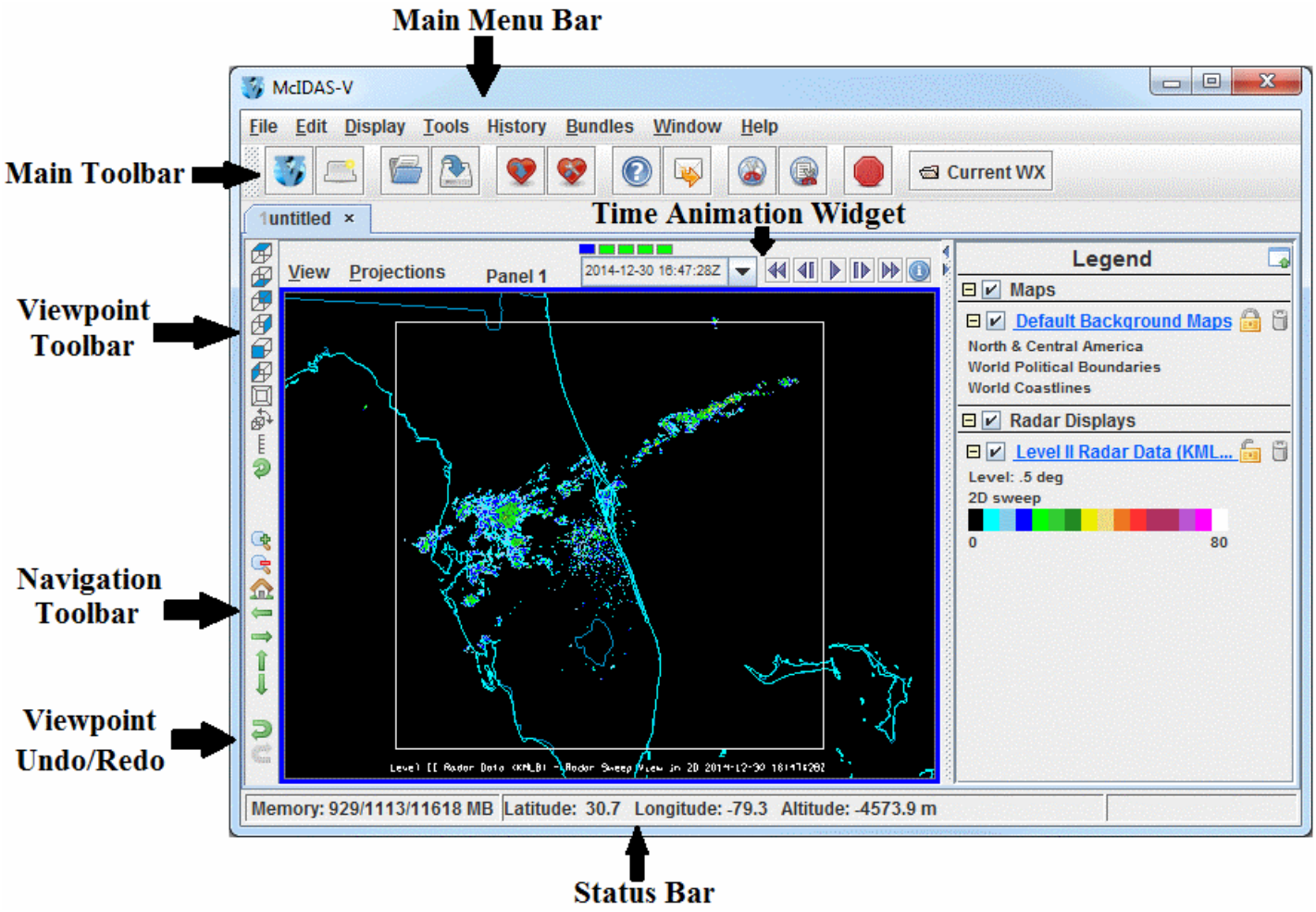


Image 2: Main Display Window

Common Usage Scenario

To create displays with McIDAS-V, the common usage scenario is:

- Choosing sources of data
- Selecting parameters and times and creating a display
- Controlling the display
- Removing the displays

Getting Started Sections

- Displaying Satellite Imagery
- Displaying Hyperspectral Satellite Imagery Using HYDRA
- Displaying Level II Radar Imagery
- Displaying Level III Radar Imagery
- Displaying Surface and Upper Air Point Data
- Displaying RAOB Sounding Data
- Displaying Gridded Data
- Displaying Fronts
- Displaying Local Files
- Displaying Files From a URL
- Using the Globe Display

Accessing Additional Tutorials

For more help with getting started with McIDAS-V, please see the Installation and Introduction tutorial on the McIDAS-V Documentation webpage.

Displaying Satellite Imagery

This section describes how to make displays using geostationary and polar orbiting satellite imagery.

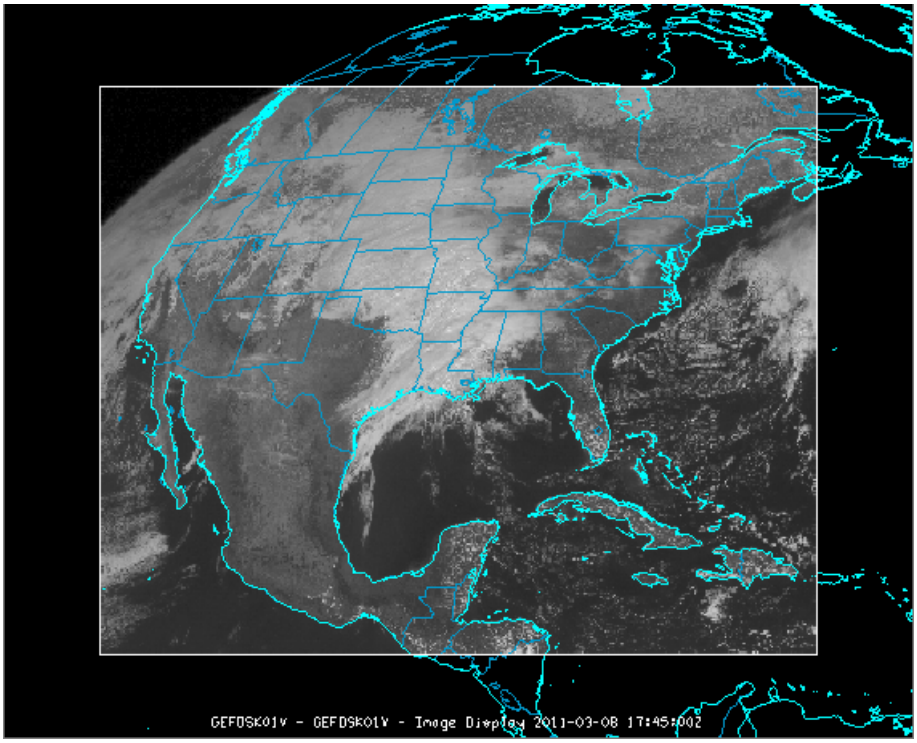


Image 1: Satellite Image in the Main Display Window

The steps include:

- Choosing Geostationary Satellite Imagery from a Remote Server
- Creating the Display
- Displaying a Single Polar Orbiting Satellite Image from a Remote Server
- Creating a Loop of Polar Orbiting Satellite Images from a Remote Server
- Accessing Additional Tutorials

Choosing Geostationary Satellite Imagery from a Remote Server

In the Data Explorer window, select the **Data Sources** tab. On the left side of this tab, select **Satellite->Imagery** from the list of available choosers. For more information about the imagery chooser, see Choosing Satellite Imagery.

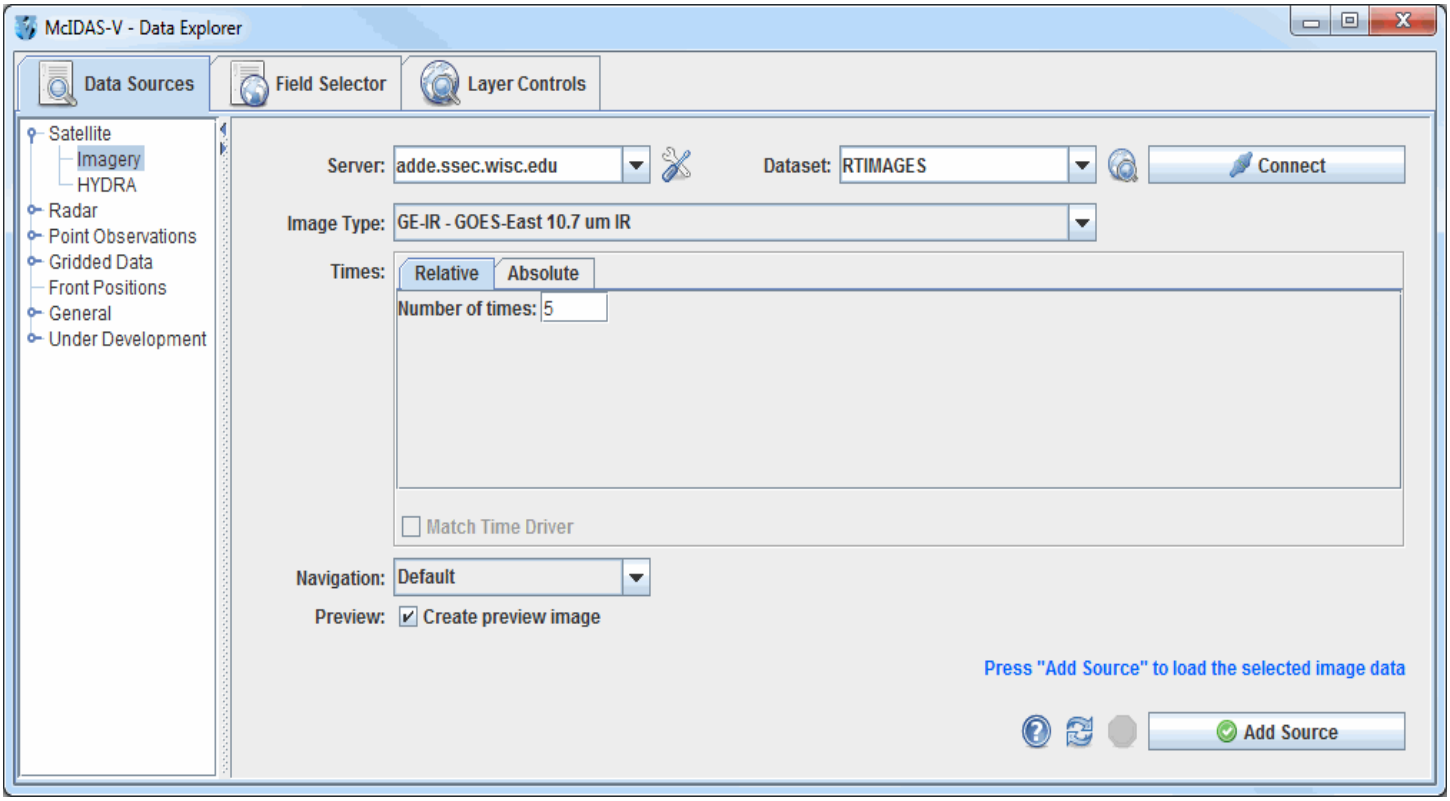


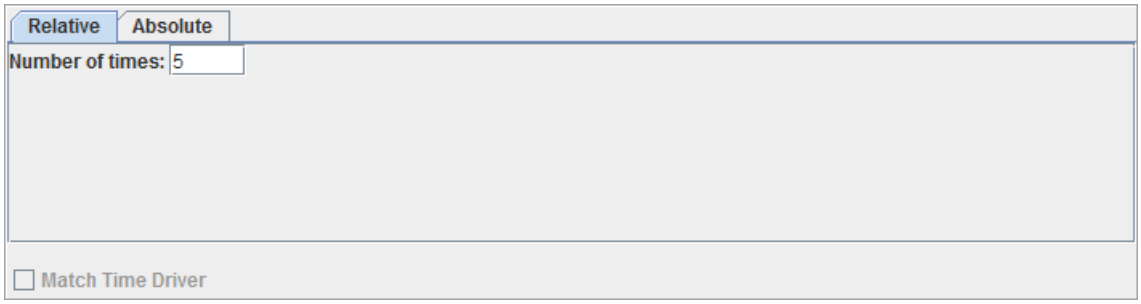
Image 2: Data Sources Tab of the Data Explorer

1. Choose the ADDE Server: **adde.ssec.wisc.edu** and the Dataset: **RTIMAGES**.

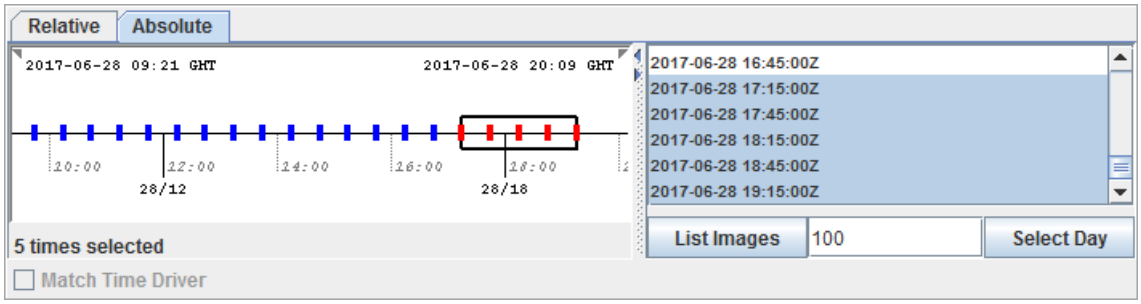
   McIDAS-V comes pre-configured with a list of ADDE servers and datasets, or you can enter your own. See Available data for a description of these pre-defined data sets.
2. Press **Connect** to query the server for available image types.

3. Select the **Image Type** to use (in the example below, **GE-IR** for GOES-East 10.7um IR images).

4. Choose the image time(s) you want. Either choose a set of relative times as shown in the example below (5 most recent), or a set of absolute times as shown in step 5.

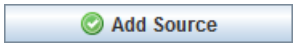


5. A set of absolute times (e.g., 17:15:00 UTC, 19:15:00 UTC).



When choosing absolute times for the first time McIDAS-V needs to query the ADDE server for the times. This may take some time. To select more than one time use Ctrl+click or Shift+click.

6. Select the Navigation type (either Default or Lat/Lon). Choose Lat/Lon if you are using Level 1B or POES ADDE servers.
7. If you do not want to create a preview image in the **Field Selector** tab of the Data Explorer, uncheck 'Create preview image' box.
8. When done, load the selected image data with the **Add Source** button.



Creating the Display

The image data source that you selected will be shown in the [Field Selector] tab. The available display types are listed in the **Displays** panel, the times are listed in the **Times** tab, the preview image or map is displayed in the **Region** tab, and the geographical selection parameters are listed in the **Advanced** tab.

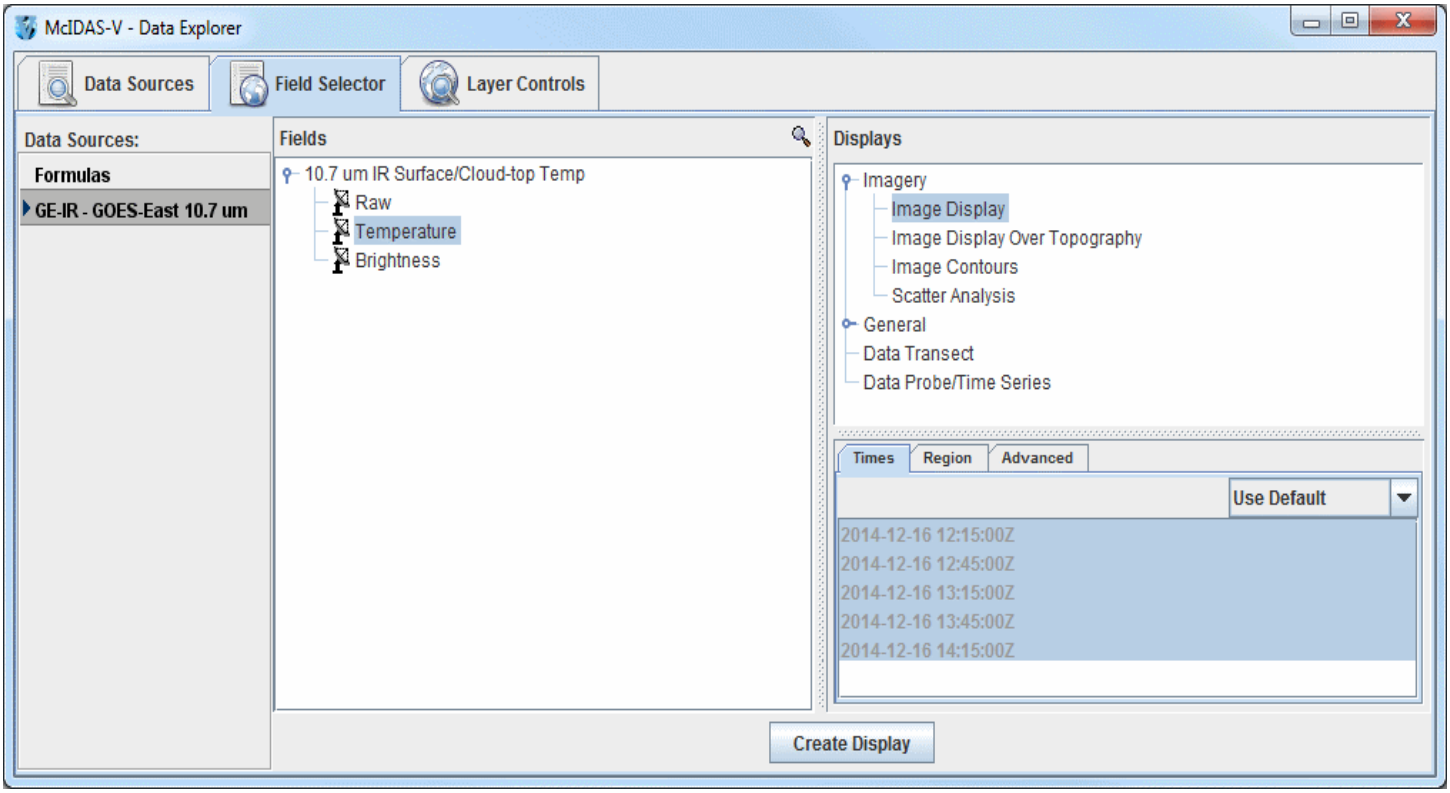
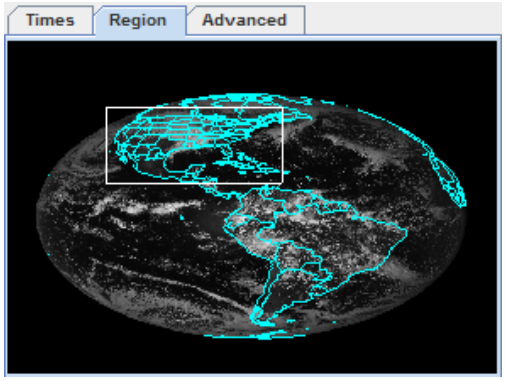


Image 3: Field Selector Tab of the Data Explorer

1. Select the calibration that you wish to display in the **Fields** panel. In this example, Temperature is selected.
2. "Image Display" should be selected for you in the **Displays** panel. "Image Display" displays your data as an image and is the display type used for satellite and Level III radar images in almost all cases.
3. Click the **Region** tab to view the Preview Image. Use the mouse to Shift+left click and drag to select the geographical boundaries of your image.



4. Click Create Display to display the image(s) in the Main Display window. To control time animation use the Time Animation Widget.

If you want to create another type of satellite display over your current display, click "Image Contours" in the **Displays** panel to contour your data. To change your contour colors, right click on the color bar in the Legend, and choose one of the color tables shown in the list.

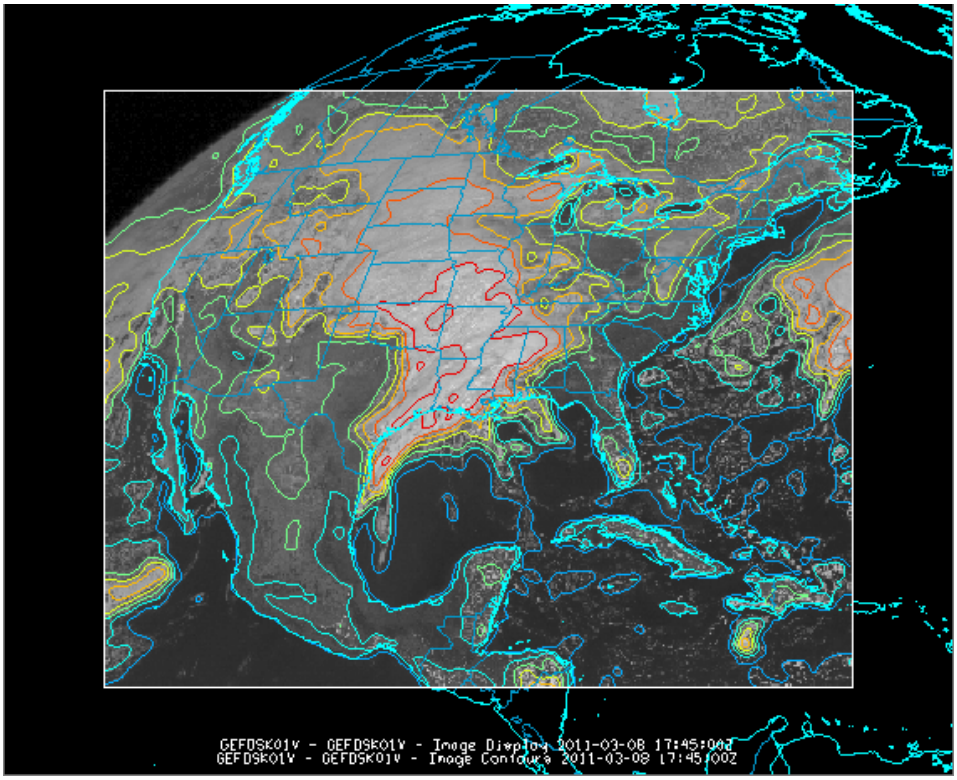


Image 4: Satellite Image with Contours in the Main Display Window

Due to the variability in brightness values in satellite images, some changes may need to be made to the contours to produce a quality image. To reduce the number of contours in the image, the contour interval can be increased by clicking the Change button next to **Contour** in the **Layer Controls** tab of the Data Explorer, and entering a higher value for the **Contour Interval**. To decrease the rigidness of the contours, select a new **Smoothing** method in the **Layer Controls** tab and enter a higher smoothing factor.

Displaying a Single Polar Orbiting Satellite Image from a Remote Server

Return to the Satellite Imagery chooser in the **Data Sources** tab of the Data Explorer. Selecting polar orbiting satellite data is similar to the method to select geostationary data.

1. Choose the ADDE Server: **stratus.al.noaa.gov** and the Dataset: **RTIMAGES** and press **Connect** to query the server for available image types.
2. Select the **Image Type** to use (in the example below, ANTARCTIC - Antarctic Thermal IR Composite).

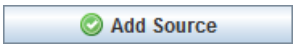
3. Choose to display the most recent image, and click Add Source.
4. In the **Fields** panel, select the calibration that you wish to view.
5. When done, load the selected image data with the Create Display button.

6. The polar orbiting satellite image will be displayed on top of the existing geostationary satellite image.

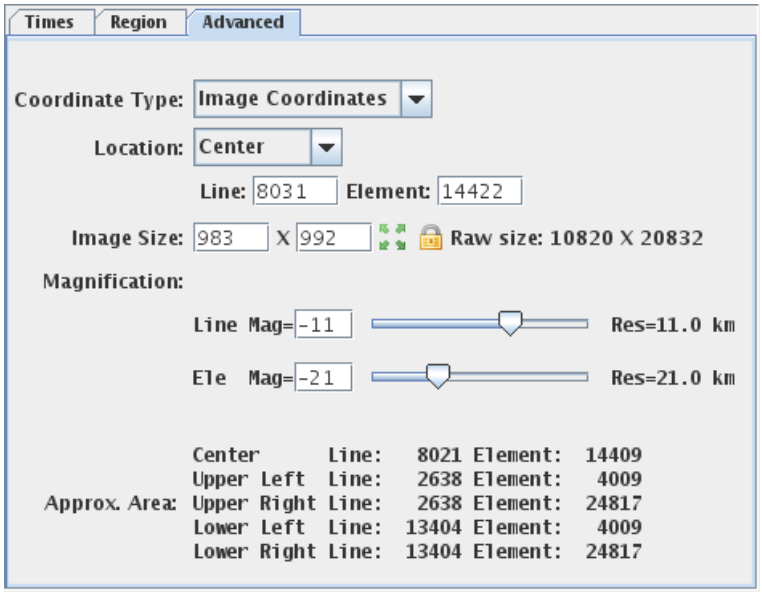
Creating a Loop of Polar Orbiting Satellite Images from a Remote Server

When creating loops of polar orbiting satellite images, it is recommended that the **Auto-set Projection** option be turned off, and a global projection be used in the map display to ensure all images can be viewed. For this example, turn the **Auto-set Projection** option off by going to the Main Display window and selecting **Projections->Auto-set Projection**. Under the same menu, change your projection to **Projections->Predefined->World**. These options can also be used for displaying single images of polar orbiting satellite data. If you have access to an ADDE server with Aqua or Terra granules, you can use the following steps to display the data:

1. Return to the **Data Sources** tab of the Data Explorer.
2. Select a different **Image Type** to use (in the example below, Aqua 500 meter resolution Calibrated Radiances).

3. Choose a set of either the 10 most recent relative times, or a set of 10 absolute times.
4. When done, load the selected images into the **Field Selector** with the  button.

5. In the **Fields** panel, select the calibration that you wish to view.
6. In the **Advanced** tab, change the Coordinate Type to Image Coordinates. There is currently no method of determining the latitude and longitude boundaries of multiple polar orbiting images. Using the Image Coordinates option ensures the images will be displayed.



7. When done, load the selected images with the button.

Accessing Additional Tutorials

For more help with displaying satellite data, please see the Satellite Imagery tutorial on the McIDAS-V Documentation webpage.

Displaying Hyperspectral Satellite Imagery Using HYDRA

This section describes how to create multispectral displays using HYDRA. The set of steps include:

- Creating the Multispectral Display
- Using the Multispectral Display
- Accessing Additional Tutorials

Creating the Multispectral Display

In the Data Explorer window, select the **Data Sources** tab. On the left side of this tab, select **Satellite->HYDRA** from the list of available choosers. For more information about the HYDRA chooser, see Choosing Hyperspectral Data.

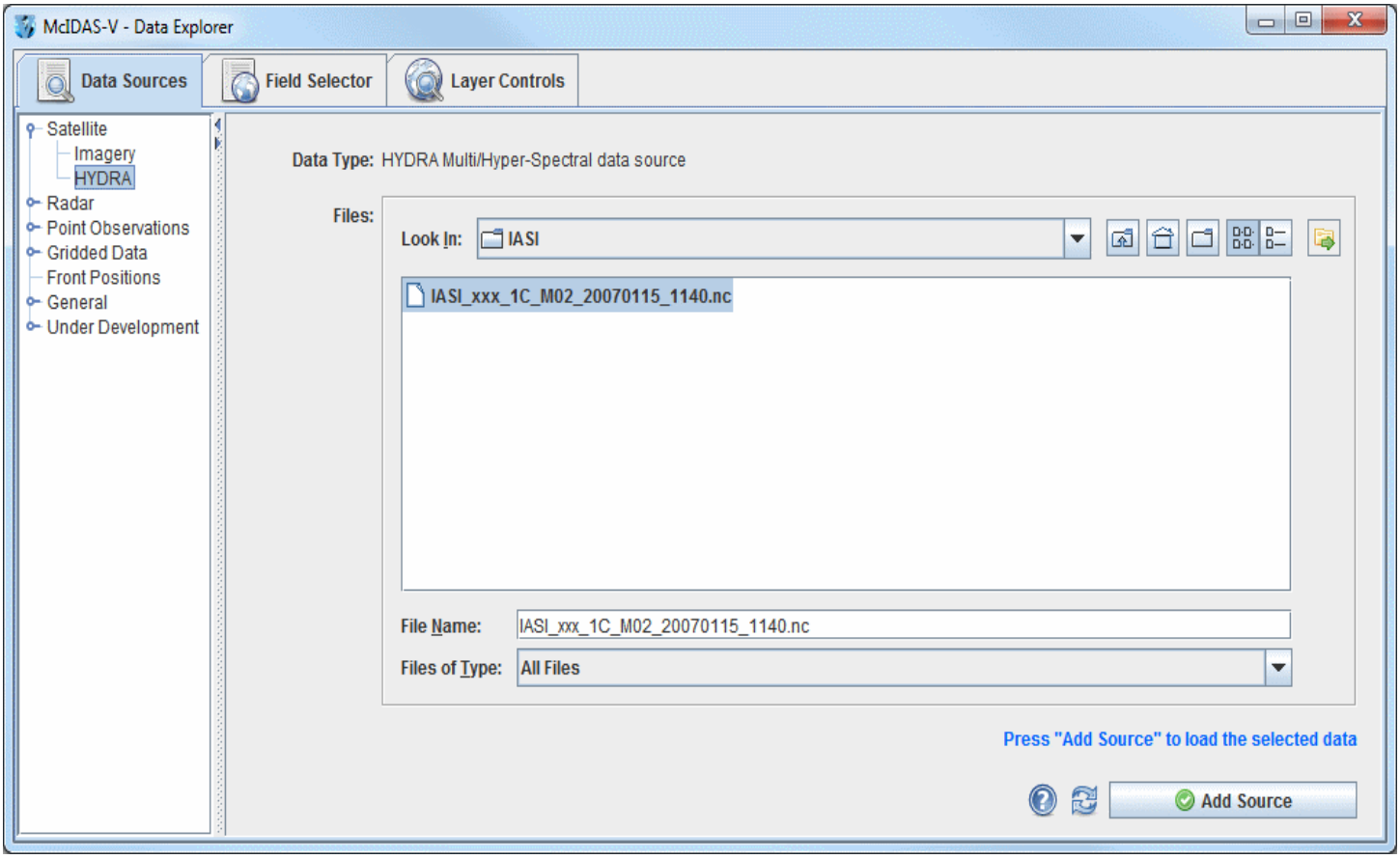


Image 1: Data Sources Tab of the Data Explorer

The HYDRA chooser is fairly similar to the File Chooser. As a demonstration, download the IASI image from January 15, 2007 located at: ftp://ftp.ssec.wisc.edu/pub/mug/mcidas-v/training/data/IASI_xxx_1C_M02_20070115_1140.nc. Navigate to the directory the file is in and press Add Source.

In the **Field Selector** tab of the Data Explorer, select **Imagery->Multispectral Display**, and click the Create Display button.

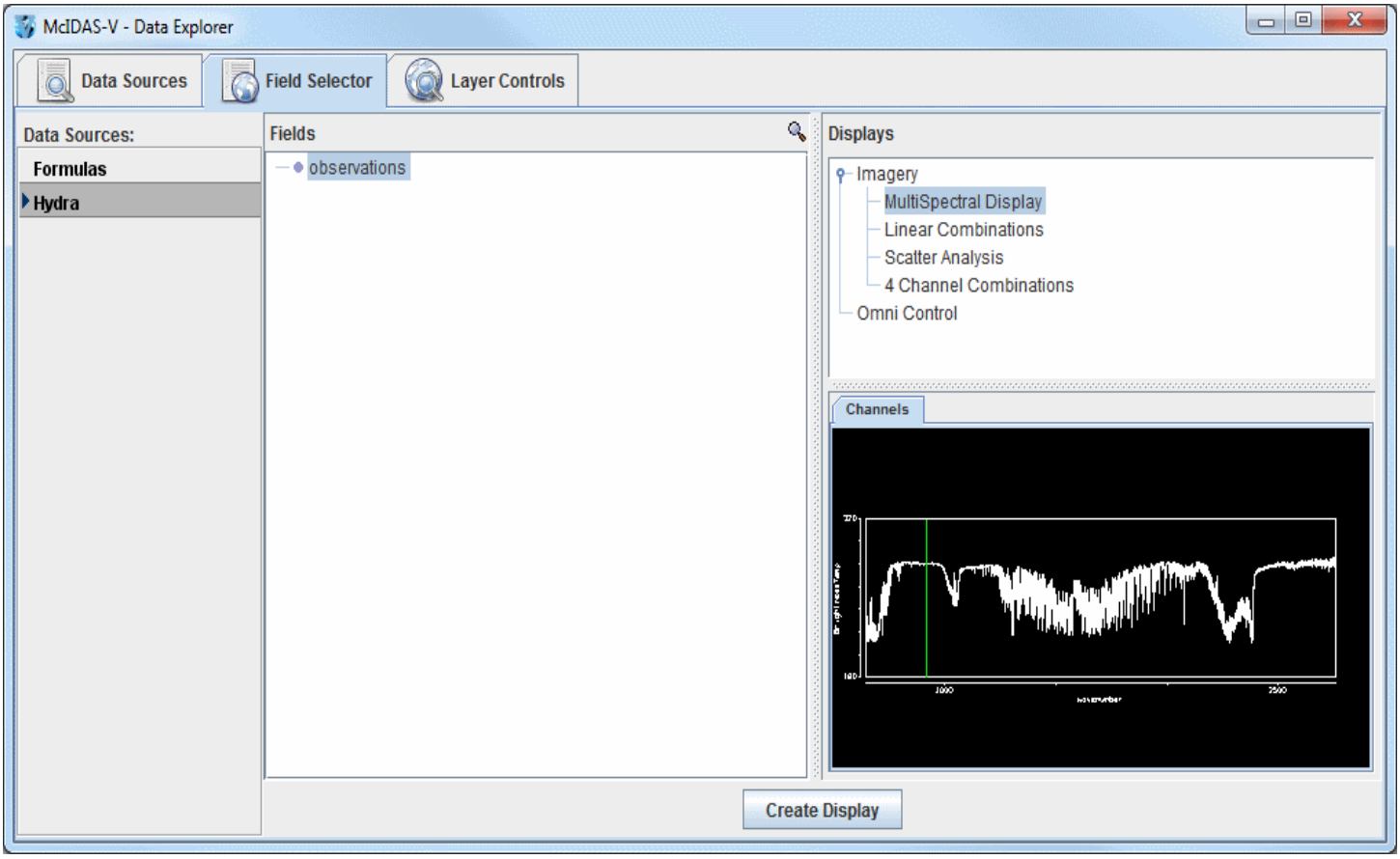


Image 2: Field Selector Tab of the Data Explorer

There are four aspects to the multispectral display. The first is the image in the Main Display window. The image will be over Northern Africa and the Mediterranean Sea. The second aspect is the Spectra. The Spectra is displayed in the **Layer Controls** tab under "MultiSpectral". The spectra displayed by default is the 919.50 cm^{-1} spectral region (10.8 μm). The final two aspects are the two spectrum probes. In the Main Display window, there are two colored square boxes that represent the main probe (magenta) and the reference probe (light blue). These two probes are listed under "Readout" under "No Display" in the **Layer Controls** tab of the Data Explorer. Left click and drag either probe to view the spectra measured in various pixels around the image, or use one as a reference spectrum.

Using the Multispectral Display

Change the wavenumber being displayed to 852.25 cm^{-1} by entering in the value into the **Wavenumber:** box in the Multispectral Display and hitting Enter. Move the magenta and light blue spectra probes to the approximate locations in the image below to locate an inversion at the location of the red box over Albania.

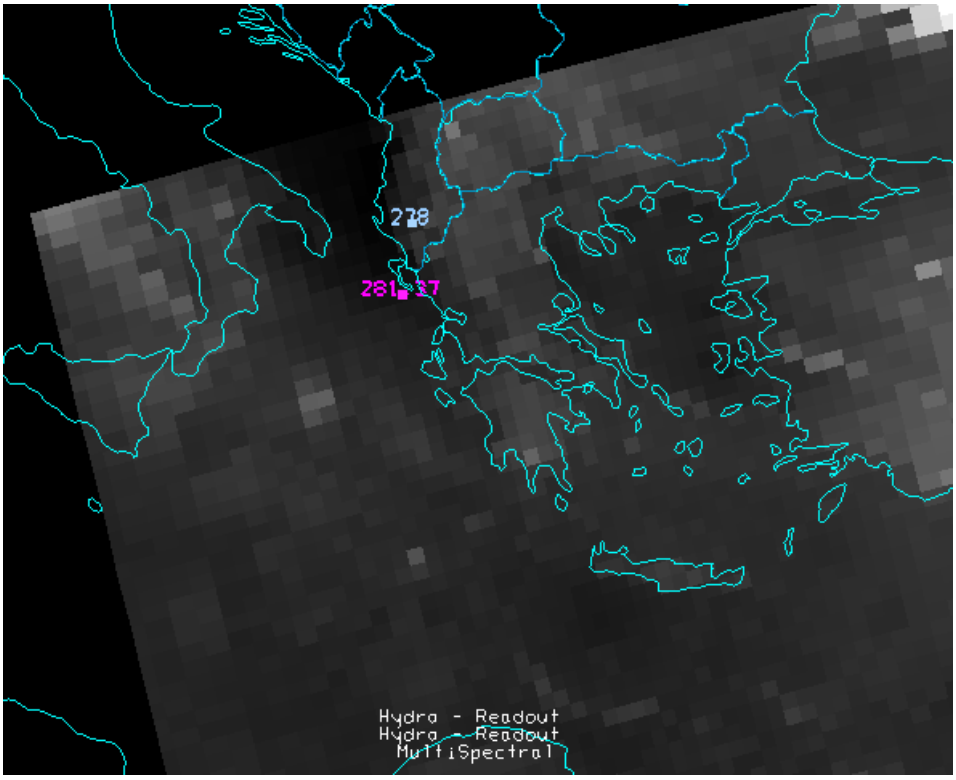


Image 3: HYDRA Data Displayed in the Main Display Window

Once the two probes are in the approximate locations, the MultiSpectral window should look similar to the image below.

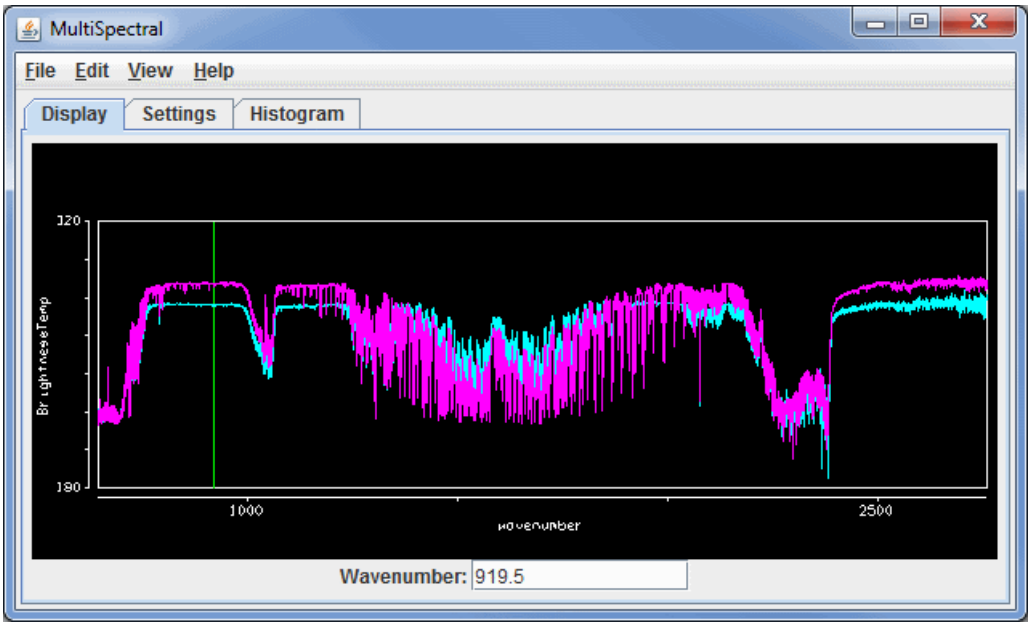


Image 4: HYDRA Data Displayed in the MultiSpectral Window

Zoom in over the 852.25 cm^{-1} region using the Ctrl+left click+drag combination to create a box of the region to zoom in on. If you miss the region, or want to return to the full spectra, use Shift+left click. The inversion should become clear as you zoom in, as shown in the image below.

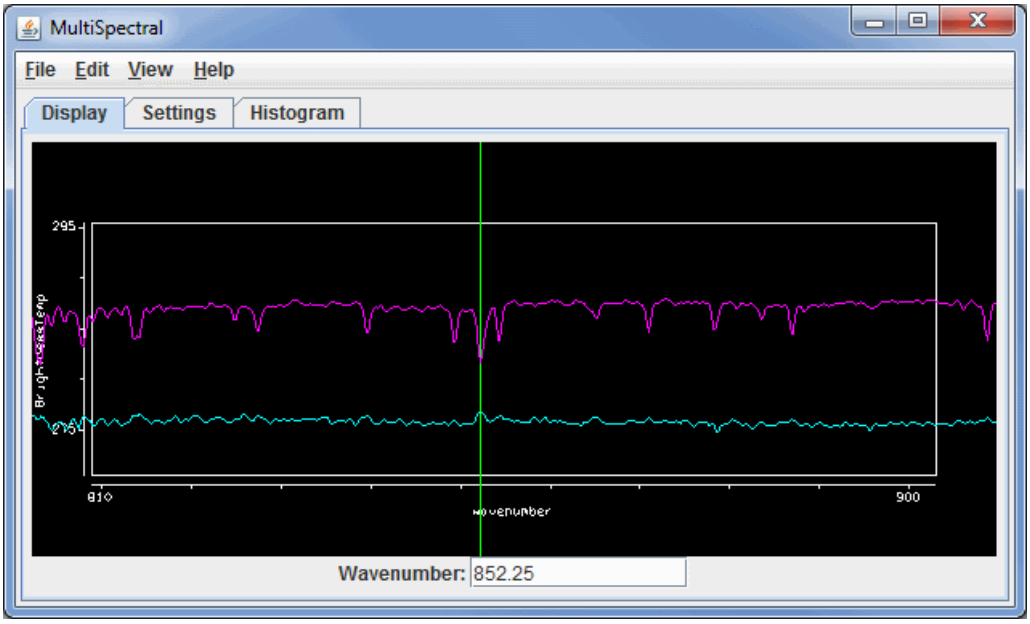


Image 5: HYDRA Data Displayed in the MultiSpectral Window

Accessing Additional Tutorials

For more help with displaying hyperspectral satellite imagery using HYDRA data, please see the Hyperspectral Data tutorial on the McIDAS-V Documentation webpage.

Displaying Level II Radar Imagery

This section describes how to make displays using NWS WSR-88D Level II data. The steps include:

- Accessing WSR-88D Level II Radar Data
- Choosing Level II Radar Data
- Making Level II Radar Displays
- Creating 2D Displays of Individual Sweeps
- Creating 3D Displays of Individual Sweeps
- Displaying Pseudo-RHI Displays in 2D and 3D
- Displaying All Sweeps in 3D
- Radar Isosurfaces in 3D
- Choosing Local Level II Radar Data
- Accessing Additional Tutorials

Accessing WSR-88D Level II Radar Data

The Level II data is supplied as volume-scan files, each file having all data from WSR-88D radar for all sweeps for one "time". Archived Level II data is available from the National Climatic Data Center (NCDC) (data from NCDC must be un-tarred).

The files should be stored on your local file system with each station's files in a directory whose name is the 4-character ID (e.g., KTLX for Oklahoma City). In many cases, the data files do not have any location information in them and McIDAS-V uses the directory name as a first guess at the station location.

Choosing Level II Radar Data

In the **Data Sources** tab of the Data Explorer, select **Radar->Level II->Remote** to view the Level II radar chooser. The **Radar->Level II->Local** chooser allows you to choose Level II data from your file system. For more information about the Level II radar chooser, see Choosing NEXRAD Level II Radar Data.

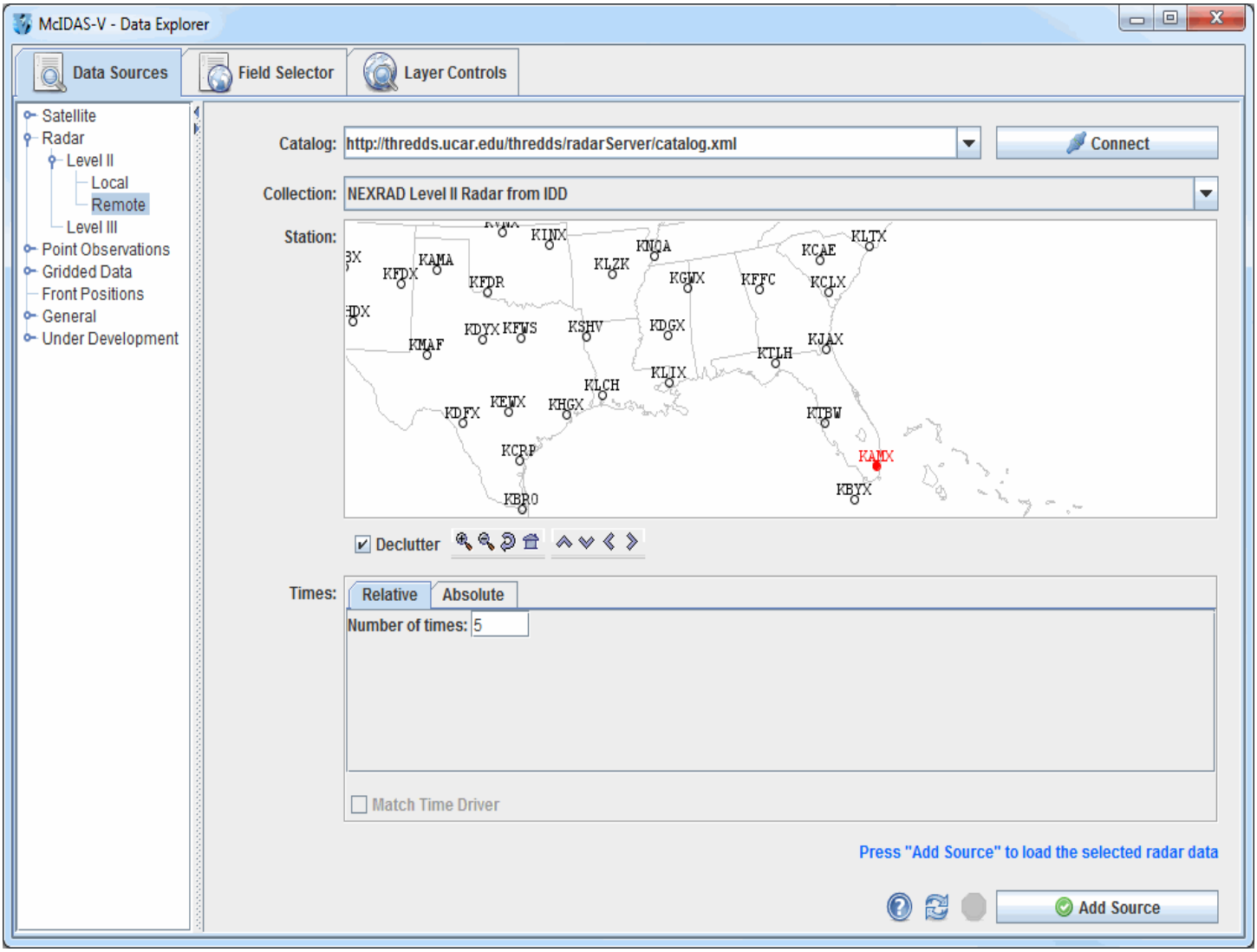


Image 1: Data Sources Tab of the Data Explorer

Select a station and a relative or absolute set of times. When done, click the Add Source button.

Making Level II Radar Displays

The data source is shown in the **Field Selector** tab of the Data Explorer. Level II data has three moments or data types: Reflectivity, RadialVelocity, and SpectrumWidth. McIDAS-V has several display types for Level II data, and any of the moments can be shown with any of the displays. Selecting "Reflectivity" in the **Fields** panel will show the list of available displays in the **Displays** panel.

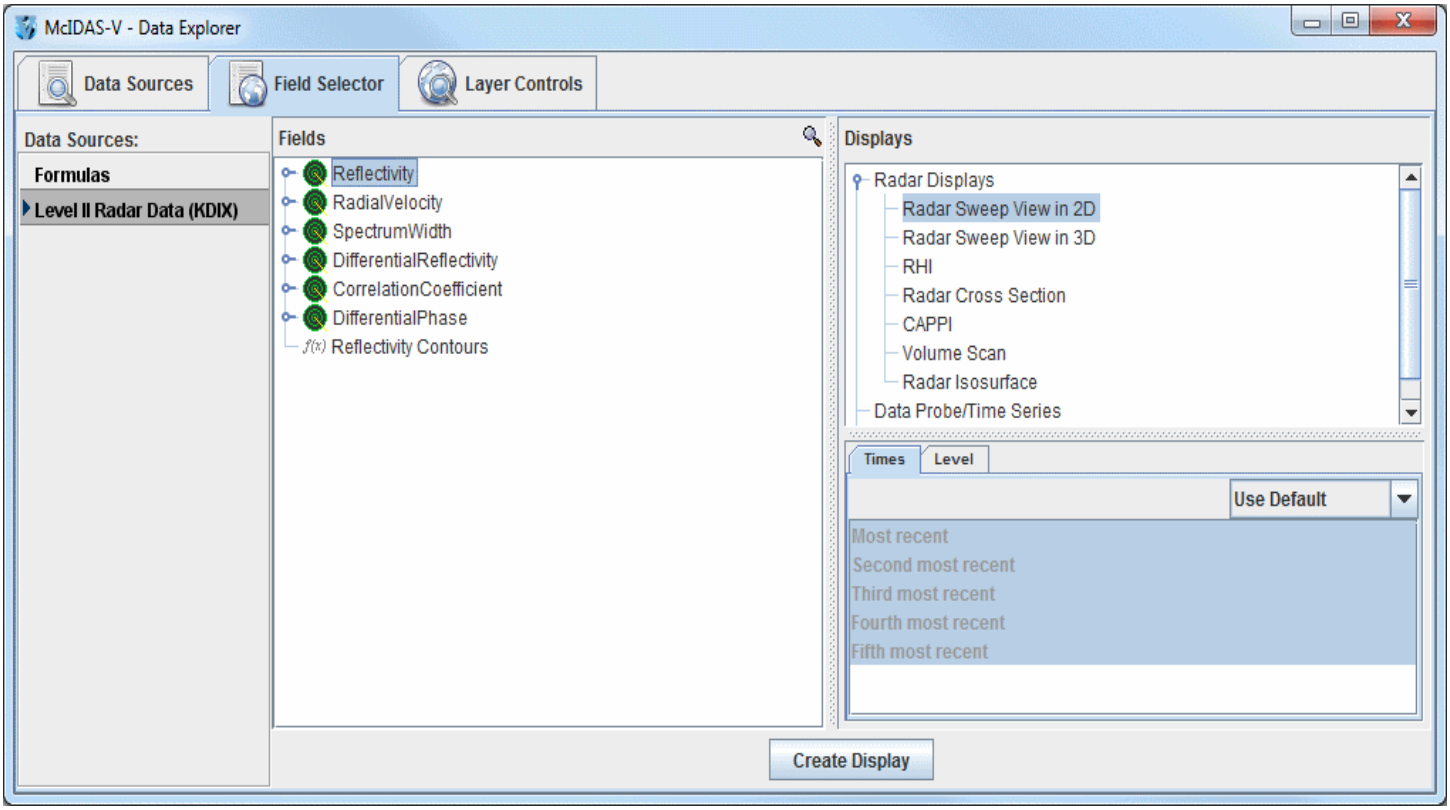


Image 2: Field Selector Tab of the Data Explorer

Creating 2D Displays of Individual Sweeps

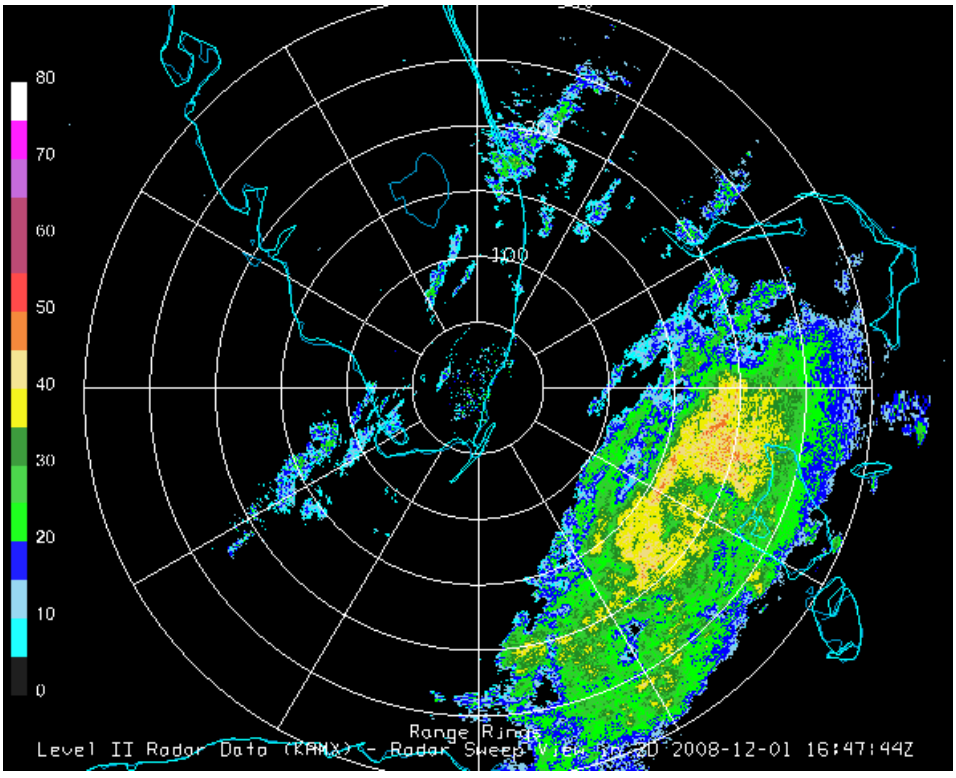


Image 3: Level II 2D Radar Displayed in the Main Display Window

Select the **Radar Sweep View in 2D** under **Radar Displays** in the **Displays** panel and click Create Display. Radar Sweep View in 2D plots the data as a colored image on the base of the 3D display area.

The Radar Sweep Controls allow you to change which sweep elevation you want to use. You can add range rings with the **Displays->Add Range Rings** menu item.

Creating 3D Displays of Individual Sweeps

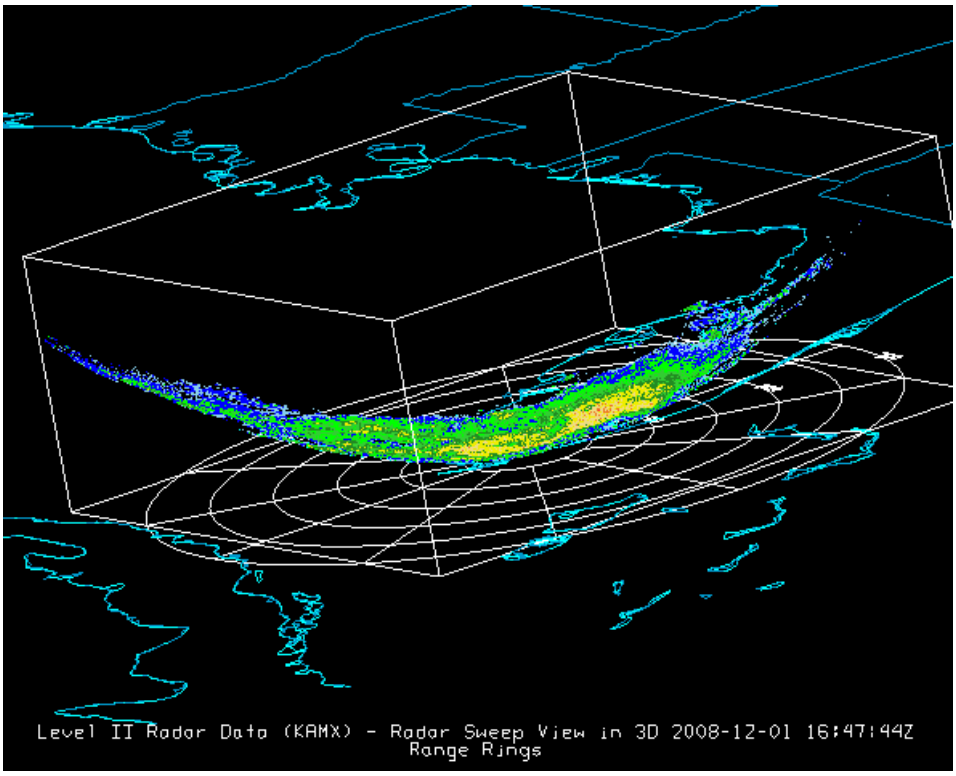


Image 4: Level II 3D Radar Displayed in the Main Display Window

Select the **Radar Sweep View in 3D** entry under **Radar Displays** in the **Displays** panel. The Radar Sweep View in 3D display plots the data as a colored image, with the data plotted in 3D space at the elevation where the sweep occurred. You can rotate the display to see its 3D nature.

Since the Earth is projected onto a flat surface in this display, the sweep has a shape very close to a rotated parabola. The Elevation Angles menu in the **Layer Controls** tab allows you to change which sweep elevation to display.

Displaying Pseudo-RHI Displays in 2D and 3D

Select **RHI** (**R**ange-**H**eight **I**ndicator) under **Radar Displays** in the **Displays** panel and press **Create Display**. The RHI display plots the data as a colored vertical cross section at the true elevations of the beams in 3D space (Image 5). This pseudo-RHI is constructed from several horizontal sweeps of the radar. It may be necessary to rotate the display to see the RHI in 3D.

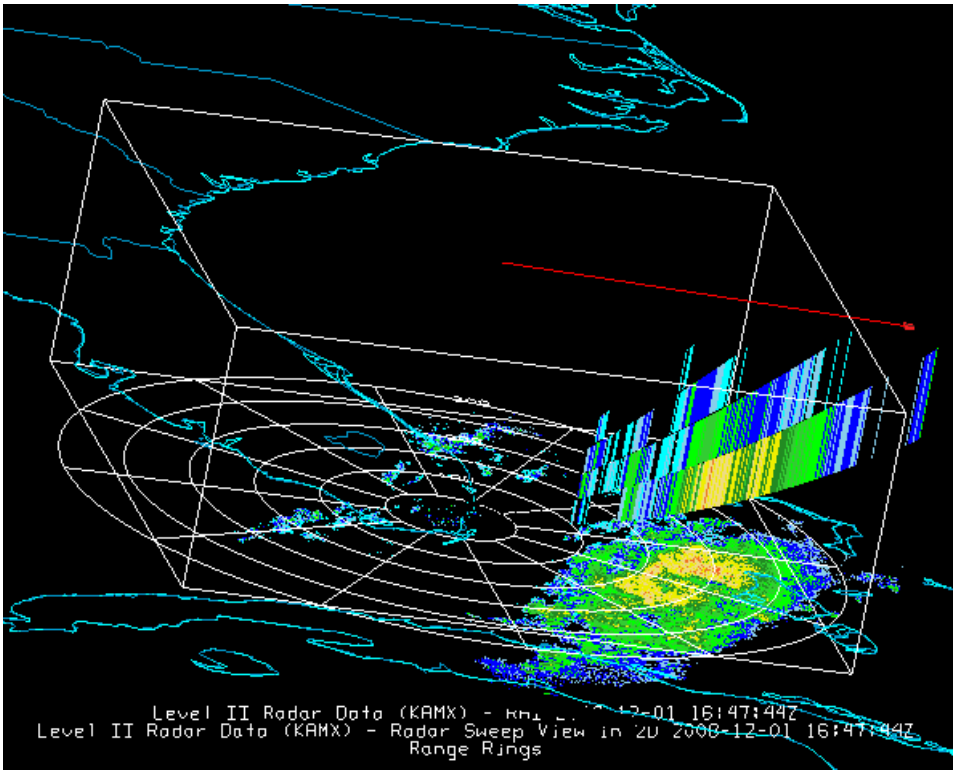


Image 5: Level II Pseudo-RHI Radar Displayed in the Main Display Window

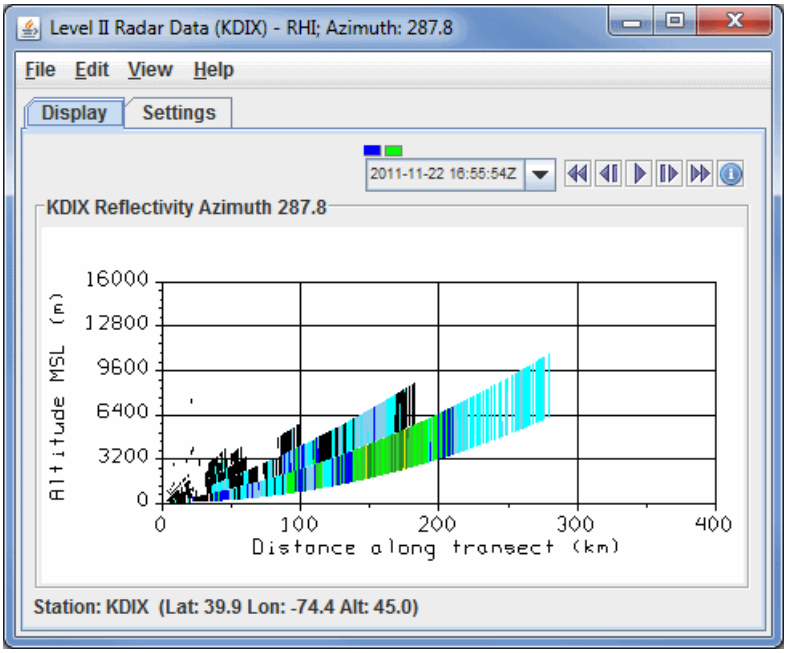


Image 6: Level II Pseudo-RHI Radar Displayed in the Layer Controls Tab

The beam width is indicated by the vertical extent of each colored vertical stripe, corresponding to a bin beam bin sample. The position of the RHI in azimuth can be adjusted by dragging the little box on the end of the selector line above the RHI.

A 2D plot of pseudo-RHI (Image 6), is shown in the **Display** tab of the **Layer Controls** tab. The RHI displays have an auto-rotate feature and a Time Animation Widget.

Displaying All Sweeps in 3D

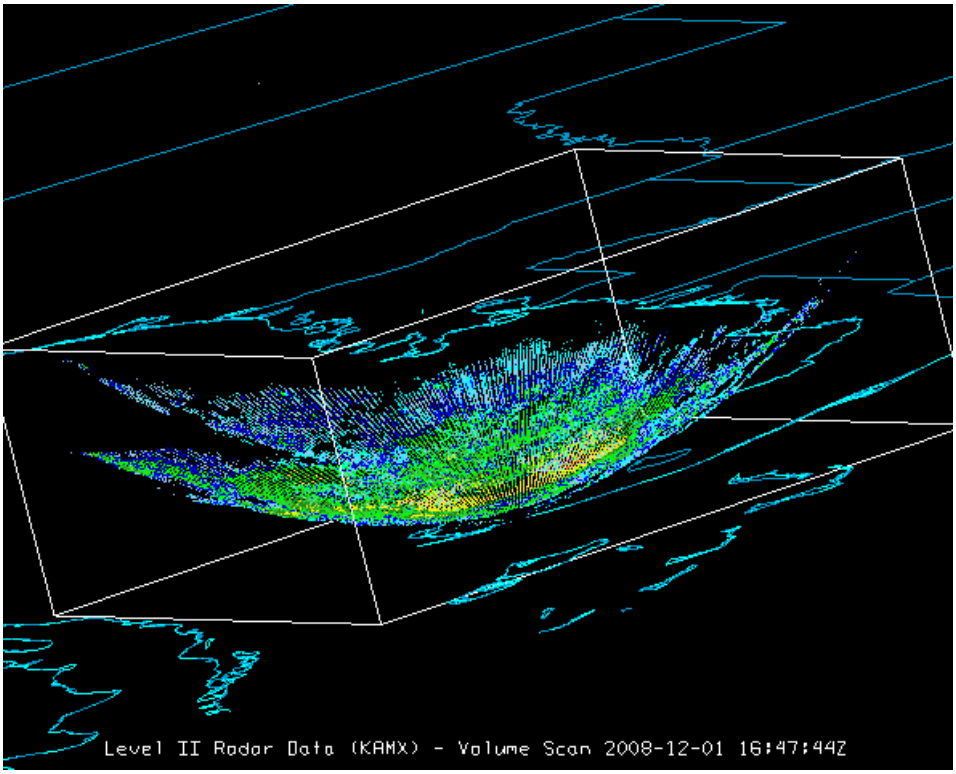


Image 7: Level II Radar Volume Scan in the Main Display Window

Select **Volume Scan** (all sweeps) in the **Displays** panel in the **Field Selector**. Volume Scan (all sweeps) plots the data as 3D field of points colored by value. Each point is a bin value; all sweeps and bins are shown.

Radar Isosurfaces in 3D

Select **Radar Isosurface** under **Radar Displays** in the **Displays** panel in the **Field Selector** tab. An isosurface is a 3D analog of a contour line which shows the location of all data with a single data value. Interpolation is used between sweep altitudes in the isosurface plot of Level II data, and all data in a volume scan is used.

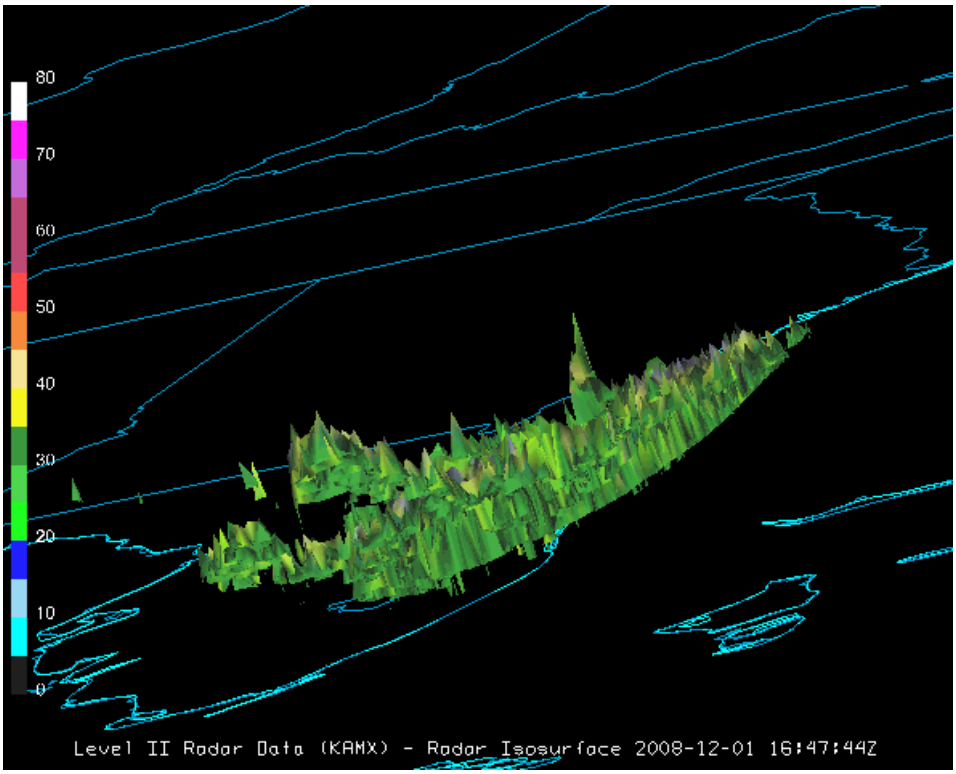


Image 8: Level II Radar Isosurface Displayed in the Main Display Window

Choosing Local Level II Radar Data

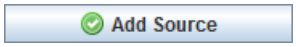
To select Level II data from the **Radar Imagery->Level II->Local** file chooser:

1. Navigate to the desired directory. This chooser works like the Files chooser.

2. Select one or more Level II data files. Use Ctrl+click or Shift+click to select multiple files. Each file represents a full volume scan at a particular time.

3. Alternatively, use the **Use Relative Times** button to select the latest **N** files in the directory. You can optionally use the **File Pattern** field to specify the pattern for files to look for.

4. Provide a radar station name. For some Level II data, McIDAS-V requires you to provide the radar location. McIDAS-V will try to guess at the location based on the directory name but you can specify the location using the **Radar Location** menu.

When done, load the selected radar data with the 

button. The local data source will be shown in the **Field Selector**.

Accessing Additional Tutorials

For more help with displaying Level II radar imagery, please see the Level II Radar Imagery tutorial on the McIDAS-V Documentation webpage.

Displaying Level III Radar Imagery

This section describes how to make displays using NWS WSR-88D Level III data.

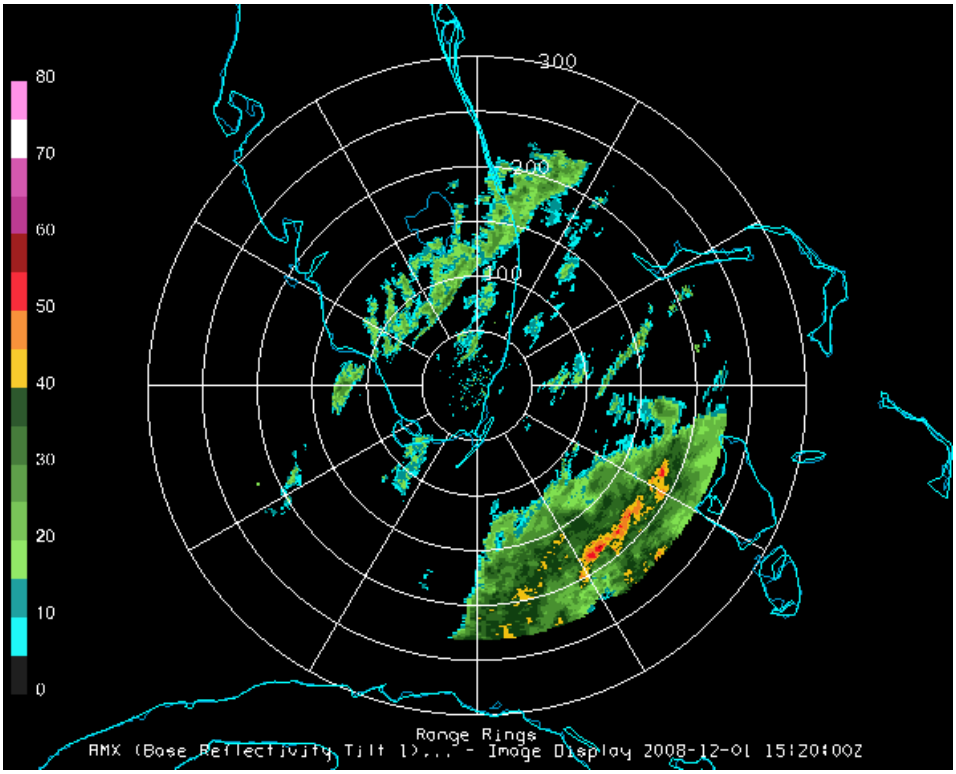


Image 1: Level III Radar Display Overlaid with Range Rings

The steps include:

- Choosing Radar Image Data from a Remote Server
- Creating the Radar Display

Choosing Radar Image Data from a Remote Server

In the Data Explorer window, select the **Data Sources** tab. On the left side of this tab, select **Radar->Level III** from the list of available choosers. For more information about the Level III radar chooser, see Choosing NEXRAD Level III Radar Data.

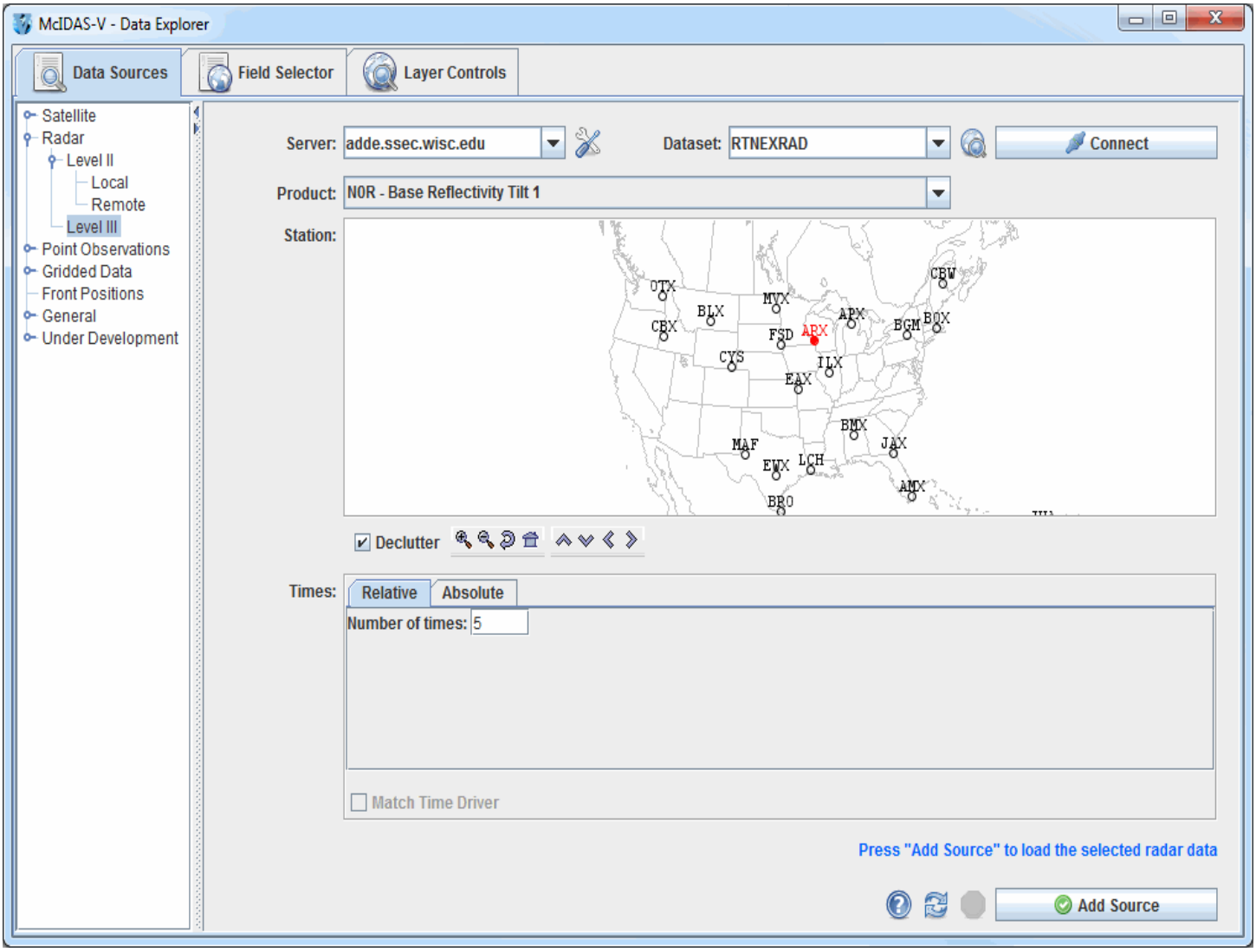
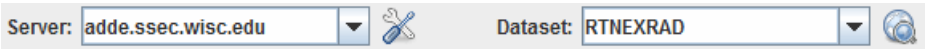


Image 2: Data Sources Tab of the Data Explorer

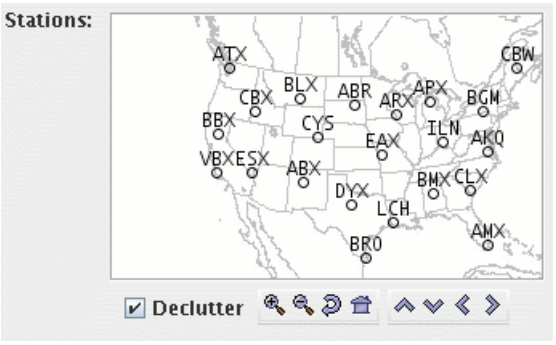
1. Choose the ADDE Server: **adde.ssec.wisc.edu** and the Dataset: **RTNEXRAD**.



2. Press **Connect** to query the server for available radars types:

3. Select a radar product, such as **N0R - Base Reflectivity Tilt 1**, from the pull-down menu.

4. The map shows the available radar station locations and IDs. Select one by clicking on it.

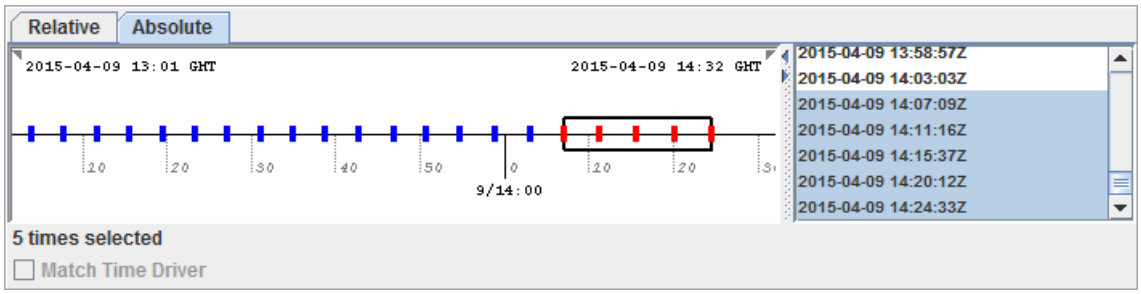


The **Declutter** checkbox allows you to show all stations (not checked), or only a limited number of stations that do not overlap each

other (checked). You will need to zoom in to see all the stations without overlaps.

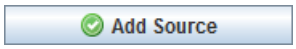
5. You can choose a relative set of times steps (e.g., Last 5 times) or absolute times (see step 6):

6. You can choose a set of absolute times:



When choosing absolute times for the first time McIDAS-V needs to query the ADDE server for the times. This may take some time. To select more than one time use Control+click or Shift+click.

7. When done, load the selected radar data with the **Add Source** button.



Creating the Radar Display

The radar data source that you selected will be shown in the **Field Selector** tab of the Data Explorer.

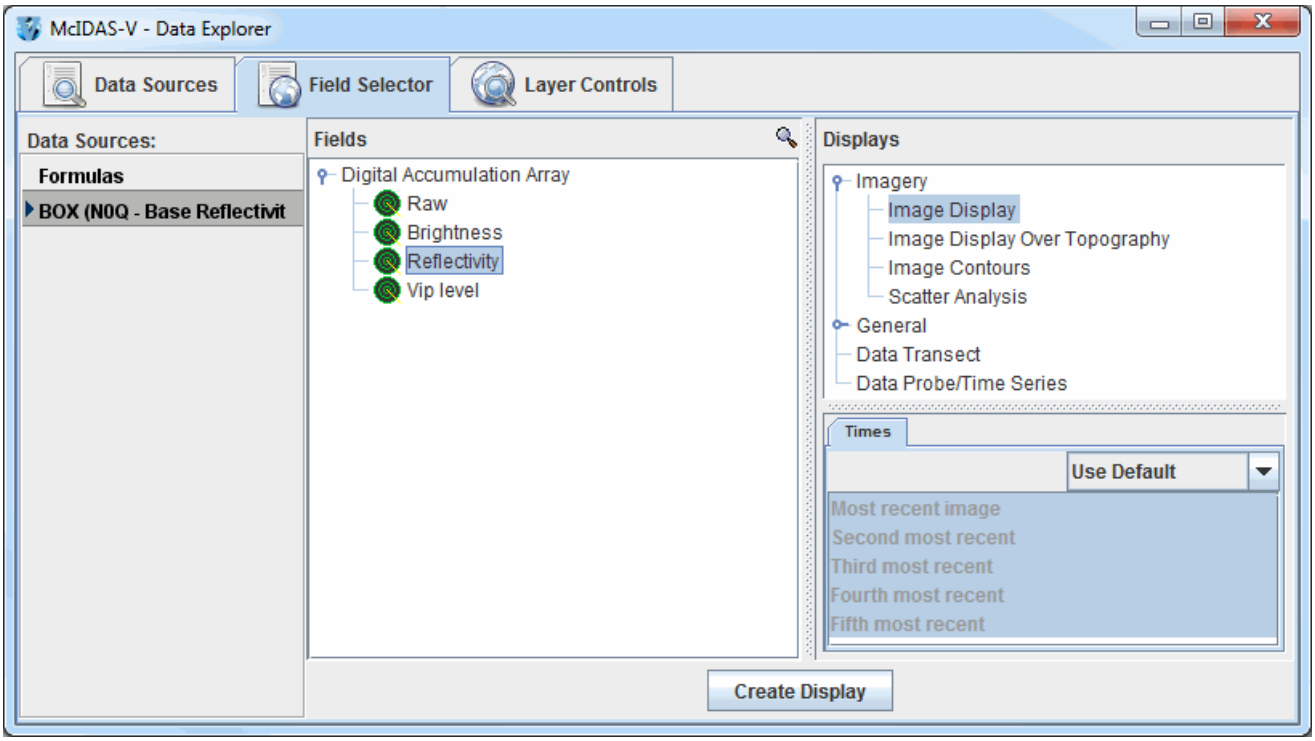


Image 3: Field Selector Tab of the Data Explorer

Open up the Digital Accumulation Array tab under the **Fields** panel ( ) to select a data type. Select "Image display" in the **Displays** panel under **Imagery**, and make the display by clicking the Create Display button.

You can add Range Rings with the **Display->Add Range Rings** menu item. To control the looping of the images in the Main Display window, use the Time Animation Widget.

Displaying Surface and Upper Air Point Data

This section describes how to make layout model plots and contour displays using surface and upper air data. It also explains how to create and edit layout models.

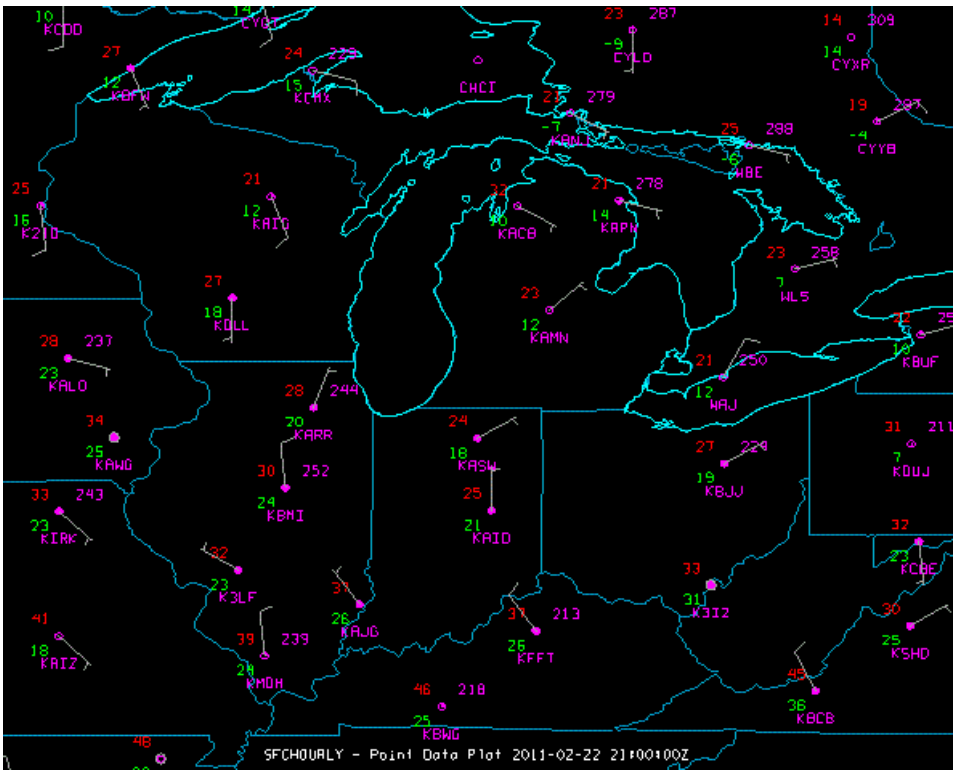


Image 1: Layout Model Plot in the Main Display Window

The steps include:

- Selecting Surface Observations from a Remote Server
- Creating the Plot Display
- Creating the Contour Display
- Accessing Additional Tutorials

Selecting Surface Observations from a Remote Server

In the Data Explorer window, select the **Data Sources** tab. On the left side of this tab, select **Point Observations->Plot/Contour** from the list of available choosers. For more information about the Point Observations Plot/Contour chooser, see Choosing Point Data.

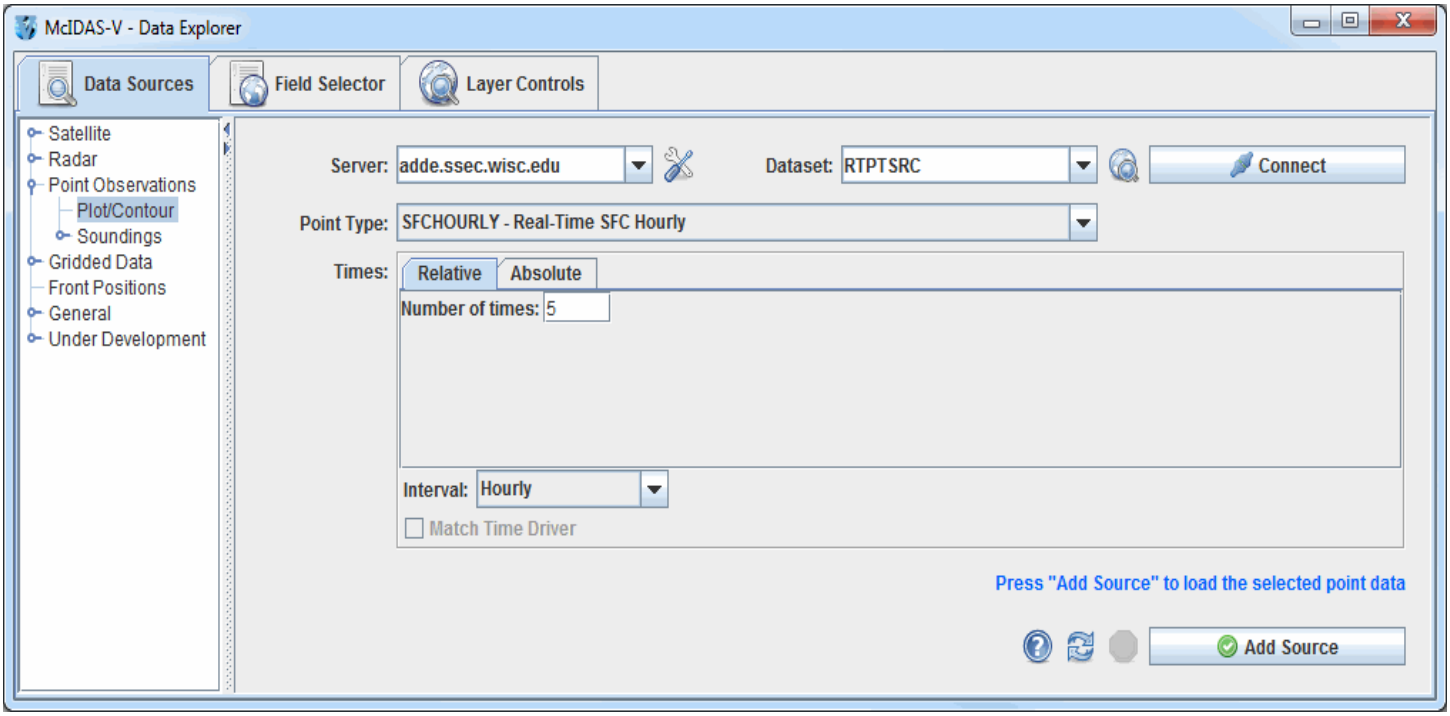
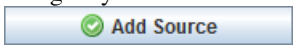


Image 2: Data Sources Tab of the Data Explorer

In the **Server:** and **Dataset:** entry boxes, use the pulldown lists to select a local or remote server and a dataset with METAR data, such as **adde.ssec.wisc.edu** and **RTPTSRC**. You can also type a different server name into the entry box. Click

to find data on the remote server. In the **Point Type:** selection box choose "Real-Time SFC Hourly", or the equivalent depending on your data source. You can choose either the latest **N** times using the **Relative** tab or select specific times using the **Absolute** tab. Click 

when you have made your selection. Only data from the current date will be retrieved from the server.

Creating the Plot Display

The surface observation data will be shown in the **Field Selector** tab of the Data Explorer.

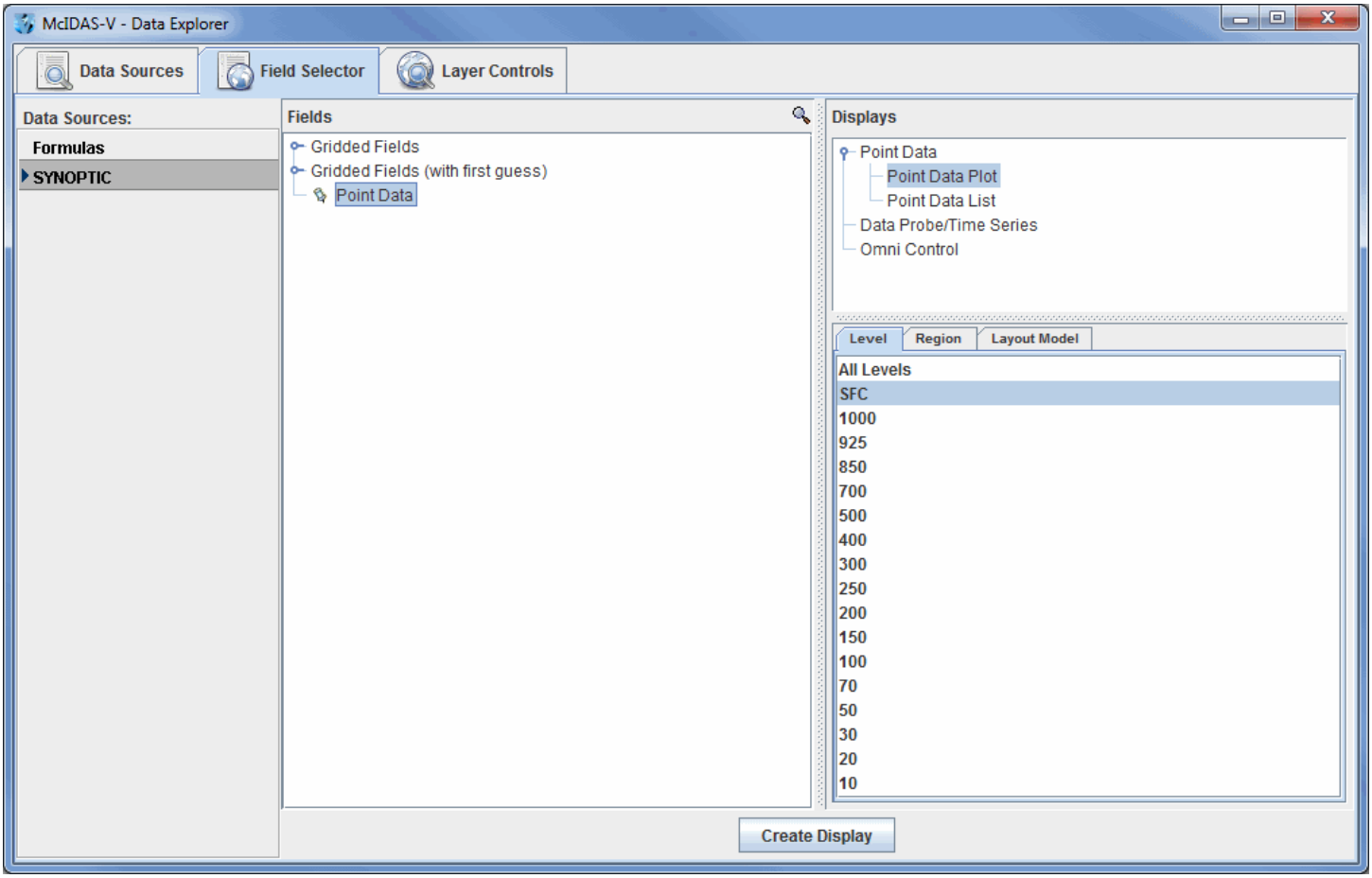


Image 3: Field Selector Tab of the Data Explorer

Select "Point Data" in the **Fields** panel and "Point Data Plot" under **Point Data** in the **Displays** panel. Make the display by clicking on the **Create Display** button at the bottom of the **Field Selector** tab.

To declutter the display, use the Point Data Plot Controls in the **Layer Controls** tab.

Upper air plots can be created the same way. In the **Data Sources** tab of the Data Explorer, select a **Point Type:** of "Real-Time Upper Air (Mandatory)," change the **Interval** to "12 hourly," and add the source. In the **Field Selector**, select a level of 500mb in the **Level** panel and click Create Display to plot your data in the Main Display window.

Creating the Contour Display

The Gridded Fields tree allows you to use the Barnes analysis to create gridded fields of specific point observation parameters.

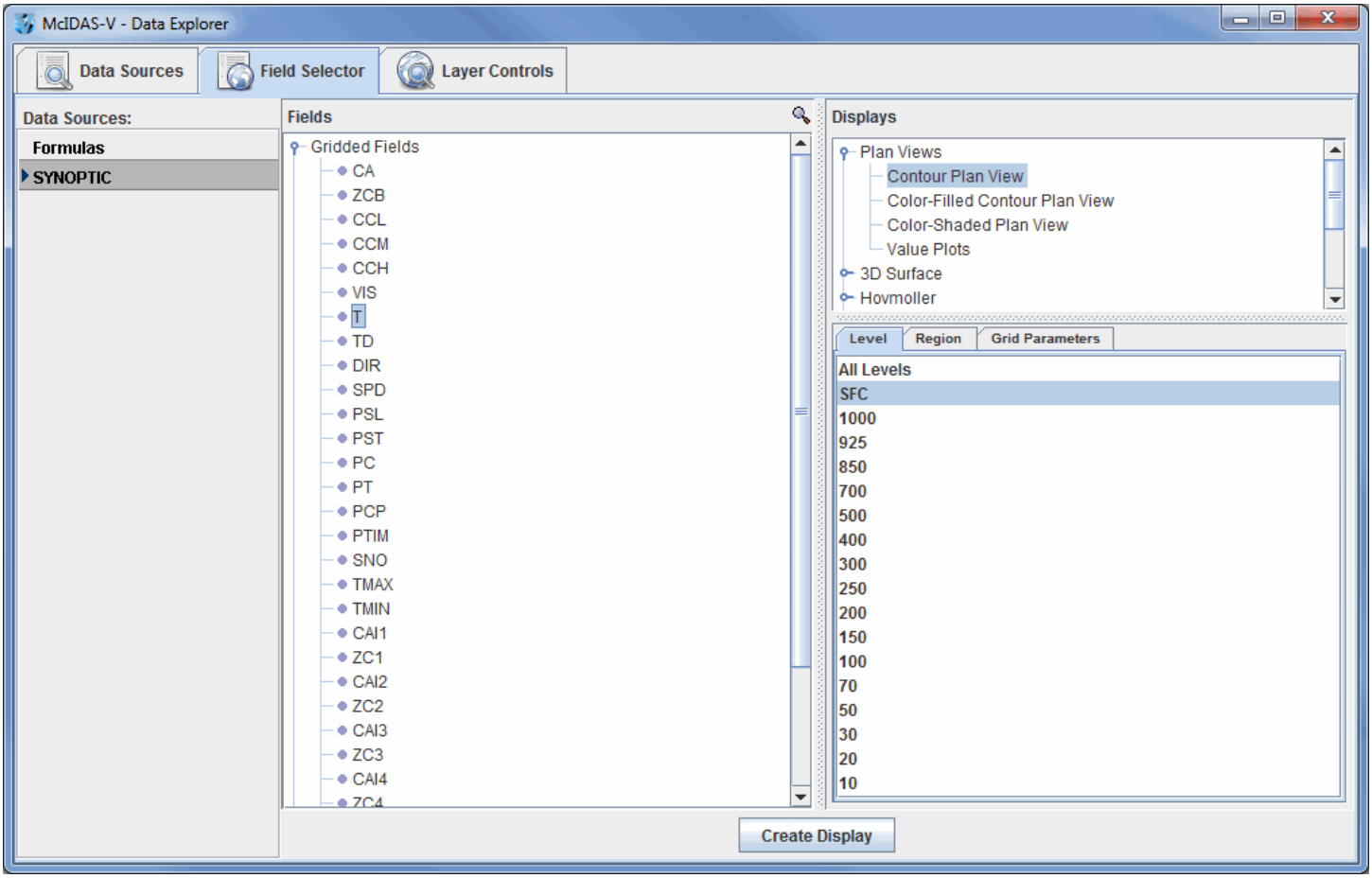


Image 4: Field Selector Tab of the Data Explorer

Select the **SYNOPTIC** (SFCHOURLY) dataset from the **Data Sources** panel of the **Field Selector**. In the **Fields** panel, open the Gridded Fields tree by clicking on the tab icon ( ) and select the temperature (T) parameter. In the **Displays** panel, select Contour Plan View, and create the display by clicking the Create Display button at the bottom of the **Field Selector** tab. You can create or edit your own layout models by using the Layout Model Editor. To access the editor, click on the double down arrow (») and select **Edit** under the **Layout Model:** section in the **Layer Controls** tab or select **Tools->Layout Model Editor** from the Main Display window.

Upper air gridded fields can be created the same way. In the **Field Selector**, select the **UPPERMAND** dataset, open the Gridded Fields tab, select a parameter and level, and create the display.

Accessing Additional Tutorials

For more help with displaying surface and upper air point data, please see the Point Observations tutorial on the McIDAS-V Documentation webpage.

Displaying RAOB Sounding Data

This section describes how to make Skew-T plots from RAOB data.

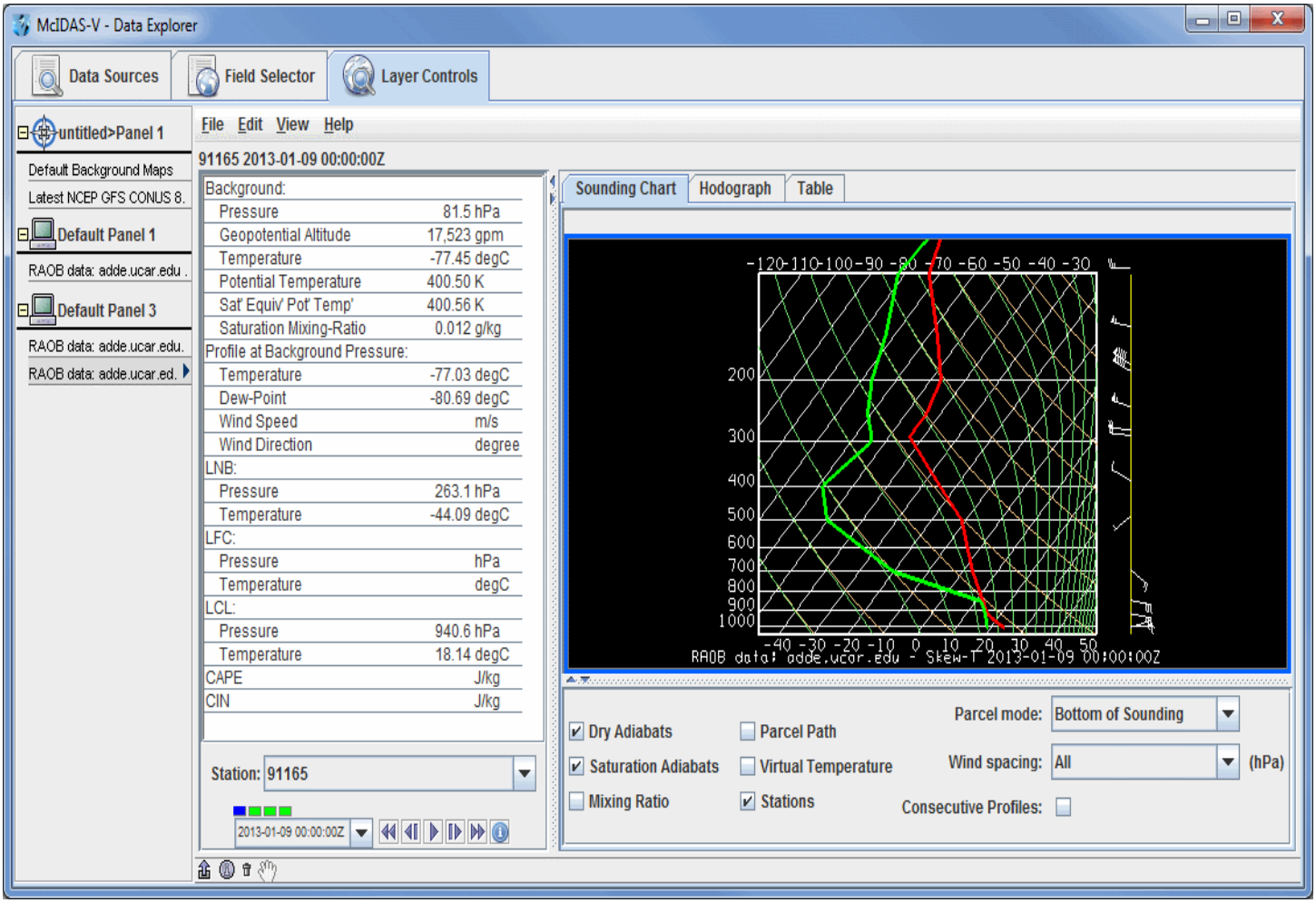


Image 1: Skew-T Display in the Layer Controls Tab of the Data Explorer

The set of steps include:

- Choosing RAOB Sounding Data from a Remote Server
- Creating the Sounding Display
- Accessing Additional Tutorials

Choosing RAOB Sounding Data from a Remote Server

In the Data Explorer window, select the **Data Sources** tab. On the left side of this tab, select **Point Observations->Soundings->Remote**. For more information about the soundings chooser, see Choosing Upper Air Sounding Data.

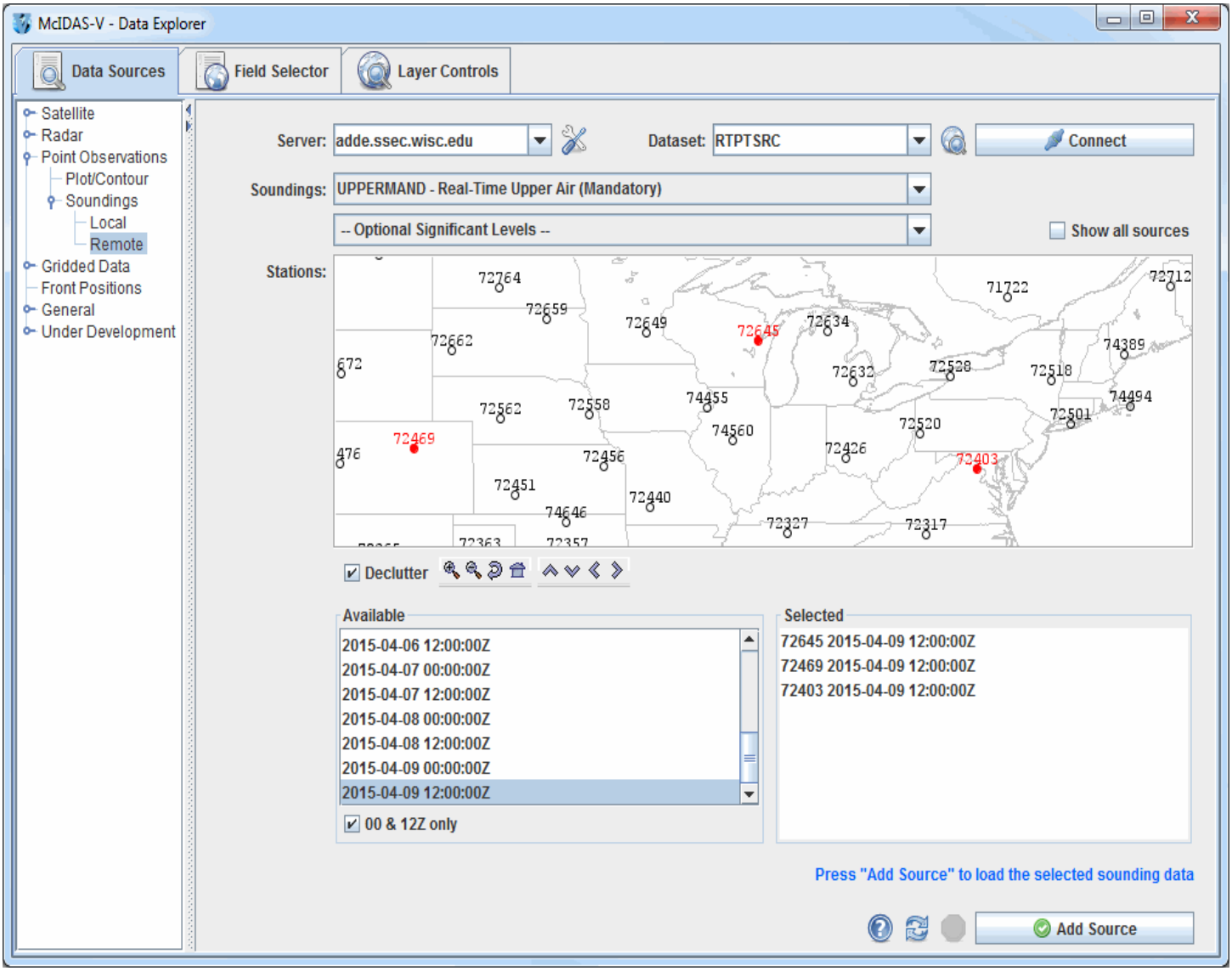


Image 2: Data Sources Tab of the Data Explorer

For the **Server** and **Dataset**, select **adde.ssec.wisc.edu** and **RTPTSRC** and click **Connect**. You must select **UPPERMAND** for real-time upper air mandatory data, and you have the option to also select **UPPERSIG** for real-time upper air significant data for the **Soundings** category. The stations that match your conditions will be displayed in the map. Select the station(s) you want to use. You can select one or more stations by clicking on them; hold down the Ctrl key to select more than one. When the **Declutter** checkbox is checked, only stations that do not overlap will be shown. When in declutter mode you can zoom in (by dragging the left mouse) to see more stations. The icons below the map allow you to navigate the map.

After you select your station(s), select the available time(s) you want to view in the **Available** box. The list of available soundings will be displayed in the **Selected** box. When you have made your selection click the button.

Creating the Sounding Display

The RAOB data will be shown in the **Field Selector** tab.

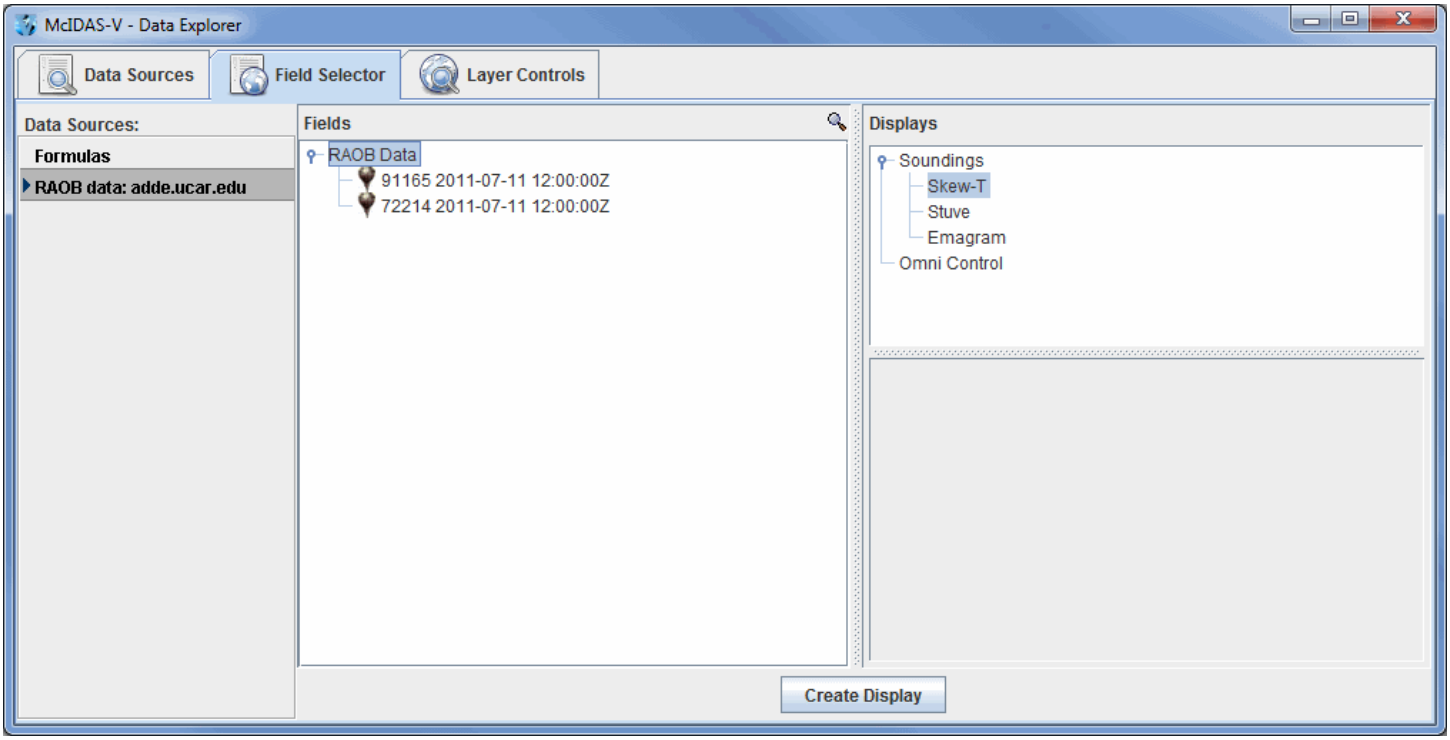


Image 3: Field Selector Tab of the Data Explorer

Select "RAOB data" in the **Fields** panel and "Skew-T" or one of the other sounding types in the **Displays** panel. All times will be loaded by selecting the **RAOB Data** field. You can select individual times to display at once by selecting individual times under **RAOB Data**. Make the sounding display by clicking on the Create Display button. The sounding will be displayed in the **Layer Controls** tab. For more information about the Skew-T and other aerological displays, see Sounding Display Controls.

Accessing Additional Tutorials

For more help with displaying RAOB sounding data, please see the Point Observations tutorial on the McIDAS-V Documentation webpage.

Displaying Gridded Data

This section describes how to make displays using gridded data sets. The steps include:

- Connecting to a Data Source on a Remote Server
- Creating a Plot of 2D Data
- Creating a Plot of 3D Data
- Subsetting Times
- Subsetting Spatially
- Accessing Additional Tutorials

Connecting to a Data Source on a Remote Server

In the Data Explorer window, select the **Data Sources** tab. On the left side of this tab, select **Gridded Data->Remote** from the list of available choosers. For more information about the catalog chooser, see Choosing Gridded Data.

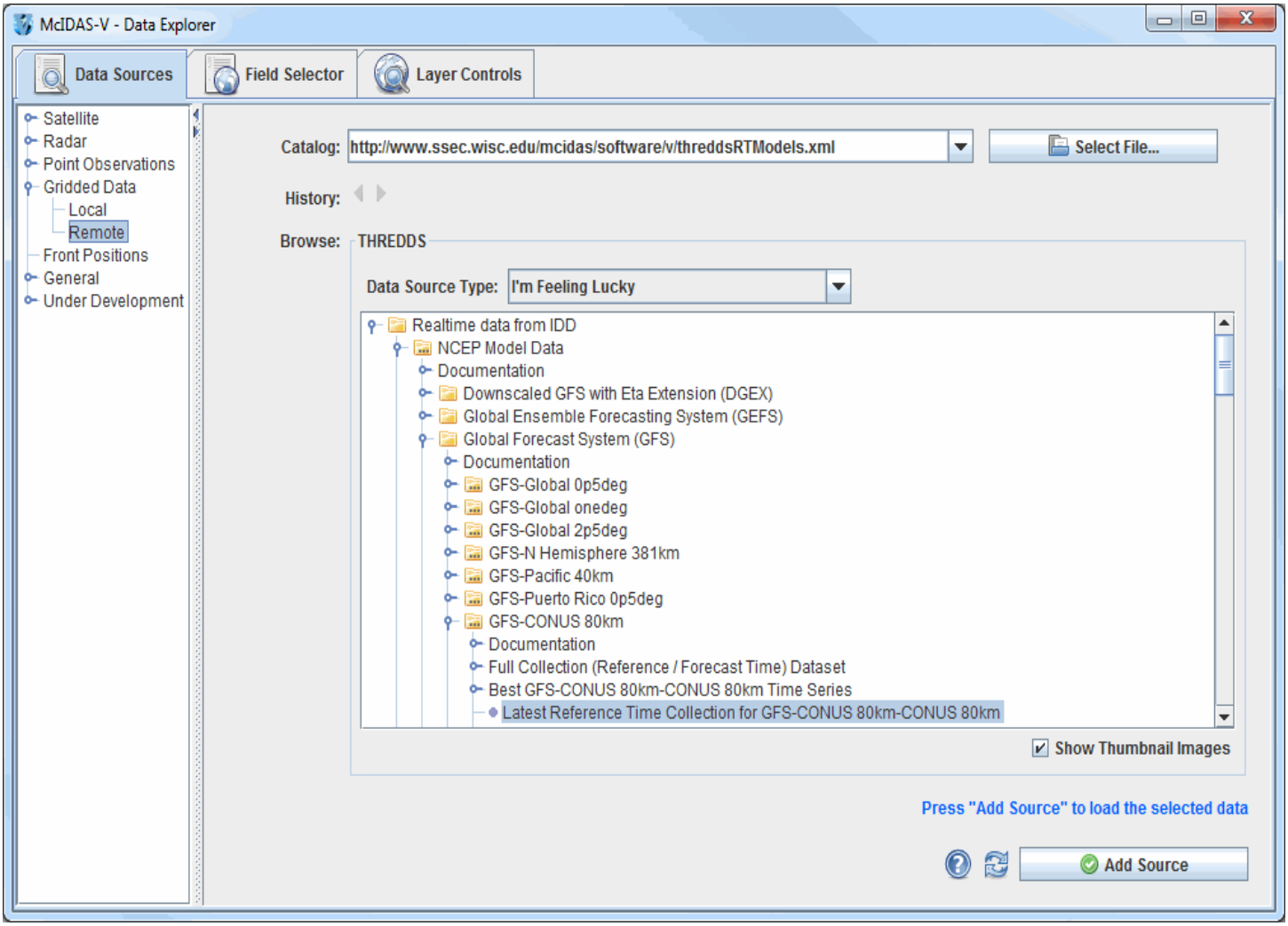


Image 1: Data Sources Tab of the Data Explorer

Choose one of the remote **Catalogs:** such as **http://www.ssec.wisc.edu/mcidas/software/v/threddsRTModels.xml** for Unidata's catalog of near real-time model output.

A tree view of the catalog will be displayed. Open one, such as the **NCEP Model Data->Global Forecast System (GFS)->GFS-CONUS 80km->Latest Reference Time Collection**, by using the tab icons ( ).

The list of this model's run times appears. Click on one time to select it, and then click the Add Source button. You have selected this model run's output to be accessible by McIDAS-V.

Creating a Plot of 2D Data

The gridded data source that you selected will be shown in the **Field Selector** tab of the Data Explorer. The **Field Selector** tab contains folders of data categorized as 2D and 3D fields. Click on the 2D grid tab ( ) to expand that category list. A list of all 2D grid parameters in the data source appears. When one of the fields is selected, the list of applicable display types will be added to the **Displays** panel.

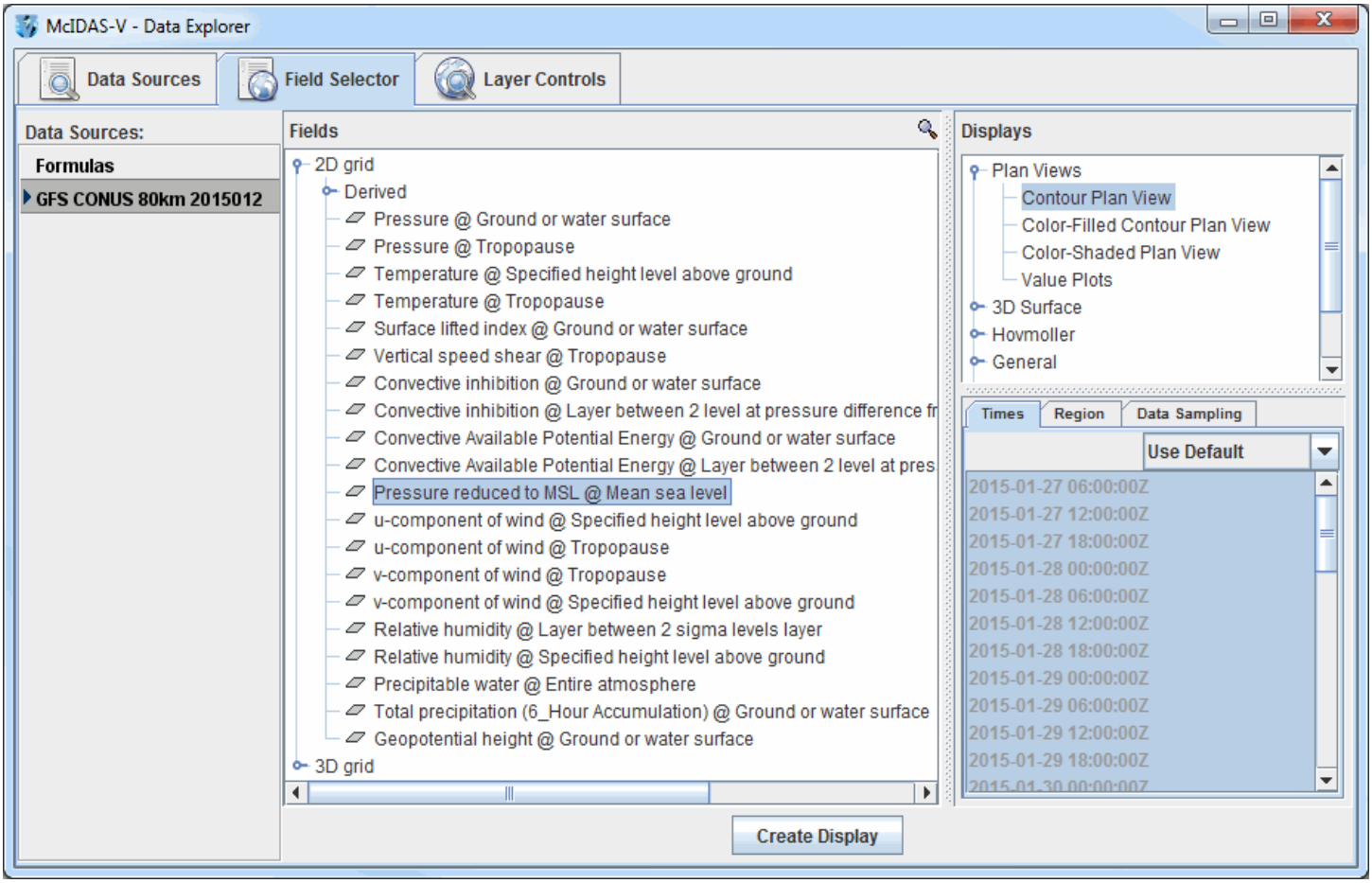


Image 2: Field Selector Tab of the Data Explorer

Create a Contour Plan View display of a parameter by selecting a field to display in the **Fields** panel and selecting Contour Plan View in the **Displays** panel. Click the **Create Display** button. The display will be created and shown in the Main Display window. The display's Legend should also be shown on the right side of the Main Display window. You can open the Layer Controls for the item by right-clicking on the name in the legend and selecting **Control Window**.

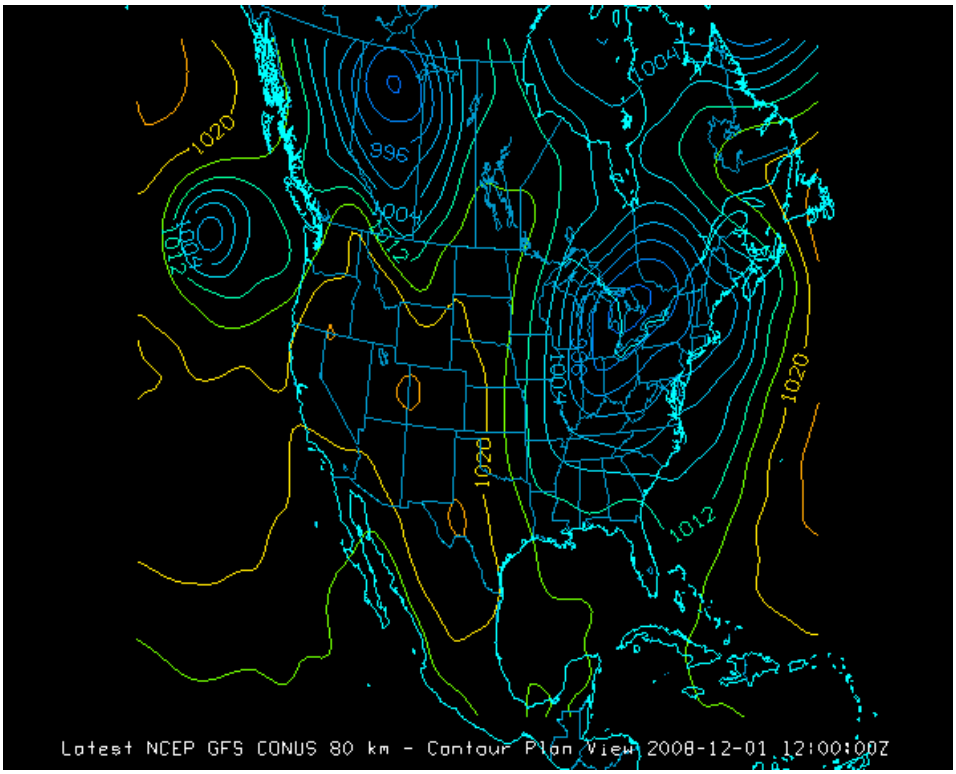


Image 3: Contour Plan View Display in the Main Display Window

Creating a Plot of 3D Data

In the **Field Selector** tab of the Data Explorer, click on the 3D grid tab to expand that category. A list of all 3D grid parameters appears. To make a plot, first select a parameter name such as "Geopotential height @ Isobaric surface".

Display types suitable for this parameter are listed in then **Displays** panel. Select the Contour Plan View display, and click the **Create Display** button.

The initial plot is at the highest level in the data grid, such as 100 millibars. To shift the level to other levels:

- Left-click on the blue text in the Legend for your 3D layer. This takes you to the **Layer Controls tab** of the Data Explorer.
- In the **Data Explorer**, click on the **Levels:** box to bring up the drop-down list of native grid levels for the data.
- Select the desired level from the list.

The data in the Main Display window will now be displayed at the new level you have selected.

To zoom, pan, or rotate this 3D display, see Zooming, Panning, and Rotating. To toggle on the time animation loop, use the Run/Stop icon in the Time Animation Widget. To remove an existing display, use the **File->Remove Display** menu of the **Layer Controls** tab.

Subsetting Times

McIDAS-V automatically loads data for all times selected in the **Layer Controls** tab of the Data Explorer, and loads them as displays for an animation loop. Creating several displays may take time. If you only need to see one data time, it is better to only create displays for that time, as McIDAS-V will load in smaller loops of data faster than larger ones.

To make time selections that apply to all data in one data source, double click on the data source name in the **Data Sources** panel of the **Field Selector** tab to bring up the Data Source Properties editor. Click on the **Times** tab to subset the times.

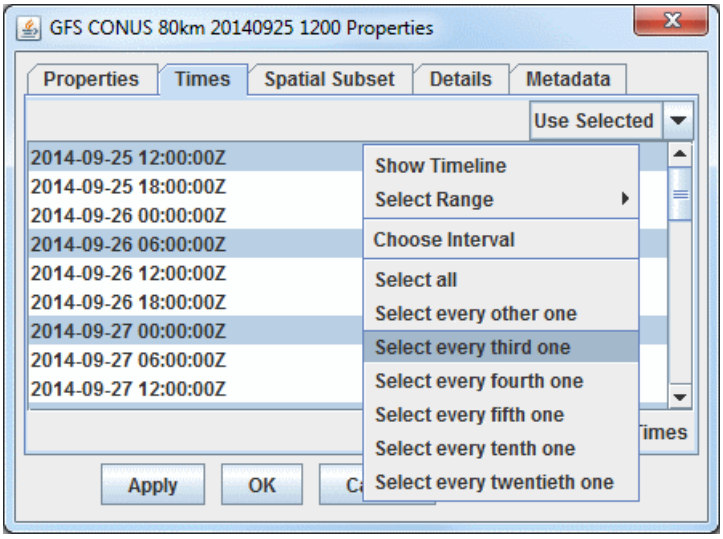


Image 4: Times Tab of the Subset Panel

Initially, all times are selected for display, indicated by the times in this window being grayed out and the **Use Default** checkbox being checked. To limit the selection to fewer times than all times, first check off the **Use Default** checkbox, and then select the times you want by clicking on the times (Note: You can select multiple times with the Shift and Ctrl keys). The selected times will be highlighted in blue, and these are the only times that will appear in your loop of data in the Main Display window.

To make time selections for one field, use the **Times** tab in the lower right panel of the **Field Selector** tab after you select the field and before you create the display. This will override the default times for the data source selected in the **Field Selector** tab of the Data Explorer.

Subsetting Spatially

You can also spatially subset the grid using the **Spatial Subset** tab of the Data Source Properties. This works similar to the times subsetting where you can set the property for all fields in the Data Source or override the default for a particular field.

Accessing Additional Tutorials

For more help with displaying gridded data, please see the Gridded Data tutorial on the McIDAS-V Documentation webpage.

Displaying Fronts

This section describes how to make plots of frontal analyses and forecasts from ADDE data.

In the Data Explorer window, select the **Data Sources** tab. On the left side of this tab, select **Front Positions** from the list of available choosers. For more information about the fronts chooser, see Choosing Front Positions.

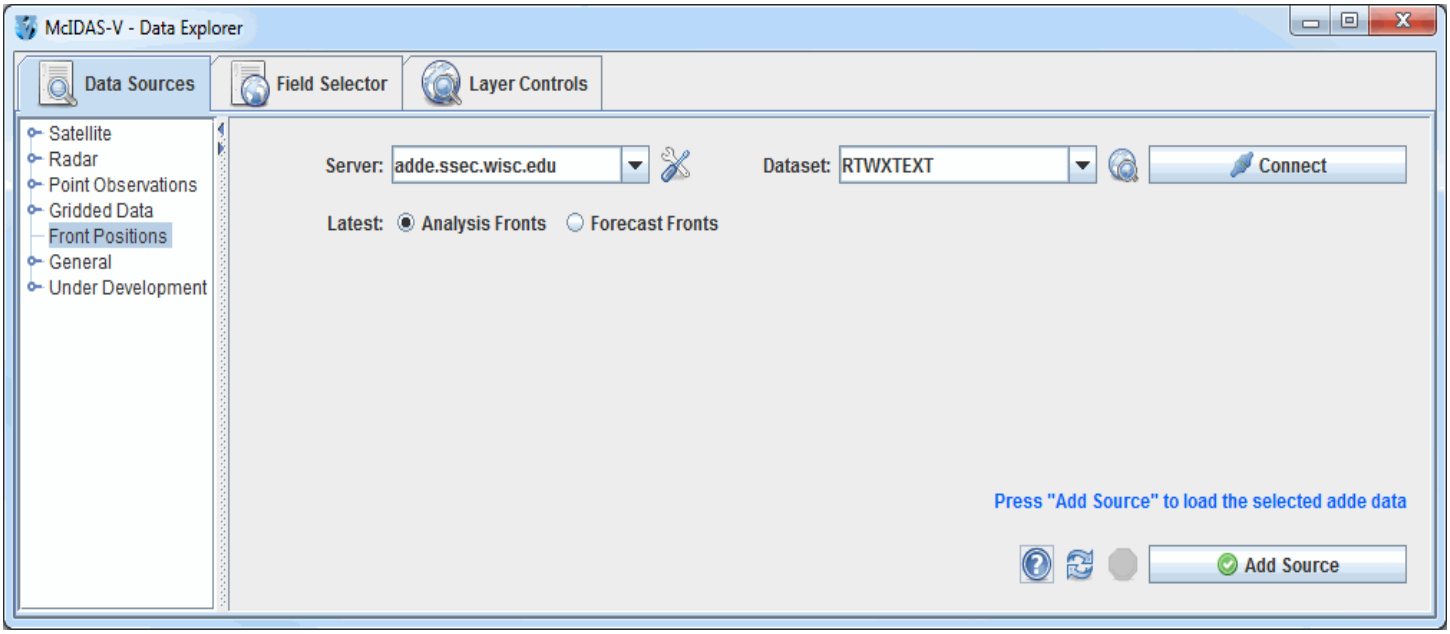


Image 1: Data Sources Tab of the Data Explorer

In the **Server:** and **Dataset:** entry boxes, use the pull down lists to select a remote server and dataset containing front data, such as **adde.ssec.wisc.edu** and **RTWXTEXT**, and connect to the server.

Select either analysis or forecast fronts and click the Add Source button. The fronts will automatically plot in the Main Display window.

Displaying Local Files

This section describes how to make a display using files or a directory located on your local machine.

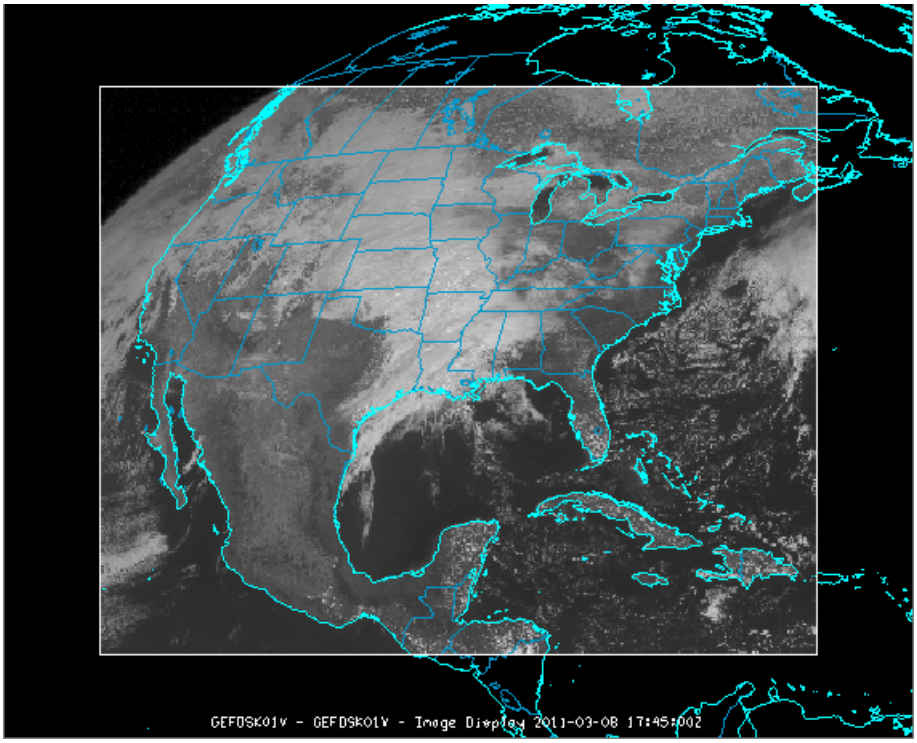


Image 1: Satellite Image in the Main Display Window

The set of steps include:

- Loading Local Files
- Loading Local Files from a Directory
- Creating the Display

Loading Local Files

In the Data Explorer window, select the **Data Sources** tab. On the left side of this tab, select **General->Files** from the list of available choosers. For more information about this chooser, see Choosing Data on Disk.

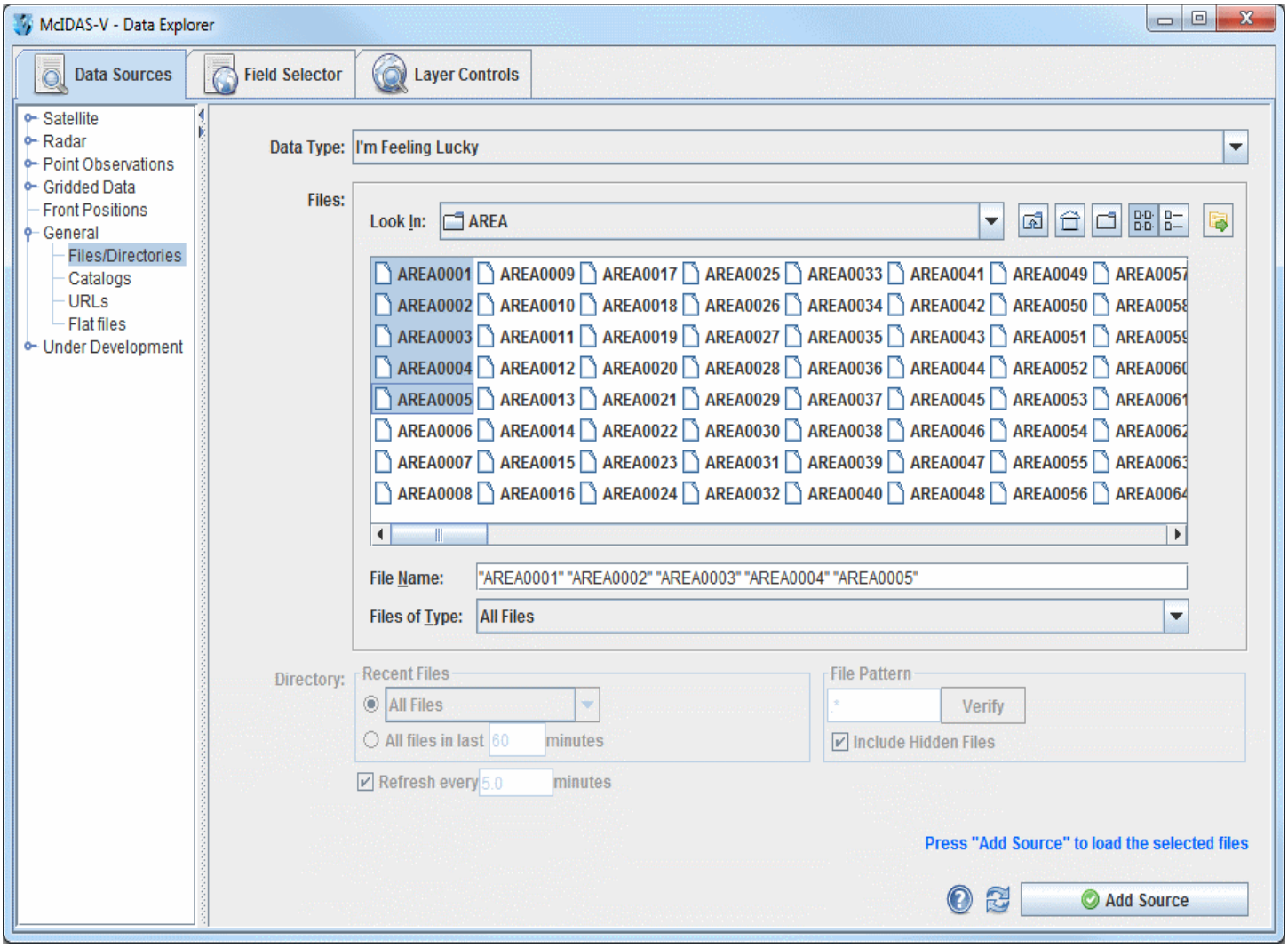


Image 2: Data Sources Tab of the Data Explorer

1. Navigate to the directory that contains the file(s) you are interested in. Use the **Look In** menu to select directories, or double-click on directory names to open the directories and load individual files.
2. Select one or more files. Multiple files can be selected using Ctrl+click or Shift+click.
3. Optionally, specify the type of data the file contains by using the **Data Type** menu.
4. When done, load the selected file(s) by clicking the Add Source button.

Loading Files from a Directory

Loading files from a directory is similar to loading files, however you are limited to one directory. Loading files from a directory also gives you the options of polling files, as well as limiting files to a specific file pattern.

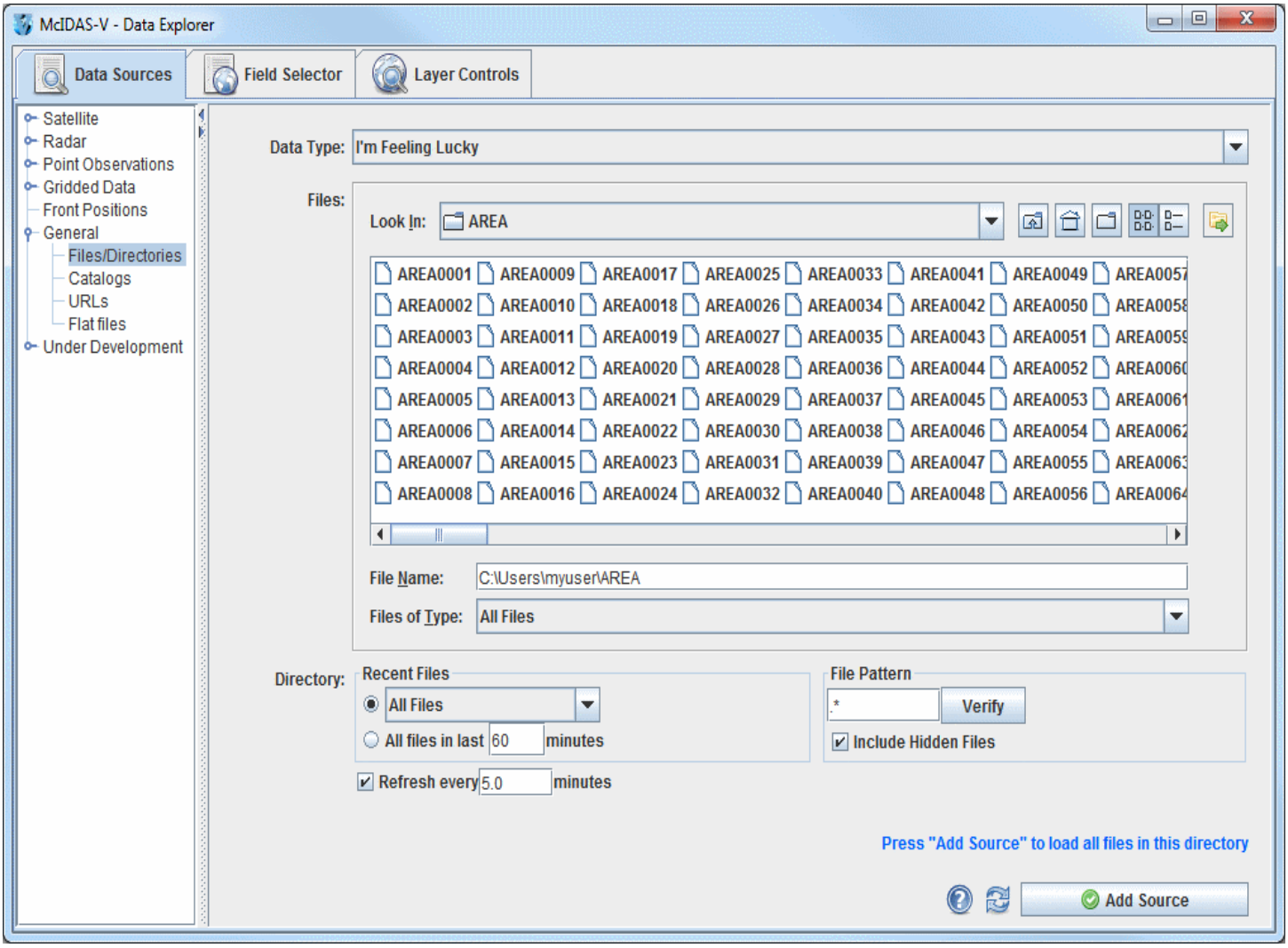


Image 3: Data Sources Tab of the Data Explorer

1. Open a directory containing data files, but do not select any individual files.
2. Optionally, specify the type of data the directory contains by using the **Data Type** menu.
3. Choose the number of files you want to to search for. You can select an absolute number of files that have been updated in a certain time period.
4. When done, load the data in the selected directory by clicking the Add Source button.

Creating the Display

The local data files will be shown in the **Field Selector** tab of the Data Explorer.

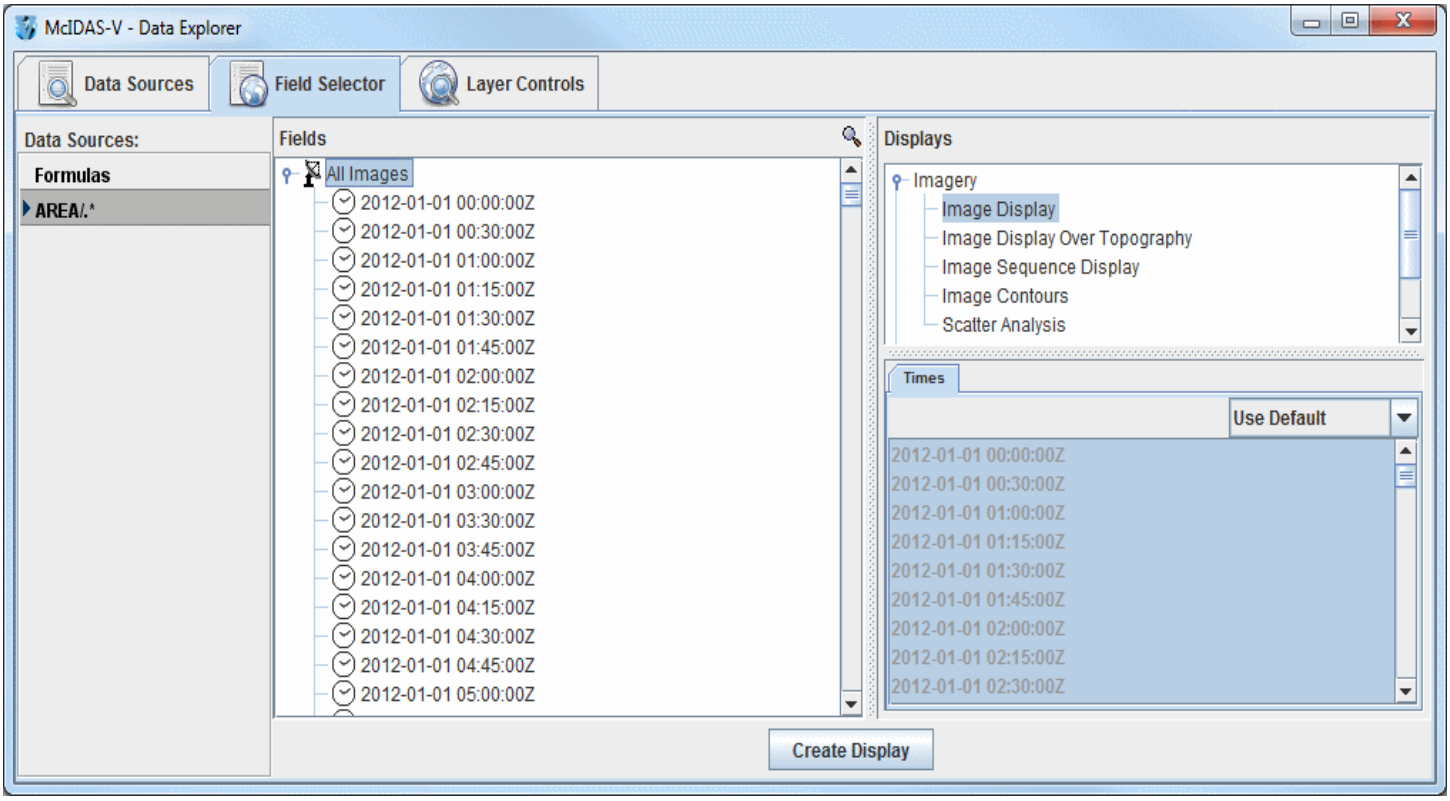


Image 4: Field Selector Tab of the Data Explorer

The data source name listed in the **Field Selector** will be based upon whether you loaded files or a directory. If one file is loaded, the name of the file is shown. Multiple files will be listed as "N files" where N is the number of files loaded. A directory will be shown as the directory name plus the file pattern (if used), or ".*" if all files in the directory are loaded. Once you have selected a Field, Display, and Time(s), click the Create Display button to display your data in the Main Display window.

Displaying Files from a URL

This section describes how to make a display using files located at a specific URL.

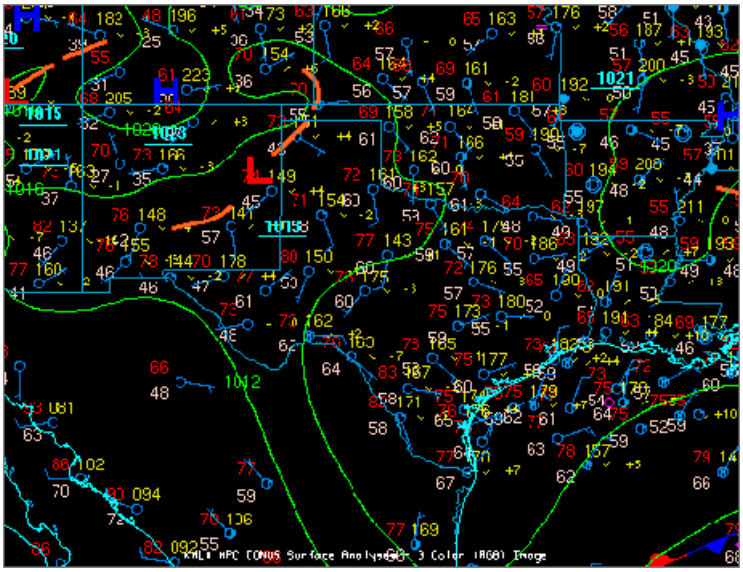


Image 1: URL Display in the Main Display Window

The set of steps include:

- Loading Files from a URL
- Creating the Display

Loading Files from a URL

In the Data Explorer window, select the **Data Sources** tab. On the left side of this tab, select the **General->URLs** from the list of available choosers. For more information about this chooser, see Choosing a URL.

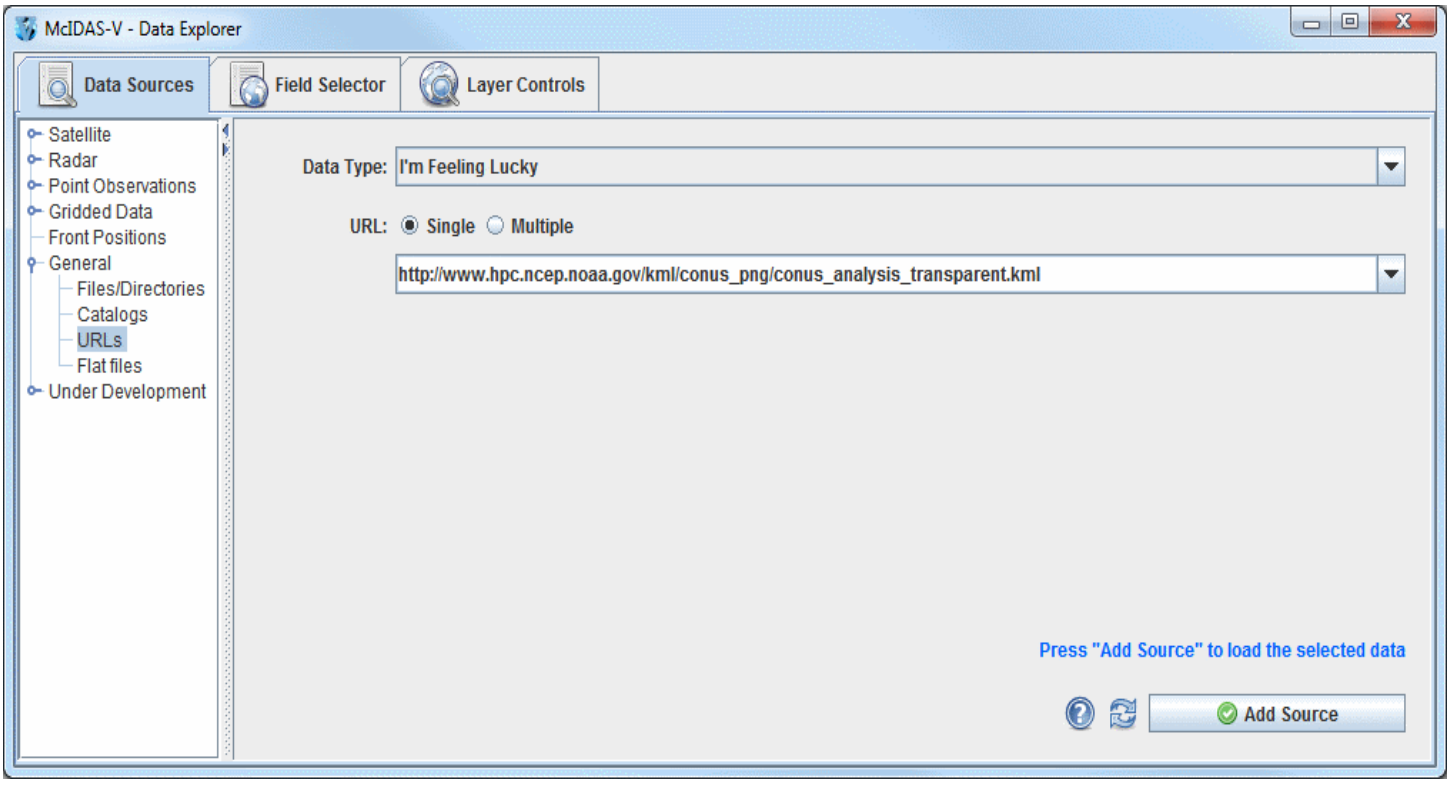
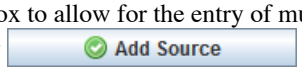


Image 2: Data Sources Tab of the Data Explorer

1. Optionally, select the Data Type of your data using the pull down menu.
2. Enter the URL into the field or choose a previously selected URL from the pull down menu.
3. Change the **URL** option to **Multiple** to expand the box to allow for the entry of multiple URLs, one per line.
4. When done, load the selected URL(s) by clicking the  button.

Creating the Display

The local image data source files will be shown in the **Field Selector** tab of the Data Explorer.

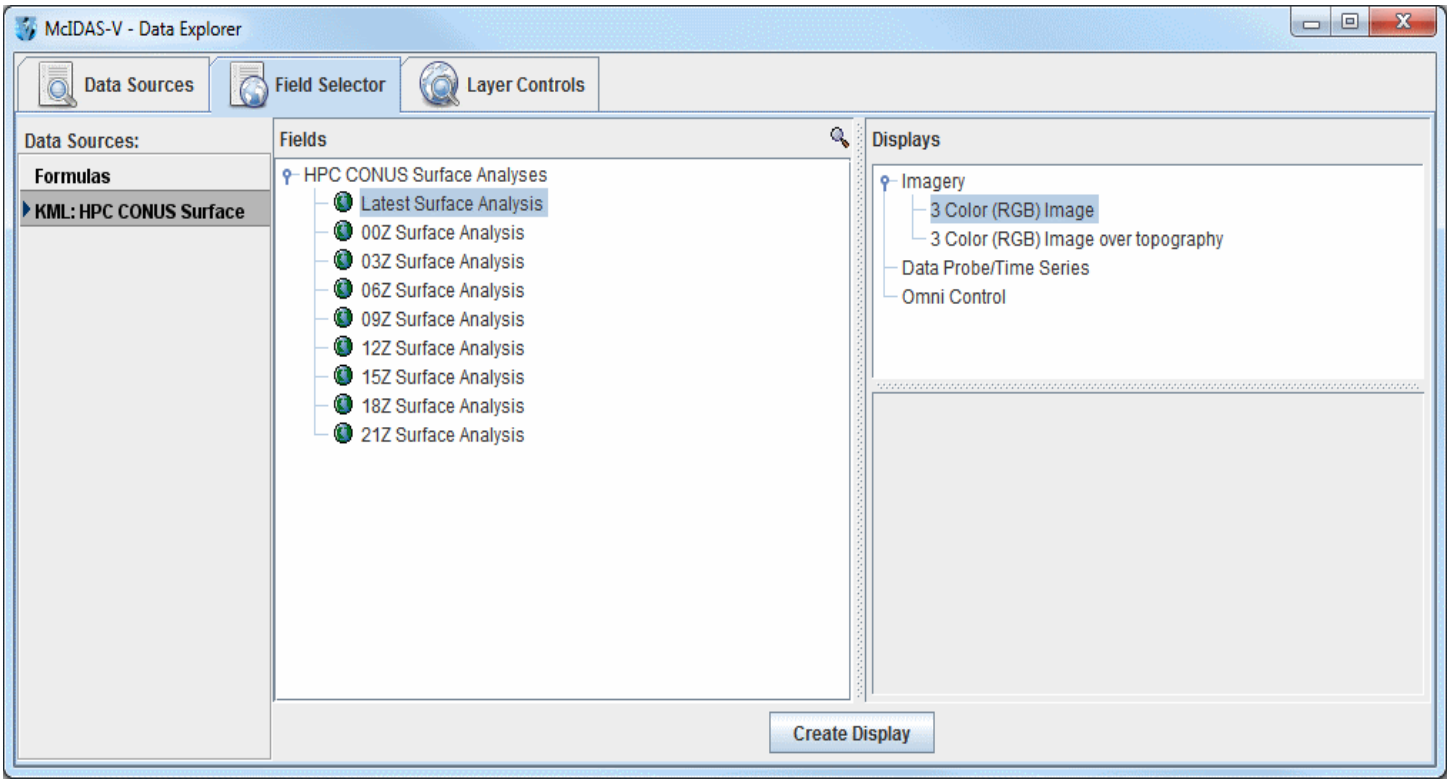


Image 3: Field Selector Tab of the Data Explorer

Once you have selected a Field, Display, and Time(s), click the Create Display button to display your data in the Main Display window.

Using the Globe Display

This section describes how to make a globe display. The illustration below shows a McIDAS-V Globe Display of GFS numerical weather prediction model output of mean sea level pressure (as color-shaded image and contour lines) and 50 m/s wind speed isosurfaces showing the jet streams.

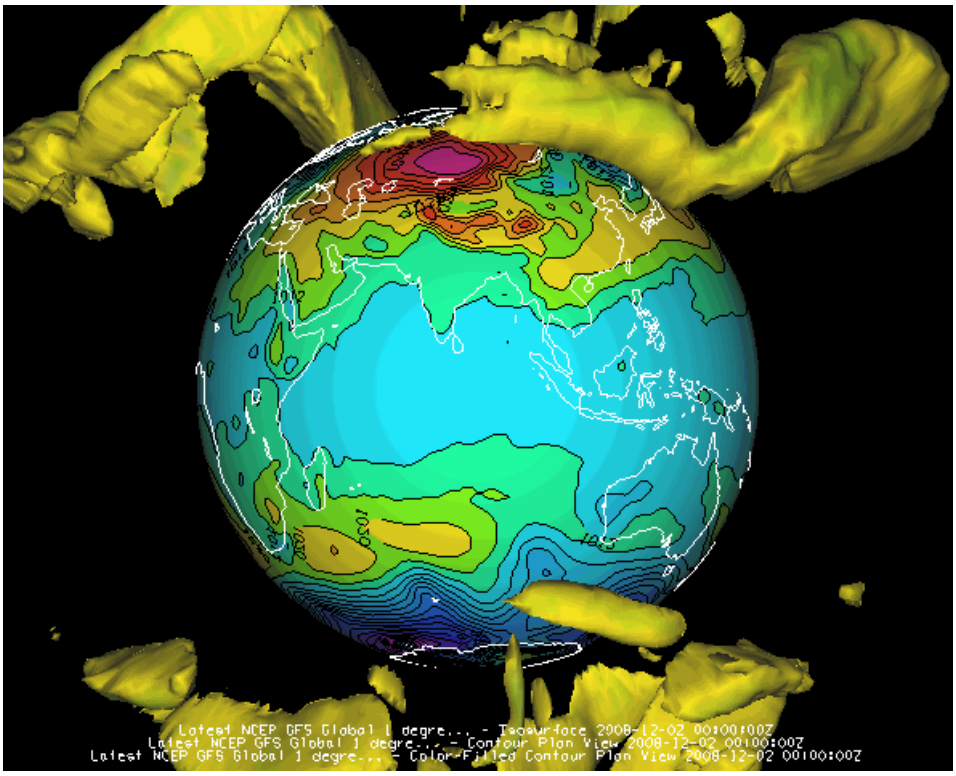


Image 1: Globe Display

In the Globe Display display of McIDAS-V, the displays and maps are projected onto a spherical globe. The globe can be rotated by hand or automatically, along with the usual zooming and time animation of displays on the globe.

To create a Globe View window, use the **File->New Display Tab->Globe Display->One Panel** menu. This section describes how to make plots of global satellite imagery on the Globe display. The set of steps include:

- Choosing Global Satellite Imagery
- Displaying the Data
- Using the Display

Choosing Global Satellite Imagery

After creating a globe display in McIDAS-V, open the **Data Sources** tab of the Data Explorer and select the **Satellite->Imagery** chooser.

- Connect to one of the servers listed using the **RTIMAGES** dataset.
- From the **Image Data Type** selector, choose the **GE-IR - GOES-East Hemispheric IR** Image Type.
- Select the three most recent images.
- Click the Add Source button to load the data source.

Displaying the Data

Once the data source has been selected, you can create the display by doing the following in the **Field Selector** tab of the Data Explorer:

- Select the "GE-IR - GOES-East Hemispheric IR" data source in the **Data Sources** panel.
- Select the "10.7 um IR Surface/Cloud-top Temp->Brightness" field in the **Fields** panel.
- Select "Image Display" in the **Displays** panel.
- Click the Create Display button to create the display.

Using the Display

You can move the display using the standard McIDAS-V zooming, panning and rotating functions. For this exercise try the following:

- Use the **Viewpoint toolbar** or the **View->Viewpoint** menu to rotate to the West view.
- Start the image animation using the Time Animation Widget.
- Utilize the Main Display window's **View->Viewpoint->Auto-Rotate View** menu to rotate the globe. Check this on to rotate the globe along

the vertical axis.

Any suitable data with navigation information (latitude, longitude, and altitude) that McIDAS-V can handle can be plotted on the globe display.

Data Explorer

The McIDAS-V Data Explorer window is composed of three tabs, **Data Sources**, **Field Selector**, and **Layer Controls**:

- Data Sources
- Field Selector
- Layer Controls

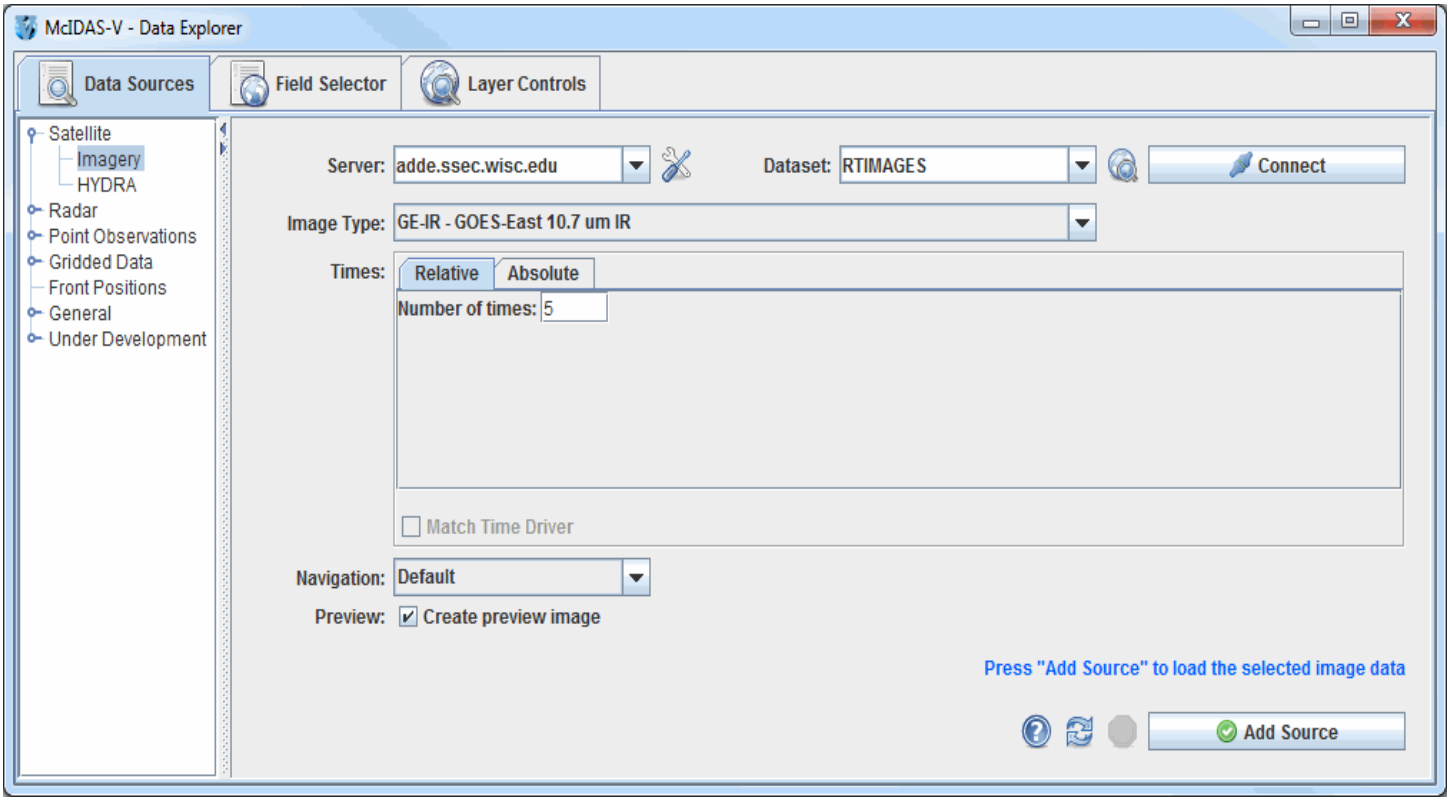


Image 1: McIDAS-V Data Explorer Window

Data Sources

McIDAS-V can use data from local files, remote data servers such as OPeNDAP or ADDE and even web servers. You can read further about specific data formats and sources available.

Select the sources of data that you want to work with within McIDAS-V using the **Data Sources** tab of the Data Explorer. Once selected, the data source will be shown in the **Field Selector** tab where you can select parameters, display times, the display type, and create the display.

McIDAS-V can work with any number of data sources at one time. Choosing a data source with McIDAS-V typically only reads the metadata (i.e., data about the data); no parameter data values are read until you request a display to be made.

To select the data that is to be used in McIDAS-V you use the **Data Sources** tab. You can bring this up by selecting the **Data Sources** tab of the Data Explorer window, or by using the **Display->Create Layer from Data Source...** menu item in the Main Display window.

This section describes:

- Choosing Satellite Imagery
- Choosing Hyperspectral Data
- Choosing NEXRAD Level II Radar Data
- Choosing NEXRAD Level III Radar Data
- Choosing Point Data
- Choosing Upper Air Sounding Data
- Choosing Gridded Data
- Choosing Front Positions
- Choosing Data on Disk
- Choosing Cataloged Data
- Choosing a URL
- Choosing Flat File Data

Choosing Satellite Imagery

The **Satellite->Imagery** chooser allows you to access satellite imagery on local or remote ADDE servers. For more information on how to use this chooser, see Getting Started - Displaying Satellite Imagery.

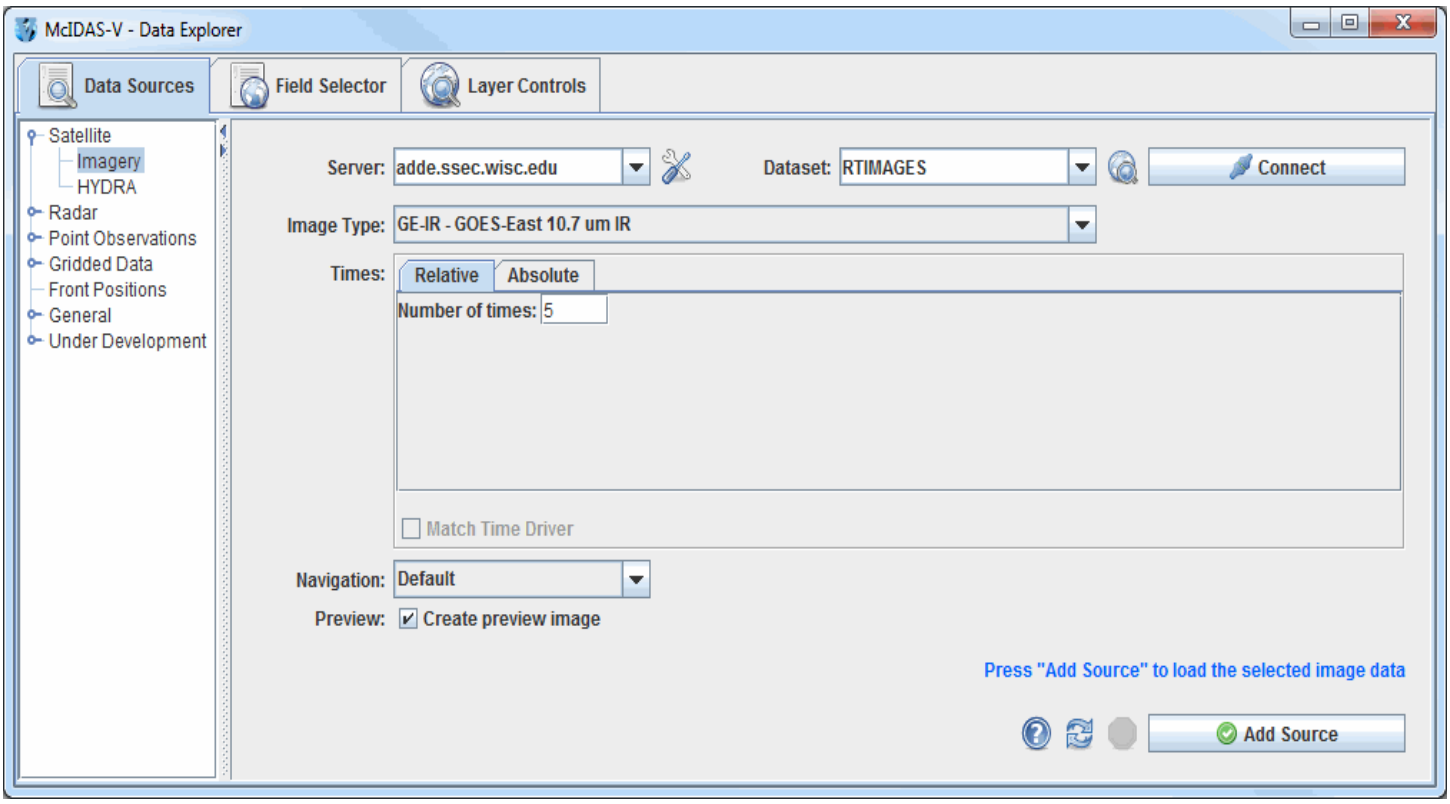


Image 1: Satellite Imagery Chooser

Properties

Server - Selects the server to be used. Enter in a server name or choose one from the pulldown menu. Right-click in the entry box to manage your ADDE servers and to delete the server from the list.

Manage - Manages the list of servers by opening the **ADDE Servers** tab of the User Preferences window.

Dataset - Selects the dataset to be used. Enter in a dataset name or choose one from the pulldown menu.

Public Datasets - Lists the public datasets available on the server. This button looks for any datasets contained in the PUBLIC.SRV file on the server. If this file doesn't exist, or if there are no datasets in this file that can be used by this chooser, then no datasets will be returned.

Connect **-** Connects and queries the server for available image types.

Image Type - Selects the image type.

Times: Relative - Allows for adding any number of relative (most recent) images.

Times: Absolute - Allows for selecting one or more absolute times. When choosing absolute times for the first time, McIDAS-V needs to query the ADDE server for the times. This may take some time. To select more than one time use Ctrl+click or Shift+click. See the Timeline Controls section for details on its use. There are a couple of buttons in this tab that allow for controlling which times are available:

List Images **-** Requests the server to list the most recent number of times defined in the text entry field to the right of this button. By default, the 100 most recent times will be listed. The text entry field can be any integer value, as well as "ALL" to request all of the times included in the dataset. Note that requesting "ALL" may take a while to complete dependent on the amount of data on the server.

Select Day **-** Narrows down a large dataset to a single day. For real time datasets, this button will say "Select Day" until the user clicks a button and selects a date. At this point, the button will change to say the date selected (e.g. "2016-06-01") instead of "Select Day". In the case of an archive dataset, the button will say the date right away since a date must be selected before the times panel can be populated.

Match Time Driver - Selects times that match the time driver, assuming one has been set. For more on this feature, see Time Matching. This option is only available if a time driver has been set in the session.

Navigation - Selects one of the available navigation types. Use Default for most images, and Lat/Lon if LALO navigation should be used. Level 1b servers and POES servers often require Lat/Lon navigation to be used.

Preview - Displays a preview of the image in the **Region** tab of the **Field Selector**. If this box is unchecked, then only a map of the image coverage area will be shown without any data.

Help - Brings up this help page.

Refresh - Updates the Imagery chooser with the most recent data.

Cancel - Cancels the query of data. The chooser will reset back to default.

- Loads the selected data.

Choosing Hyperspectral Data

The **Satellite->HYDRA** chooser allows you to select data from your local file system to be displayed using HYDRA. For more information on using this chooser, see Getting Started - Displaying Hyperspectral Satellite Imagery Using HYDRA.

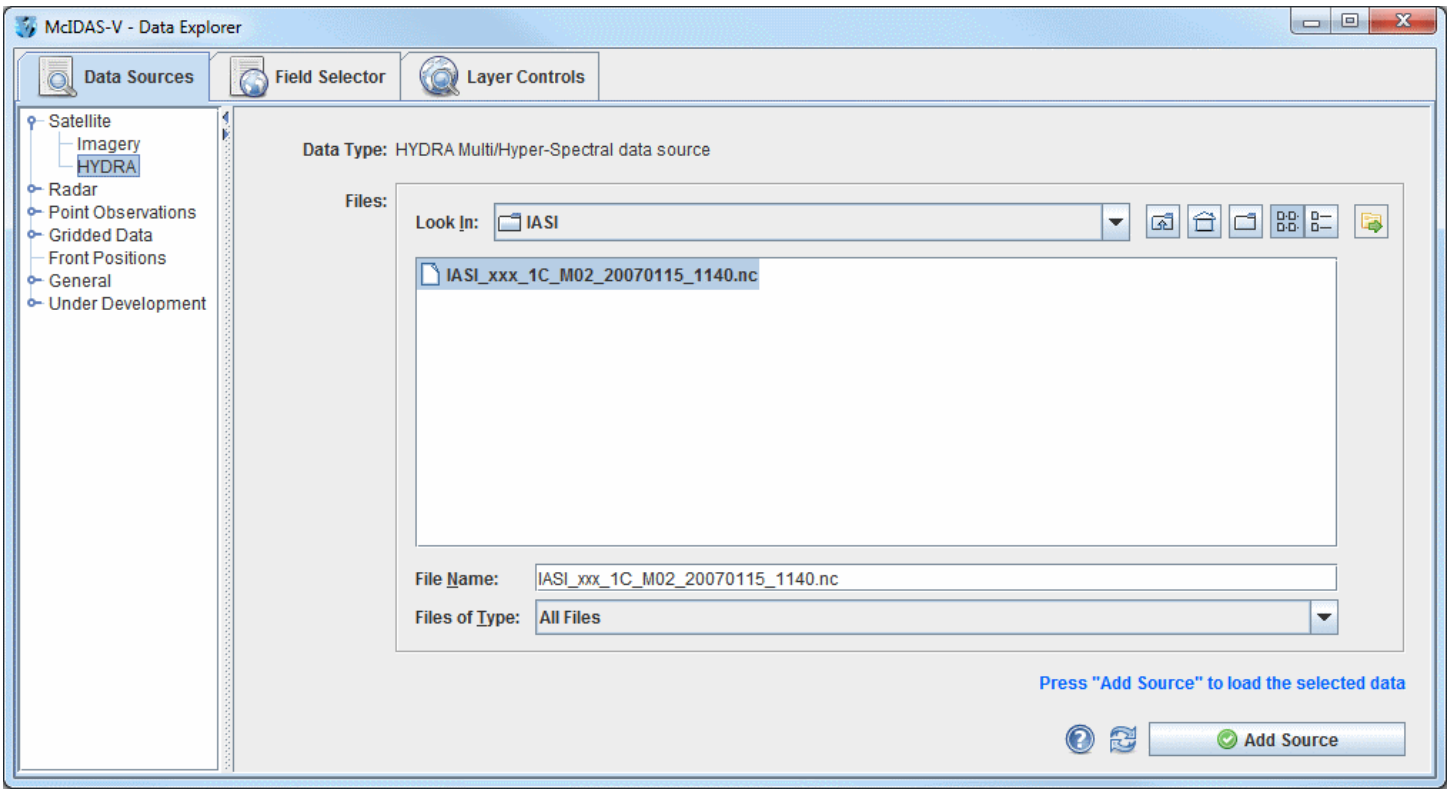


Image 1: HYDRA Chooser

Properties

Look In - Allows you to select folders to search for data files.

Up One Level - Moves you up one folder level in your local file system.

Desktop - Takes you to the Desktop folder of your local file system.

Create New Folder - Creates a new folder.

List - Switches the view to a listing of all folders and files in the current path.

Details - Switches the view to a detailed list of all folders and files in the current path.

Show History Menu - Displays your most recent loaded data sources.

File Name - Represents the full name of the file selected.

Files of Type - Narrows down the files shown in a folder to a specific data type.

Help - Brings up this help page.

Refresh - Rescans the current directory and update the file chooser if the files have changed.

Add Source **-** Loads the selected file(s).

Choosing NEXRAD Level II Radar Data

The **Radar->Level II->Remote** chooser allows you to choose Level II radar data from a remote THREDDS server. For more information on how to use this chooser, see Getting Started - Displaying Level II Radar Imagery.

Local Level II Radar Chooser

The **Radar->Level II->Local** chooser allows you to choose Level II radar data from your file system. The Level II data is supplied as volume-scan files, each file having all data from one WSR-88D radar for all sweeps for one "time". Archived Level II radar files can be displayed through the **Radar->Level II->Local** file chooser. The files should be stored on your file system with each station's files in a directory (folder) whose directory name is the station 4-character ID (e.g., KTLX for Oklahoma City). In some cases, the data files do not have any location information in them, and McIDAS-V uses the directory name as a first guess at the station location. Archived Level II data is available from the National Climatic Data Center (NCDC).

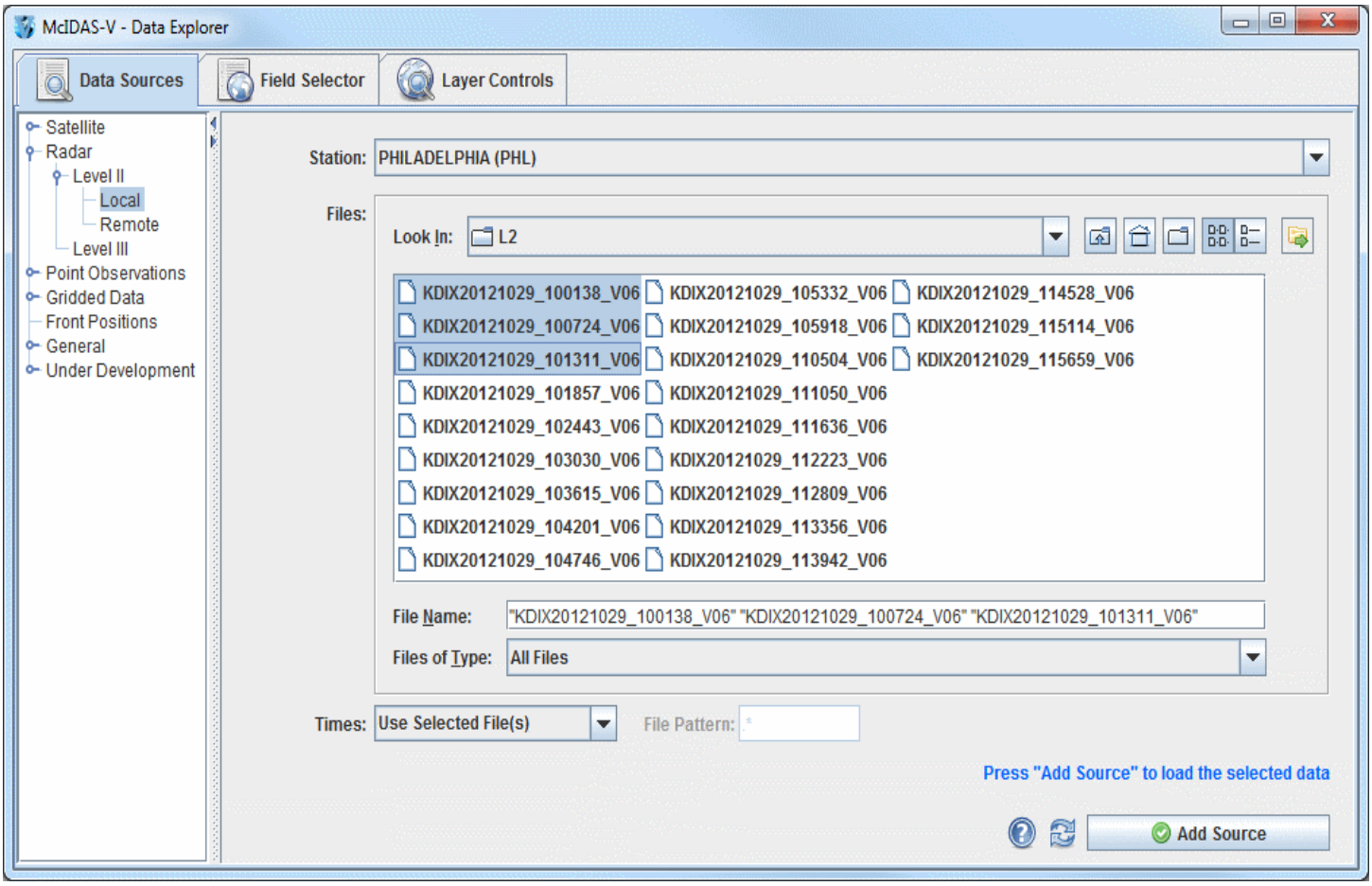


Image 1: Level II Local Radar Chooser

Properties

Station - Selects the radar station for the data. By default, McIDAS-V will use the folder name to determine the radar location.

Look In - Allows you to select folders to search for data files.

Up One Level - Moves you up one folder level in your local file system.

Desktop - Takes you to the Desktop folder of your local file system.

Create New Folder - Creates a new folder.

List - Switches the view to a listing of all folders and files in the current path.

Details - Switches the view to a detailed list of all folders and files in the current path.

Show History Menu - Shows a list of the last 15 folders that data was loaded from.

File Name - Represents the file name. Select a file to populate the entry box to show the full name of the file selected.

Files of Type - Represents the file type. This narrows down the files shown in a folder to a specific data type.

Times - Represents the times of the radar displays. These times can be individually set, or you can use a File Pattern to display the images in specific intervals.

File Pattern - Specifies the pattern for files to look for if **Times** is set to "Use most recent N files".

Help - Brings up this help page.

Refresh - Updates the Level II radar chooser with the most recent data.

Add Source **-** Loads the selected radar data.

Remote Level II Radar Chooser

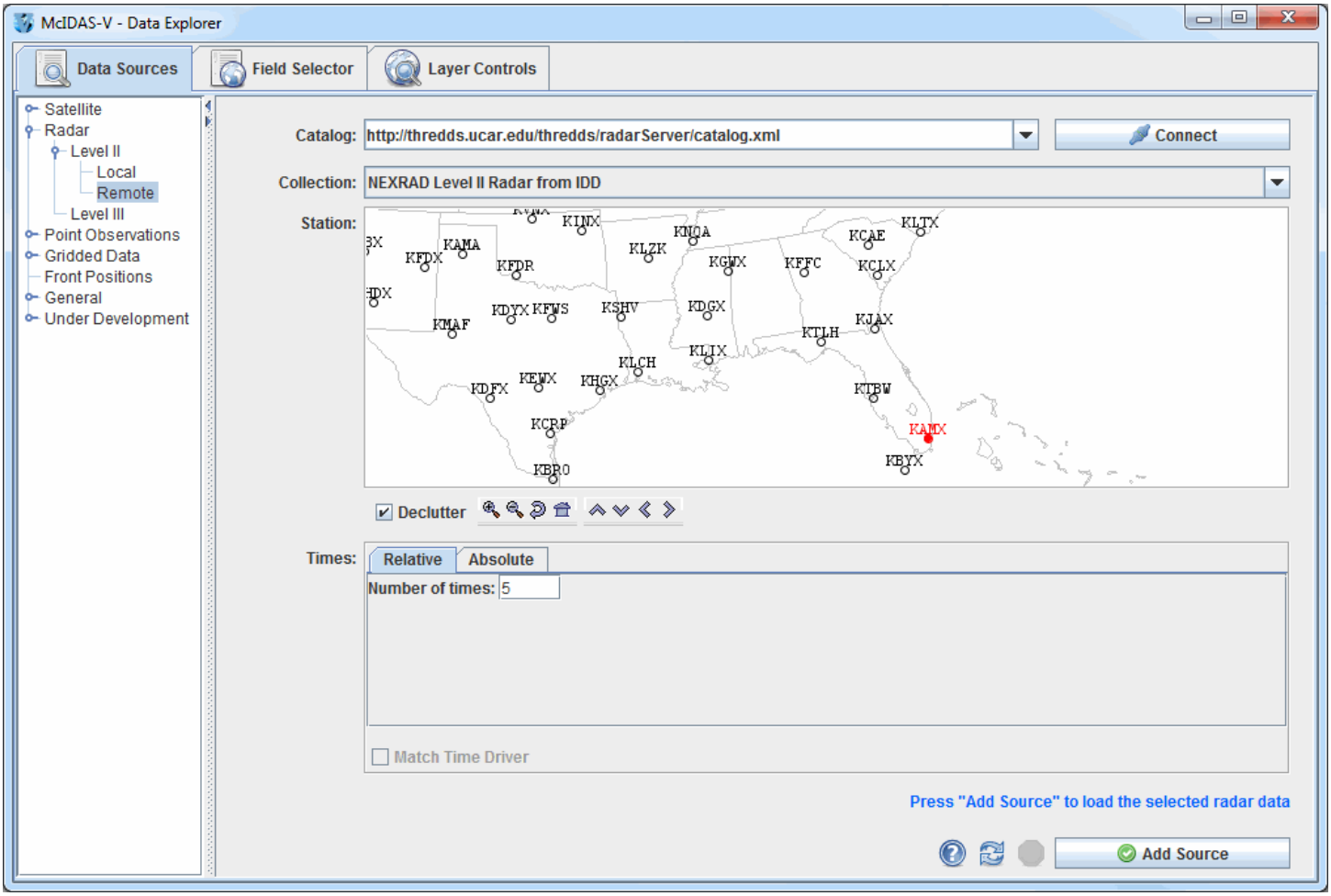


Image 2: Level II Radar Remote Chooser

Properties

Catalog - Selects the catalog used to access the Level II radar data.

Connect **-** Connects to and queries the server for available radar types and stations.

Collections - Selects the collection to use.

Station - Displays the stations related to the selected catalog and selection. Select a station by clicking on the station displayed on the map. The **Declutter** checkbox allows you to show all stations (not checked), or only a limited number of stations that do not overlap each other (checked). You will need to zoom in to see all the stations without overlaps. Use the Zooming and Panning options to locate a station, or the following buttons:

- **Zoom In** - Zooms in over the current map area.
- **Zoom Out** - Zooms out over the current map area.
- **Previous Map Area** - Returns to the previous map area.
- **Home Map Area** - Returns to the default map area.
- **Move View Up** - Moves the view up (map down).

Move View Down - Moves the view down (map up).

Move View Left - Click to move the view left (map right).

Move View Right - Click to move the view right (map left).

Times: Relative - Allows you to select a group of up to the last 100 times.

Times: Absolute - Allows you to choose one or more absolute times. When choosing absolute times for the first time McIDAS-V needs to query the ADDE server for the times. This may take some time. To select more than one time use Ctrl+click or Shift+click. See the Timeline Controls section for details on its use. Click on the **Select Day** button to narrow down a large dataset to one day.

Match Time Driver - Selects times that match the time driver, assuming one has been set. For more on this feature, see Time Matching. This option is only available if a time driver has been set in the session.

Help - Brings up this help page.

Refresh - Updates the Level II radar chooser with the most recent data.

Cancel - Cancels the query of data and stations. The chooser will reset back to default.

- Loads the selected radar data.

Choosing NEXRAD Level III Radar Data

The **Radar->Level III** chooser allows you to choose NEXRAD Level III radar data on remote ADDE servers. For more information on how to use this chooser, see Getting Started - Displaying Level III Radar Imagery.

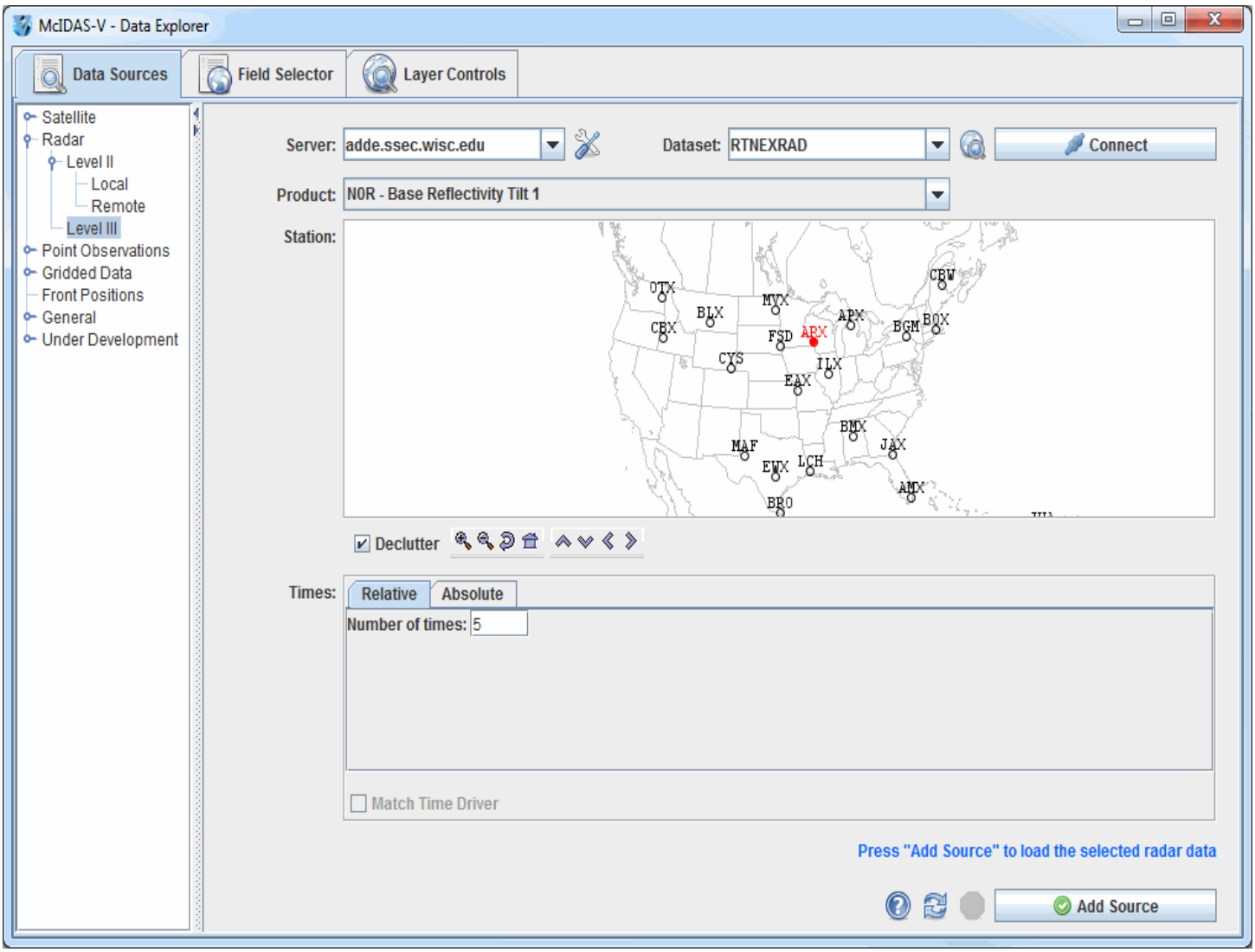


Image 1: Level III Radar Chooser

Properties

Server - Selects the server to be used. Enter in a server name or choose one from the pulldown menu. Right click in the entry box to manage your ADDE servers and to delete the server from the list.

Manage - Manages the list of servers by opening the **ADDE Servers** tab of the User Preferences window.

Dataset - Selects the dataset to be used. Enter in a dataset name or choose one from the pulldown menu.

Public Datasets - Lists the public datasets available on the server. This button looks for any datasets contained in the PUBLIC.SRV file on the server. If this file doesn't exist, or if there are no datasets in this file that can be used by this chooser, then no datasets will be returned.

Connect **-** Connects to and queries the server for available radar types and stations.

Product - Selects a radar product.

Station - Selects a station using the map. Once a station and a product have been selected, the ADDE server will be queried as to the available times. The **Declutter** checkbox allows you to show all stations (not checked), or only a limited number of stations that do not overlap each other (checked). You will need to zoom in to see all the stations without overlaps. Use the Zooming and Panning options to locate a station, or the following buttons:

Zoom In - Zooms in over the current map area.

Zoom Out - Zooms out over the current map area.

Previous Map Area - Returns to the previous map area.

Home Map Area - Returns to the default map area.

Move View Up - Moves the view up (map down).

Move View Down - Moves the view down (map up).

Move View Left - Moves the view left (map right).

Move View Right - Moves the view right (map left).

Times: Relative - Allows for adding any number of relative (most recent) images.

Times: Absolute - Allows for selecting one or more absolute times. When choosing absolute times for the first time McIDAS-V needs to query the ADDE server for the times. This may take some time. To select more than one time use Ctrl+click or Shift+click. See the Timeline Controls section for details on its use. Click on the **Select Day** button to narrow down a large dataset to one day.

Match Time Driver - Selects times that match the time driver, assuming one has been set. For more information on this feature, see Time Matching. This option is only available if a time driver has been set in the session.

Help - Brings up this help page.

Refresh - Updates the Level III radar chooser with the most recent data.

Cancel - Cancels the query of data and stations. The chooser will reset back to default.

Add Source **-** Loads the selected radar data.

Choosing Point Data

The **Point Observations->Plot/Contour** chooser allows you to choose surface, upper air, and other types of point data (e.g.: aircraft data) to plot or contour for the current date. For more information on how to use this chooser, see Getting Started - Displaying Surface and Upper Air Point Data.

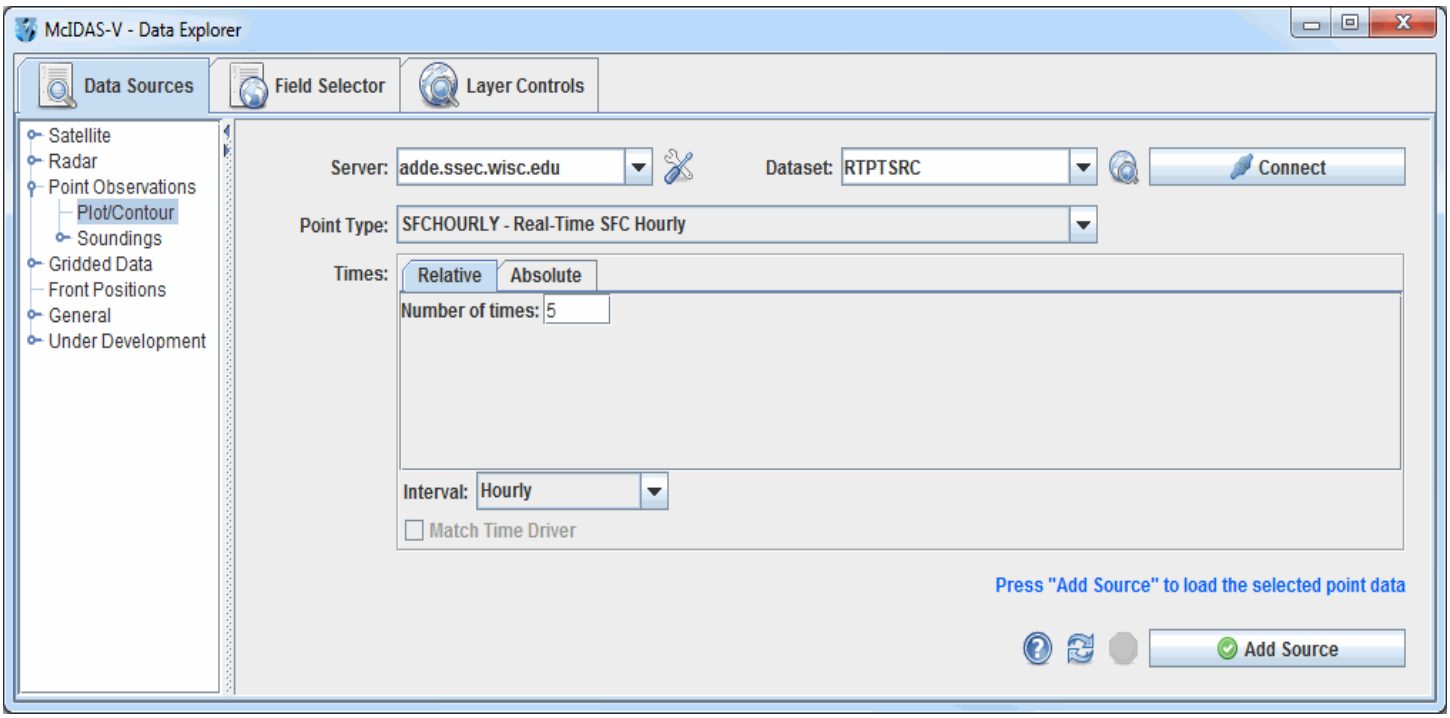


Image 1: Point Data Chooser

Properties

Server - Selects the server to be used. Enter in a server name or choose one from the pulldown menu.

Manage - Manages the list of servers by opening the **ADDE Servers** tab of the User Preferences window.

Dataset - Represents the dataset being used. Enter in a dataset name or choose one from the pulldown menu.

Public Datasets - Lists the public datasets available on the server. This button looks for any datasets contained in the PUBLIC.SRV file on the server. If this file doesn't exist, or if there are no datasets in this file that can be used by this chooser, then no datasets will be returned.

Connect **-** Connects to and queries the server for available times.

Point Type - Selects the Point Type to display.

Times: Relative - Allows for adding any number of relative (most recent) times.

> **Relative Time Interval** - Sets a time increment to use with relative times. For example, using "3 most recent" times with a "3" hour time increment would result in the most recent time, one from 3 hours ago and one from 6 hours ago. This does not impact absolute times.

Times: Absolute - Allows for selecting one or more absolute times. When choosing absolute times for the first time McIDAS-V needs to query the ADDE server for the times. This may take some time. To select more than one time use Ctrl+click or Shift+click. See the Timeline Controls section for details on its use. Click on the **Select Day** button to narrow down a large dataset to one day.

Match Time Driver - Selects times that match the time driver, assuming one has been set. For more information on this feature, see Time Matching. This option is only available if a time driver has been set in the session.

Help - Brings up this help page.

Refresh - Updates the Level III radar chooser with the most recent data.

Cancel - Cancels the query of data and stations. The chooser will reset back to default.

Add Source **-** Loads the selected radar data.

Choosing Upper Air Sounding Data

Upper air RAOB data can be displayed as soundings. You can access RAOB data as soundings either from remote ADDE servers (using the **Point Observations->Soundings->Remote** chooser, pictured below) or from local files (using the **Point Observations->Soundings->Local** chooser). The only difference between these two choosers is specifying the source of data. You either select an ADDE server and press Connect, or you can select a file containing RAOB data. For more information on how to use these choosers, see Getting Started - Displaying RAOB Sounding Data.

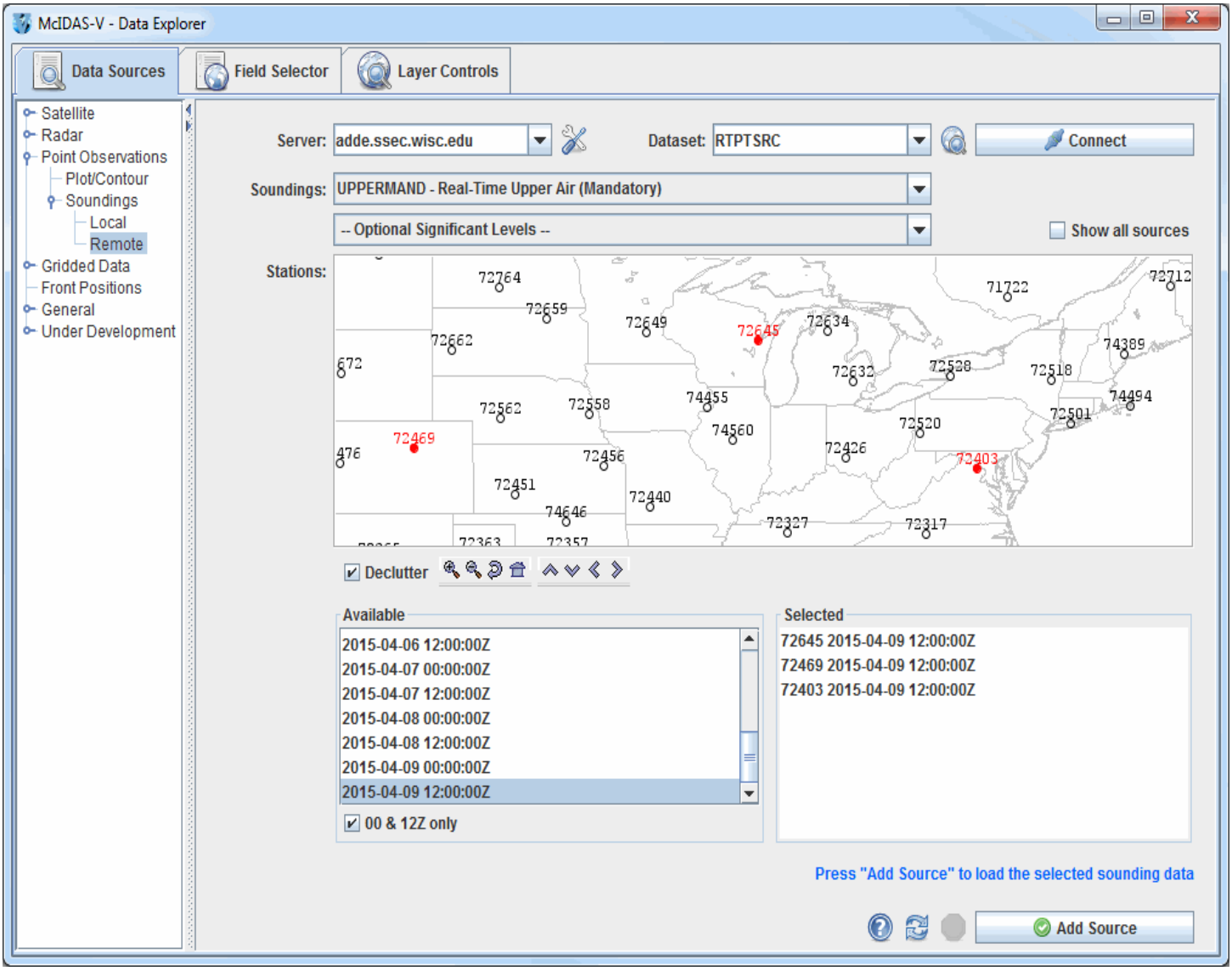


Image 1: RAOB Chooser

Properties

Server - Selects the server to be used. Enter in a server name or choose one from the pulldown menu.

Manage - Manages the list of servers by opening the **ADDE Servers** tab of the User Preferences window.

Dataset - Selects the dataset to be used. Enter in a dataset name or choose one from the pulldown menu.

Public Datasets - Lists the public datasets available on the server. This button looks for any datasets contained in the PUBLIC.SRV file on the server. If this file doesn't exist, or if there are no datasets in this file that can be used by this chooser, then no datasets will be returned.

Connect **-** Connects to and queries the server for available times.

Station Map - Displays the stations on the map. Select a station using the map. Left clicking on a station will select it. For multiple selections, Shift+drag will select all stations within a region. Ctrl+drag will add the stations in the selected region to the set of already selected stations. Pressing the Ctrl+A key will select all stations. Right-clicking in the map will bring up a menu that allows you to select all stations and to clear the selection. The **Declutter** checkbox allows you to show all stations (not checked), or only a limited number of stations that do not overlap each other (checked). You will need to zoom in to see all the stations without overlaps. Use the Zooming and Panning options to locate a station, or the following buttons:

Zoom In - Zooms in over the current map area.

Zoom Out - Zooms out over the current map area.

Previous Map Area - Returns to the previous map area.

Home Map Area - Returns to the default map area.

Move View Up - Moves the view up (map down).

Move View Down - Moves the view down (map up).

Move View Left - Moves the view left (map right).

Move View Right - Moves the view right (map left).

Available Times - Selects a single or set of dates and times to use. To select more than one time use Ctrl+click or Shift+click.

00 & 12Z only - Lists only the 00Z and 12Z soundings under **Available Times**.

Selected Soundings - Shows soundings available for the times selected at all locations selected in the **Available Times**.

Help - Brings up this help page.

Refresh - Updates the RAOB chooser with the most recent data.

Cancel - Cancels the query of data and stations. The chooser will reset back to default.

- Loads the selected RAOB data.

Choosing Gridded Data

The **Gridded Data->Remote** chooser shows THREDDS catalogs of gridded data holdings on remote data servers (typically TDS or OPeNDAP). The pulldown menu has several catalog options. For more information on using this chooser to display grid data, see Getting Started - Displaying Gridded Data.

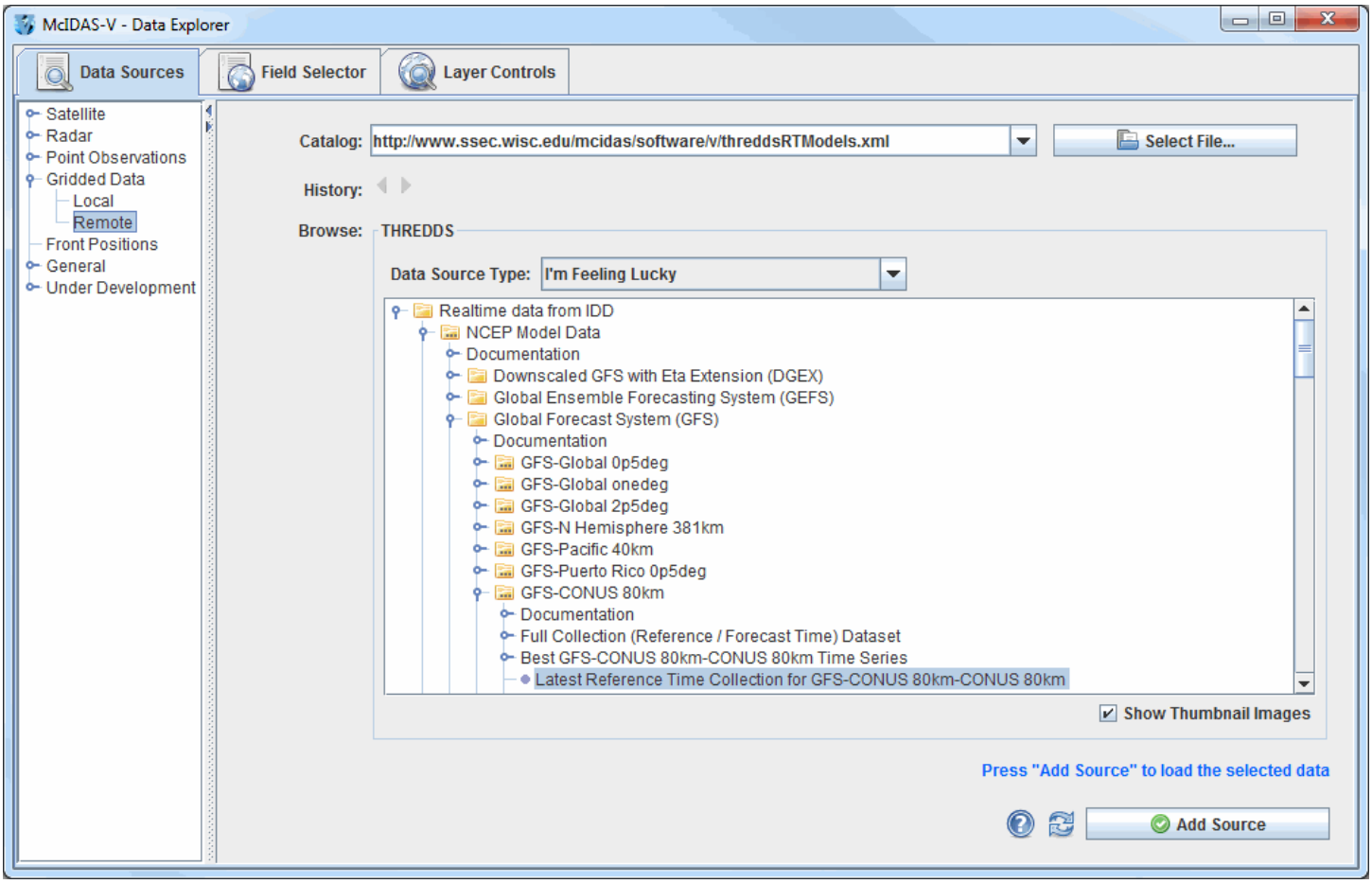


Image 1: Remote Grid Chooser

Properties

Catalog - Represents the catalog you are getting your data from. Enter in a catalog URL (and hit Enter or click **Refresh**) or select a catalog URL from the pull down menu. Use the Select File... button to select a catalog on your local disk.

History - Switches back and forth between selected catalogs by using the and buttons.

Data Source Type - Represents the type of file. If left as "I'm Feeling Lucky", McIDAS-V will figure out what kind of data is in the file by the URL itself. This can be overridden by selecting the type of data the file contains from the pull down menu. For more information, see the list of data formats and sources that are available.

Tree Structure - Contains individual model runs for each of the parent models. Open the tree structure by clicking on the ( ) tab icon. Clicking on a data source will enable the Add Source button.

Show Thumbnail Images - Shows thumbnails in the THREDDS catalog if available.

Help - Brings up this help page.

Refresh - Updates the catalog chooser with the most recent data.

Add Source **-** Loads the selected data.

The following image displays the **Gridded Data->Local** chooser:

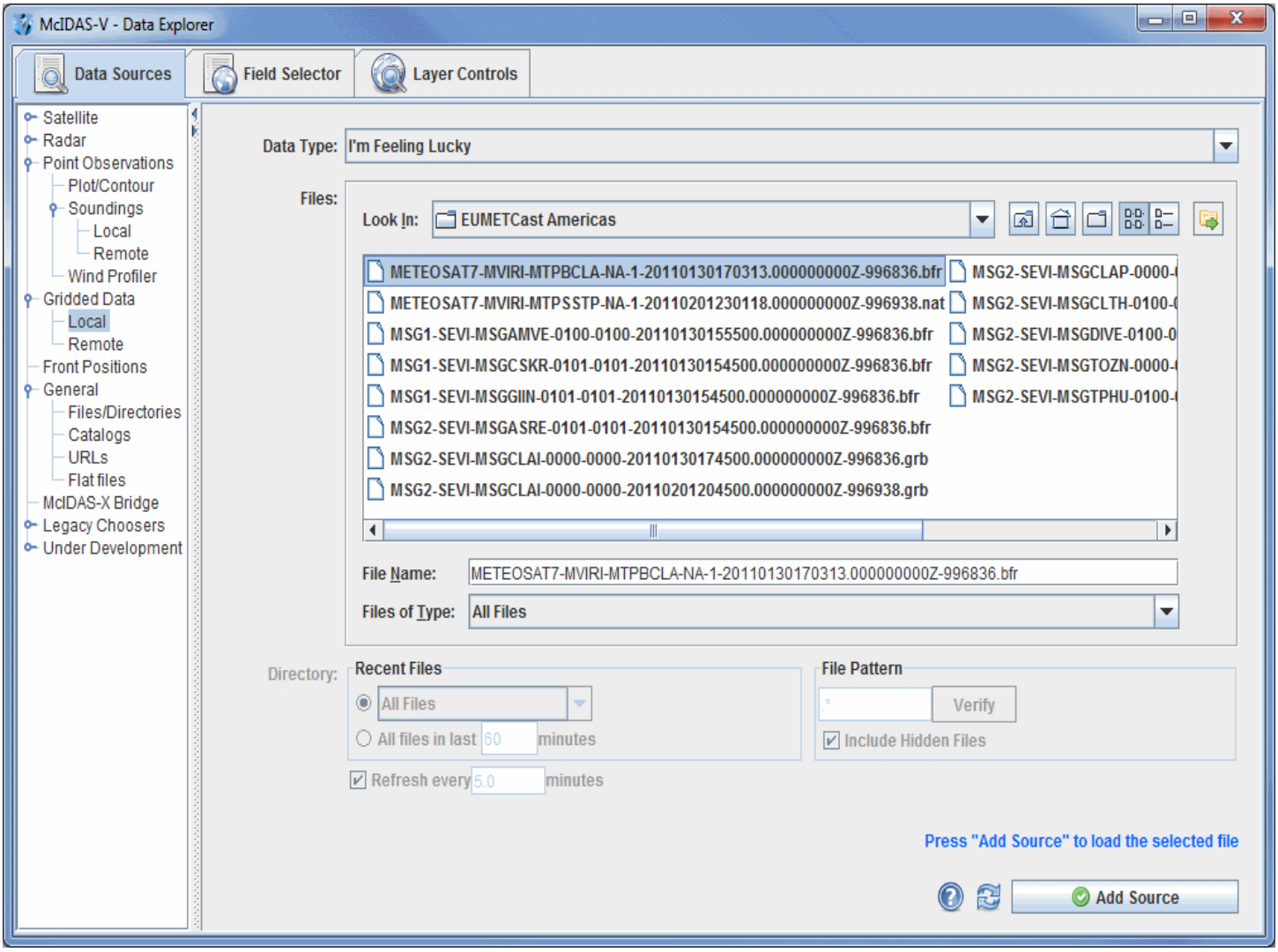


Image 2: Local Grid Chooser

Properties

Data Type - Selects the data type of the data. If left as "I'm Feeling Lucky", McIDAS-V will figure out what kind of data is in the file by the filename itself. This can be overridden by selecting the type of data the file contains from the pull down menu. For more information, see the list of available data source types.

Look In - Selects folders to search for data files via the pulldown menu, or you can double-click on folder names.

Up One Level - Moves you up one folder level in your local file system.

Desktop - Takes you to the Desktop folder of your local file system.

Create New Folder - Creates a new folder.

List - Switches the view to a listing of all folders and files in the current path.

Details - Switches the view to a detailed list of all folders and files in the current path.

Show History Menu - Shows a list of the last 15 folders that data was loaded from.

File Name - Represents the name of the file. Select a file to populate the entry box to show the full name of the file selected.

Files of Type - Narrows down the files shown in a folder to a specific data type.

Recent Files - Lists up to the twenty most recent files. Choose the number of files you want to search for by an absolute number, or by the files that have been updated in a certain number of minutes.

Refresh - Updates automatically the files and their associated displays. Change the number of minutes to control the update frequency.

File Pattern - Selects the file pattern for the files you want to poll on.

Verify - Verifies the files that will be scanned.

Include Hidden Files - Includes hidden files in the polling.

Help - Brings up this help page.

Refresh - Rescans the current directory and update the file chooser if the files have changed.

- Loads the file(s) selected. The data file(s) will appear in the **Field Selector** tab.

Choosing Front Positions

The **Front Positions** chooser allows you to access analysis or forecast fronts on ADDE servers. For more information on using this chooser, see Getting Started - Displaying Fronts.

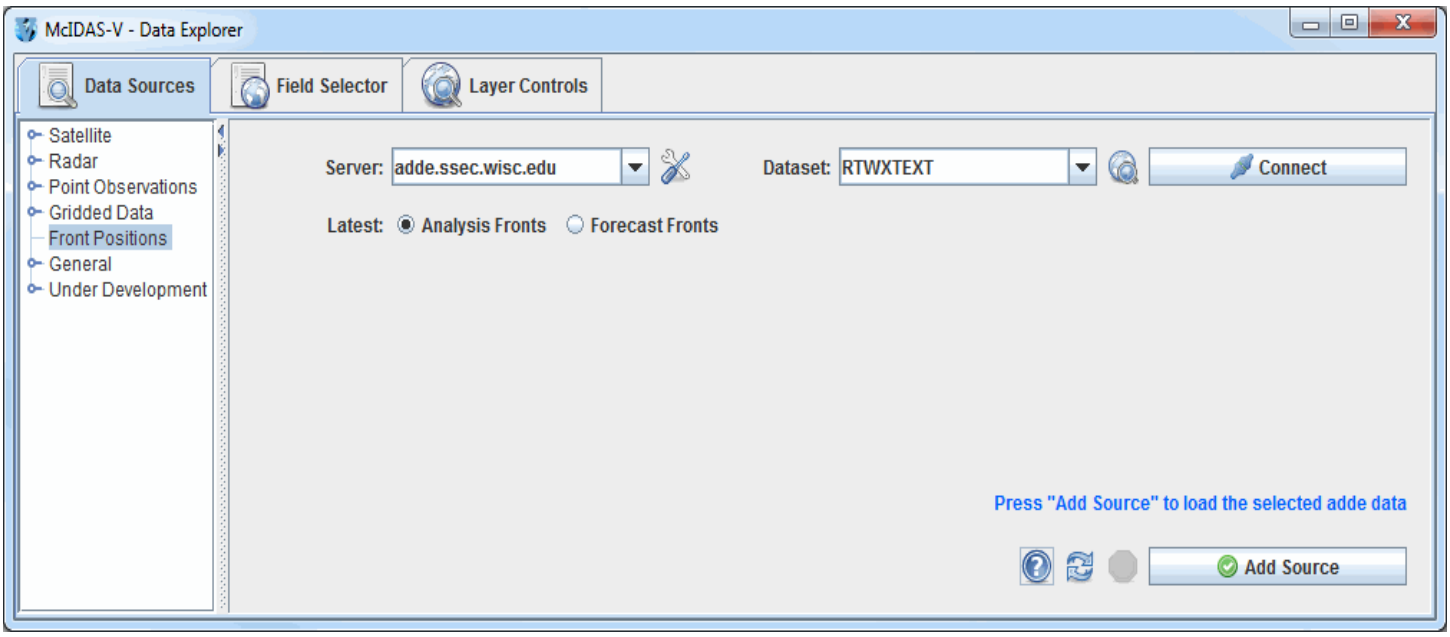


Image 1: Front Chooser

Properties

Server - Selects the server to be used. Enter in a server name or choose one from the pulldown menu. Right click in the entry box to manage your ADDE servers and to delete the server from the list.

Manage - Manages the list of servers by opening the **ADDE Servers** tab of the User Preferences window.

Dataset - Selects the dataset to be used. Enter in a dataset name or choose one from the pulldown menu.

Public Datasets - Lists the public datasets available on the server. This button looks for any datasets contained in the PUBLIC.SRV file on the server. If this file doesn't exist, or if there are no datasets in this file that can be used by this chooser, then no datasets will be returned.

Connect **-** Connects to and queries the server for available times.

Latest - Selects a current analysis or a forecast of fronts.

Help - Brings up this help page.

Refresh - Updates the Front Position chooser with the most recent data.

Cancel - Cancels the query of data. The chooser will reset back to default.

Add Source **-** Loads the selected front data.

Choosing Data on Disk

The **General->Files/Directories** chooser allows you to select data or a directory from your file system. For more information on using this chooser, see Getting Started - Displaying Local Files.

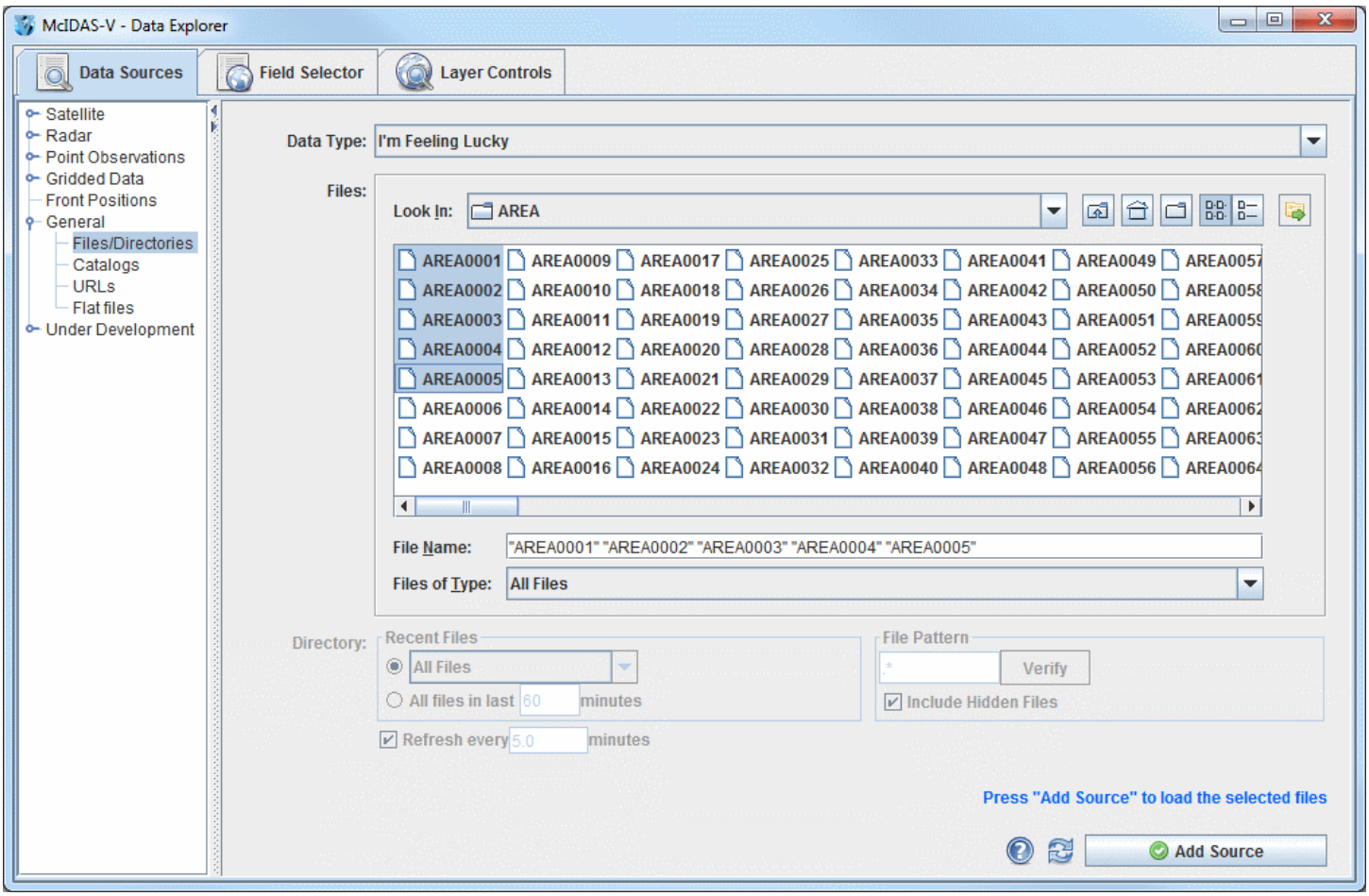


Image 1: File Chooser

Properties

Data Type - Selects the type of data. If left as "I'm Feeling Lucky", McIDAS-V will figure out what kind of data is in the file by the filename itself. This can be overridden by selecting the type of data the file contains from the pull down menu. See the data formats and sources available.

Look In - Selects the folder to search for data files.

Up One Level - Moves you up one folder level in your local file system.

Desktop - Takes you to the Desktop folder of your local file system.

Create New Folder - Creates a new folder.

List - Switches the view to a listing of all folders and files in the current path.

Details - Switches the view to a detailed list of all folders and files in the current path.

Show History Menu - Shows a list of the last 15 folders that data was loaded from.

File Name - Selects the file or files selected.

Files of Type - Narrows down the files shown in a folder to a specific data type.

Recent Files - Selects the number of files you want to search for by an absolute number, or by the files that have been updated in a certain number of minutes.

Refresh - Automatically updates the files and their displays. Change the number of minutes to control the update frequency.

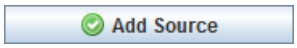
File Pattern - Selects the pattern for the files you want to poll on.

Verify - Verifies the files that will be scanned.

Include Hidden Files - Includes hidden files in the polling.

Help - Brings up this help page.

Refresh - Rescans the current directory and update the file chooser if the files have changed.



- Loads the file(s) selected. The data file(s) will appear in the **Field Selector** tab.

Choosing Cataloged Data

The **General->Catalogs** chooser shows THREDDS catalogs of data holdings on remote data servers (typically TDS or OPeNDAP) and provides access to remote Web Map Server (WMS) image servers. McIDAS-V provides a link to an initial default catalog, idvcatalog.xml, which should appear in the Catalog menu. If not you can directly enter the URL of the catalog: http://www.unidata.ucar.edu/georesources/idvcatalog.xml.

This URL links to a catalog of real time model data, a collection of county level shapefiles for roads and hydrography features, and a collection of useful Web Map Servers. For more information on using this chooser to display grid data, see Getting Started - Displaying Gridded Data.

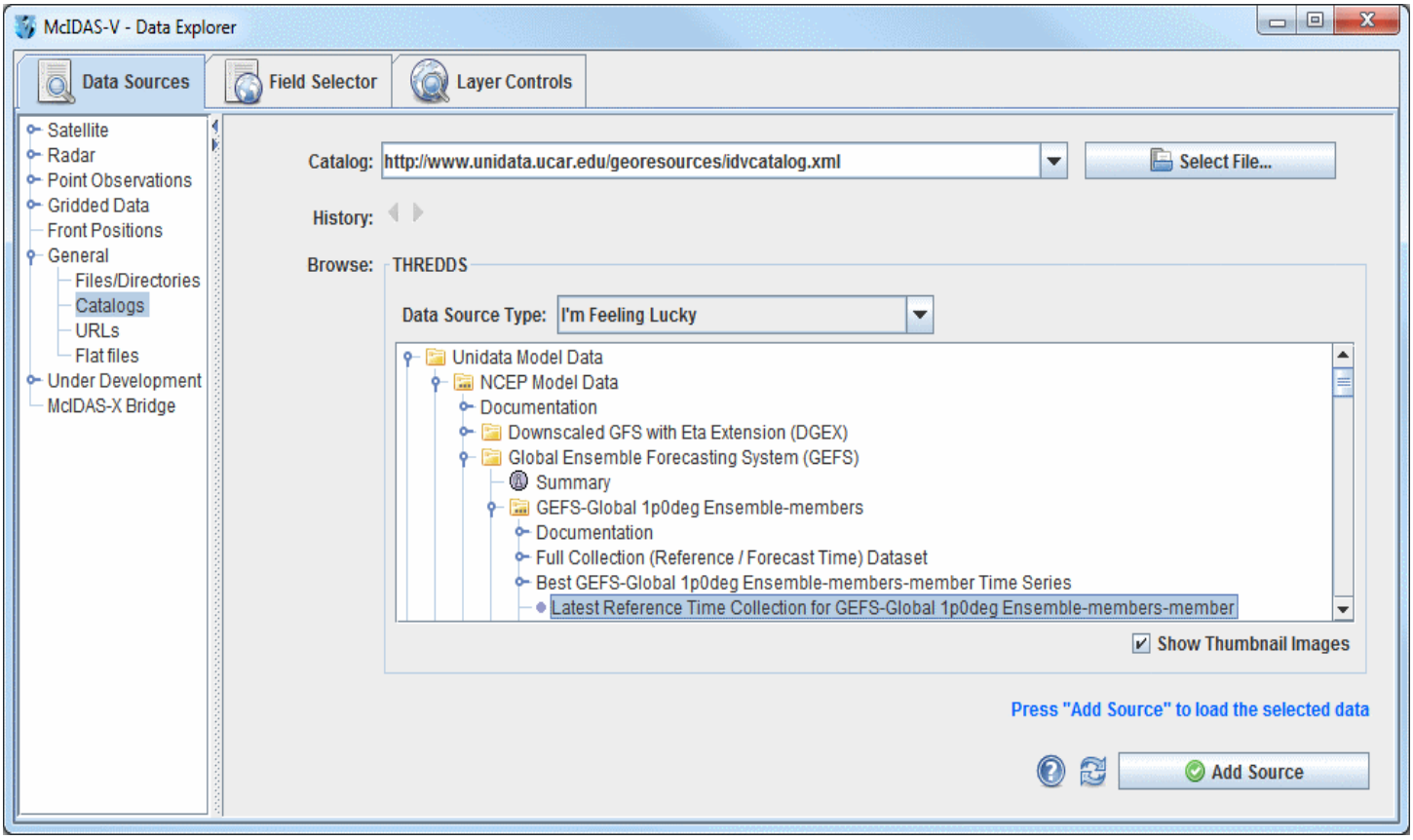


Image 1: Catalog Chooser

Properties

Catalog - Selects the catalog for the data. Enter in a catalog URL (and hit Enter or click **Refresh**) or select a catalog URL from the pull down menu. Use the Select File... button to select a catalog on your local disk.

History - Switches back and forth between selected catalogs with the and buttons.

Data Type - Selects the type of data. If left as "I'm Feeling Lucky", McIDAS-V will figure out what kind of data is in the file by the URL itself. This can be overridden by selecting the type of data the file contains from the pull down menu. See the data formats and sources available.

Tree Structure - Lists all of the data. Open the tree structure by clicking on the ( ) tab icon. Clicking on a data source will enable the Add Source button.

Show Thumbnail Images - Shows thumbnails in the THREDDS catalog if available.

Help - Brings up this help page.

Refresh - Updates the catalog chooser with the most recent data.

Add Source **-** Loads the selected data.

The following image displays the WMS chooser:

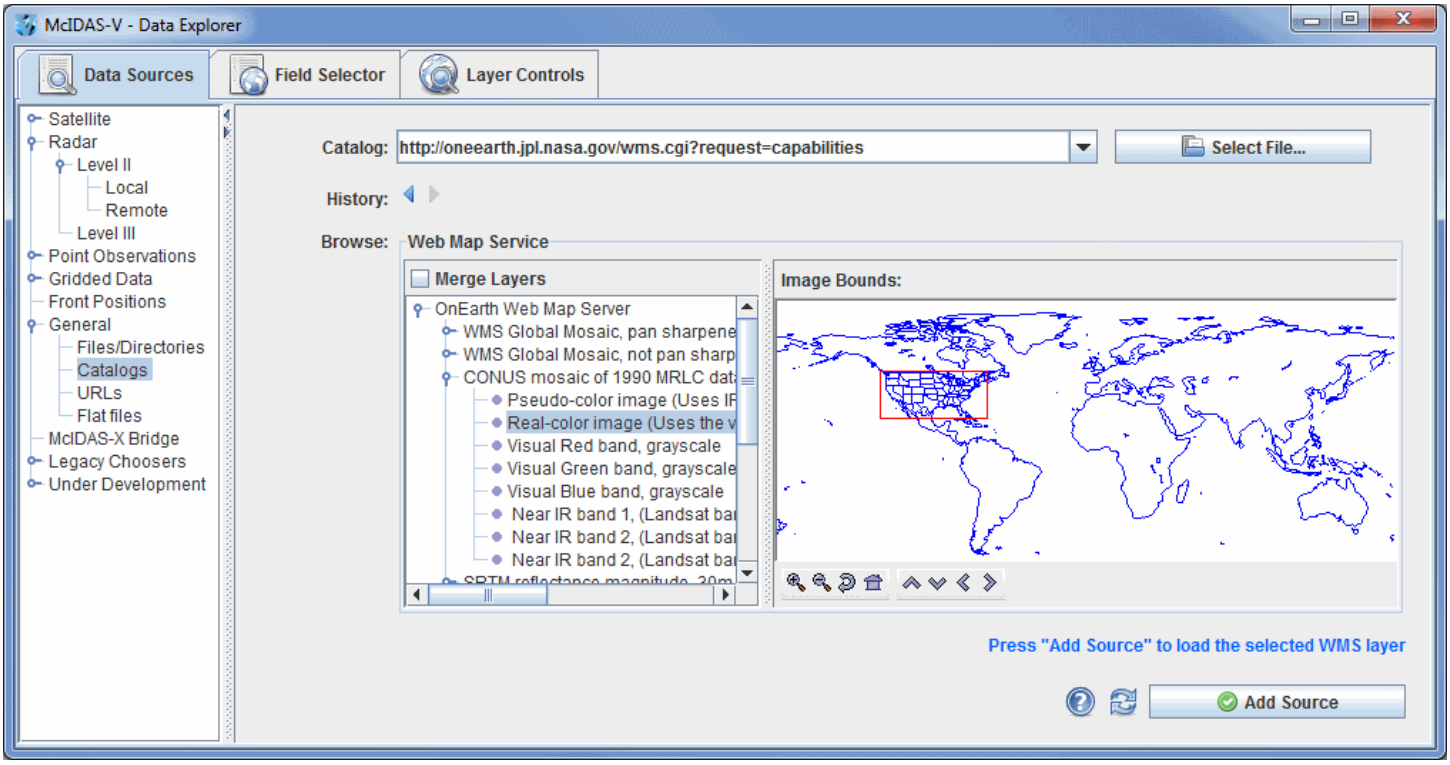


Image 2: WMS Chooser

The tree view on the left shows the different image layers available. You can select one image or use Ctrl+click to select multiple images. The map on the right plots a red box around the bounding area of the particular item selected.

Data files that are imported through the WMS Servers must contain gridded data. Also, the NetCDF-Java Common Data Model must be able to identify the coordinate system used.

Properties

Merge Layers - Selects multiple data sources to be loaded and displayed at the same time. When unchecked, multiple data sources will be loaded, but not displayed.

Image Bounds - Provides an overview of the bounding box area of a selected image. Use the following buttons to navigate around the map:

- **Zoom In** - Zooms in over the current map area.
- **Zoom Out** - Zooms out over the current map area.
- **Previous Map Area** - Returns to the previous map area.
- **Home Map Area** - Returns to the default map area.
- **Move View Up** - Moves the view up (map down).
- **Move View Down** - Moves the view down (map up).
- **Move View Left** - Moves the view left (map right).
- **Move View Right** - Moves the view right (map left).

Choosing a URL

The **General->URLs** chooser allows you to specify the internet location (URL) of a data source. This URL may be a web page, a bundle or any data file that McIDAS-V can process from a URL. For more information on using this chooser, see Getting Started - Displaying Files from a URL.

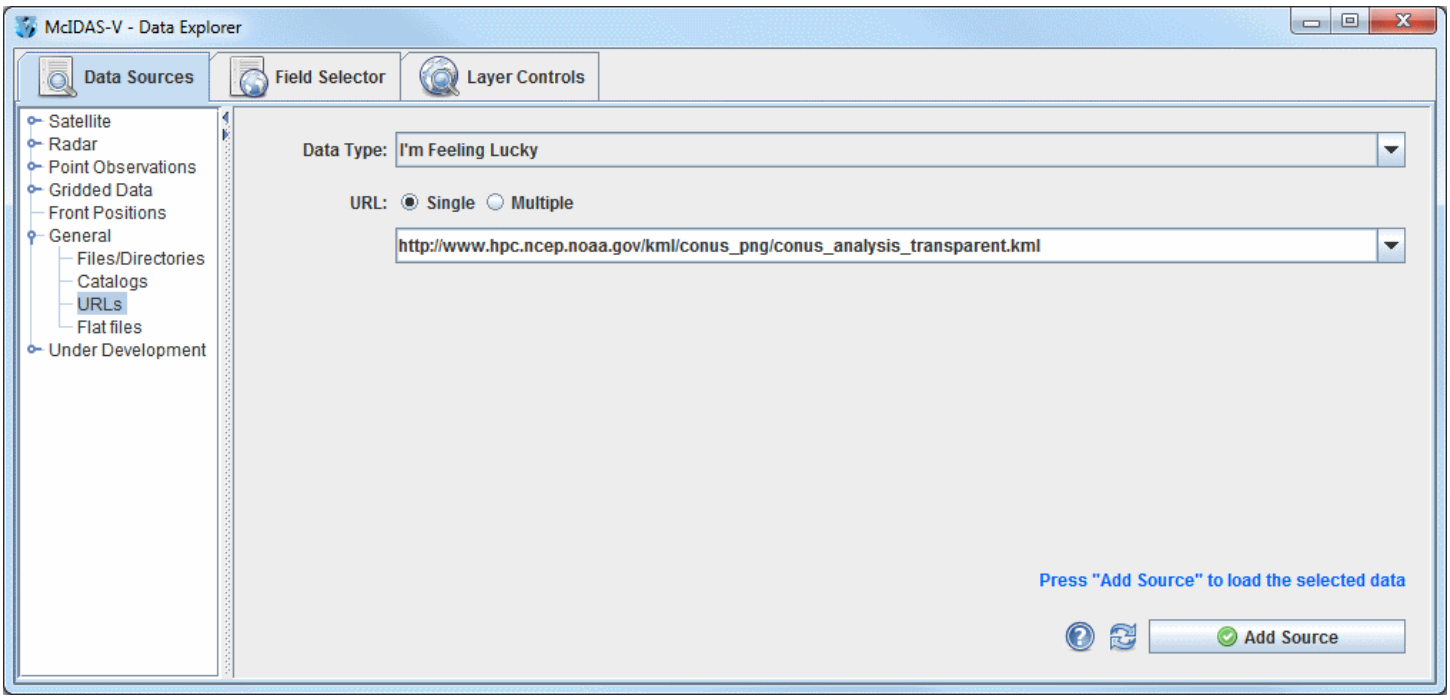


Image 1: URL Chooser

Properties

Data Type - Selects the type of data. If left as "I'm Feeling Lucky", McIDAS-V will figure out what kind of data is in the file by the URL itself. This can be overridden by selecting the type of data the file contains from the pull down menu. See the data formats and sources available.

URL - Selects the URL location of the data. Enter in a URL or select one from the pull down menu. Change the radio button to single to enter in one URL. Change it to Multiple to enter in multiple URL entries. Only URL's using http will load data. Any URLs entered in either single or multi-line mode will be remembered between sessions.

Help - Brings up this help page.

Add Source **-** Loads any URLs entered as data sources in the Field Selector.

Choosing Flat File Data

The **General->Flat files** chooser allows generic flat (2-dimensional) data to be loaded. The user must supply information about the format of the data by either specifying it directly or by loading a properly formatted header file. Flat files can be binary, ASCII values, or standard images (JPEG, GIF, etc.), and may contain multiple bands. Navigation may be loaded via separate navigation files or by specifying a bounding box for the data.

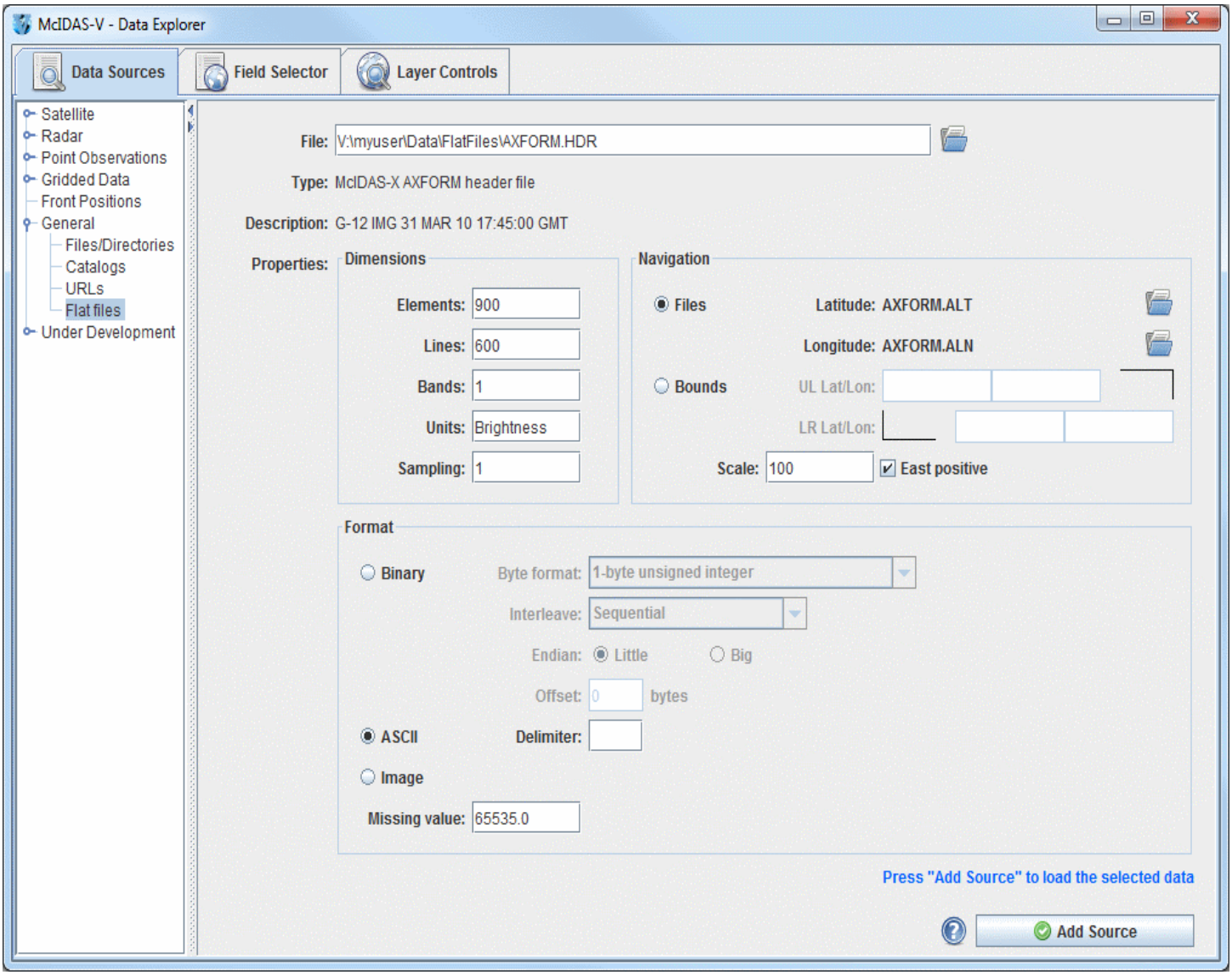


Image 1: Flat File Chooser

Properties

Files - Selects the file. Enter in a file location or use the button to browse your local disk.

Type - Selects the file type. McIDAS-V will attempt to determine the type of file you are loading. If it is an unknown format, **Binary, ASCII or Image data** will be displayed.

Description - Displays a description of the data if available. If no description can be found, the file name is displayed.

Properties->Dimensions -

Elements - Lists the number of elements (columns) in the data.

Lines - Lists the number of lines (rows) in the data.

Bands - Lists the number of bands (layers) in the data.

Units - Lists the unit type of the data.

Sampling - Sets the number of points to skip in each dimension when loading the data. This is useful with very large data files.

Properties->Navigation -

Files - Specifies navigation files containing grids of Lat/Lon points by specified by clicking on the button.

Bounds - Specifies a navigation bounding box by entering Upper Left (UL) and Lower Right (LR) Lat/Lon pairs.

Scale - Specifies the scaling factor if the Lat/Lon navigation dimensions if different than the data.

East positive - Indicates that the longitude values are East positive.

Properties->Format -

Binary - Represents fields necessary when loading Binary data. When loading binary files the **Byte format**, **Interleave**, and **Endian**-ness must accurately describe the data. A byte **Offset** into the data can also be given.

ASCII - Specifies the **Delimiter** field when loading ASCII files.

Image - Represents that a raw image has been selected.

Missing value - Specifies missing values from the data.

Help - Brings up this help page.

- Loads the selected data.

Field Selector

The **Field Selector** tab of the Data Explorer is used to list the loaded data sources, view their available fields, select a display type, subset (time and space) the field and create displays.

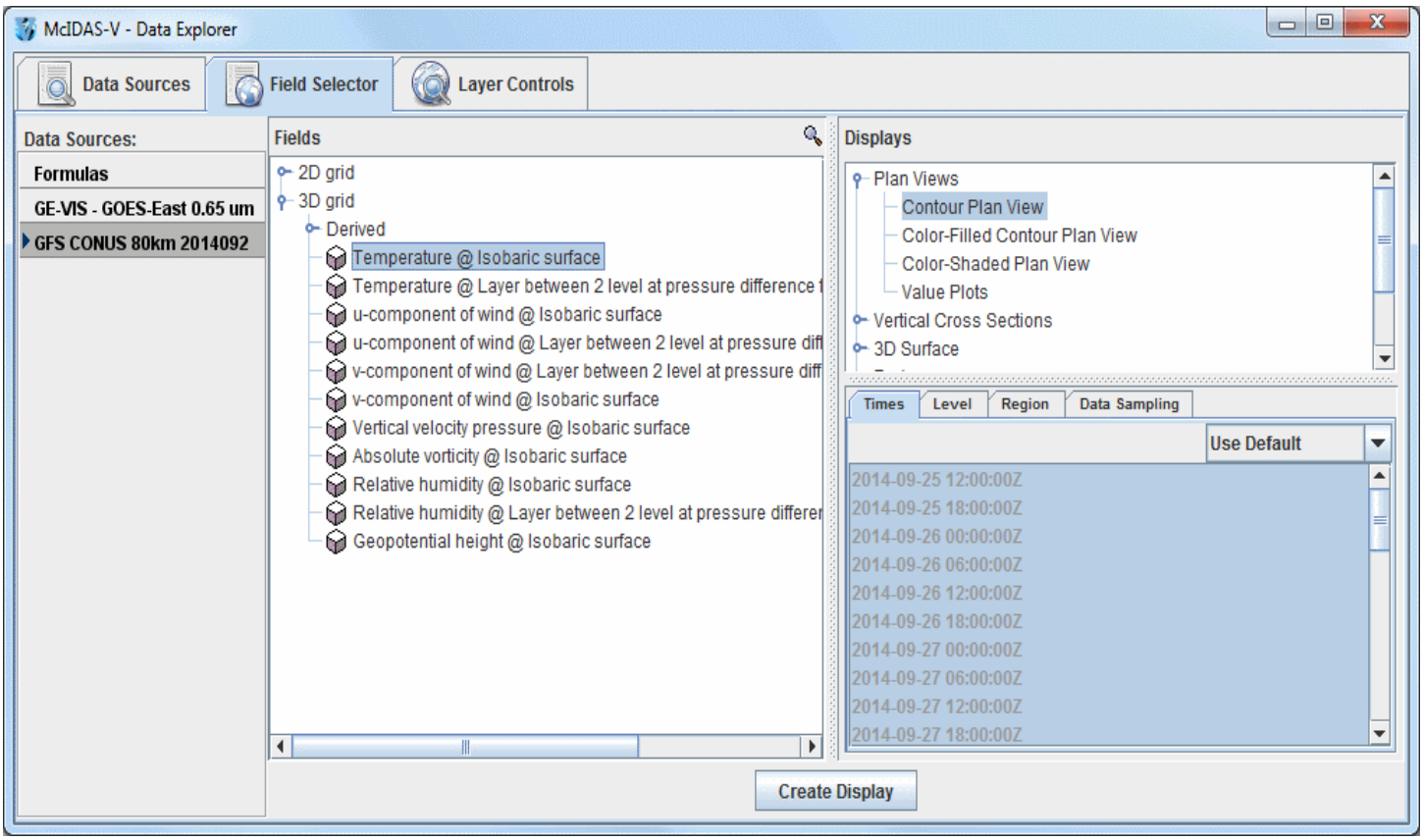


Image 1: Field Selector Tab

The **Field Selector** consists of four main panels:

- Data Sources
- Fields
- Displays
- Data Subset

Data Sources

The **Data Sources** panel lists the data sources currently loaded into McIDAS-V and provides access to both the user-made and native formulas. The data sources listed are chosen as described in the Data Sources page. The selected item is the data source that lists out its fields in this tab:

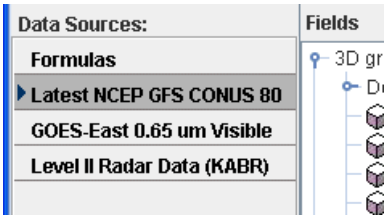


Image 1: Data Sources Panel

To set the defaults for a data source bring up the Properties dialog by right-clicking (or double-clicking) on the data source name in the **Data Sources** panel of the **Field Selector** tab and select **Properties** (note that the items in this menu will differ dependent on the data source type):

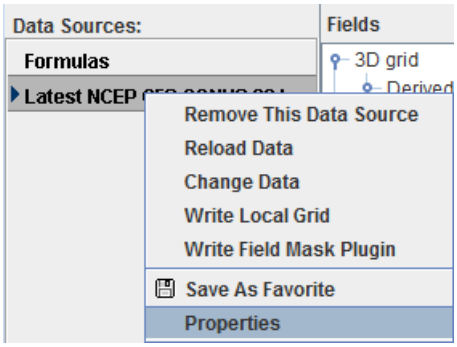


Image 2: Data Sources Panel Properties

Properties

Remove This Data Source - Removes the data source from the McIDAS-V Session.

Reload Data - Reloads the data. This allows for data to be updated to a more recent time without having to go back to the **Data Sources** tab to reload it.

Change Data - Opens a 'Change data for:' window. This window looks almost exactly like the Data Explorer and works the same. This selects a new data source to load in and replace the existing one.

Write Local Grid - Saves the data as a grid as a netCDF file (*.nc). This opens a window where a user can select what fields in the selected data source will be written to the grid. In the Save dialog, there is an option for 'Change data source'. When this is selected, the data source in the Field Selector will change to only list the fields that were written out to the local grid.

Write Field Mask Plugin - Saves the data source as a Jar file (*.jar). This opens a 'Data Source Field Mask File' window, where a user can select what parameters to show, hide, or write to a plugin.

Make Data Source Local - Generates McIDAS AREA files form an imagery data source. The only calibrations that can be written to the AREA are those that have been previously displayed in the session. When selecting the directory to write the AREA file to, there is a text field for **Prefix**. By default, this will be populated with text about the data source (for example: *GE-IR-GOES-East10.7umIR*). Regardless of how this field is set, the output file will be appended with information about the band number and position. For example, a default output file may be named *GE-IR-GOES-East10.7umIR_Band4_Unit_Pos0.area*.

Save As Favorite - Saves the selected data source as off as a *.xidv bundle in your /User/McIDAS-V/datasources directory. This file can be loaded in as a bundle, and the data source will be added.

Properties - Opens the data source's Properties window.

The Properties window is different for different types of data sources. Below is the Properties window for a gridded data source:

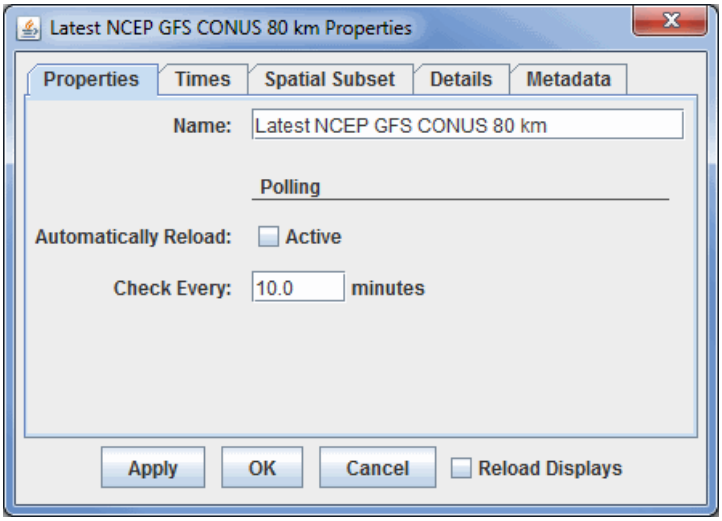


Image 3: Properties Tab of the Data Sources Properties Window

Properties

Name - Sets the name of the field to poll. This is how the item will list in the **Data Sources** panel of the **Field Selector**. This is also the text of the %datasourcename% macro once the data is displayed.

Automatically Reload - Reloads the data from the data source automatically when the **Active** checkbox is checked.

Check Every - Sets how often McIDAS-V will check to see if the data source has been updated.

Reload Displays - Reloads the display once **Apply** or **OK** is selected.

Time Binning

For point data you can define Time Binning settings (not shown) by selecting a Bin Size (e.g., 5 minutes, 1 hour) and a Round To value (e.g., On the hour, 15 minutes after the hour). This will map all the observation times into the nearest bin. The smallest time is rounded with the Round To value (e.g., if Round To was "10 after" and the smallest time was 10:23 then this time would be rounded to 10:20). This is the base time. Each actual observation time is mapped into a set of bins of Bin Size starting at the base time.

Times

The **Times** tab allows you to select the times to use. Change the dropdown menu from **Use Default** to **Use Selected** to select individual times. If **Use Selected** was chosen, right click in the list to show a menu that allows for selecting different subsets (e.g., every 3rd time).

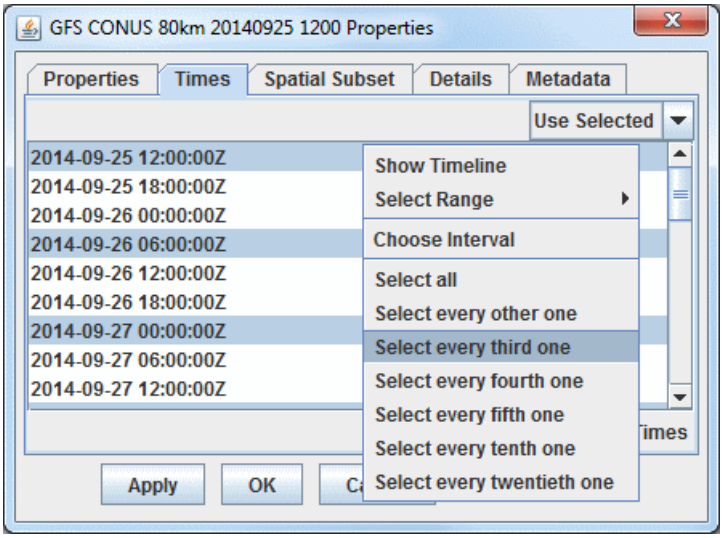


Image 4: Times Tab of the Data Sources Properties Window

Spatial Subsetting

For grids and other data source types, the data can be subsetted and decimated with the **Spatial Subset** tab. The **X Stride**, **Y Stride** and **Level Stride** lists allows for decimating a grid, selecting every Nth point. The **Bounding Box** allows for defining a spatial area to load. The default spatial domain of the data is shown by the blue outline box. To select an area, left click and drag on the map. Alternatively, enter in Lat/Lon values in the fields to the left of the map and press Enter. Once a subset is selected it can be resized (grab on the little black selection points) moved (grab somewhere near the box) and delete (press the Delete key).

Subsetting can be useful when displaying an image that has a high resolution or covers a large spatial area as a Contour Plan View or Color-Filled Contour Plan View display. Instead of having McIDAS-V take the time to compute values between every point, a user can set a stride where only every Nth point will be taken into consideration. If a very detailed image is needed, it is recommended that stride is kept at the default (none). However, if a user is looking to get a general picture, the stride feature can be a time-saver.

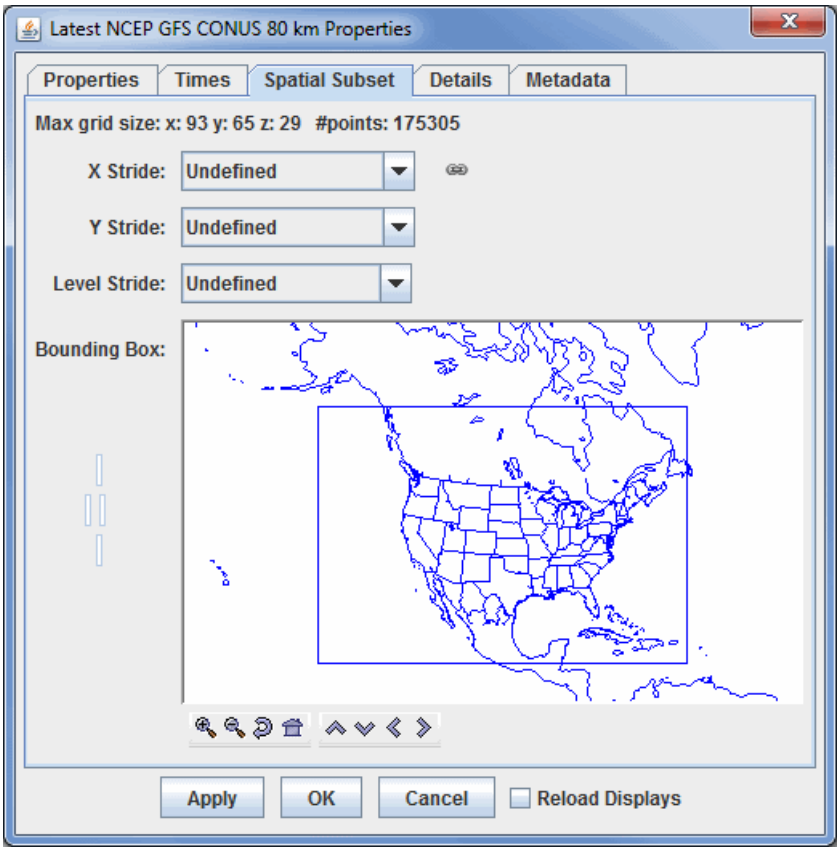


Image 5: Spatial Subset Tab of the Data Sources Properties Window

A version of this spatial subsetting window is used in the **Field Selector** tab of the Data Explorer. Here, a user explicitly enables these settings. The decimation and spatial subset are shown in different tabs:

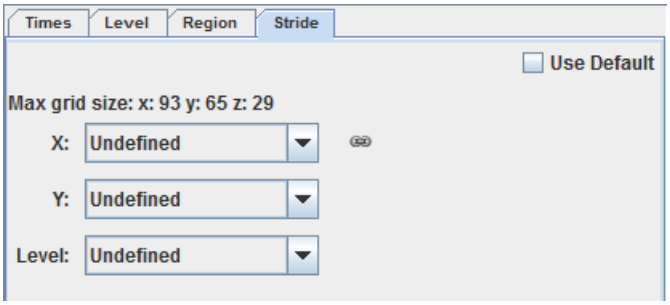


Image 6: Subset Panels in the Field Selector

Details

The **Details** tab shows further information about the data source, e.g.: any documentation associated with the data, what files or URLs are used, etc.

Metadata

For grid data sources the **Metadata** tab shows the NetCDF metadata information.

Objective Analysis

The **Objective Analysis** tab is available if working with Point Data.

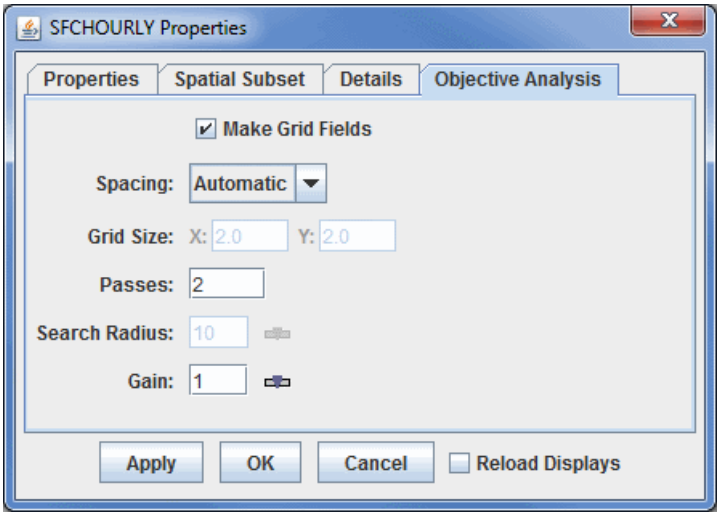


Image 7: Objective Analysis Tab of the Data Sources Properties Window

Properties

Make Grid Fields - Allows point data to be plotted in as a grid display. If this option is unchecked, then the Gridded Fields and Gridded Fields (with first guess) will not be available in the **Fields** panel of the **Field Selector**. Also, if this option is not selected, any other items in this display will have no effect on the final display. This option is checked on by default.

Spacing - Determines the grid spacing method.

Automatic - Calculates grid spacing from observation density.

Degrees - Uses a specific lat/lon spacing fro the grid spacing.

 # Points - Sets the number of grid points in the x and y direction.

Grid Size - Sets the X and Y spacing in spacing units. This is an option if Degrees or # Points is selected for Spacing.

Passes - Sets the number of passes for the Barnes analysis to do. Four passes are recommended for analyzing fields where derivative estimates are important (Ref: Barnes 1994b), three passes recommended for all other fields (with gain set to 1.0) (Ref: Barnes 1994c "Two pass Barnes Objective Analysis schemes now in use probably should be replaced by appropriately tuned 3pass or 4pass schemes"), and two passes are only recommended for "quick look" type analyses.

Search Radius - Sets the search radius (in grid units) for the weighting of points in determining the value at a specific grid point. This should be in the range 0.2 to 1.0. Data are fitted more closely with a gain of 0.2 (at the expense of less overall accuracy over the entire grid), larger values smooth more.

Gain - Represents the factor by which scaleLength is reduced for the second pass. This should be in the range 0.2 to 1.0. Data are fitted more closely with a gain of 0.2 (at the expense of less overall accuracy over the entire grid), larger values smooth more. Suggested default: 1.0. Set the gain for each pass after the first.

Formulas

A user can create their own formulas using the McIDAS-V Formulas facility. The **Formulas** data source in the **Field Selector** is a special data source and lists all of the available end user formulas. Right-click on the data source to create new formulas and import and export formulas. The formulas are listed in the Fields tree. Right-clicking on one of the formulas listed in the Fields tree allows for editing, copying or evaluating the formula. This menu also provides access to the Jython Library and Jython Shell.

A user can select a formula just like any other Field and create a display from it. However, the formula, when evaluated to create the display, usually needs one or more other data fields to act on. In this case a special **Field Selector** window appears that allows the user to select the fields for the formula. (Note: The Fields selected here can also be Formula Fields resulting in further Field selection).

Fields

The **Fields** panel displays the list of data choices for the selected data source:

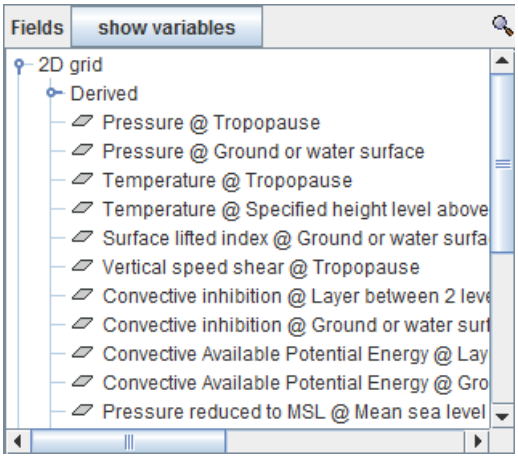


Image 1: Fields Panel in the Field Selector

Selecting a data source in the **Data Sources** panel will list the available fields in the **Fields** panel. This list is usually hierarchical showing different categories of fields (e.g., 2D grids, 3D grids, image sequences, etc.). Note that these fields can be searched through these fields by clicking the button above the **Fields** panel. This allows for typing in the desired field without having to go through the entire list. To see the fields under a particular category, click on the toggle icon ( ).

If a NetCDF formatted data source is populating the **Fields**, a button will appear next to **Fields** for "show variables" show variables. This is the default for the field listing, and will list the longname of each field included in the data source (also the %longname% macro used in the display). An example of a longname field would be "Pressure reduced to MSL @ Mean sea level". For many NetCDF data sources, this will provide a descriptive listing of each field in the file. When this "show variables" button is clicked, the button will change to say "show descriptions" show descriptions, and the fields will change to list by their shortname included with the data source (also the %shortname% macro used in the display). An example shortname field would be "Pressure_reduced_to_MSL_msl". Both the longname and shortname of each field can be seen by mousing over a field name. Note that this button will not be available if the data source is not NetCDF.

Selecting a field will show the list of display types available in the **Displays** panel and subsetting information (e.g., times, spatial subset). The fields listed in the initial tree (in the above case, 3D and 2D) are all native to the data source. The fields listed under the Derived tree are produced from formulas that are applied to the native fields.

Derived Parameters

McIDAS-V provides derived parameters; parameters not provided by the original source data, but made from the source data with computations by McIDAS-V. This provides commonly used fields, such as dewpoint. While dewpoint is not included in the native fields of the data, it can be derived from humidity and temperature, where are native fields.

Since few data sets use the same names for parameters, McIDAS-V keeps of a list of "aliases" or particular parameter names that match with "canonical" names which are generally understood by all McIDAS-V users and which McIDAS-V uses for computations. Users can add their own special parameter names to the list of aliases. See the Parameter Alias Editor section for information on using that facility.

All needed source parameters for one derived parameter must come from one single data source (e.g. from one single netCDF file). McIDAS-V attempts to find derived parameters that can be made from data in each data source in the **Data Sources** panel, but not from all possible combination of data sources. If there are two data sources, one has the u-component and the other has the v-component of the wind, for example, the parameter names or aliases will not create derived wind vectors.

Displays

The **Displays** panel lists the display types applicable to the selected field. The display type you select will be used to display your data in the Main Display window or the **Layer Controls** tab of the Data Explorer. Note that the displays listed in this panel will be different depending on the type of data you are loading in.

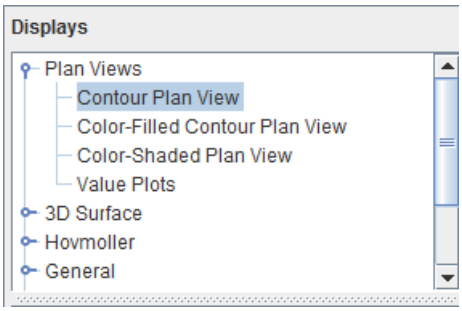


Image 1: Displays Panel in the Field Selector

Creating Displays

The **Displays** panel shows a hierarchical list of the available displays for a particular field. Click on the type of display you want from the choices listed in the **Displays** panel. There are a variety of different display types that are unique to particular types of data. For more information, see the Examples of Display Types pages.

You can select two or more displays (different display types) at one time. For an additional display, hold down the Control key and click on the second display type desired.

Data Subset

The **Data Subset** panel contains tabs for subsetting **Times**, **Levels**, **Region**, and **Stride**. These tabs may be different depending on the type of data.

The **Times** tab allows for selecting which times will be used in the display, as well as for matching or setting a time driver:

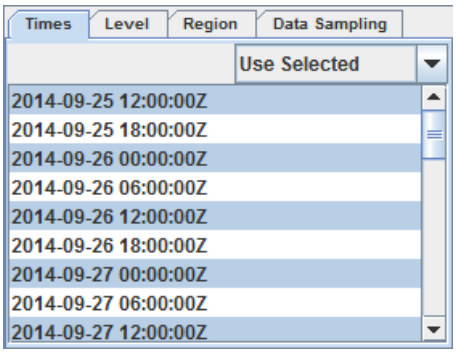


Image 1: Times Tab of the Subset Panel in the Field Selector

There are four different modes when selecting what times of data to display:

Use Default - Selects all times included with the data source.

Use Selected - Allows for selection of individual times to display with Ctrl+click or Shift+click. Alternatively, subset the times by right-clicking in the panel and selecting 'Select every N'th time'.

Match Time Driver - Selects times that match the time driver, assuming one has been set. For more information on **Match Time Driver**, see Time Matching.

Sets As Time Driver - Sets the times being displayed as the time driver. For more information on **Set As Time Driver**, see Time Matching.

The **Level** tab allows for subsetting levels for 3D grids. This sets the level in the atmosphere that will be used to plot the data in the Main Display window:

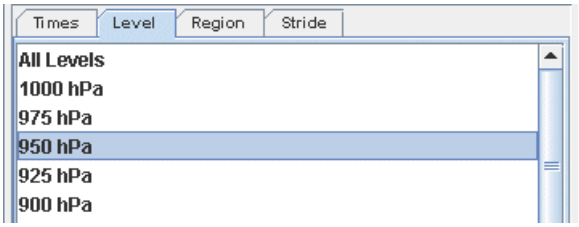


Image 2: Level Tab of the Subset Panel in the Field Selector

For images, optionally subset the spatial area to be displayed. Use the **Region** tab to left-click and drag to select a geographical region to display. In the Main Display window, the display will be centered around your box and no data will be plotted outside of it. Note that before subsetting a region, you may have to uncheck the **Use Default** checkbox:

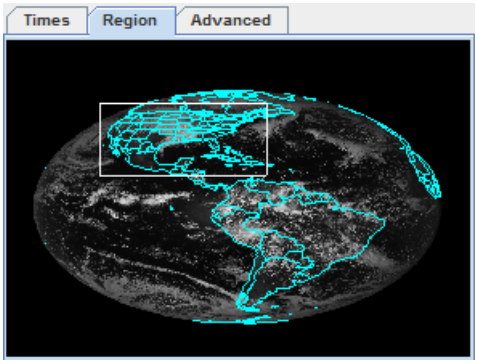


Image 3: Region Tab of the Subset Panel in the Field Selector (Satellite)

Note that the **Region** tab is different for some data sources. For example, here is the **Region** tab when working with gridded data:

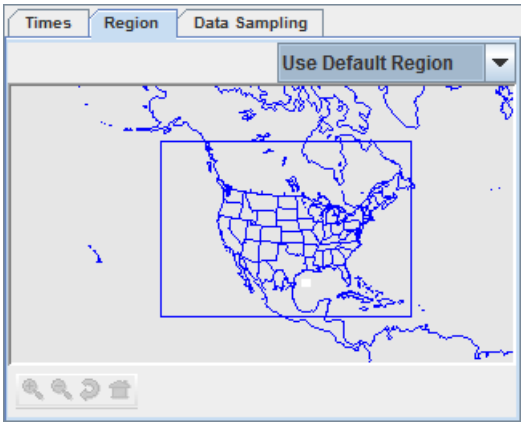


Image 4: Region Tab of the Subset Panel in the Field Selector (Grid)

Use the dropdown menu to select what geographical region to display the data over:

Use Default Region - Displays the default, full geographical region of the data.

Select A Region - Allows for drawing a bounding box for where to display the data.

Match Display Region - Displays only data that fits within the geographic boundaries of the active panel in the Main Display window.

Use the **Advanced** tab to further refine the data selection and refer back to the **Region** tab to view the image you've selected:

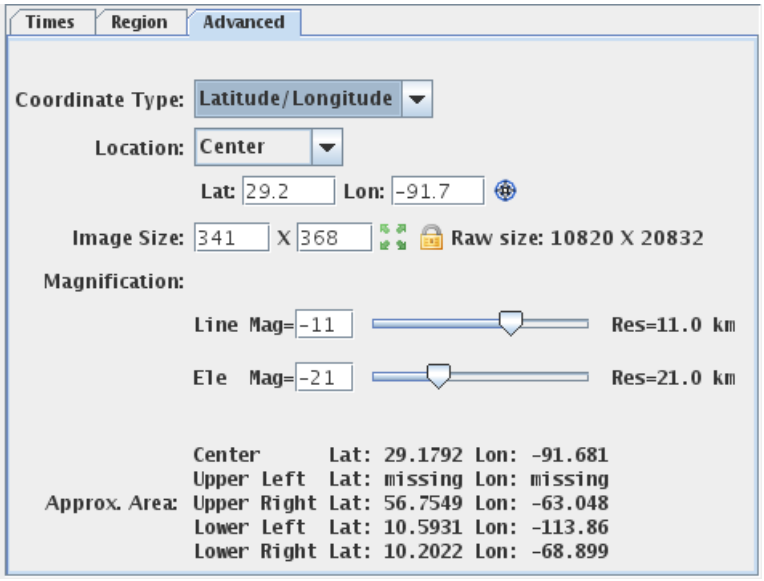


Image 5: Advanced Tab of the Subset Panel in the Field Selector

Properties

The image properties in the **Advanced** tab allow for overriding the default properties McIDAS-V uses to specify aspects of the image data. The widgets show the defaults McIDAS-V will use. Changing any of the widgets can override the default value.

Coordinate Type - Changes the coordinate type used to specify the data location.

Latitude/Longitude Coordinates - Specifies Latitude and Longitude values of the image to be used by the **Location** field. Note that McIDAS-V cannot read latitude and longitude values for loops of polar data where the navigation changes. If displaying a loop of polar data, **Image Coordinates** should be used to ensure the images will be displayed.

Image Coordinates - Specifies the line and element values of the image itself to be used by the **Location** field. The upper left point is specified by (1,1) and each pixel in the image has its own, unique pair.

Area Coordinates - Specifies the area coordinate of the image to be used by the **Location** field. This is based off the size of the area and referenced in terms of line/element. The upper left point is specified by (0,0) and each pixel has its own, unique pair.

Location - Specifies the placement point of the image at either the center or the upper left.

Lat/Lon - Specifies the location of the image with respect to latitude and longitude. Note that if **Image** or **Area Coordinates** is selected in the **Coordinate Type** field, these fields will be **Line/Element**.

Line/Element - Specifies the location of the image with respect to line and element.

Center Display - Centers the image over the center, upper left, upper right, lower left, or lower right latitude and longitude coordinates of the of the current main display.

Image Size - Changes the size of the image.

Lock Image Size - Changes size automatically when changing magnification when unlocked.

Full Resolution - Sets the image size to the full resolution size of the image.

Raw Size - Lists the full size of the image on the server.

Magnification - Changes the magnification of the image, or manually type the **Line** and **Ele** magnification in the **Mag=** fields.

Res - Lists the approximate resolution of the image, if displayed with the current Image Properties.

Approx. Area - Lists the center, upper left, upper right, lower left, and lower right coordinates of the selected image, if displayed with the current Image Properties.

Use the **Data Sampling** tab to change the number of points used to create the image. Fewer points along the X and Y-axes will display the data faster, but with less precision. It is recommended to leave the X and Y values as their default (all points) unless a general picture and nothing too specific is the overall goal.

Use the **Settings** tab to utilize any display settings that may have been set.

Subsetting

The Subsetting component of the **Field Selector** allows for subsetting the data in both time and space (if possible). If there are times in the data source they will be shown in this area. Likewise, if it is possible to do spatial subsetting or decimation. a **Spatial Subset** tab will be shown.

Time and spatial subsetting defaults can be applied to the data source itself through the Data Source Properties dialog or the defaults can be overwritten through the **Field Selector** tab.

Layer Controls

The **Layer Controls** tab of the Data Explorer is used to modify an existing display. The options to choose from in this tab will vary depending on the data source and field selected.

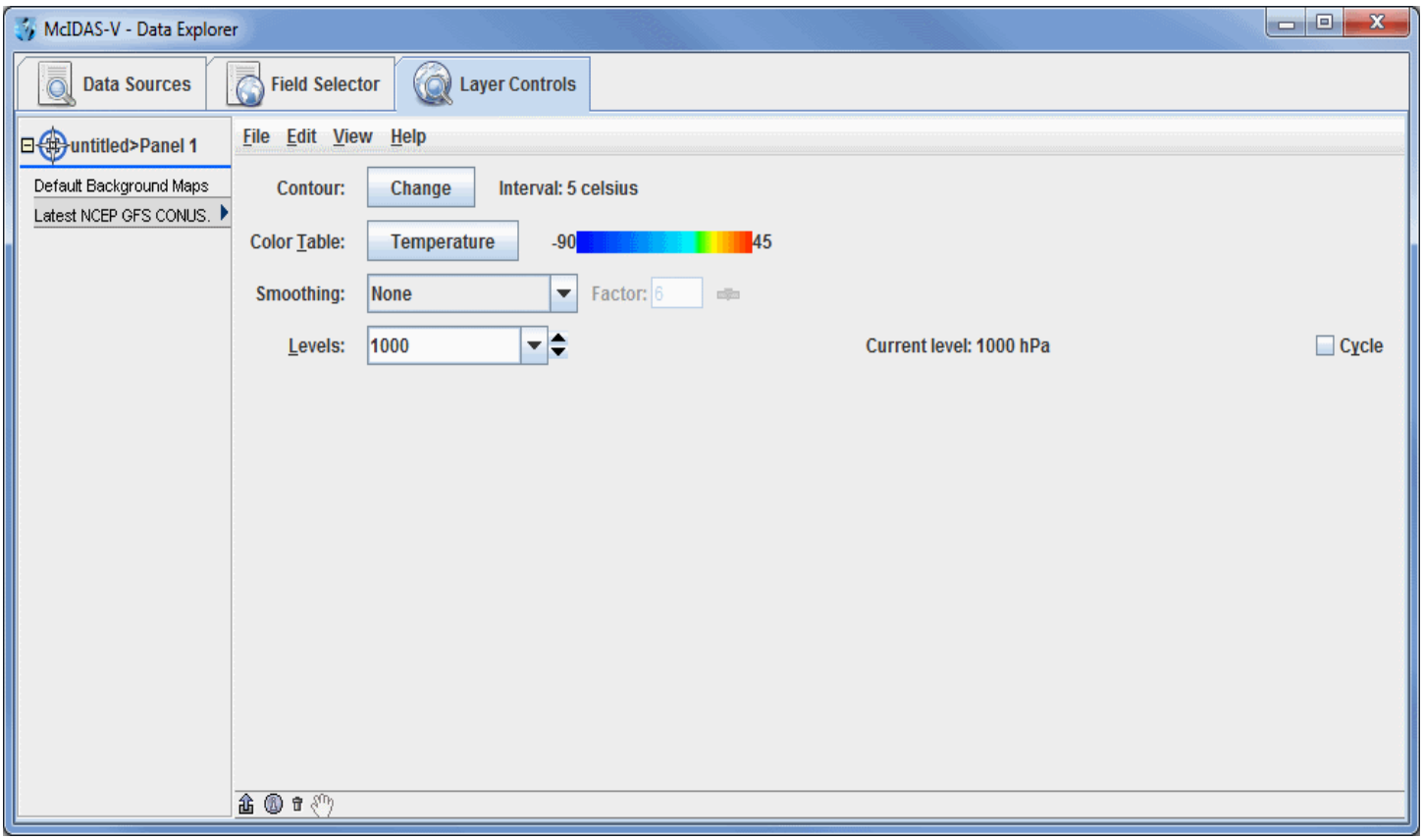


Image 1: Layer Controls Tab

This section describes the specifics of the **Layer Controls** tab for different data sources and fields, including the following:

- Gridded Data Displays
- Satellite and Radar Displays
- Probes
- Mapping Controls
- Observation and Location Controls
- Miscellaneous Controls
- Properties Dialog
- Color Scale
- Charts
- Ensemble Grid Controls

There are some general features of the **Layer Controls** tab that are consistent with every display, which are described below.

Options

- Provides a dropdown menu with options to move the Main Display window to the front displaying the selected tab, and allows for accessing the View and Projections menus of the Main Display window.

These options are found at the bottom left corner of the **Layer Controls** tab of the Data Explorer.

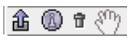


Image 2: Options in the Layer Controls Tab

Properties

Undock Control Window - Undocks the selected controls from the Data Explorer. The Control Window can be redocked by selecting **View->Dock in Data Explorer**.

Show Display Control Properties - Opens a Properties window, where a user can control basic settings, add a color scale to the Main Display window, change the times being displayed, or change the spatial subset of the data.

Remove Display Control - Removes the selected display from the Data Explorer and from the Main Display window.

Drag and Drop to a Window Component - Allows for moving a layer from one panel/tab to another. This is done by selecting an item to move from one panel/tab to another by clicking on the item. Once the item is selected, click on the **Drag and Drop to a Window Component** icon, and while holding down the left mouse button, drag the mouse to the desired panel/tab and release the mouse click when over the desired panel/tab name, represented by the symbol. This will bring the selected field to the desired panel/tab in both the **Layer Controls** tab of the Data Explorer and in the Main Display window.

Menus

All parameters share a common set of **File, Edit, View**, and **Help** menu items, shown in the menu bar of the **Layer Controls** tab. Different controls may also have custom items in these menus as well.

The **File** menu has these common choices:

Remove Display - Removes the display.

Save - Saves the state of the display.

Save Data in Cache - Saves the current data of the display in a Cache Data Source as a new field. The user will be prompted for the name of the field. This can be used in a variety of ways:

After calculating a complex formula, selecting operands for the formula, etc., to create the data in a display a user can save the formula and the data that was calculated. Then new displays can be created from that formula without having to reselect the operands and recalculate the final data.

The Web Map Server (WMS) display allows for the capturing of the image and then making use of it in formulas and in other displays. For example, the image can be draped over topography.

Export Displayed Data to NetCDF - Saves the data in the NetCDF (*.nc) format.

Save As Parameter Defaults - Saves the current display state for the parameter as the default for that parameter in the future. See the Parameter Defaults Editor page for more information.

Save Display as Favorite - Saves the current display state (without the data) as a display template. This is an easy way to apply what is essentially parameter defaults to a variety of different fields. For example, if a display is created that uses Color-Shaded Plan View, an enhancement range of 0 - 90, the gray scale enhancement, and shade colors, this can be saved as a favorite display. This menu item opens a Save Display Template window, where a user can enter a category as well as a name. The category is used to determine what directory the bundle will be stored in and is not used directly in McIDAS-V. The name field sets the name of the display template, which will be seen in the Displays panel of the Field Selector. Now, a user can select a different field, the display template, and click Create Display. This will display the field that was selected by the user, but everything in the Layer Controls comes from the display template.

Save Display as Bundle - Saves the current application state as a bundle.

- **Reload Data** - Reloads the data for this display.

The **Edit** menu has these common choices:

Color Table - Edits the color table, changes the range, chooses a new color table, etc. This works for displays that have a color table.

Change Parameter - Changes the parameter that is being displayed.

Change Display Unit - Changes the unit that is used in the display, e.g., changing temperature plots in Kelvin to Celsius.

Change Contours - Changes the different aspects of the contours in the image by opening the Contour Properties Editor.

Sharing - Turns on/off sharing and sets the "share group". When sharing is turned on, control operations will be shared between two or more displays of the same type that are in the same share group. The share group can be an arbitrary name. For example, the location of a vertical cross section, the color table, location of a probe point, etc., can all be shared.

Display Settings - Opens the Display Settings dialog, allowing for the selection of display properties to be applied to other display controls and/or to be saved as preferences to be used in the creation of new display controls.

Properties - Opens the Properties dialog, allowing for the changing of customization of the display.

The **View** menu has these common choices:

Visible - Toggles visibility. When selected, the parameter will be displayed in the Main Display window.

Lock Visibility - Toggles the visibility lock (see cycling visibilities).

Bring To Front - Selects which display is on top if one display is showing at the same level in 3D as another (e.g., satellite and radar images in the same display).

Show View Window - Brings the Main Display window to the front.

Times -

Use Times in Animation - Loops the data when the layers have a time associated with them by adding the Time Animation Widget to the Main Display window.

Drive Times with this Display - Sets the layer as the time driver. For more information, see Time Matching.

Uses Time Driver Times - Sets the times of the layer to match the time driver times, assuming a time driver has been set. Note that the layer must be reloaded via **File -> Reload Data** after using this option. For more information, see Time Matching.

Display List - Displays the parameter information at the bottom of the Main Display window and allows for setting the color of the text.

Center on Display - Re-centers the display in the Main Display window without changing the zoom level if the display has been translated from its original position.

Undock from Data Explorer - Unattaches the **Layer Controls** tab from the Data Explorer by making it its own window. This can be brought back to the Data Explorer by selecting **View->Dock**.

Export to Component - Transfers the **Layer Controls** tab of the Data Explorer to the Main Display window as a separate tab. This can be brought back to the Data Explorer by selecting **View->Undock**, and once it is undocked, **View->Dock**.

The **Help** menu has these common choices:

Details - Opens a window that shows detailed information about the display and any associated data.

User's Guide - Opens the User's Guide entry relevant for the particular display.

Gridded Data Displays

- Plan View Controls
- Flow Display Controls
- 3D Flow Display Controls
- Value Plot Controls
- Vertical Cross Section Controls
- 3D Surface Controls
- Volume Rendering Controls
- Point Volume Controls
- Sounding Controls
- Hovmoller Controls
- Grid Trajectory Controls

Plan View Controls

Overview

Plan views can be made in four types of displays: Contour Plan View, Color-Filled Contour Plan View, Color-Shaded Plan View, and Value Plots. Contour Plan View and Color-Filled Contour Plan View have the same properties. For more information on the Value Plots display, see Value Plot Controls.

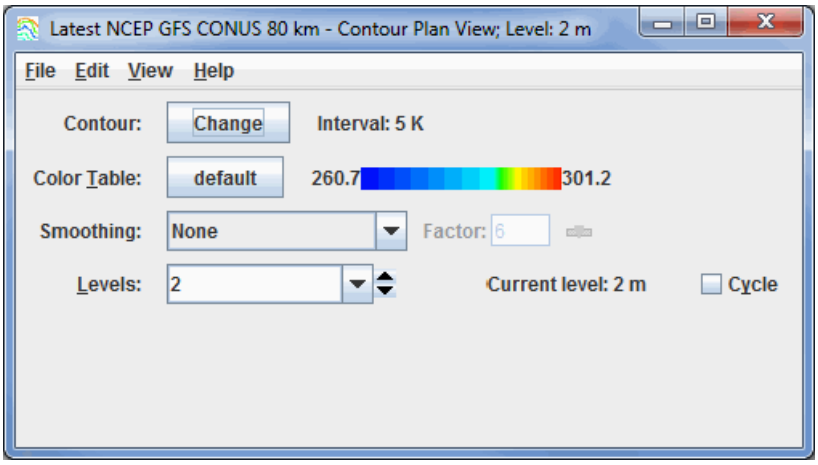


Image 1: Contour Plan View Controls

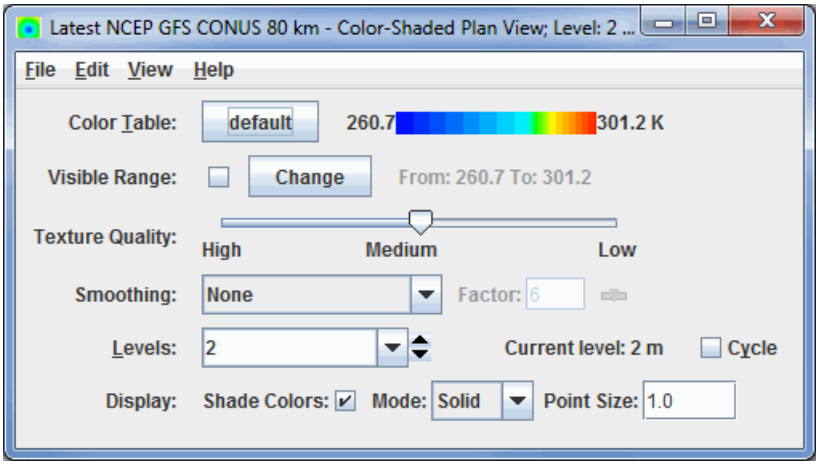


Image 2: Color-Shaded Plan View Controls

Properties

Contour - Opens the Contour Properties Editor to change how the contours appear in the Main Display window. This is an option for the Contour Plan View and Color-Filled Contour Plan View display types.

Color Table - Shows the active color table and the associated high and low data values in the units of the display. As the mouse pointer is moved over the color bar, the value at a particular color is shown. Right click on the color bar or click on the button that displays the name of the Color Table to make modifications to the color bar. This allows you to open the Color Table Editor, change the range, select other color tables, etc. This is an option for the Contour Plan View, the Color-Filled Contour Plan View, and the Color-Shaded Plan View display types.

Smoothing - Smooths the grid. There are seven types of smoothing: None, 5-point, 9-point, Gaussian Weighted, Cressman Weighted, Circular Aperture, and Rectangular Aperture. The amount of smoothness can be set for all except the 5 and 9-point smoothers. The higher the amount, the smoother the grid. For the Cressman, Circular and Rectangular aperture smoothing types, the smoothing factor is the radius in grid spacing units.

Levels - Lists the native grid levels. Click on one level value to reset the plan to that level. The plan level in use is shown in the data's native altitude units. The **Levels** box is editable. Click in the box, enter a value and hit Enter to set your own value. Additionally, you can click on the arrows to the right of the **Levels** box to switch levels, or click on the **Cycle** check box to animate vertically through all available levels. This is an option for the Contour Plan View, the Color-Filled Contour Plan View, and the Color-Shaded Plan View display types.

Visible Range - Determines what parts of the data is actually shown. Click the Change button to set the range of data shown. Once the checkbox is checked, the Visible Range will be applied to the data in the Main Display window. This is an option in the Color-Shaded Plan View.

Texture Quality - Sets the quality of the displayed texture. A higher quality will take longer to render and user more memory. This is an option for the Color-Shaded Plan View display type.

Shade Colors - Colors every pixel to give a smooth gradation of color. The alternative is coloring an area of pixels corresponding to a single data grid cell with one color. This is an option for the Color-Shaded Plan View display type.

Mode - Sets the way the texture is displayed. You can select Solid, Mesh, or Points. This is useful for looking at the structure of the underlying data. This is an option for the Color-Shaded Plan View display type.

Point Size - Sets the size of the points when the Points Mode is selected. This is an option for the Color-Shaded Plan View display type.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there are some options that are unique to this display.

The **Edit** menu has these unique options:

Levels - Represents the level where the data is displayed. This is an option for the Contour Plan View, Color-Filled Contour Plan View, and the Color-Shaded Plan View display types.

Change Contours - Opens the Contour Properties Editor to change how the contours appear in the Main Display window. This is an option for the Contour Plan View and the Color-Filled Contour Plan View display types.

The **View** menu has these unique options:

Use Grid Projection - Re-centers the display and resets the zoom level back to the display's initial settings without changing any other preferences you have modified. This is an option for the Contour Plan View, the Color-Filled Contour Plan View, and the Color-Shaded Plan View display types.

Enable Adaptive Resolution (Under Development) - Turns adaptive resolution on or off for the layer. This menu item is only available if adaptive resolution is enabled in the User Preferences. Note that adaptive resolution is still under development.

Flow Display Controls

Overview

The Flow Plan View Controls are used to control plan (horizontal) displays (flow vectors, wind barbs, streamlines, trajectories, and curly vectors) of vector based data (e.g., wind components). They are similar to the Plan View controls. For more information on what wind speeds correspond to each of the wind barbs in McIDAS-V displays, please see the table in the FAQ.

The seven types of Flow Displays are Vector Plan View, Vector Colored by Speed, Vector Colored by Another Parameter, Wind Barb Plan View, Wind Barb Colored by Speed, Wind Barb Colored by Another Parameter, and Streamline Plan View. Under the 3D Surface displays, additional display types of Vectors Over Topography, Wind Barbs Over Topography, and Streamlines Over Topography can be selected. Under Flow Cross Section displays, Vector Cross Section and Wind Barb Cross Section can be selected. Note that with oceanographic wind data (where direction is opposite the normal convention in a way that 0 degrees is a wind from south to north) the vectors and barbs are handled in a way that they point in the correct direction. The **Layer Controls** listed below apply for all display types:

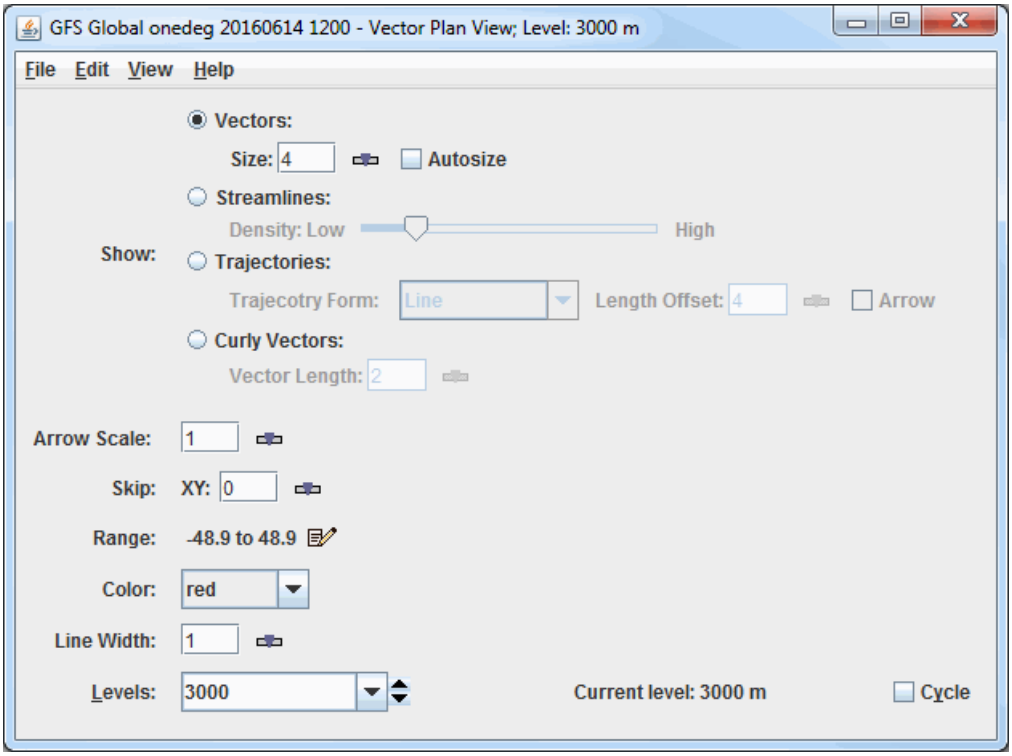


Image 1: Flow Displays Controls

Properties

Show - Switches between displaying Vectors, Streamlines, Trajectories, and Curly Vectors. Note that in order to use Trajectories or Curly Vectors, at least four timesteps must be displayed, otherwise, these **Show** modes will be inactive.

Vectors - Displays vectors in the Main Display window.

Size - Changes the length of the vectors. The Size box is an editable box where you can enter a new size and press Enter, or use the slider ( ) to change the value.

Autosize - Controls the size of the vectors based on zoom level. If the checkbox is checked, the size of the vectors will change proportionally as the zoom level changes. When unchecked, the vectors will remain the same size regardless of zoom level.

Streamlines - Displays streamlines in the Main Display window.

Density - Changes the density of the streamlines on the display. More streamlines will be displayed as the slider is moved closer to 'High'.

Trajectories - Displays trajectories in the Main Display window.

Trajectory Form - Allows for selecting the type of trajectory used in the display. The options are Line, Cylinder, Ribbon, and Deform Ribbon.

Length Offset - Sets the number of timesteps to include in each trajectory.

Arrow - Adds an arrow head to the trajectories if the Line **Trajectory Form** is selected.

Curly Vectors - Displays curly vectors in the Main Display window. This option draws vectors that include multiple timesteps.

Vector Length - Sets the length, or number of timesteps included with each curly vector.

Arrow Scale - Sets the size of the arrows in the Main Display window for all of the **Show** modes.

Skip - Defines the number of grid points that are skipped to mitigate cluttering in the display. A skip interval of 0 utilizes all grid points, 1 uses every other grid point, 2 uses every third grid point, etc. This value can be modified by typing a value into the text field and pressing Enter or by using the slider button.

Range - Lists the current range of data for sizing the vectors. Click on the **Edit** ( ) icon to change the range. This is an option for all of the Flow Displays displays.

Color - Changes the color of the vectors, streamlines, and trajectories in the display. Note that if the displayed field is derived from speed and direction fields (not u- and v-wind components), or colored by another parameter, the vectors, streamlines, and trajectories will be colored by the speed or the color-by field. In this case, the **Color** field will be **Color Table**, where the user can define the enhancement and enhancement range used for the display.

Line Width - Sets the line width (thickness) in the display. Click on the or put in a value and hit enter to change the value.

Levels - Lists the native grid levels. Click on one level value to reset the plan to that level. The plan level in use is shown in the data's native altitude units. The **Levels** box is editable. Click in the box, enter a value and hit return to set your own value. Additionally, you can click on the arrows to the right of the **Levels** box to switch levels, or click on the **Cycle** checkbox to animate vertically through all available levels.

Selector Position - Determines the vertical positioning of the Selector line with respect to other variables displayed in the Main Display window. This is an option with the Vector Cross Section and Wind Barb Cross Section displays.

Vertical Scale - Changes the vertical axis of the chart in the **Display** tab of the **Layer Controls** tab of the Data Explorer.

Autoscale - Scales the Y-Axis automatically to the data range along the selector line in the display.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there are some options that are unique to this display.

The **Edit** menu has these unique options:

Levels - Represents the level where the data is displayed. This is an option for the Vector Plan View, Streamline Plan View, and Wind Barb Plan View display types.

Color - Sets the color of the streamlines, vectors, wind barbs, trajectories, or curly vectors in the display.

Change Color Unit - Sets the unit to color the streamlines, vectors, wind barbs, trajectories, or curly vectors by. This allows the displayed field to be colored by any unit of speed, regardless of the unit used to originally plot the field.

The **View** menu has these unique options:

Use Grid Projection - Re-centers the display and resets the zoom level back to the display's initial settings without changing any other preferences you have modified. This is an option for the Vector Plan View, Streamline Plan View, and Wind Barb Plan View display types.

Enable Adaptive Resolution (Under Development) - Turns adaptive resolution on or off for the layer. This menu item is only available if adaptive resolution is enabled in the User Preferences. Note that adaptive resolution is still under development.

3D Flow Display Controls

Overview

The 3D Flow Display controls are used to control 3D displays of flow vectors and trajectories derived from wind and vertical velocity data.

The five types of 3D Flow Displays are 3D Vector Cross Section, 3D Volume Vector, 3D Volume Vector Colored by Speed, 3D Volume Vector Colored by Another Parameter, and 3D Volume Trajectory. The controls for the 3D Vector Cross Section display are similar to those of the Flow Display Controls. The **Layer Controls** listed below apply for the 3D Volume Vector and 3D Volume Trajectory displays:

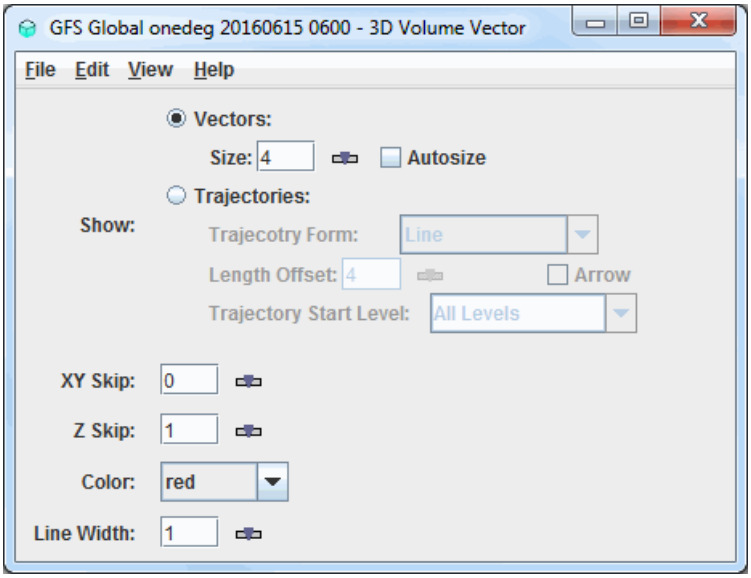


Image 1: 3D Volume Vector/Trajectory Controls

Properties

Show - Switches between displaying Vectors and Trajectories. Note that in order to use Trajectories or Curly Vectors, at least four timesteps must be displayed, otherwise, these **Show** modes will be inactive.

Vectors - Displays vectors in the Main Display window.

Size - Changes the length of the vectors. The Size box is an editable box where you can enter a new size and press Enter, or use the slider ( ) to change the value.

Autosize - Controls the size of the vectors based on zoom level. If the checkbox is checked, the size of the vectors will change proportionally as the zoom level changes. When unchecked, the vectors will remain the same size regardless of zoom level.

Trajectories - Displays trajectories in the Main Display window.

Trajectory Form - Allows for selecting the type of trajectory used in the display. The options are Line, Cylinder, Ribbon, and Deform Ribbon.

Length Offset - Sets the number of timesteps to include in each trajectory.

Arrow - Adds an arrow head to the trajectories if the Line **Trajectory Form** is selected.

Trajectory Start Level - Sets the vertical level where the trajectories will originate from. If 'All Levels' are selected then trajectories will originate from all levels.

XY Skip - Defines the number of grid points that are skipped to mitigate cluttering in the display in the x/y direction. A skip interval of 0 utilizes all grid points, 1 uses every other grid point, 2 uses every third grid point, etc. This value can be modified by typing a value into the text field and pressing Enter or by using the slider button.

Z Skip - Defines the number of grid points that are skipped to mitigate cluttering in the display in the z direction. A skip interval of 0 utilizes all grid points, 1 uses every other grid point, 2 uses every third grid point, etc. This value can be modified by typing a value into the text field and pressing Enter or by using the slider button.

Range - Lists the current range of data for sizing the vectors. Click on the **Edit** ( ) icon to change the range. This is an option for all of the Flow Displays displays.

Color - Changes the color of the vectors, streamlines, and trajectories in the display. Note that if the displayed field is derived from speed and direction fields (not u- and v-wind components), or colored by another parameter, the vectors or trajectories will be colored by the speed or the color-by field. In this case, the **Color** field will be **Color Table**, where the user can define the enhancement and enhancement range used for the display.

Line Width - Sets the line width (thickness) in the display. Click on the or put in a value and hit enter to change the value.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there are some options that are unique to this display.

The **Edit** menu has these unique options:

Color - Sets the color of the vectors or trajectories. This is an option for the 3D Volume Vector and 3D Volume Trajectory display types.

Color Table - Sets the color enhancement applied to the vectors or trajectories. This is an option for the 3D Volume Vector Colored by Speed and 3D Volume Vector Colored by Another Parameter display types.

The **View** menu has these unique options:

Use Data Projection - Re-centers the display and resets the zoom level back to the display's initial settings without changing any other preferences you have modified. This is an option for the Vector Plan View, Streamline Plan View, and Wind Barb Plan View display types.

Enable Adaptive Resolution (Under Development) - Turns adaptive resolution on or off for the layer. This menu item is only available if adaptive resolution is enabled in the User Preferences. Note that adaptive resolution is still under development.

Value Plot Controls

Overview

The Value Plot controls are used to adjust the display of individual grid point values.

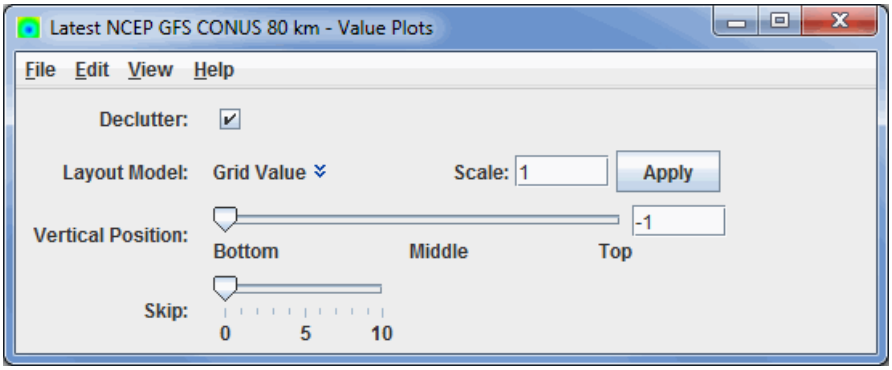


Image 1: 2D Value Plot Controls

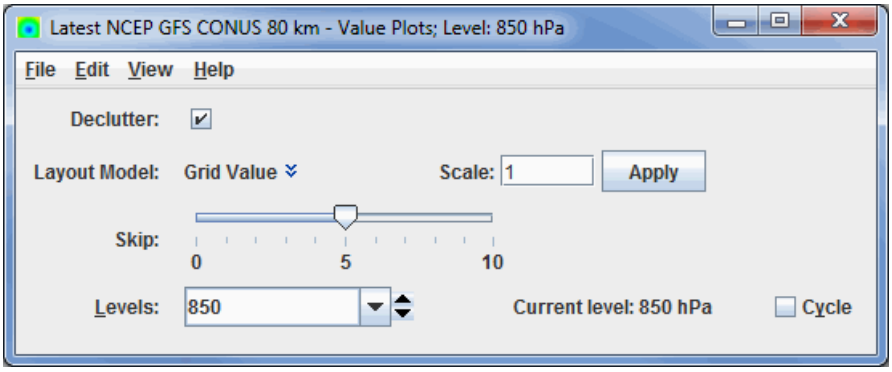


Image 2: 3D Value Plot Controls

Properties

Declutter - Displays only stations that do not overlap. When unchecked, all of the stations will be shown.

Layout Model - Sets the layout of the displayed data. Click on the downward facing blue arrows to change the layout model. Selecting **Edit** will open the Layout Model Editor which will allows for creating your own custom layout model.

Scale - Sets the size of the displayed elements. Enter a value into the field and press Enter or click **Apply** to scale up or down.

Vertical Position - Sets the vertical position of the locations with respect to other variables being displayed in the Main Display window. This can be changed by using the slider, or entering a value into the field and pressing Enter.

Skip - Sets the size of the layout model being displayed in the Main Display window. This value can be changed by using the slider.

Levels - Lists the native grid levels. Select a level value to reset the display to that level. The level in use is shown in the data's native altitude units. The **Levels** box is editable. Click in the box, enter a value and hit Enter to set your own value. Additionally, a user can click on the arrows to the right of the **Levels** box to switch levels, or click on the **Cycle** check box to animate vertically through all available levels. The current level used to display the data in the Main Display window is listed next to **Current level**.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there are some options that are unique to this display.

The **Edit** menu has these unique options:

Levels - Represents the level where the data is displayed when displaying a 3D field.

Selector Color - Changes the color of the selector point at the bottom left corner of the display when utilizing a 3D field.

The **View** menu has these unique options:

Use Grid Projection - Re-centers the display and resets the zoom level back to the display's initial settings without changing any other preferences that have been modified.

Enable Adaptive Resolution (Under Development) - Turns adaptive resolution on or off for the layer. This menu item is only available if

adaptive resolution is enabled in the User Preferences. Note that adaptive resolution is still under development.

Vertical Cross Section Controls

Overview

The Vertical Cross Section Controls are used to adjust vertical cross section displays. Vertical cross sections can be made in three types of displays: Contour, Color-Filled Contour, and Color-Shaded. The control window has two tabs: **Display** and **Settings**. You can change the endpoints of the cross section by clicking and dragging the endpoints in the Main Display window.

The **Display** tab includes a duplicate of the display in the Main Display window:

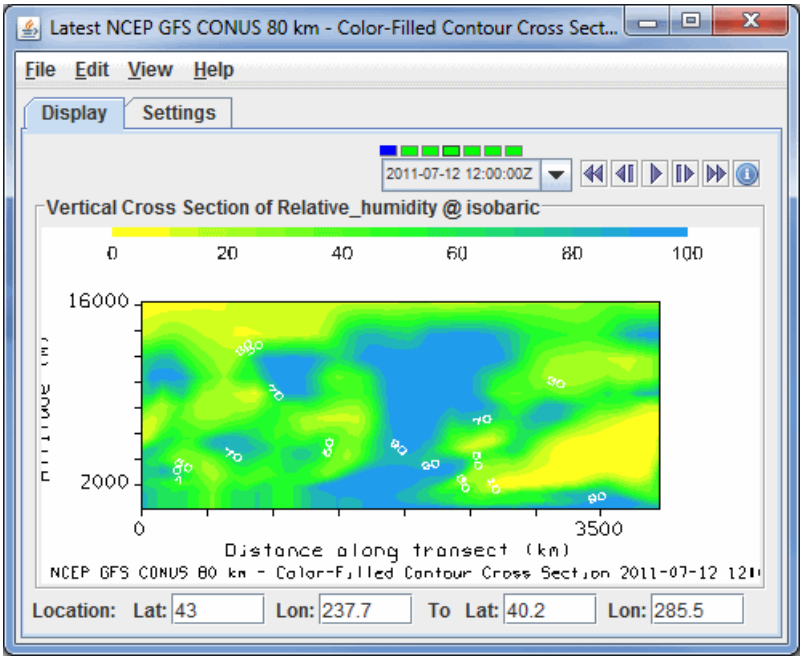
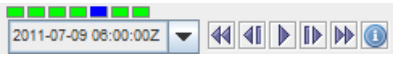


Image 1: Display Tab of the Layer Controls Tab

Properties



Time Animation Control - Controls the looping of displays through time. See more in Time Animation Control.

Distance along transect - Depicts the horizontal distance the cross section covers in the Main Display window. This can be changed by left-clicking and dragging the end points of the cross section in the Main Display.

Location - Displays the location of the end points of the cross section. The endpoints of the cross section can be changed by entering in new values and hitting Enter.

The **Settings** tab shows the settings for this display control:

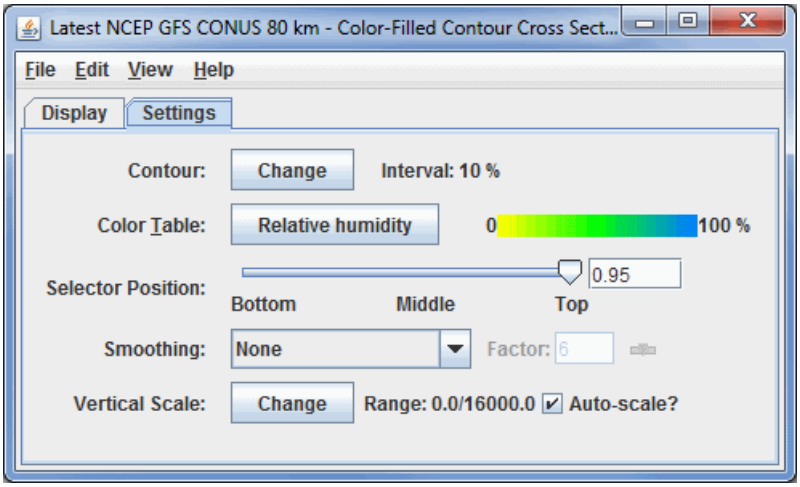


Image 2: Settings Tab of the Layer Controls Tab

Properties

Contour - Sets contour parameters. Click Change next to Contour to open the Contour Properties Editor. This control can be accessed with the Contour Cross Section and Color-Filled Contour Cross Section views.

Color Table - Shows the active color table and the associated high and low data values in the units of the display. As the mouse pointer is moved over the color bar, the value at a particular color is shown. Right click on the color bar or click on the button that displays the name of the Color Table to make modifications to the color bar. This allows you to open the Color Table Editor, change the range, select other color tables, etc.

Visible Range - Sets the range of data displayed when using the Color-Shaded Cross Section display type.

Selector Position - Changes the position of the selector in the main display. You can change this by using the slider or by typing a value into the field and hitting Enter.

Smoothing - Smooths the grid that can be used to smooth contour lines or flow fields in the display. There are seven types of smoothing: None, 5-point, 9-point, Gaussian, Cressman, Circular, and Rectangular weighted smoothers. The smoothing factor can be adjusted for all except the 5-point and 9-point smoothers. The higher the value, the smoother the grid. For the Cressman, Circular and Rectangular aperture smoothing types, the smoothing factor is the radius in grid spacing units.

Vertical Scale - Changes the vertical axis range of the cross section.

Autoscale - Scales the Y-Axis automatically to the data range along the selector line in the display.

Visible Range - Determines what parts of the data is actually shown. Click the Change button to set the range of data shown. Once the checkbox is checked, the Visible Range will be applied to the data in the cross section. This is an option for the Color-Shaded Cross Section display type.

Shade Colors - Colors every pixel to give a smooth gradation of color. The alternative is coloring an area of pixels corresponding to a single data grid cell with one color. This is an option for the Color-Shaded Cross Section display type.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there are some options that are unique to this display.

The **Edit** menu has this unique option:

Change Contours - Opens the Contour Properties Editor to change how the contours appear in the Main Display window. This is an option for the Contour Cross Section and Color-Filled Contour Cross Section display types.

The **View** menu has these unique options:

Use Data Projection - Re-centers the display and resets the zoom level back to the display's initial settings without changing any other preferences you have modified.

Enable Adaptive Resolution (Under Development) - Turns adaptive resolution on or off for the layer. This menu item is only available if adaptive resolution is enabled in the User Preferences. Note that adaptive resolution is still under development.

Cross Section - Enables you to capture an image or movie of your display, or open a Properties window which allows you to modify many aesthetic aspects of the Main Display window.

3D Surface Controls

Overview

Isosurfaces can be made in two types of displays, regular isosurfaces, and isosurfaces colored by another parameter. An isosurface is a 3D surface mapping the location of a single parameter value through a 3D field. Isosurfaces are a 3D analog of a single contour line in a 2D plot; the intersection of an isosurface and any plane is a contour line of the same value in that plane.

Coloring an isosurface by another parameter can serve many purposes. One example use of this is creating a display for possible icing conditions in the atmosphere that could be useful for pilots. To do this, you would select Temperature as your field, the "Isosurface colored by another parameter" display type, and Relative Humidity in the Field Selector window that appears when you click Create Display. After the display is created, you can set the isosurface value for Temperature to be 0 degrees Celsius in the **Layer Controls** tab of the Data Explorer. Now, in the Main Display window, you have a surface of 0 degrees Celsius colored by Relative Humidity. Wherever you see high RH values means that there is a lot of moisture in the atmosphere, and at the freezing temperatures, there could be icing conditions.

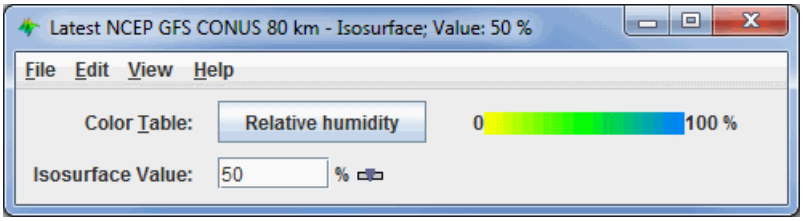


Image 1: Isosurface Controls Properties Dialog

Properties

Color Table - Shows the active color table and the associated high and low data values in the units of the display. As the mouse pointer is moved over the color bar, the value at a particular color is shown. Right click on the color bar or click on the button that displays the name of the Color Table to make modifications to the color bar. This allows you to open the Color Table Editor, change the range, select other color tables, etc.

Isosurface Value - Sets the numerical value of your field that the display will draw the isosurface at. You can do this by clicking the button or entering a value in the field and hitting Enter.

Properties with *As Topography Displays

Contour - Opens the Contour Properties Editor to change how the contours appear in the Main Display window. This is an option for the Color-Filled Contour Plan View display type.

Visible Range - Sets the range of the data displayed. These numbers represent the range of reflectivity values that can be viewed in the Main Display window. This tool is active when the **Visible Range** checkbox is checked, if not checked, the default range will be used. To change these values, check the checkbox, and click Change to bring up a Change Visible Range window, where you can enter your upper and lower bound values.

Texture Quality - Sets the quality of the displayed texture of Image Control. A higher quality will take longer to render and more memory.

Smoothing - Smooths the grid that can be used to smooth contour lines or flow fields in the display. There are seven types of smoothing: None, 5-point, 9-point, Gaussian, Cressman, Circular, and Rectangular weighted smoothers. The smoothing factor can be adjusted for all except the 5-point and 9-point smoothers. The higher the value, the smoother the grid. For the Cressman, Circular and Rectangular aperture smoothing types, the smoothing factor is the radius in grid spacing units.

Levels - Lists the native grid levels. Click on one level value to reset the plan to that level. The plan level in use is shown in the data's native altitude units. The **Levels** box is editable. Click in the box, enter a value and hit Enter to set your own value. Additionally, you can click on the arrows to the right of the **Levels** box to switch levels, or click on the **Cycle** checkbox to animate vertically through all available levels. This is an option for the Contour Plan View, the Color-Filled Contour Plan View, and the Color-Shaded Plan View display types.

Vertical Range - Sets the vertical extent of the data with respect to the wireframe box of the Main Display window. Click the Change button to set the vertical range of the data. This works similarly to the Vertical Range in the Main Display window, which sets the height of the wireframe box for other types of data. Changing these values can allow certain features to stand out more by showing higher peaks and valleys based off of their data values.

Display -

Shade Colors - Colors every pixel to give a smooth gradation of color. The alternative is coloring an area of pixels corresponding to a single data grid cell with one color.

Mode - Sets the way the texture of the data is displayed. You can select Solid, Mesh, or Points. This is useful for looking at the structure of the underlying data.

Point Size - Sets the size of the points when the **Mode** Points is chosen.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there is one option that is unique to this display.

The **Edit** menu has this unique option:

> **Levels -** Represents the level where the data is displayed. This is an option for the *As Topography display types.

The **View** menu has these unique options:

> **Use Data Projection -** Re-centers the display and resets the zoom level back to the display's initial settings without changing any other preferences you have modified.
>
> **Use Grid Projection -** Re-centers the display and resets the zoom level back to the display's initial settings without changing any other preferences you have modified. This is an option for the *As Topography display types.

Volume Rendering Controls

Overview

3D grids can be rendered as a volume display.

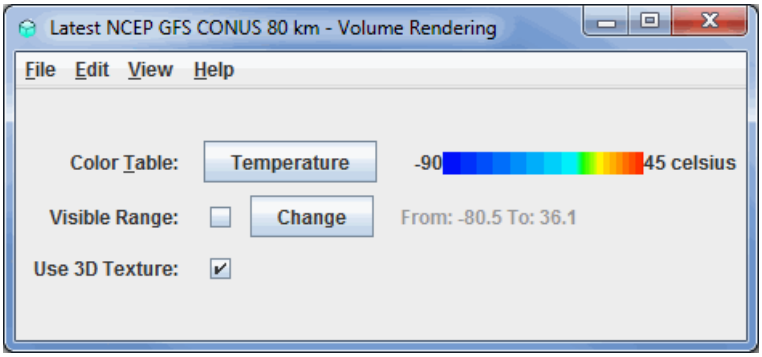


Image 1: Volume Rendering Controls Properties Dialog

You can use the transparency features of the color table to see through the display. This is done by right-clicking on the color bar, going down to Transparency, and selecting a percentage.

Properties

Color Table - Shows the active color table and the associated high and low data values in the units of the display. As the mouse pointer is moved over the color bar, the value at a particular color is shown. Right click on the color bar or click on the button that displays the name of the Color Table to make modifications to the color bar. This allows you to open the Color Table Editor, change the range, select other color tables, etc.

Visible Range - Sets the range of data displayed. Clicking the Change button will allow you to change the range from the default values for the parameter. Clicking the checkbox next to Visible Range applies any modified range to the data being displayed in the Main Display window.

Use 3D Texture - Uses 3D texture to display the image in the Main Display window. This incorporates a sense of transparency to the display, making it easier to visualize features.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there is one option that is unique to this display.

The **View** menu has these unique options:

Use Data Projection - Re-centers the display and resets the zoom level back to the display's initial settings without changing any other preferences you have modified.

Enable Adaptive Resolution (Under Development) - Turns adaptive resolution on or off for the layer. This menu item is only available if adaptive resolution is enabled in the User Preferences. Note that adaptive resolution is still under development.

Point Volume Controls

Overview

The Point Volume display shows the grid points in a volume of data as individual points in the display. The controls are used to change color tables, the number of points to skip, and the point size.

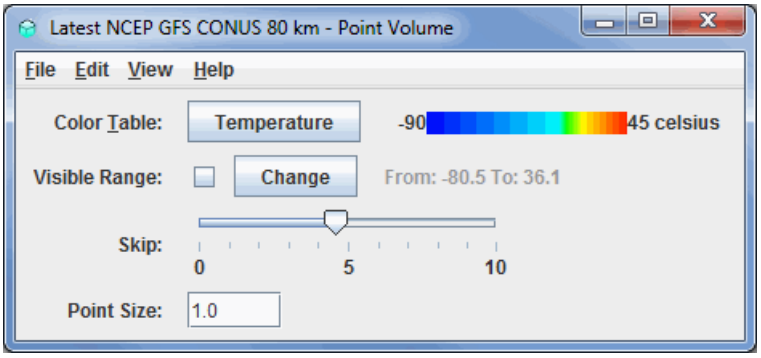


Image 1: Point Volume Controls Properties Dialog

You can use the transparency features of the color table to see through the display. This is done by right-clicking on the color bar, going down to Transparency, and selecting a percentage.

Properties

Color Table - Shows the active color table and the associated high and low data values in the units of the display. As the mouse pointer is moved over the color bar, the value at a particular color is shown. Right click on the color bar or click on the button that displays the name of the Color Table to make modifications to the color bar. This allows you to open the Color Table Editor, change the range, select other color tables, etc.

Visible Range - Sets the range of data displayed. Clicking the Change button will allow you to change the range from the default values for the parameter. Clicking the checkbox next to Visible Range applies any modified range to the data being displayed in the Main Display window.

Skip - Determines how many points to skip in the display. This helps to mitigate cluttering.

Point Size - Sets the size of the data points in the Main Display window.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there is one option that is unique to this display.

The **View** menu has these unique options:

Use Data Projection - Re-centers the display and resets the zoom level back to the display's initial settings without changing any other preferences you have modified.

Enable Adaptive Resolution (Under Development) - Turns adaptive resolution on or off for the layer. This menu item is only available if adaptive resolution is enabled in the User Preferences. Note that adaptive resolution is still under development.

Sounding Controls

Overview

For 3D derived gridded data, one of the Fields you can select is Sounding Data (Temperature & dewpoint only or with true winds). In the **Displays** panel of the **Layer Controls** tab, there is a category for soundings. The three sounding display options are Grid Skew-T, Grid Stuve Display, and Grid Emagram Display. This display uses the model data to produce soundings, and their controls are similar to those for Point Data sounding display controls. You can modify the location of the sounding in the Main Display window by dragging the selector point to a different position on the map.

The example below is loaded from the 'Sounding Data (with true winds)' field. If you select 'Sounding Data (Temperature & dewpoint only)', then wind data will not be included in the display. Therefore, there will be no barbs along the side of the sounding in the **Sounding Chart** tab, the **Hodograph** tab will not be available, and there will be no wind information listed in the **Table** tab. For more information on what wind speeds correspond to each of the wind barbs in McIDAS-V displays, please see the table in the FAQ.

The **Sounding Chart** tab includes an aerological diagram (e.g., skew-T, Stuve, Emagram):

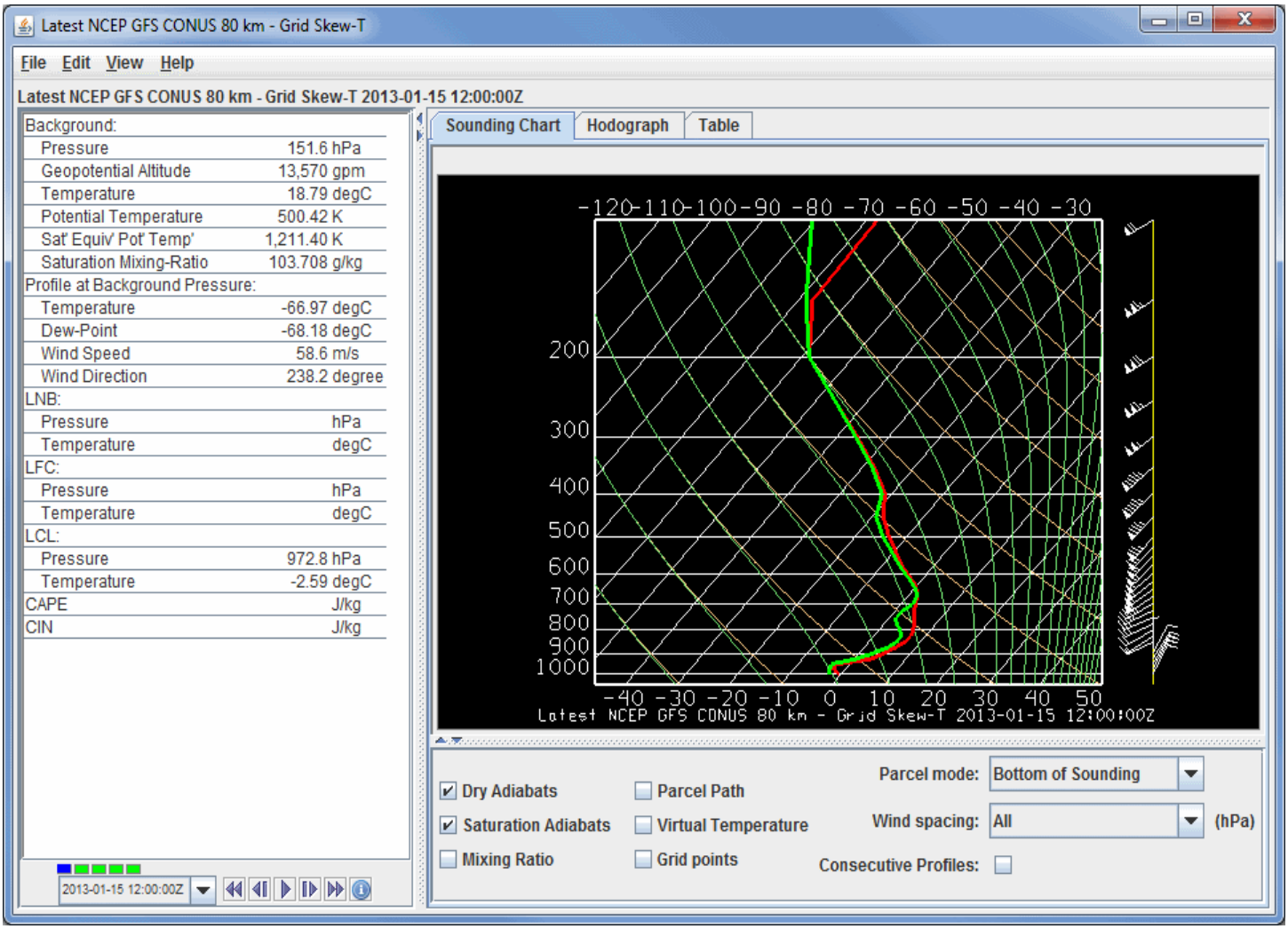


Image 1: Sounding Display of Model Data

Properties

Time Animation Control - Controls the looping of displays through time. See Time Animation Control for more information. This will be available if you select more than one time to display in the **Field Selector**.

Dry Adiabats - Displays the dry adiabats on the Skew-T diagram.

Saturation Adiabats - Displays the saturation adiabats on the Skew-T diagram.

Mixing Ratio - Displays the mixing ratio lines on the Skew-T diagram.

Parcel Path - Displays the path of a parcel of air lifted pseudo-adiabatically from the initial point to the top of the Skew-T diagram.

Virtual Temperature - Displays the virtual temperatures of the environmental profile and pseudo-adiabatically lifted air-parcel.

Grid Points - Plots grid points in the Main Display window. The grid point spacing will be related to the model resolution that you selected

in the **Data Sources** tab of the Data Explorer.

Parcel mode - Specifies how the initial conditions of the pseudo-adiabatically lifted air-parcel are determined from the environmental sounding according to the mode indicated. This will affect how the LNB, LFC, LCL, CAPE, and CIN are calculated. The choices are:

Bottom of Sounding - Determines the initial conditions of the parcel from the temperature and dewpoint at the level of highest pressure. The path will update whenever the profiles change.

Below Cursor - Determines the initial conditions of the parcel from the temperature and dewpoint profiles by computing the pressure-weighted mean potential temperature and water vapor mixing-ratio of the atmosphere that lies below the cursor when the middle mouse button is pressed. Thus, pressing the middle button at 950 hPa for a sounding that starts at 1000 hPa will effectively mix the lower 50 hPa of the atmosphere and lift the resulting parcel starting at 975 hPa. The path will update whenever the profiles change and as the cursor is dragged.

At Cursor Pressure - Determines the initial pressure, in-situ temperature, and moisture content of the parcel from the temperature and dewpoint profiles at the pressure of the cursor when the middle mouse button is pressed. The initial moisture content is determined from the dewpoint profile at the initial pressure. The path will update whenever the profiles change and as the cursor is dragged.

At Cursor (Press, Temp) - The computed path of a lifted parcel is automatically updated when appropriate. The initial pressure and in-situ temperature of the parcel equal the pressure and temperature values under the cursor when the middle mouse button is pressed. The path will update whenever the profiles change and as the cursor is dragged.

Wind spacing - Allows the user to control which wind levels are shown in the display.

Consecutive Profiles - Allows you to plot both the current sounding, as well as the sounding of the next time step in one image. The temperature and dewpoint temperature profiles of the current timestep will be dashed, and the profiles of the next timestep will be displayed as solid lines. The current time's winds will be displayed directly to the right of the sounding, and the next timestep's winds will be shown to the right of that. This makes it easy to see how a profile will change through time. This will reduce the number of time steps in your loop by 1. This option will not make any changes to the display if you only have one timestep displayed.

A label above the sounding's chart shows the model, date, and time of the data. You can modify the individual T and Td profiles on the skew T by clicking and dragging the profile lines. You will see changes in the parameter table to the left of the Skew-T that reflect modifications made to the sounding.

The **Hodograph** tab shows a 3D hodograph display. Note that this tab is only included with the display if you select a Field that includes wind data:

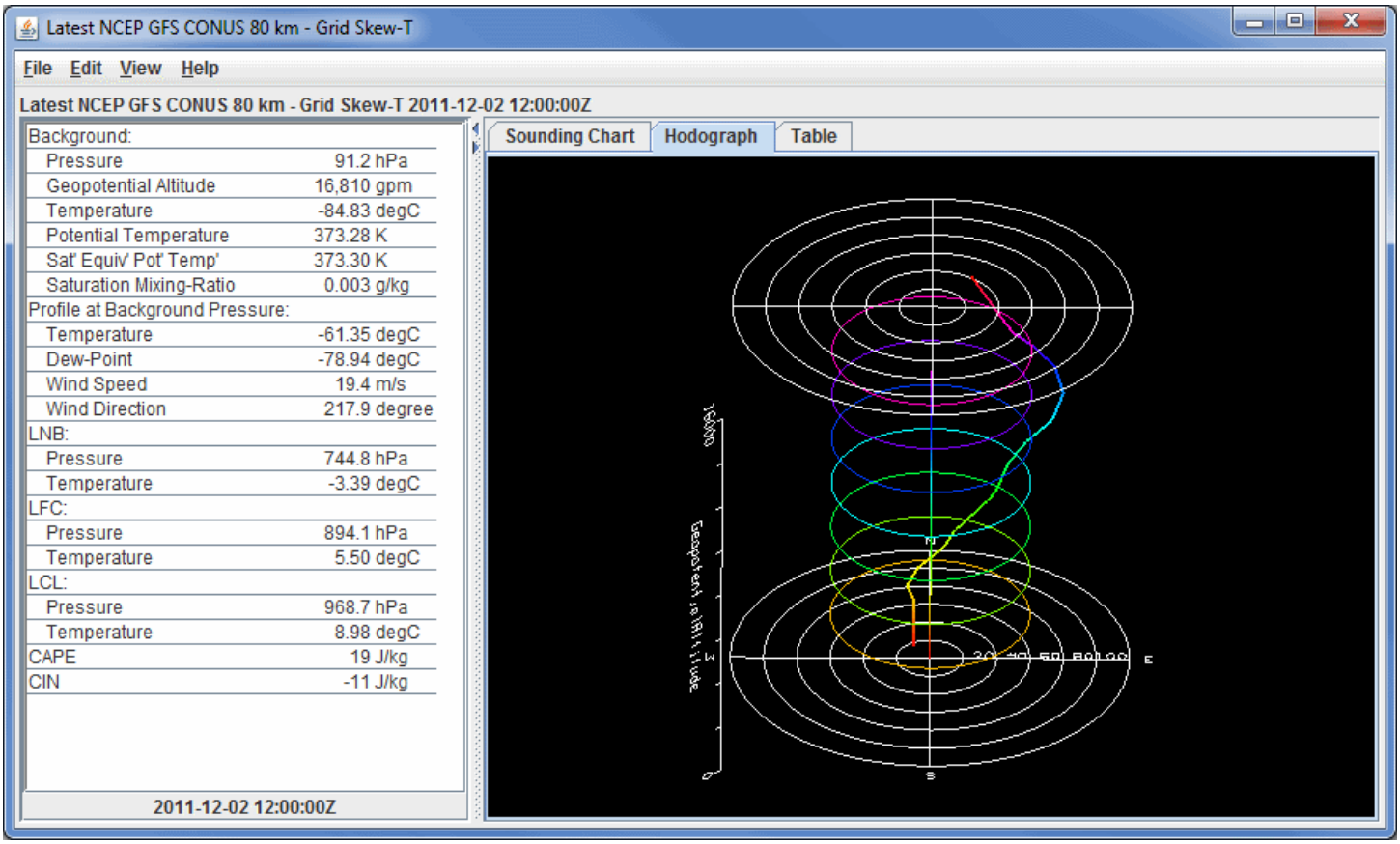


Image 2: Hodograph Display of Model Data

Properties

Time Animation Control - Controls the looping of displays through time. See Time Animation Control for more information. This will be

available if you select more than one time to display in the **Field Selector**.

The hodograph is enabled if the plotted data includes wind fields. It can be rotated into 3D by right-clicking and dragging. You can zoom in/out by holding down Shift and right-clicking and dragging up/down or by using the scroll wheel on your mouse. To reset the hodograph, use Ctrl+R.

The **Table** tab shows a table of all available values in the sounding. You can invert the order of the table by double clicking on the name of a column (ex. AirPressure).:

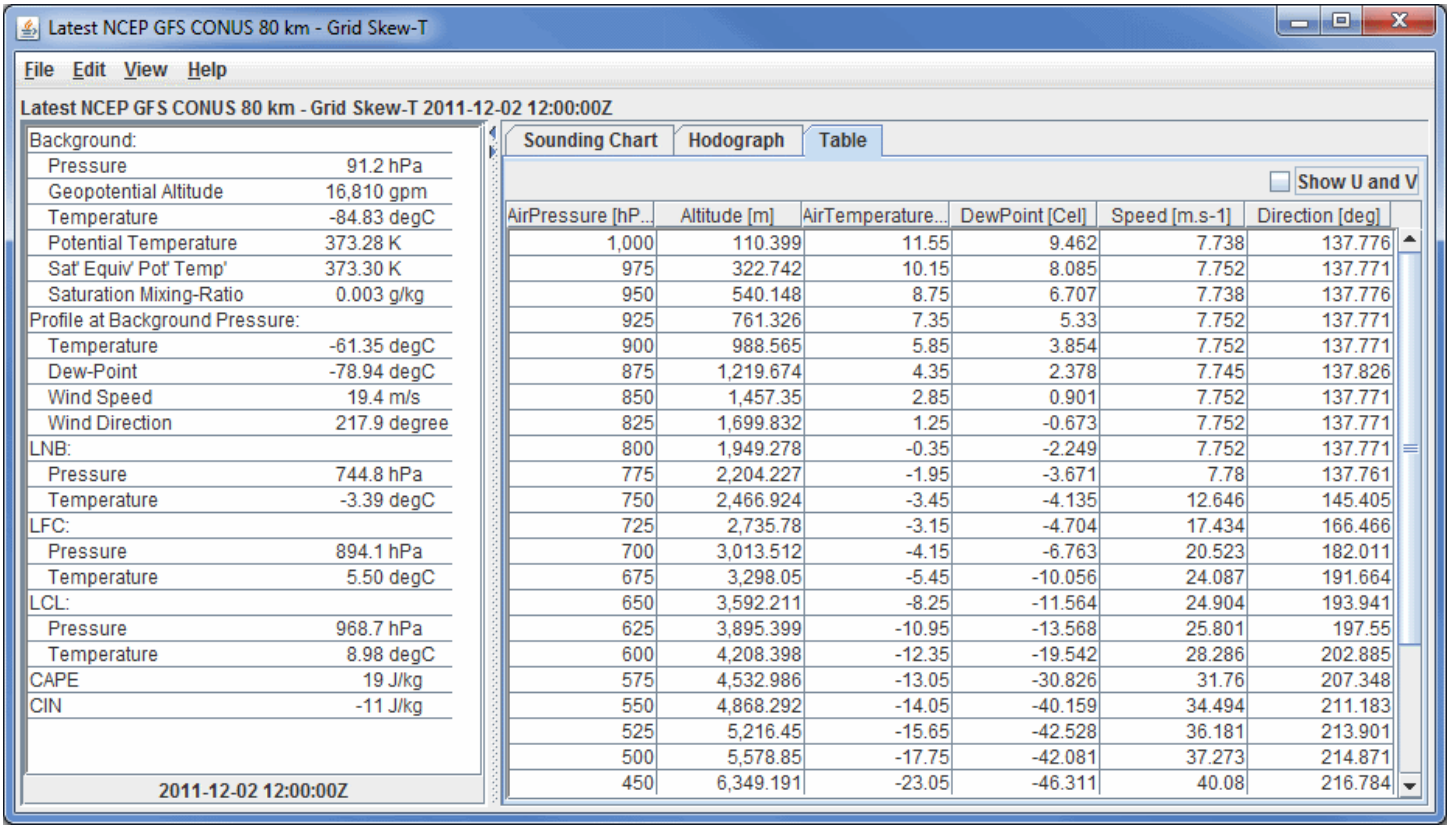


Image 3: Table Display of Model Data

Properties

Time Animation Control - Controls the looping of displays through time. See Time Animation Control for more information. This will be available if you select more than one time to display in the **Field Selector**.

Show U and V - Breaks the Speed and Direction categories up into the individual U (east-west) and V (north-south) components of the wind. This option will only be available if you choose a sounding display with true winds.

Aerological Parameters

The table to the left of the sounding diagram contains aerological parameters determined from the atmospheric sounding displayed in the diagram. The following abbreviations are used:

LCL: Lifting Condensation Level - The level at which a pseudo-adiabatically lifted air-parcel becomes saturated with water vapor.

LFC: Level of Free Convection - The level at which the virtual temperature of a pseudo-adiabatically lifted air-parcel changes from being less than the environment's virtual temperature to being greater than the environment's virtual temperature.

LNB: Level of Neutral Buoyancy - The level above the LFC at which the virtual temperature of a pseudo-adiabatically lifted air-parcel equals the environment's virtual temperature.

CAPE: Convective Available Potential Energy - The area between the virtual temperature trace of the pseudo-adiabatically lifted air-parcel and the virtual temperature trace of the environment from the LFC to the LNB in which the parcel's virtual temperature is greater than the environment's (positive CAPE connotes convective development).

CIN: Convective Inhibition - The negative of the area between the virtual temperature trace of the pseudo-adiabatically lifted air-parcel and the virtual temperature trace of the environment from the parcel's initial conditions to the LFC in which the parcel's virtual temperature is less than the environment's (negative CIN connotes initial positive work to lift the parcel).

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there is one option that is unique to this display.

The **File** menu has this unique option:

> **Export Sounding Table to File... -** Exports the data in the **Table** tab. This can be saved in Comma-Separated Values (CSV) format (*.csv) or in Excel format.

The **Edit** menu has these unique options:

> **Reset Probe Position -** Moves the probe in the Main Display window back to its initial location before it was moved.
>
> **Reset Sounding -** Reverts the sounding back to its initial configuration after any modifications have been made to it.
>
> **Selector Color -** Changes the color of the shape representing the location of the sounding in the Main Display window.

The **View** menu has these unique options:

> **Sounding Chart -** Allows you to capture an image or movie of the sounding and change many aesthetic preferences.
>
> **Hodograph -** Allows you to capture an image or movie of the hodograph and change aesthetic preferences related to the Main Display window.

Hovmoller Controls

Overview

The Hovmoller display plots grid and gridded point data in a diagram with the Latitude/Longitude component on the X-axis, and the time component on the Y-axis. This display option is found in the Displays menu of the **Field Selector** tab of the Data Explorer. You can display the data as Time with respect to either Latitude or Longitude, and either as a Color Shaded or Contour display type.

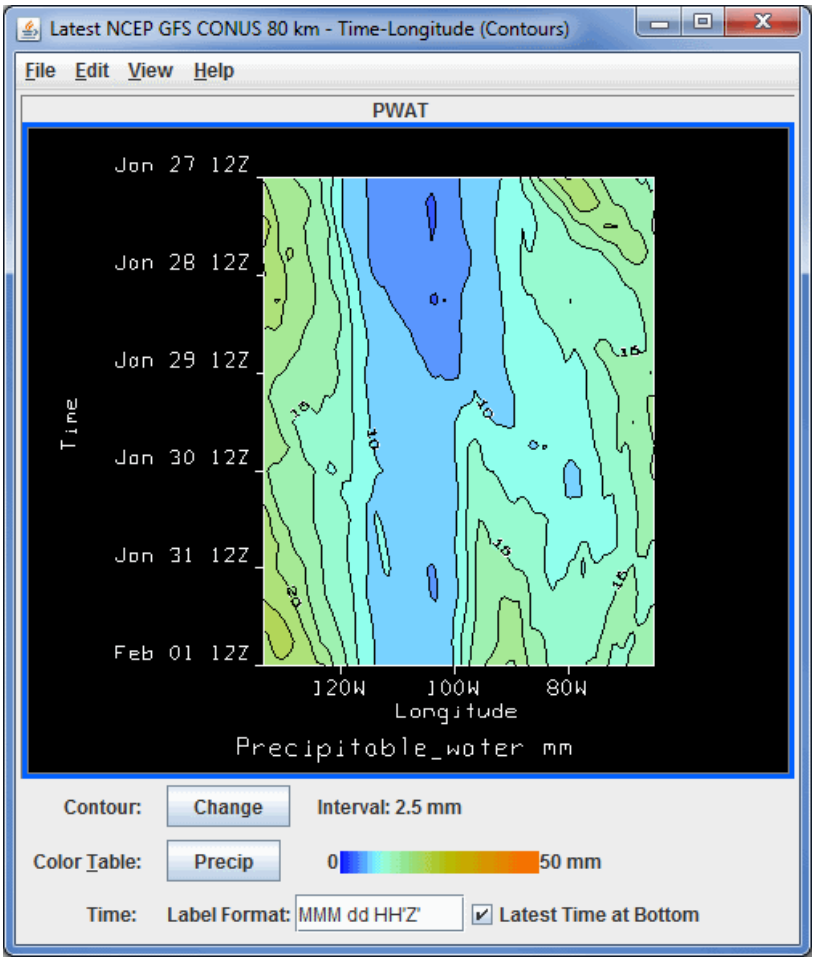


Image 1: Hovmoller Display

Properties

Contour - Opens the Contour Properties Editor, which allows you to change the contour interval, style, and labeling of the contour lines. The current contour interval for the display is listed next to **Interval**. This is an option for Contour displays.

Color Table - Shows the active color table and the associated high and low data values in the units of the display. As the mouse pointer is moved over the color bar, the value at a particular color is shown. Right click on the color bar or click on the button that displays the name of the Color Table to make modifications to the color bar. This allows you to open the Color Table Editor, change the range, select other color tables, etc.

Time - Sets the format used to label time along the Y-axis. See the Formats and Data Preferences page for information on how to format the label. After you enter your desired values into this field, press Enter for it to be applied to the display.

Latest Time at Bottom - Displays the oldest time will be shown at the top of display, and the most recent time at the bottom when selected. This is the default for the Hovmoller display. If you uncheck this box, the Y-axis will be inverted, showing the most recent time at the top, and the oldest time at the bottom.

By default, if you select a Longitude display, the entire spatial domain will be utilized, and the longitude range will go from the western extent to the eastern extent of your domain. The latitude will be averaged from the northern to southern boundaries of your domain. You can restrict the latitude and longitude domain by selecting a region in the **Region** tab of the **Field Selector** tab of the Data Explorer. The Latitude displays work the same way, by averaging the longitude across the entire domain unless you subset a region.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there are a couple of options unique to this display.

The **Edit** menu has this unique option:

Contour Line Color - Allows you to change the contour line color in the display. This option is an option for the Contour display types.

The **View** menu has this unique option:

Hovmoller View - Allows you to capture an image of the data and change many aesthetic aspects of the display.

Grid Trajectory Controls

Overview

The Grid Trajectory display types are capable of working with gridded data containing u and v-wind components, as well as a scalar quantity to color them by. Both 2D and 3D trajectories can be created dependent on the fields contained in the data. The relevant display types are:

- 2D Grid Trajectory
- 2D Grid Trajectory Colored by Speed
- 3D Grid Trajectory
- 3D Grid Trajectory Colored by Speed
- Trajectory Colored by Another Parameter

The Grid 2D Trajectory or Grid 3D Trajectory formulas can be used to access these display types. The formulas will request for all of the fields to pass through it, including the u- and v-wind components, the vertical component, and a color-by component. An alternative to the formulas is utilizing the derived 2D and 3D fields of your data, Grid 2D Trajectory and Grid 3D Trajectory. When using these fields, all you need to specify is the scalar quantity when using the Trajectory Colored by Another Parameter display type, and McIDAS-V will pull out the relevant u- and v-wind components (as well as the vertical component when creating 3D Trajectories).

After clicking **Create Display** and choosing the field(s), the **Layer Controls** tab of the Data Explorer will appear, where various properties of the trajectories can be set:

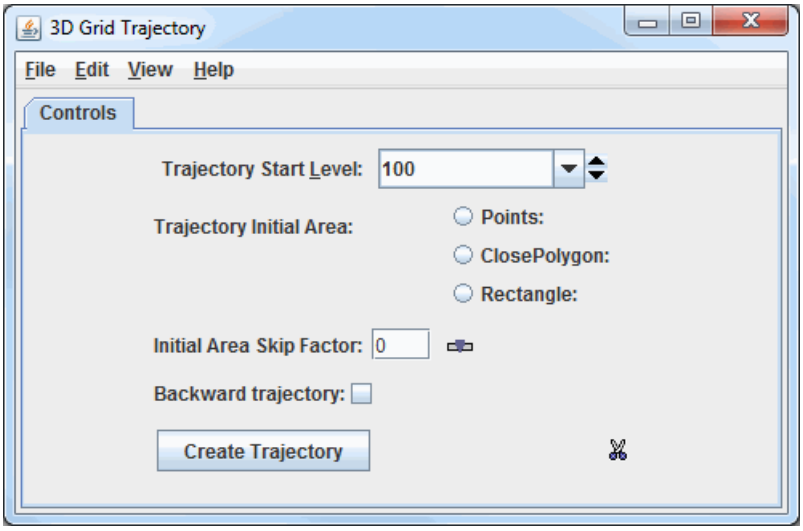


Image 1: Grid Trajectories Layer Controls

Properties

Trajectory Start Level - Sets the vertical level where the trajectories will originate from.

Trajectory Initial Area - Allows for determining the geographical domain where the trajectories will originate from. While the trajectories originate at these locations, they are not bounded by the Trajectory Initial Area. They can extend beyond these boundaries up to the geographical extent of the data. Multiple Trajectory Initial Areas of the same type can be drawn, but you cannot mix different types. Note that if no Trajectory Initial Area is selected, trajectories will originate over the entire domain of the data:

Points - Plots individual points in the Main Display where the trajectories will originate from.

ClosePolygon - Allows for clicking and dragging in the Main Display window to draw a shape around any desired area. The trajectories will originate from everywhere inside of the shape. By default, they will be spaced apart at the resolution of the grid.

Rectangle - Allows for clicking and dragging in the Main Display window to draw a rectangle around any desired area. The trajectories will originate from everywhere inside of the rectangle. By default, they will be spaced apart at the resolution of the grid.

Initial Area Skip Factor - Sets the skip factor of the trajectories. This is an option when using **ClosePolygon** and **Rectangle Trajectory Initial Areas**. By default, this value is 0, meaning that the trajectories will be spaced by the model resolution. This can changed by typing a new value into the field and pressing Enter, or by using the slider. Raising this value will result in fewer trajectories being drawn in your display.

Backward trajectory - Creates backward trajectories instead of the default, which is forward trajectories.

Create Trajectory **-** Creates the trajectories utilizing the information provided in the **Trajectory Start Level**, **Trajectory Initial Area**, and **Initial Area Skip Factor** fields. These trajectories will be displayed in the Main Display window.

Remove existing glyphs and trajectories - Removes any trajectories and trajectory initial areas from the Main Display window.

Once Create Trajectory is clicked to display the trajectories, the options in the **Layer Controls** will expand to include more controls:

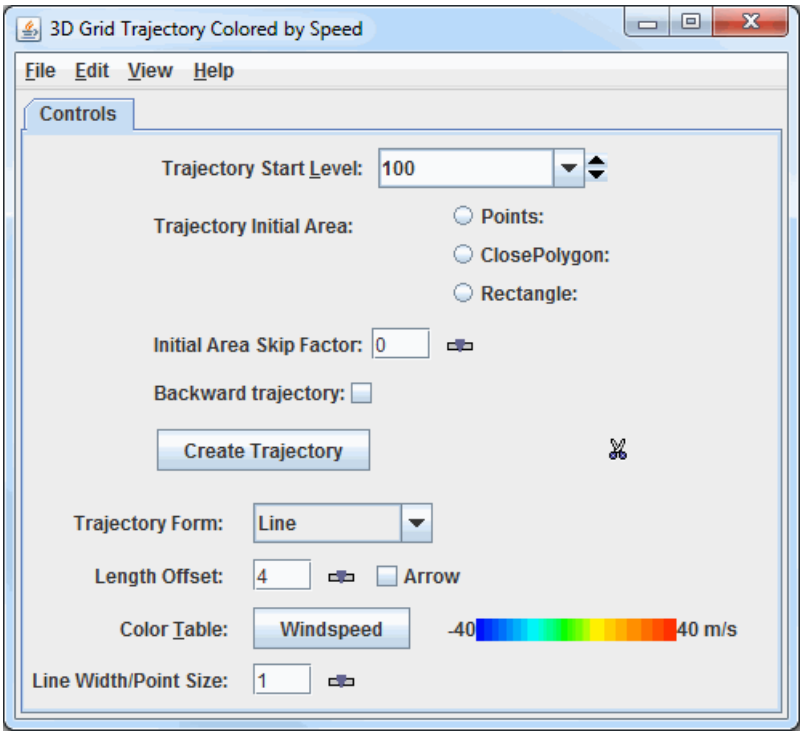


Image 2: Grid Trajectories Layout Tab

Properties

Trajectory Form - Allows for selecting the type of trajectory used in the display. The options are Line, Ribbon, Cylinder, Deform Ribbon, and Point.

Length Offset - Sets the number of timesteps to include in each trajectory.

Arrow - Adds an arrow head to the trajectories if the Line Trajectory Form is selected.

Color Table - Shows the active color table and the associated high and low data values in the units of the display. As the mouse pointer is moved over the color bar, the value at a particular color is shown. Right click on the color bar or click on the button that displays the name of the Color Table to make modifications to the color bar. This allows you to open the Color Table Editor, change the range, select other color tables, etc. This option sets the color of the trajectories drawn in the Main Display window. This control is available if the trajectories are colored by speed or another scalar parameter, otherwise, a **Color** dropdown menu will be available to set the color of the trajectories.

Line Width/Point Size - Sets the thickness of the trajectory lines or points in the Main Display window. This can be changed by typing a value into the field and pressing Enter, or by using the slider. The default value is 1.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there are a couple of options unique to this display.

The **File** menu has these unique options:

Export Drawing - Allows for exporting the Trajectory Initial Area as a drawing file (*.xgrf). **Load as map data** can be selected as well, which will add the shape to the **Field Selector**. This exported drawing can then be loaded again in subsequent sessions using **Import Drawing**.

Import Drawing - Allows for importing a drawing file (*.xgrf) which draws a Trajectory Initial Area. Once the drawing has been imported, Create Trajectory can be clicked and trajectories the will be drawn using this shape as the Trajectory Initial Area

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Satellite and Radar Displays

- Image Controls
- HYDRA Controls
- WSR-88D Level III Controls
- Level 2 Radar Layer Controls

Image Controls

Overview

The Image Controls are used to adjust displays of satellite imagery. The control window generally consists of two tabs: **Settings** and **Histogram**.

The **Settings** tab allows you to customize many aspects of the appearance of your display. Note that the items in this control may be different depending on which display type you select:

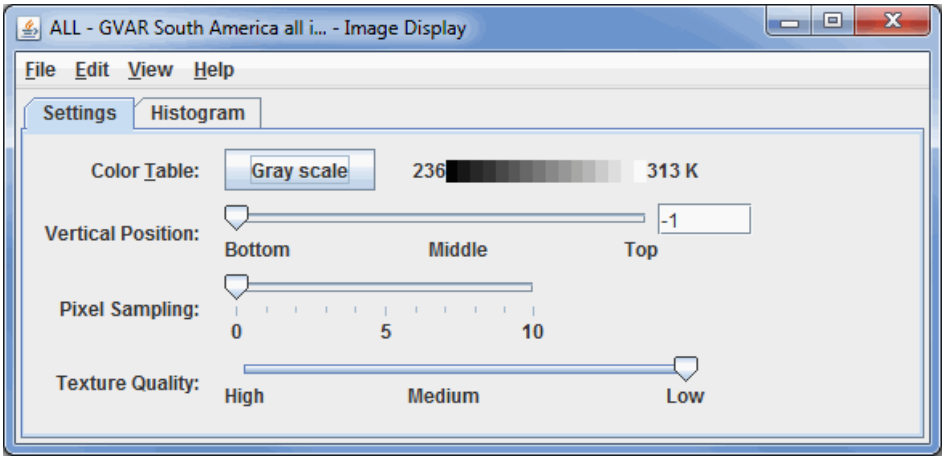

Image 1: Settings Tab of the Image Controls Properties Dialog

Properties

Color Table - Shows the active color table and the associated high and low data values in the units of the display. As the mouse pointer is moved over the color bar, the value at a particular color is shown. Right-click on the color bar or click on the button that displays the name of the Color Table to make modifications to the color bar. This allows you to open the Color Table Editor, change the range, select other color tables, etc.

Vertical Position - Changes the vertical position of the satellite display with respect to other variables being displayed in the Main Display window. You can change this value by using the slider, or by entering a value into the field and pressing Enter.

Pixel Sampling - Changes the resolution of the image. A larger number makes a lower resolution display.

Texture Quality - Sets the quality of the displayed texture of Image Control. A higher quality will take longer to render and utilize more memory. One example of when **Texture Quality** may be useful is after reprojecting a satellite image. Depending on the original and final projections, you may see tears or jagged edges near the sides of the image. Changing the **Texture Quality** slider to a higher value will help to mitigate those reprojection artifacts.

Contour - Opens the Contour Properties Editor to change how the contours appear in the Main Display window. This is an option for the Image Contours display type.

Smoothing - Smooths the contour lines in the Main Display window. There are seven types of smoothing: None, 5-point, 9-point, Gaussian, Cressman, Circular, and Rectangular weighted smoothers. The smoothing factor can be adjusted for all except the 5-point and 9-point smoothers. The higher the value, the smoother the grid. For the Cressman, Circular and Rectangular aperture smoothing types, the smoothing factor is the radius in grid spacing units. This is an option for the Image Contours display.

The **Histogram** tab allows you to visualize a histogram of your Satellite data:

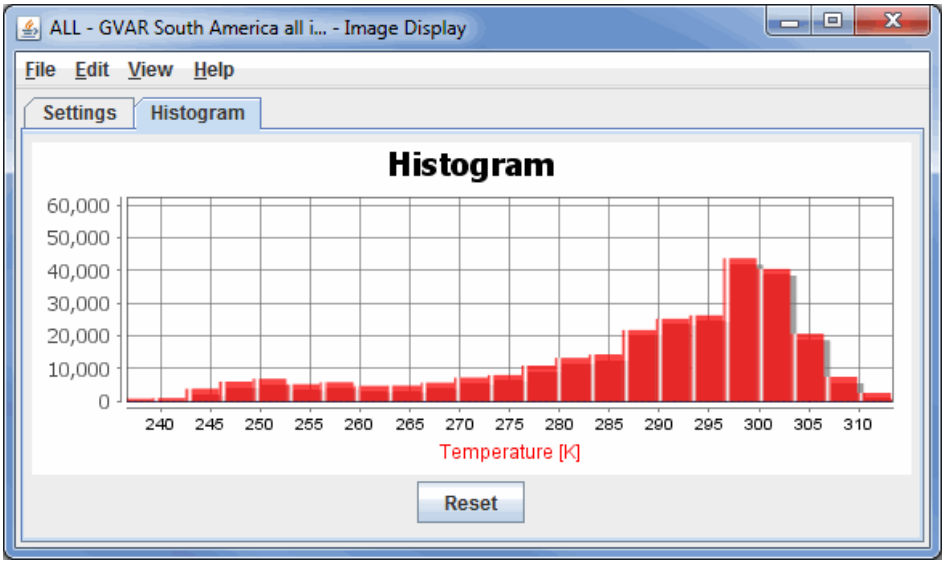

Image 2: Histogram tab of the Image Controls Properties Dialog

There are many ways that you can customize this histogram. If you right-click on the histogram and select Properties, you can get to a Plot Properties dialog which allows you to change many aesthetic properties of the histogram. You can also modify the display in the Main Display window through the **Histogram** tab. You can do this by left-clicking and dragging from left to right to zoom in over your desired range of data values. Once you are done zooming in, the display in the Main Display window will modify to use a color bar range that matches the boundaries of the zoom box you created in this tab. To return to the original data range, use the Reset button.

Image Display Over Topography

One of the display types in the **Displays** subset panel of the **Field Selector** is Image Display Over Topography. This display type differs from the other Imagery display types because it allows you to create a 3D display of your satellite image. In order to utilize this display type, you must have both the satellite data and a separate data source for topography. One example of a topographic data source is the *2D->Geopotential_height @ surface* field of GFS CONUS model data.

To use this display type, select your satellite field, the Image Display Over Topography display type, and click **Create Display**. This will open a Field Selector window, prompting for your topography field. Once you select your topography field and click **OK**, a 3D display of your satellite image draped over topography will be displayed. You can rotate the image in the Main Display window using right-click and drag to visualize the 3D aspects of the display. You can also make the topographic features stand out more or less by using the Vertical Range item in the Viewpoint Toolbar in the Main Display window. Lowering the **Max value** field of the Vertical Range window will make tall features (ex. mountains) appear even taller.

The **Layer Controls** tab of the Data Explorer for this display type does not include a **Histogram** tab. The controls in this tab are **Color Table**, **Pixel Sampling**, and **Texture Quality**, which are described in the **Properties** section above.

Note: In order to get this display type to show 3D topographic features, the entire domain of your satellite data must lie within the domain of your topographic field. For example, if you are working with a full disk satellite image, but you only have topographic data over the United States, you must subset a satellite region over the United States in the **Region** tab of the **Field Selector** before creating the display. If you do not do this, the image will display entirely in the 2D and not show any topographic features.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there is one option that is unique to this display.

The **View** menu has this unique option:

> **Use Native Image Projection -** Re-centers the display and resets the zoom level back to the display's initial settings without changing any other preferences you have modified.

HYDRA Layer Controls

- MultiSpectral Display Controls
- Linear Combination Controls
- 4 Channel Combination Controls
- ProfileAlongTrack Controls

MultiSpectral Display Controls

Overview

HYDRA MultiSpectral Display controls are used to create a multispectral display within McIDAS-V. There are two sets of controls, the MultiSpectral Display and the MultiSpectral Probes. The Multispectral Display consists of three tabs: **Display**, **Settings**, and **Histogram**.

The **Display** tab shows the spectra. This may differ if you are looking at Hyperspectral data or Multispectral data due to the number of bands included with the data. Hyperspectral data will have a spectra drawn as a line, while multispectral data will show a variety of points:

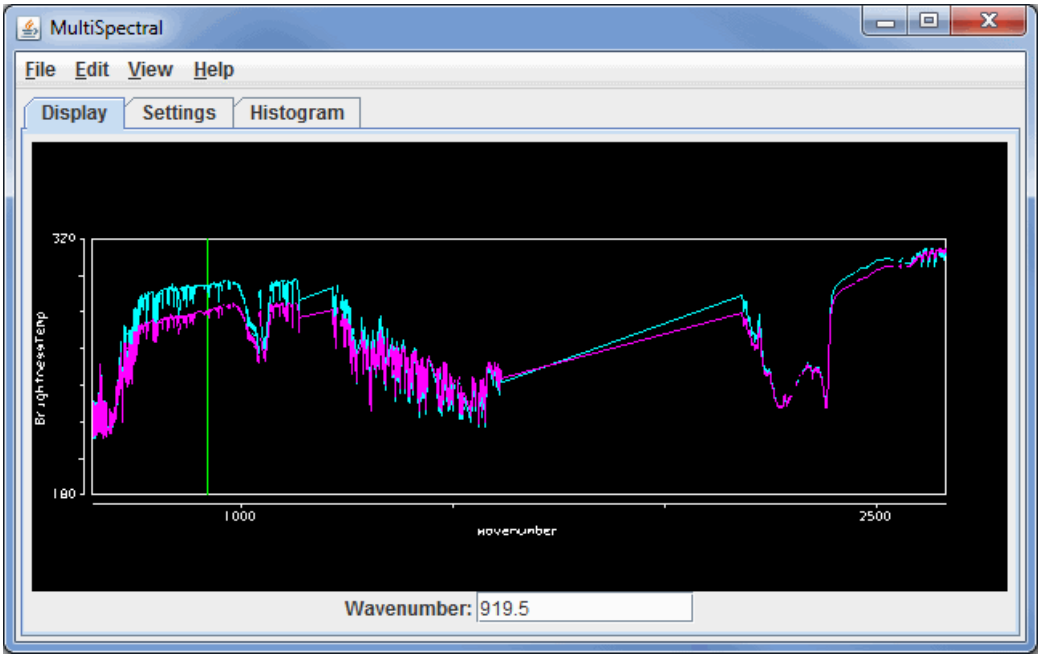

Image 1: Display Tab of the MultiSpectral Display Controls Window for Hyperspectral Data

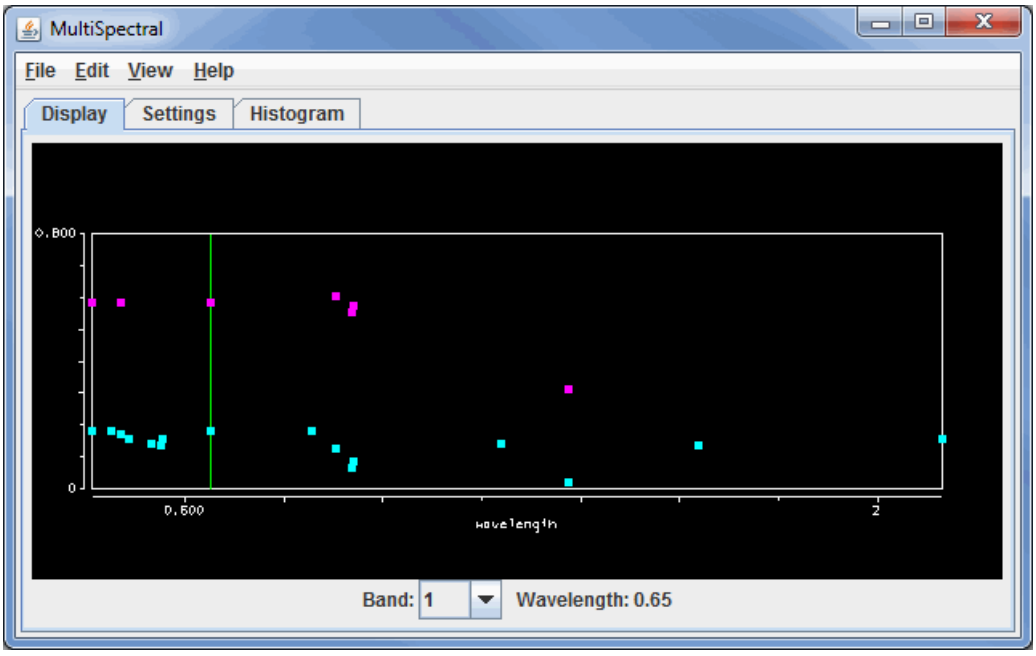

Image 2: Display Tab of the MultiSpectral Display Controls Window for Multispectral Data

Properties

Wavenumber - Changes the wavelength/wavenumber displayed in the image by entering in a new value and hitting Enter.

Band - Changes the band number the green spectral line will be at, as well as the band that is used to display the data in the Main Display window.

Wavelength - Lists out the wavelength associated with your chosen **Band**.

Use the Shift+left click+drag combination to create a box of a region to zoom in on. To return to the full spectra, use Ctrl+left click. Middle-

clicking on a point in the spectra will change the wavelength/wavenumber of the image displayed. Right click+drag will translate the spectra left or right. Left click+drag on the green wavelength/wavenumber selector bar will allow you to change the wavelength displayed in the image. As you are dragging the selector bar, the wavelength/wavenumber will be displayed in the upper left corner of the spectra window for the current location of the the bar.

The **Settings** tab shows the settings for this display control and the readout probes:

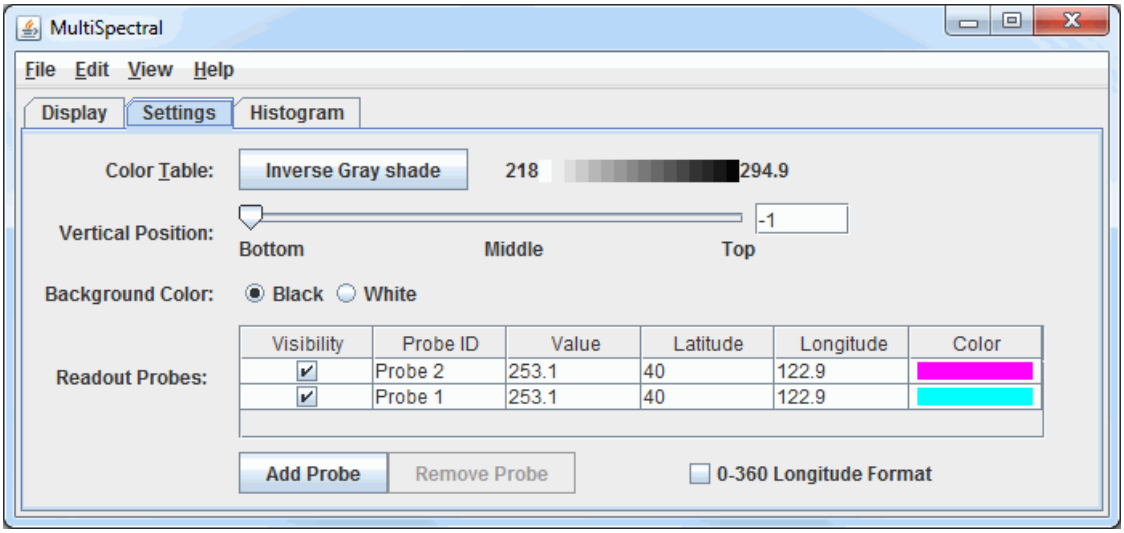

Image 3: Settings Tab of the MultiSpectral Display Controls Window

Properties

Color Table - Shows the active color table and the associated high and low data values in the units of the display. As the mouse pointer is moved over the color bar, the value at a particular color is shown. Right click on the color bar or click on the button that displays the name of the Color Table to make modifications to the color bar. This allows you to open the Color Table Editor, change the range, select other color tables, etc.

Vertical Position - Sets the vertical position of the range rings with respect to other data being displayed. This can be changed by dragging the slider or typing a value into the field and pressing Enter.

Background Color - Sets the background color of the display in the **Display** tab of the Layer Controls. When this is set to Black, the background color will be black and the axes and labels will be white. When this is set to White, the background color will be white and the axes and labels will be black.

Readout Probes - Lists information on the probes located in the Main Display window. This section allows you to modify the probe visibility and color.

Add Probe **-** Allows you to add a new probe to the MultiSpectral Display.

Remove Probe **-** Allows you to remove the selected probe from the Readout Probes list as well as from the Main Display window.

0-360 Longitude Format - Sets the longitude format in the chart. When this option is checked on, longitudes will list out in the 0-360 degree format. When this option is not checked on, longitudes will list out in the -180-180 degree format.

The **Histogram** tab shows the histogram of the data for the image:

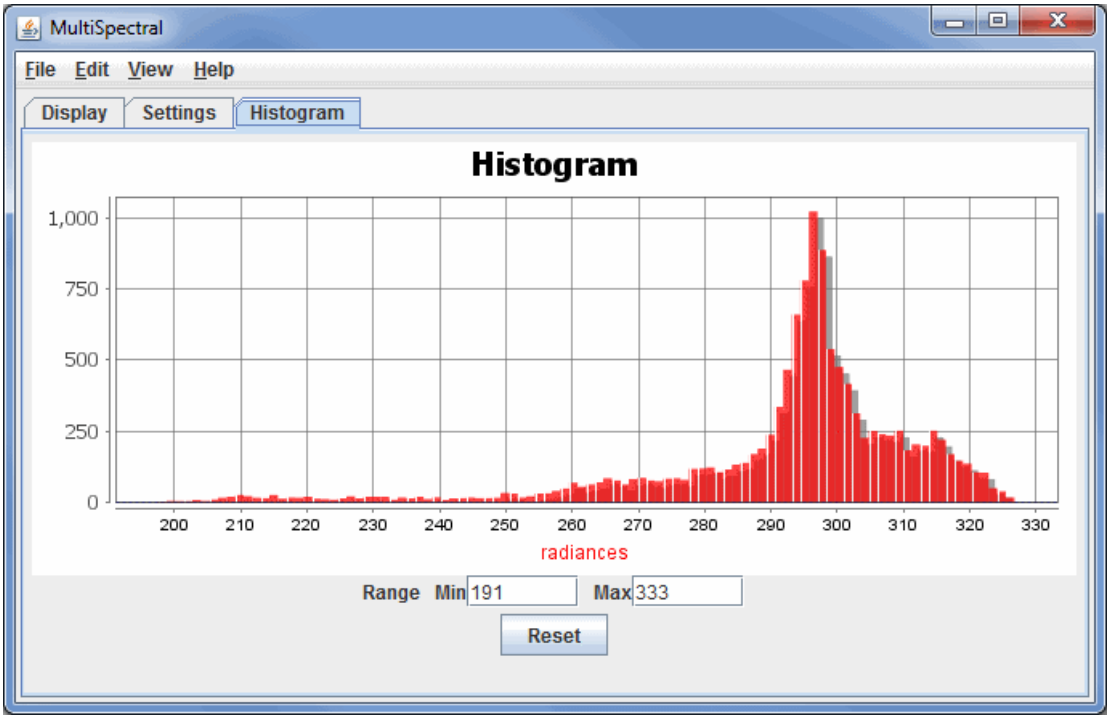

Image 4: Histogram Tab of the MultiSpectral Display Controls Window

Zoom in by left-clicking and dragging on the histogram, or enter in a set of minimum and maximum values.

Properties

Range - Allows you change the minimum and maximum values shown in the image in the Main Display window.

Reset - Resets histogram back to the default range.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there is one option that is unique to this display.

The **View** menu has this unique option:

Use Data Projection - Re-centers the display and resets the zoom level back to the display's initial settings without changing any other preferences you have modified.

Linear Combination Controls

Overview

The Linear Combinations controls are used to create and perform functions beyond the standard arithmetic functions in McIDAS-V. The **Console** tab consists of two parts - The **Spectra** and the **Console**:

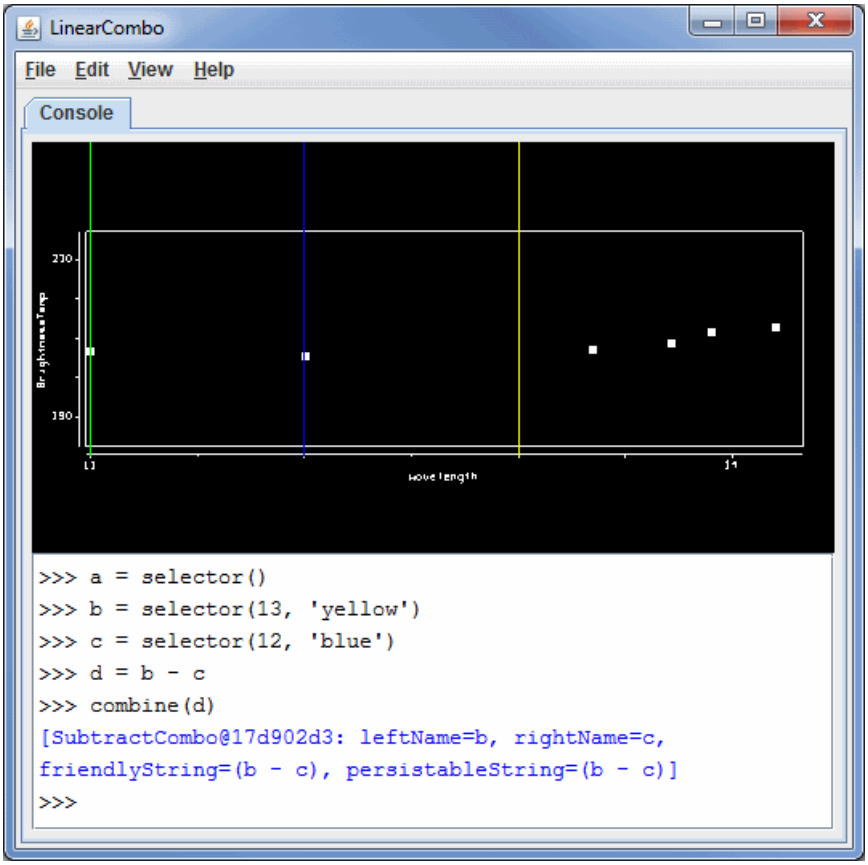

Image 1: Linear Combination Controls Window

The **Console** allows a user to define multiple spectra and perform more complex mathematical operations.

Command line functions

selector(*wavenumber, color* **)** - Creates a spectra line with a optionally defined color and wavelength. If no wavenumber parameter is found, a data-dependent default value will be used. If no color parameter is found, the color of the selector bar will default to green. The spectra line can be dragged between wavelength/wavenumbers.

Examples:

a = selector()	[Creates a green selector named "a" at a data-dependent wavenumber or wavelength]
b = selector(1000)	[Creates a green selector named "b" at wavenumber 1000.0]
c = selector('cyan')	[Creates a cyan selector named "c" at a data-dependent wavenumber or wavelength]
d = selector(919.5, 'red')	[Creates a red selector named "d" at wavenumber 919.5]
e = selector('40', 'orange')	[Creates a orange selector named "e" at the **wavenumber?** associated with band 40]
f = selector('11')	[Creates a green selector named "f" at the wavenumber associated with band 11]

combine(combination, *name* **)** - Computes the mathematical operation corresponding to the expression entered. The results are available in the **Field Selector** under the "MultiSpectral" tree in the **Fields** tab listed under the optional name. If no name was specified, the results will be displayed using the expression that was computed. A **combination** is required for this function.

Examples:

a = selector('2', 'red')	[Creates a red selector named "a" at the wavenumber associated with band 2]
b = selector('1', 'yellow')	[Creates a yellow selector named "b" at the wavenumber associated with band 1]
c = ((a-b)/(a+b))	[Creates a variable c that corresponds to the expression ((a-b)/(a+b))]
combine(c, 'NDVI')	[Results of the "c" variable will appear in the **Field Selector** as the "NDVI" entry

	]
combine((a-b)/(a+b))	[Results of the expression in the **combination** field will appear in the **Field Selector**]

print( ) - Prints out information about the current wavelength/wavenumber of a selector, or its value.

Linear Combination Properties

Spectra Window - Use the Shift+left click+drag combination to create a box of a region to zoom in on. To re-set the zoom level and return to the full spectra, use Ctrl+left click. Middle-clicking on a point in the spectra will change the wavenumber of the image displayed. Right click+drag will move the spectra left or right. Left click+drag on the wavelength/wavenumber selector bar(s) will allow you to change the wavelength

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4 Channel Combination Controls

Overview

The 4 Channel Combination controls are used to create a basic linear combination of spectral bands. There are two sets of controls. The top of the controls shows the spectra, while the bottom half gives the linear combination option:

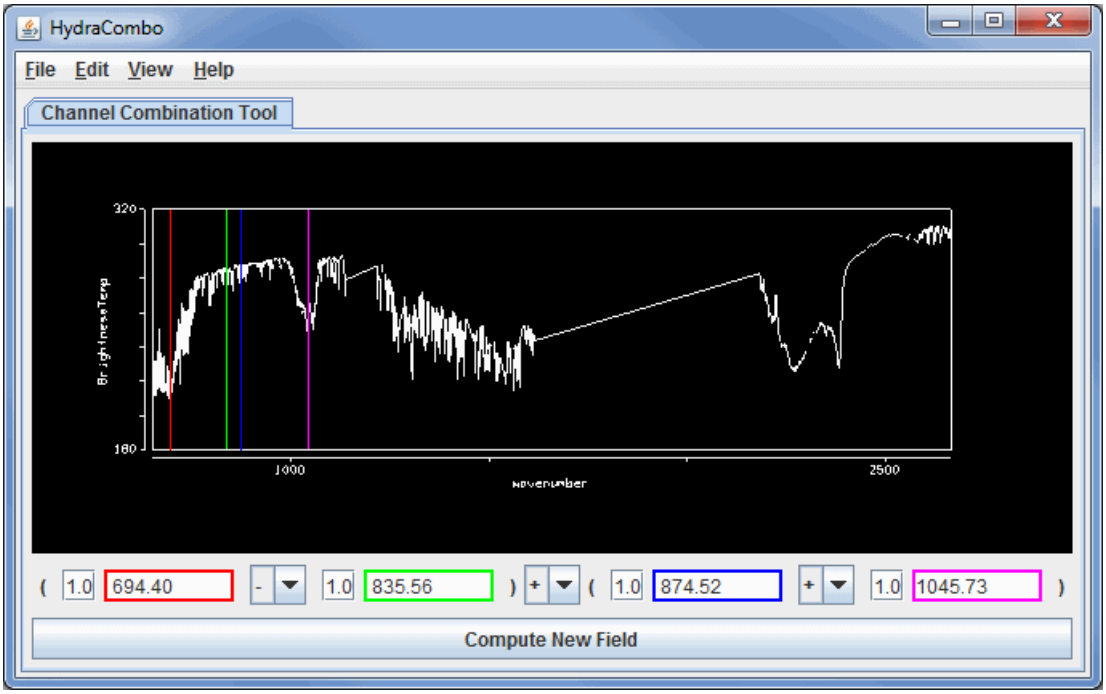


Image 1: Four Channel Combination Controls Window

Multispectral Display Properties

> **4 Channel Combination Equation -** Changes the wavenumber displayed in the image by entering in a new value and hitting **Enter** or use the pull down menus to select a band.
>
> **Compute New Field -** Computes the expression. The resulting image will show up in the **Field Selector** under the "Multispectral" field in the **Fields** tab.

Use the Shift+left click+drag combination to create a box of a region to zoom in on. To return to the full spectra, use Ctrl+left click. The Middle click+drag probing feature will list the wavelength/wavenumber as well as the reflectance or Brightness Temperature at a point along the spectra. Use the Left click+drag option to move the spectra selector bar(s) to a different value. The new value for where you moved the spectra bar to will be updated in the field at the bottom of the window.

The 4 Channel Combination tool allows you to specify arithmetic expressions for four spectral bands. Use the pull down menus between variables to select the appropriate arithmetic expressions for the equation. To apply a multiplier to any of the variables, change the value ahead of the wavelength/band.

ProfileAlongTrack Controls

Overview

The ProfileAlongTrack display controls are used to display CALIPSO (Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observation), CloudSat, and HSRL2 (High Spectral Resolution Lidar 2) lidar data, including backscatter and reflectivity. These lidar files should be loaded through the **General->Files/Directories** chooser with the *HYDRA data source* Data Type. There are a variety of formats of these data. Below is a sample list of file names from each satellite/instrument that are currently supported:

- **CALIPSO**
  - CAL_LID_L1-ValStage1-V3-30.2015-10-05T17-00-40ZD.hdf
  - CAL_LID_L2_01kmCLay-ValStage1-V3-30.2015-10-05T17-00-40ZD.hdf
  - CAL_LID_L2_333mCLay-ValStage1-V3-30.2015-10-05T17-00-40ZD.hdf
- **CloudSat**
  - 2017263170336_60634_CS_2B-GEOPROF_GRANULE_P_R04_E06.hdf
  - Note that this is the 94-GHz 2B-GEOPROF product
- **HSRL2**
  - discoveraq-HSRL2_B200_20130904_R0_F2_.h5

Once the data source has been added to the **Field Selector** and a field has been selected, a **track** subsetting tab will appear that allows for setting several options for the display of the data:

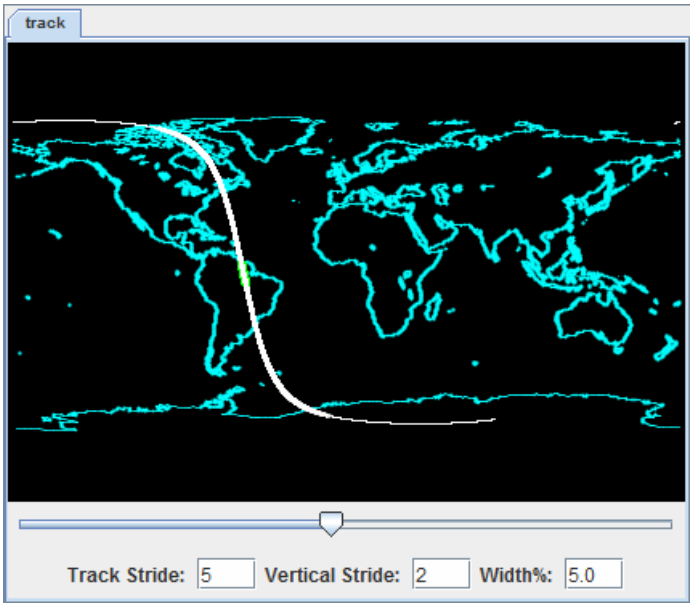


Image 1: ProfileAlongTrack subsetting tab

Track Subset Tab Properties

Preview image - Plots the path of the track/orbit over a map. The portion of the track to be displayed is outlined in green.

Slider - Defines the portion of the track to display. Moving this slider left or right will move the green-outlined part of the track closer to the beginning or ending of the track/orbit.

Track Stride - Sets the horizontal stride (along the track) to display the data at. A value of 1 does not sample the data, thus displaying at the native resolution of the data. The higher the value, the more sampling of the data and the lower the resolution.

Vertical Stride - Sets the vertical stride to display the data at. A value of 1 does not sample the data, thus displaying at the native resolution of the data. The higher the value, the more sampling of the data and the lower the resolution.

Width% - Sets the width/length of the track/orbit to display. Increasing this value will plot more data long the track. A value of 100 will plot the entire track/orbit included in the file assuming that the slider (described above) is in the center.

Dependent on the field selected to be displayed, the **Layer Controls** tab of the Data Explorer may have only a **Settings** tab or tabs for both **Settings** and **Display**.

Settings

Color Table - Sets the enhancement to be applied to the display.

Display

Plots a graph where the x-axis represents the points along the track, and the y-axis is a physical parameter such as elevation. This tab

will be available if **Track2D** or **Track3D** is the field selected to be displayed.

WSR-88D Level III Controls

Overview

The controls for Level III Radar imagery are similar to the standard Image Controls and are used to adjust image displays of this Radar imagery. The control window consists of two tabs: **Settings** and **Histogram**.

The **Settings** tab allows you to customize many aspects of the appearance of your display:

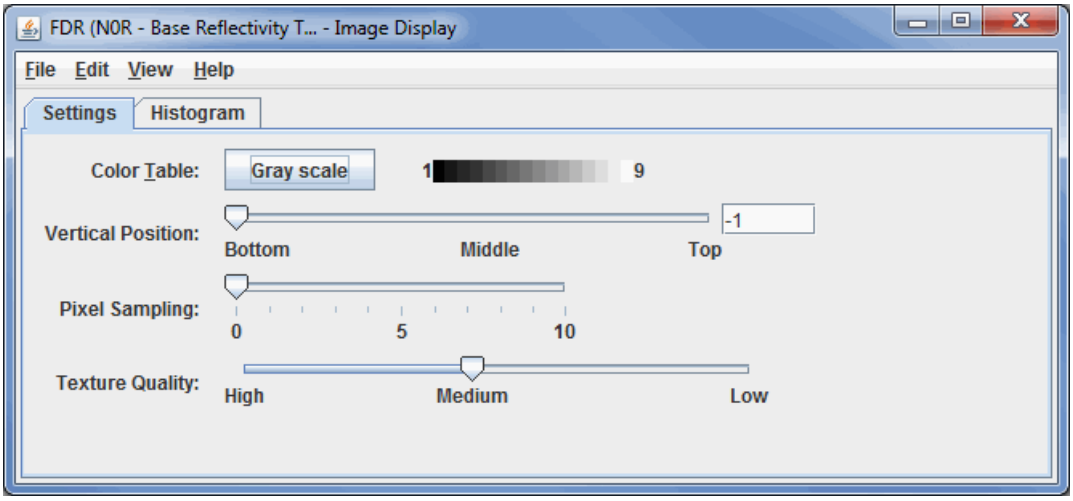


Image 1: Settings Tab of the WSR-88D Level III Controls Window

Properties

Color Table - Shows the active color table and the associated high and low data values in the units of the display. As the mouse pointer is moved over the color bar, the value at a particular color is shown. Right click on the color bar or click on the button that displays the name of the Color Table to make modifications to the color bar. This allows you to open the Color Table Editor, change the range, select other color tables, etc.

Vertical Position - Changes the vertical position of the Radar display with respect to other variables being displayed in the Main Display window. You can change this with the slider, or by entering a value in the box and pressing Enter.

Pixel Sampling - Changes the resolution of the image. A larger number makes a lower resolution display.

Texture Quality - Controls the texture quality of the display. A higher quality will provide more detail in the display, but it will take longer to render and use more memory.

Contour - Opens the Contour Properties Editor to change how the contours appear in the Main Display window. This is an option for the Image Contours display type.

The **Histogram** tab allows you to visualize a histogram of your Radar data:

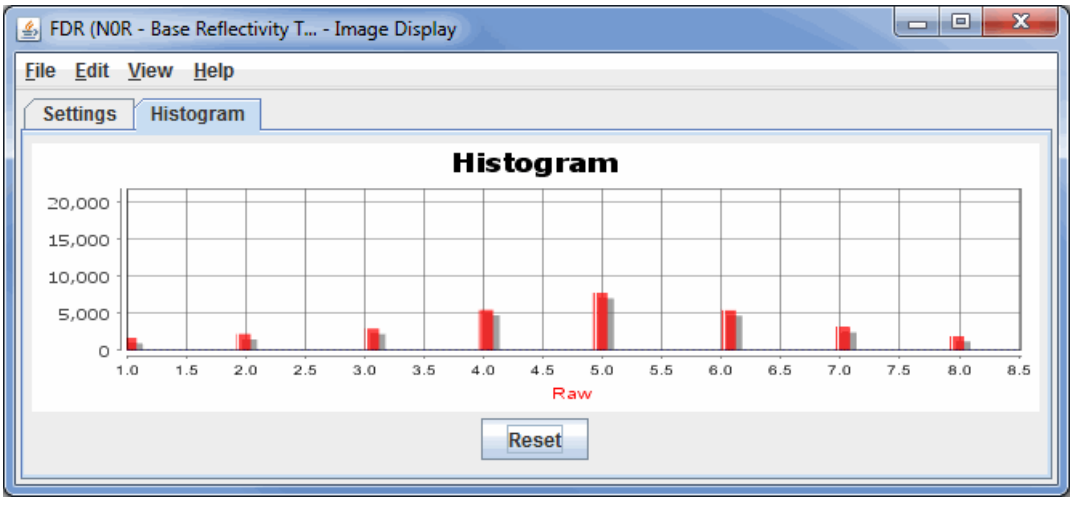


Image 2: Histogram tab of the WSR-88D Level III Controls Window

There are many ways that you can customize this histogram. If you right-click on the histogram and select Properties, you can get to a Plot Properties dialog which allows you to change many aesthetic properties of the histogram. You can also modify the display in the Main Display window through the **Histogram** tab. You can do this by left-clicking and dragging from left to right to zoom in over your desired range of data

values. Once you are done zooming in, the display in the Main Display window will modify to use a color bar range that matches the boundaries of the zoom box you created in this tab. To return to the original data range, use the Reset button.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there is one option that is unique to this display.

The **View** menu has this unique option:

> **Use Native Image Projection** - Re-centers the display and resets the zoom level back to the display's initial settings without changing any other preferences you have modified.

Level 2 Radar Layer Controls

- Radar Sweep View Controls
- Radar RHI Display Controls
- Radar Cross Section Controls
- Radar CAPPI Display Controls
- Radar Volume Scan Controls
- Radar Isosurface Controls

Radar Sweep View Controls

Overview

The Radar Sweep Controls are used to control displays of single level sweeps of radar data, and their display appears in the Main Display window. WSR-88D Level II radar data has three moments or display types: Reflectivity, RadialVelocity, and SpectrumWidth, indicated by the icon in the **Field Selector**. WSR-88D Dual Pole radar includes these three moments, as well as DifferentialReflectivity, CorrelationCoefficient, and DifferentialPhase.

The controls are identical for 2D and 3D displays:

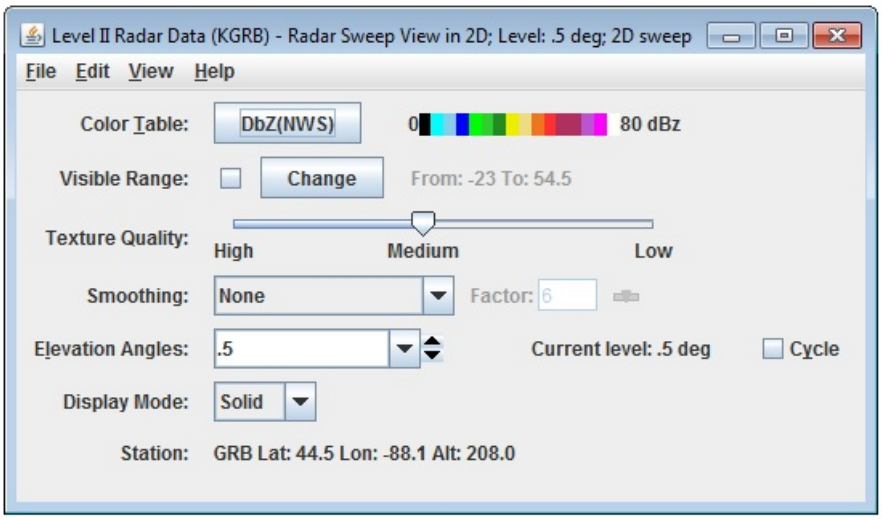


Image 1: Level II Radar Sweep Controls Properties Dialog

Properties

Color Table - Shows the active color table and the associated high and low data values in the units of the display. As the mouse pointer is moved over the color bar, the value at a particular color is shown. Right click on the color bar or click on the button that displays the name of the Color Table to make modifications to the color bar. This allows you to open the Color Table Editor, change the range, select other color tables, etc.

Visible Range - Sets the range of the data displayed. The numbers represent the range of reflectivity values that can be viewed in the Main Display window. This tool is active when the checkbox is checked, if not checked, the default range will be used. To change these values, check the checkbox, and click Change to bring up a Change Visible Range window, where you can enter your upper and lower bound values.

Texture Quality - Changes the texture quality of the display.

Smoothing - Smooths the grid that can be used to smooth contour lines or flow fields in the display. There are seven types of smoothing: None, 5-point, 9-point, Gaussian, Cressman, Circular, and Rectangular weighted smoothers. The smoothing factor can be adjusted for all except the 5-point and 9-point smoothers. The higher the value, the smoother the grid. For the Cressman, Circular and Rectangular aperture smoothing types, the smoothing factor is the radius in grid spacing units.

Elevation Angles - Determines which of several radar tilts, in degrees, is displayed. Click on the **Cycle** check box to animate vertically through all available angles. The current elevation angle used to display the data in the Main Display window is listed after **Current level**. The **Cycle** option works when the top level of the data type in the Fields section of the **Field Selector** is selected, which makes all angles available in the display.

Display Mode - Sets the way the texture is displayed. You can select Solid, Mesh, or Points. This is useful for looking at the structure of the underlying data.

Station - Shows the station Location ID, Latitude, Longitude, and Altitude.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there are some options that are unique to this display.

The **Edit** menu has this unique option:

Levels - Lists the different Elevation Angles for the chosen display. Changes to the Elevation Angle will be applied to the Radar display in the Main Display window.

The **View** menu has this unique option:

Use Radar Projection - Re-centers the display and resets the zoom level back to the display's initial settings without changing any other preferences you have modified.

Radar RHI Display Controls

Overview

The RHI (Range-Height Indicator) display appears in the Main Display window and as a 2D plot in the **Layer Controls** tab. WSR-88D Level II Radar data has three moments or data types: Reflectivity, Radial Velocity, and Spectrum Width, indicated by the icon in the **Field Selector**. WSR-88D Dual Pole radar includes these three moments, as well as DifferentialReflectivity, CorrelationCoefficient, and Differential Phase. In order for RHI to be listed as a valid Display Type in the **Field Selector**, one of the moments (ex. Reflectivity, RadialVelocity, etc.) must be chosen in the **Fields** panel, not one of their individual elevation angles. The control window contains two tabs, **Display** and **Settings**.

The **Display** tab shows the RHI in 2D:

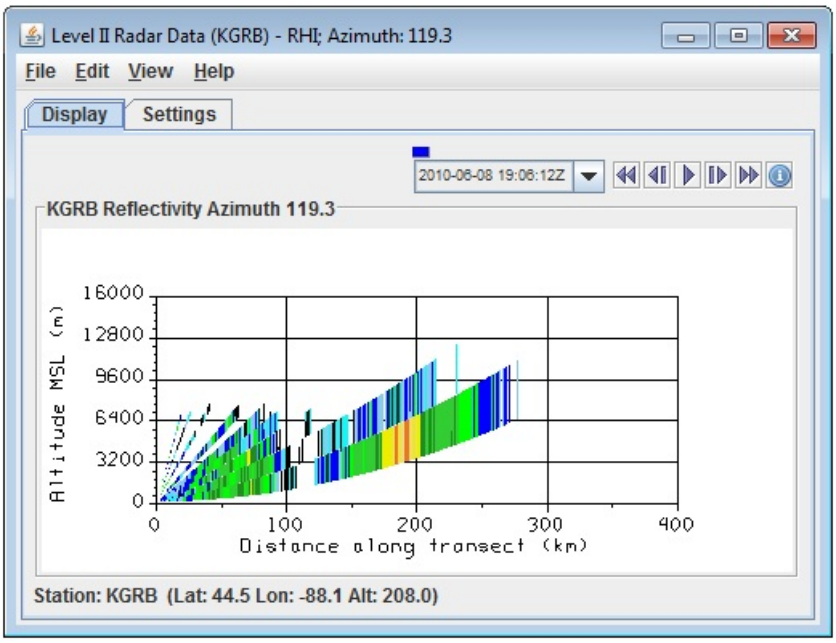
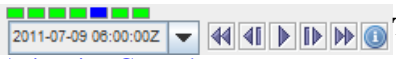


Image 1: Display Tab of the Radar RHI Display Controls

Properties



Time Animation Control - Controls the looping of displays through time. See more in Time Animation Control.

Distance along transect - Depicts the horizontal distance the covered by the radar in the Main Display window. This can be changed by left-clicking and dragging the end points of the cross section in the Main Display.

Station - Shows the station Location ID, Latitude, Longitude, and Altitude.

The **Settings** tab shows settings to control the display:

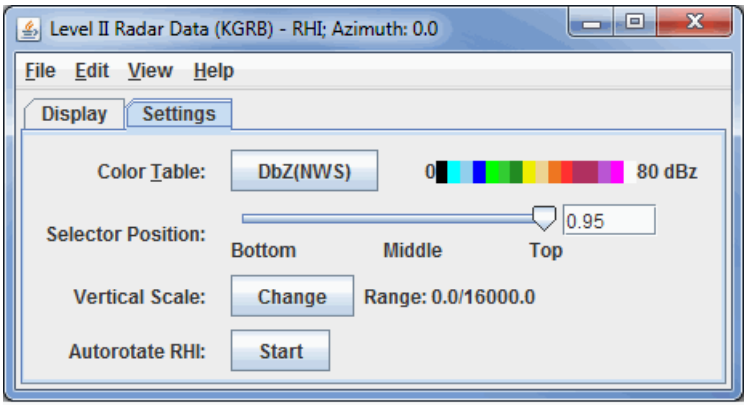


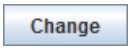
Image 2: Settings Tab of the Radar RHI Display Controls

Properties

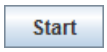
Color Table - Shows the active color table and the associated high and low data values in the units of the display. As the mouse pointer is moved over the color bar, the value at a particular color is shown. Right click on the color bar or click on the button that displays the name of

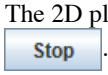
the Color Table to make modifications to the color bar. This allows you to open the Color Table Editor, change the range, select other color tables, etc.

Selector Position - Changes the vertical position of the selector line in the Main Display window. You can change this value by using the slider or by typing a value into the field and pressing Enter.

Vertical Scale - Changes the vertical axis range of the RHI line in the **Display** tab. To change this value, click 

to open a Change Vertical Axis Range window, where you can enter in new minimum and maximum values for the axis.

Autorotate RHI - Starts and stops autorotation of the RHI in the Main Display window. The 2D plot changes with the 3D RHI display when autorotate is on. Start the rotating by clicking 

and stop the rotation by clicking 

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Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there are a couple of options that are unique to this display.

The **View** menu has this unique option:

RHI - Offers options to capture an image or movie and to change many Display Window preferences.

The **Edit** menu has this unique option:

Selector Line Color - Selects the color of the selector line controlling the RHI azimuth in the Main Display window.

Radar Cross Section Controls

Overview

The radar vertical Cross Section Control is used to adjust vertical cross section displays of Level II Radar volume data. WSR-88D Level II Radar data has three moments or data types: Reflectivity, Radial Velocity, and Spectrum Width, indicated by the icon in the **Field Selector**. WSR-88D Dual Pole radar includes these three moments, as well as DifferentialReflectivity, CorrelationCoefficient, and Differential Phase. In order for Radar Cross Section to be listed as a valid Display Type in the **Field Selector**, one of the moments (ex. Reflectivity, RadialVelocity, etc.) must be chosen in the **Fields** panel, not one of their individual elevation angles. The control window has two tabs, **Display** and **Settings**.

The **Display** tab includes a duplicate of the display in the Main Display window:

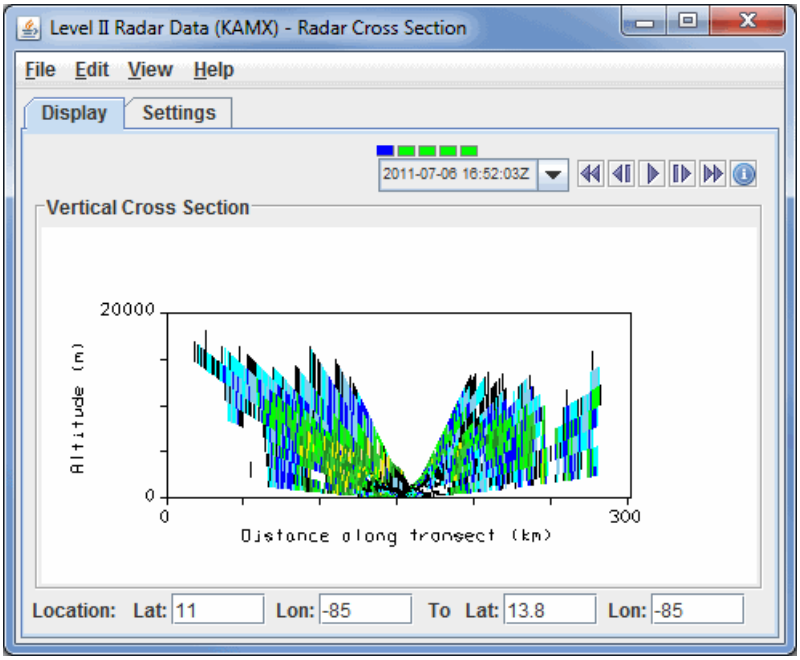
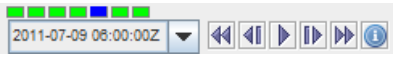


Image 1: Display Tab of the Radar Cross Section Controls

Properties



Time Animation Control - Controls the looping of displays through time. See more in Time Animation Control.

Display - Use the left-mouse button to drag the colored squares on the positioning line in the Main Display window. This repositioning of the end points allows you to reposition and extend or decrease the distance along the transect displayed by the radar cross section.

Location - Shows the location of the end points of the cross section.

The **Settings** tab shows the settings for this Layer Control:

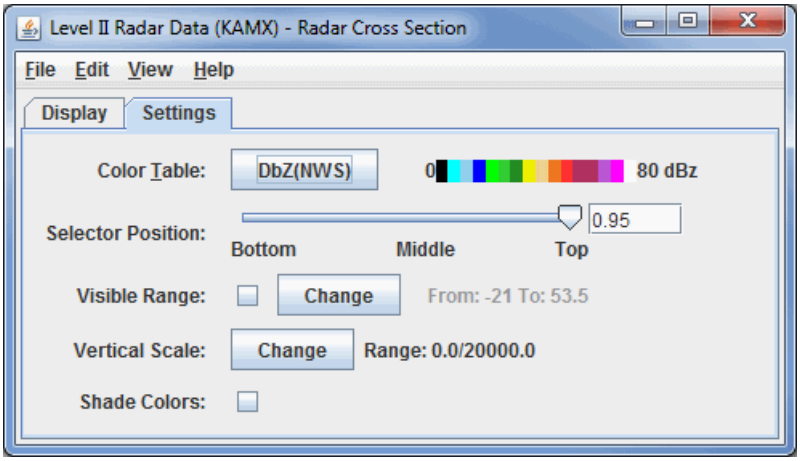


Image 2: Settings Tab of the Radar Cross Section Controls

Properties

Color Table - Shows the active color table and the associated high and low data values in the units of the display. As the mouse pointer is moved over the color bar, the value at a particular color is shown. Right click on the color bar or click on the button that displays the name of the Color Table to make modifications to the color bar. This allows you to open the Color Table Editor, change the range, select other color tables, etc.

Selector Position - Changes the vertical position of the selector line in the Main Display window. You can change this value by using the slider or by typing a value into the field and pressing Enter.

Visible Range - Sets the range of the data displayed. The numbers represent the range of reflectivity values that can be viewed in the Main Display window. This tool is active when the checkbox is checked, if not checked, the default range will be used. To change these values, check the checkbox, and click

to bring up a Change Visible Range window, where you can enter upper and lower bound values.

Vertical Scale - Changes the vertical axis range of the 2D Cross Section in the **Display** tab. To change this value, click

to open a Change Vertical Axis Range window, where you can enter in new minimum and maximum values for the axis.

Shade Colors - Blends the color between the radar data bins. The shaded display usually is not preferred for radar displays.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there is one option that is unique to this display.

The **View** menu has this unique option:

Cross Section - Offers options to capture an image or movie and to change many Display Window preferences.

Radar CAPPI Display Controls

Overview

The CAPPI (Constant Altitude Plan Position Indicator) Radar display appears in the Main Display window. WSR-88D Level II Radar data has three moments or data types: Reflectivity, Radial Velocity, and Spectrum Width, indicated by the icon in the **Field Selector**. WSR-88D Dual Pole radar includes these three moments, as well as DifferentialReflectivity, CorrelationCoefficient, and Differential Phase. In order for CAPPI to be listed as a valid Display Type in the **Field Selector**, one of the moments (ex. Reflectivity, RadialVelocity, etc.) must be chosen in the **Fields** panel, not one of their individual elevation angles.

The CAPPI Radar displays data at a constant altitude around the Radar site:

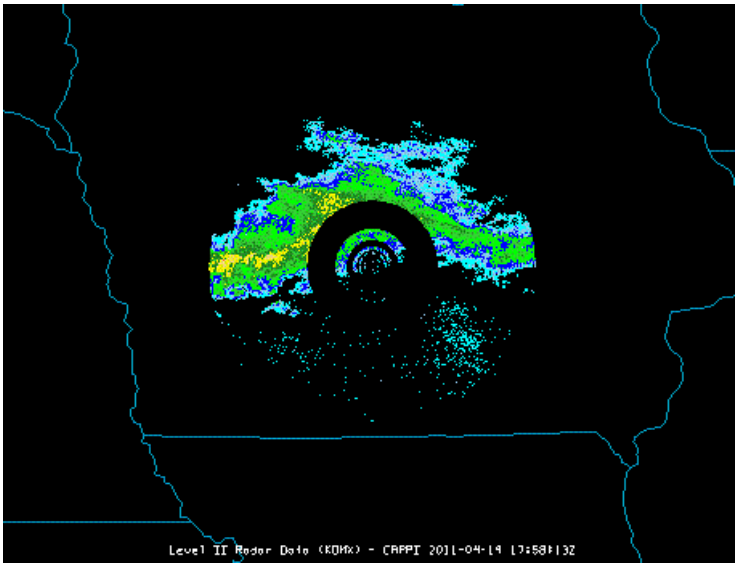


Image 1: CAPPI Display in the Main Display Window

The **Layer Controls** tab of the Data Explorer allows for several ways to customize the image or loop displayed:

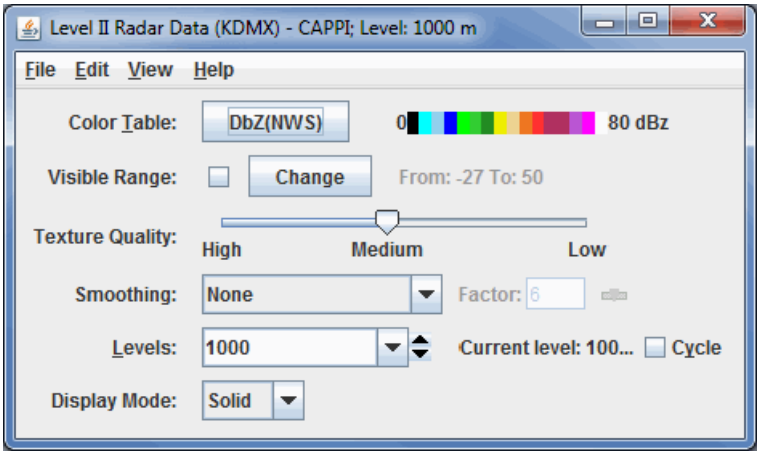


Image 2: CAPPI Layer Controls Properties Dialog

Properties

Color Table - Shows the active color table and the associated high and low data values in the units of the display. As the mouse pointer is moved over the color bar, the value at a particular color is shown. Right click on the color bar or click on the button that displays the name of the Color Table to make modifications to the color bar. This allows you to open the Color Table Editor, change the range, select other color tables, etc.

Visible Range - Sets the range of the data displayed. These numbers represent the range of reflectivity values that can be viewed in the Main Display window. This tool is active when the checkbox is checked, if not checked, the default range will be used. To change these values, check the checkbox, and click Change to bring up a Change Visible Range window, where you can enter your upper and lower bound values.

Texture Quality - Controls the texture quality of the display. A higher quality will provide more detail in the display, but it will take longer to render and use more memory.

Smoothing - Smooths the Radar display in the Main Display window. There are seven types of smoothing: None, 5-point, 9-point, Gaussian, Cressman, Circular, and Rectangular weighted smoothers. The smoothing factor can be adjusted for all except the 5-point and 9-point

smoothers. The higher the value, the smoother the grid. For Cressman, Circular, and Rectangular aperture smoothing types, the smoothing factor is the radius in grid spacing units.

Levels - Displays the native levels for the CAPPI Radar display. Use the dropdown menu to select one of the default levels to view, or type your own value into the Levels box and hit Enter. Additionally, you can use the button to switch between levels, or the check the **Cycle** checkbox to animate vertically through all of the default levels in the Levels dropdown menu. The Current Level represents the pressure level at which the data is being displayed in the Main Display window at that moment.

Display Mode - Sets the way the texture of the data is displayed. You can select Solid, Mesh, or Points. This is useful for looking at the structure of the underlying data.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there is one option that is unique to this display.

The **View** menu has this unique option:

Use Radar Projection - Re-centers the display and resets the zoom level back to the display's initial settings without changing any other preferences you have modified.

Radar Volume Scan Controls

Overview

The radar volume scan controls are used to show a radar volume as a series of nested cones. WSR-88D Level II Radar data has three moments or data types: Reflectivity, Radial Velocity, and Spectrum Width, indicated by the icon in the **Field Selector**. WSR-88D Dual Pole radar includes these three moments, as well as DifferentialReflectivity, CorrelationCoefficient, and Differential Phase. In order for Radar Cross Section to be listed as a valid Display Type in the **Field Selector**, one of the moments (ex. Reflectivity, RadialVelocity, etc.) must be chosen in the **Fields** panel, not one of their individual elevation angles.

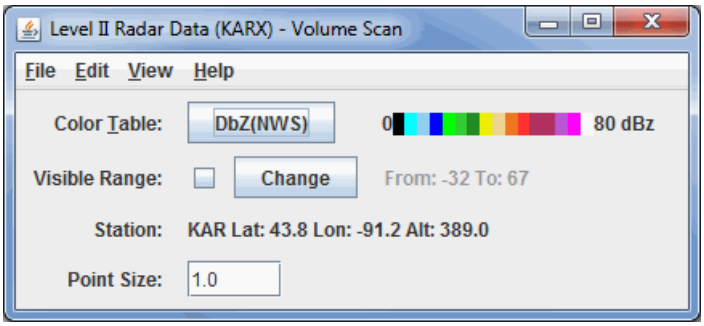


Image 1: Radar Volume Scan Controls Properties Dialog

Properties

Color Table - Shows the active color table and the associated high and low data values in the units of the display. As the mouse pointer is moved over the color bar, the value at a particular color is shown. Right click on the color bar or click on the button that displays the name of the Color Table to make modifications to the color bar. This allows you to open the Color Table Editor, change the range, select other color tables, etc.

Visible Range - Sets the range of the data displayed. These numbers represent the range of reflectivity values that can be viewed in the Main Display window. This tool is active when the checkbox is checked, if not checked, the default range will be used. To change these values, click the checkbox, and click Change to bring up a Change Visible Range window, where you can enter your upper and lower bound values.

Station - Lists the station location ID, latitude, longitude, and altitude.

Point Size - Changes the size of the points shown in the Main Display window.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there is one option that is unique to this display.

The **View** menu has this unique option:

Use Data Projection - Re-centers the display and resets the zoom level back to the display's initial settings without changing any other preferences you have modified.

Radar Isosurface Controls

Overview

Displays of Level II isosurfaces are controlled by the Isosurface controls. The Radar Isosurface display type allows you to visualize radar data in the 3D, including all elevation angles, at specific data values. An example of when this display type can be useful is if you are looking for only very high reflectivity values that may coincide with a hail spike. WSR-88D Level II Radar data has three moments or data types: Reflectivity, Radial Velocity, and Spectrum Width, indicated by the icon in the **Field Selector**. WSR-88D Dual Pole radar includes these three moments, as well as DifferentialReflectivity, CorrelationCoefficient, and Differential Phase. In order for Radar Isosurface to be listed as a valid Display Type in the **Field Selector**, one of the moments (ex. Reflectivity, RadialVelocity, etc.) must be chosen in the **Fields** panel, not one of their individual elevation angles.

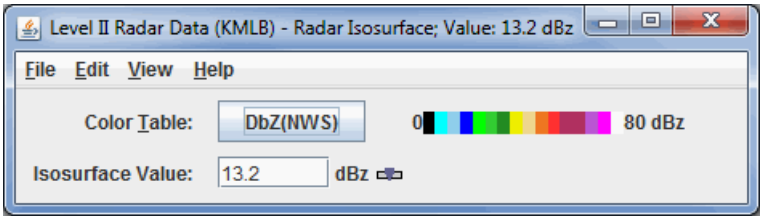


Image 1: Radar Isosurface Controls Properties Dialog

Properties

Color Table - Shows the active color table and the associated high and low data values in the units of the display. As the mouse pointer is moved over the color bar, the value at a particular color is shown. Right click on the color bar or click on the button that displays the name of the Color Table to make modifications to the color bar. This allows you to open the Color Table Editor, change the range, select other color tables, etc.

Isosurface Value - Sets the isosurface value. Only radar data with this specific data value will be shown in the display. You can set this value by using the button or by entering a value in the text field and pressing Enter.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there is one option that is unique to this display.

The **View** menu has this unique option:

Use Radar Projection - Re-centers the display and resets the zoom level back to the display's initial settings without changing any other preferences you have modified.

Probes

- Data Probe/Time Series
- Time/Height Controls
- Vertical Profile Controls
- Data Transect Controls

Data Probe/Time Series

Overview

The Data Probe/Time Series display shows a time series chart of one or more fields at a single location. It also shows a tabular readout of the value at the current animation time step. Note that you must select two or more times in the **Field Selector** in order to get valid data to display in the charts. In the image below we have a Probe Control showing three parameters: T, RH and windspeed. Their values at the current animation time step are shown in the table and their time series are shown. Note, the T and RH fields are shown in one chart and the windspeed is shown in another chart. You can have any number of fields and any number of charts. You can configure the layout of the charts, the chart properties and the line properties for each parameter. See the Charts page for more information.

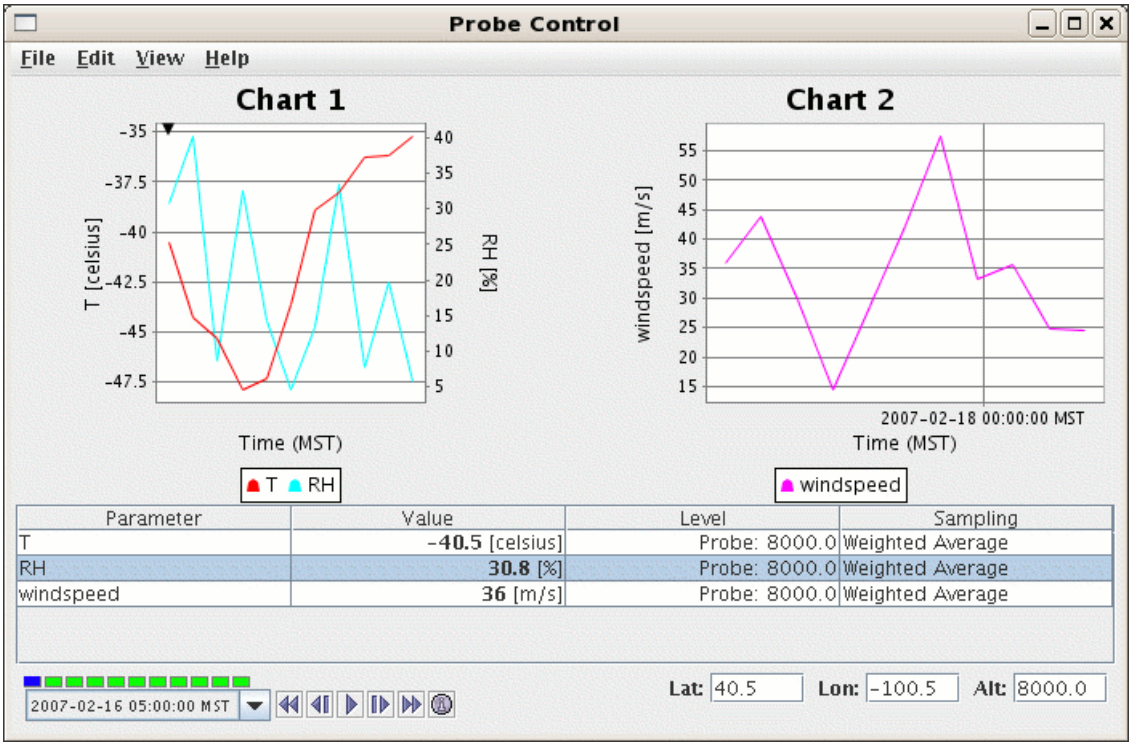


Image 1: Probe Control Window

A small colored square selector point in the Main Display window shows the location of the data probe. You can drag the data probe over the map in the Main Display window by using left-click and drag. When displaying a 3D field, you can change the data probe vertically as well. As the selector point is moved, the data in the charts will change to represent the data at the location of the probe.

The table shows the parameters with their values, the level at which the value is sampled, and the type of sampling. At the bottom of the window, the location of the probe is shown in latitude, longitude, and altitude. When surface data is probed the height of the probe point does not matter. You can move the probe by clicking and dragging it in the Main Display window, or by entering new values into the Lat, Lon, and Alt fields and pressing Enter.

You can add new parameters a number of ways:

Right-click on the table and select **Add Parameter...**
Through the **Edit->Add Parameter...** menu item.
Through the **View->Parameters->Add Parameter...** menu item.

Parameter Properties

These parameter actions can be accessed by right-clicking on the parameter row in the table or through the **View->Parameters** menu.

Copy - Copies the selected parameter. This allows you view the same parameter value at different locations or with different sampling methods.

Chart Properties - Allows you to change how the parameter is displayed in the chart. See the Chart Properties section of the Charts page for more information.

Change Unit... - Changes the display unit for the selected parameter.

Set Sound... - Defines a sound type and range for the parameter. As the probe is moved around or the time animation is run a sound is applied based on the value.

Remove - Removes the selected parameter.

Probing on Point Data

When probing on point data, the control will find the closest observation to the probe position and use that data to sample on.

Chart Options

Location - Sets the location of the probe. Enter a latitude, longitude or altitude in the location fields on the bottom right side of the **Layer Controls** and press Enter.

Levels - Shows the height of the sample point. Click in the level value box, and you can reset the level for that parameter to other altitude values (in the native data set) with a selector list of levels that pops up. The level "Probe's" is whatever level the probe happens to be at, which may not be a native level of the data. Note that once you set the level to a level not at the probe point, the probe point no longer shows where the sample is from. The probe does have the same latitude and longitude as the data shown, but not the altitude.

Sampling - Shows which interpolation is used. Probe values can be interpolated from neighboring grid values, since the probe position almost never coincides exactly with the location of a data point. "Weighed average" uses interpolation of nearby data points; "Nearest neighbor" gives the exact value of the datum in the grid cell where the probe is located. Click in the sampling column box, and you can set the sampling method for that parameter.

Menu Options

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there are several menu options that are unique to the Data Probe/Time Series display. These menus are found at the top of the **Layer Controls** tab of the Data Explorer.

The **File Menu** has these unique options -

Export Current Time as CSV... - Exports the current time step's data or all times as a comma separated file (CSV) by selecting the **File->Save** menu.

Export All Times as CSV - Exports all times as a comma separated file (CSV).

The **Edit Menu** has these unique options -

Change Display Format - Changes how the data is displayed in the table. This template is HTML with macros that get replaced with the display value, unit, raw value and raw data unit.

Probe Color - Changes the color of the probe in the Main Display window.

Add Parameter - Opens a Field Selector window with the option to add another parameter to the display from one of your loaded Data Sources.

The **View Menu** has these unique options -

Parameters

Show Parameter Table - Displays the parameter table below the chart.

Show Readout in Legend - Displays the readout of the chart in the Legend in the Main Display window.

Add Parameter - Opens a Field Selector window with the option to add another parameter to the display from one of your loaded Data Sources.

Parameter - Allows you to copy the chart, open the Chart Properties dialog window, change the unit of the selected parameter, set a sound, or remove the parameter.

Chart

Show Thumbnail in Legend - Displays a thumbnail version of the image in the Legend in the Main Display window.

Show Sunrise/Sunset Times - Displays sunrise/sunset times in the chart if applicable.

Layout - Gives you the option to open the Edit Chart Layout window as well as the option to format the chart in several ways.

Chart - Allows for zooming, saving the chart, and the option to open the Data Probe Properties window.

Probe

Position - Controls how you can reposition the probe by preventing movement in the direction of certain axes. There is also an option to reset the probe back to its initial position.

Color - Changes the color of the probe in the Main Display window.

Size - Increases or decreases the size of the probe in the Main Display window.

Probe Shape - Changes the shape of the probe displayed in the Main Display window.

Time/Height Controls

Overview

A Time/Height Display is a display of samples of a 3D parameter along a vertical profile line from top to bottom of the available data, with time as the independent coordinate (X-axis). Dependent on the field used in the display, available display options include Contour, Color Shaded, Flow, and Wind Barb Time/Height Displays. Note that the options in the Layer Controls will differ dependent on the field used to create the display.

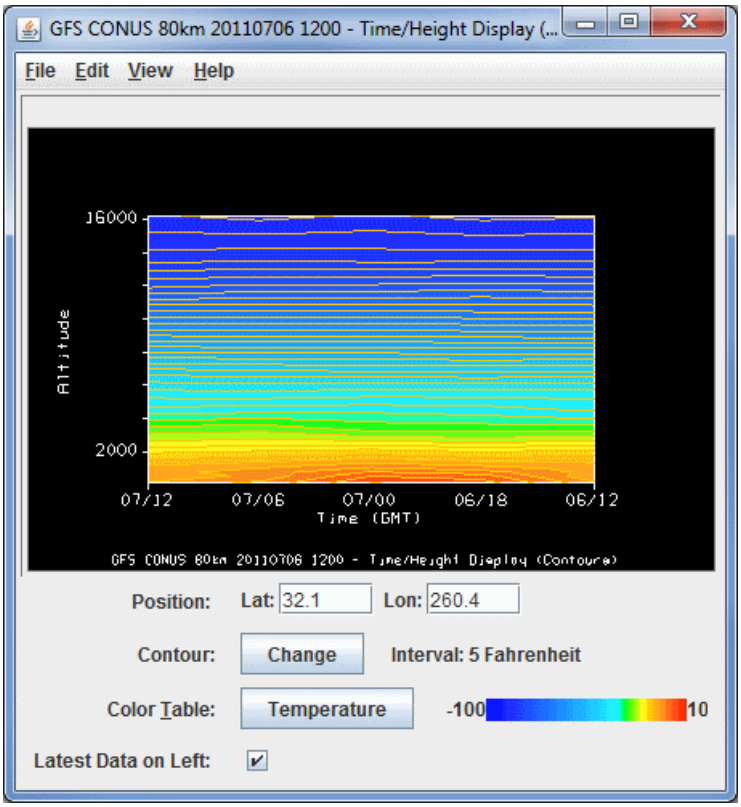


Image 1: Time/Height Display and Controls Window

Properties

Position - Displays the map position of the vertical profile by the "Lat: Lon:" readout below the graph. Enter a value in the **Lat** and/or **Lon** fields and press Enter to set the value. The map position of the profile is shown in the Main Display window by a colored vertical line. There is a Selector Point on top of the vertical line which can be moved by dragging the Selector Point with the left mouse button.

Contour - Represents the current contour interval. Click Change to open the Contour Properties Editor to set contour information. The current contour interval used to display the data in the Main Display window is displayed after 'Interval'.

Color Table - Shows the active color table and the associated high and low data values in the units of the display. As the mouse pointer is moved over the color bar, the value at a particular color is shown. Right click on the color bar or click on the button that displays the name of the Color Table to make modifications to the color bar. This allows you to open the Color Table Editor, change the range, select other color tables, etc.

Latest Data on Left - Reorders the X-axis of the display to show the latest data on the left when checked, and on the right when unchecked.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there are some options that are unique to this display.

The **Edit** menu has these unique options:

Change Parameter... - Opens a Field Selector window, which allows for the selection of a different parameter from the loaded Data Sources.

Change Display Unit... - Opens a Change Unit window, which allows for the changing of the unit of the displayed parameter.

Change Contours... - Opens the Contour Properties Editor, to change how the contours appear in the Main Display window.

The **View** menu has these unique options:

Time/Height Display - Allows the user to change many aspects of the display shown in both the Main Display window, and in the **Layer**

Controls tab of the Data Explorer.

Probe - Allows the user to change many display preferences of the probe, see the **View->Probe** menu option on the Charts page.

Vertical Profile Controls

Overview

The Vertical Profile Display Control shows a plot of any number of field values versus altitude. See the Charts page for more information about customizing the chart. In order to use the Vertical Profile display, you must be working with 3D data.

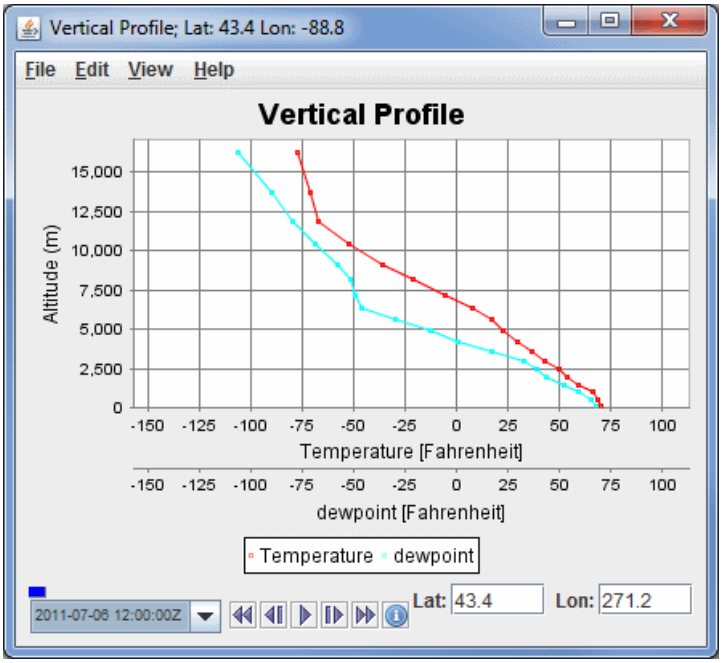
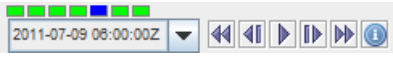


Image 1: Vertical Profile Controls Display Window

Properties

Position - Displays the map position of the vertical profile is indicated by the "Lat: Lon:" readout below the graph. Enter in a value in the **Lat** and/or **Lon** fields and press Enter to set the value to move the location of the probe.

The map position of the profile is shown in the Main Display window by a colored vertical line. There is a Selector Point on top of the vertical line. You can move the vertical profile line by dragging the Selector Point with the left mouse button.



Time Animation Control - Controls the looping of displays through time. See more in Time Animation Control.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there are some options that are unique to this display.

The **Edit** menu has these unique options:

Selector Color - Changes the color of the shape representing the location of the probe in the Main Display window.

Add Parameter... - Opens a Field Selector window with the option to add another parameter to the display from one of your loaded Data Sources.

The **View** menu has these unique options:

Parameters - Provides access to the Chart Line Properties window for each parameter, change the unit of the displayed parameters, and the option to add or remove parameters.

Chart - Allows you to change the chart layout, zoom in/out of the chart, save the chart, and access the Vertical Profile Properties window.

Probe - Allows you to change many display preferences of the probe. See the View->Probe menu option on the Charts page for more information.

Data Transect Controls

Overview

The Data Transect controls are used to adjust data transect displays. The control window includes a display of the profile of the data along the transect. The vertical axis is the parameter value and the horizontal axis is the distance along the transect line. In the Main Display window, a transect selector allows you to position the location of the transect by dragging the selector points along the line. The control window consists of two tabs, **Display** and **Settings**.

The **Display** tab shows the the profile of the data along the transect:

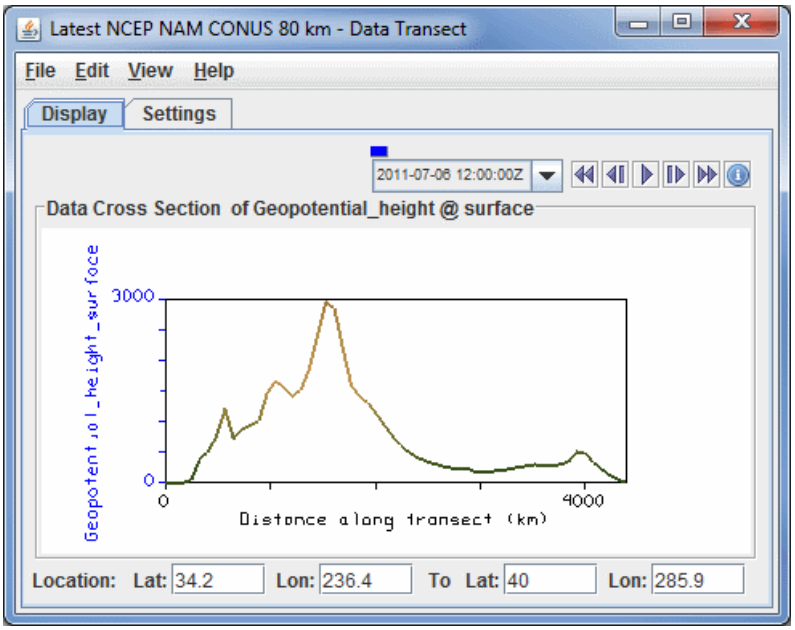
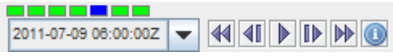


Image 1: Display Tab of the Data Transect Window

Properties



Time Animation Control - Controls the looping of displays through time. See more in Time Animation Control.

Distance along transect - Depicts the horizontal distance the cross section covers in the Main Display window. This can be changed by left-clicking and dragging the end points of the data transect line in the Main Display window.

Location - Shows the starting and ending points of the data transect line. You can change the endpoints of the data transect by entering in new values and hitting Enter.

The **Settings** tab contains widgets for changing properties of that display:

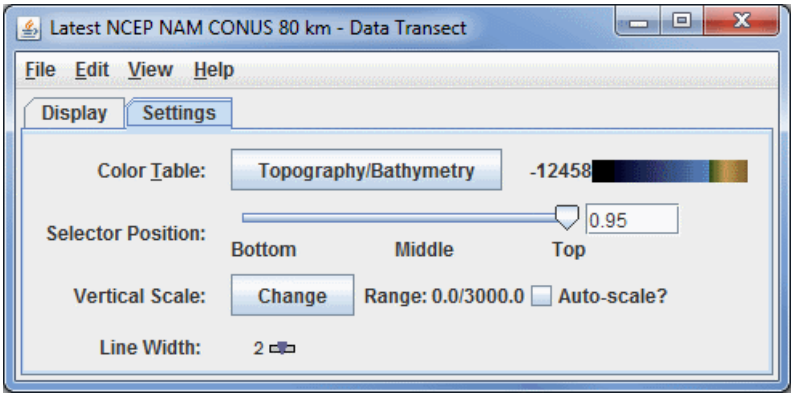


Image 2: Settings Tab of the Data Transect Window

Properties

Color Table - Shows the active color table and the associated high and low data values in the units of the display. As the mouse pointer is moved over the color bar, the value at a particular color is shown. Right click on the color bar or click on the button that displays the name of the Color Table to make modifications to the color bar. This allows you to open the Color Table Editor, change the range, select other color

tables, etc.

Selector Position - Changes the vertical position of the data transect line with respect to other variables being displayed in the Main Display window. This value can be changed with the slider or by typing a value into the field and pressing Enter.

Vertical Scale - Modifies the vertical axis range. The Use Predefined option allows you to select a variety of predefined minimum and maximum vertical values for your chosen parameter. When the **Auto-scale?** checkbox is checked, the data transect will scale the Y-axis of the transect to the sampled data range.

Line Width - Changes the width of the data transect line. Use the slider to change this value

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there are several options that are unique to this display.

The **Edit** menu has these unique options:

Selector Color - Changes the color of the shape representing the location of the probe in the Main Display window.

Change Parameter... - Opens a Field Selector window, which allows you to change the parameter you are displaying to a parameter from one of the added Data Sources.

Change Display Unit... - Opens a Change Unit window, which allows you to change the unit of the parameter you are displaying.

The **View** menu has these unique options:

Use Data Projection - Allows the user to change many aspects of the display shown in both the Main Display window, and in the **Layer Controls** tab of the Data Explorer.

Enable Adaptive Resolution (Under Development) - Turns adaptive resolution on or off for the layer. This menu item is only available if adaptive resolution is enabled in the User Preferences. Note that adaptive resolution is still under development.

Data Transect - Uses the standard Data Transect to display the Data Transect in the **Layer Controls** tab of the Data Explorer.

Mapping Controls

- Map Controls
- Topography Controls
- Shapefile Controls

Map Controls

Overview

Maps in McIDAS-V are shown using the Map Display Controls. There are two ways these controls are used: for the default background maps and for a user created map display. The control window is composed of two tabs, **Maps** and **Lat/Lon**.

The **Maps** tab lists the set of available maps. You have the ability to select which maps are displayed, as well as how they are displayed:

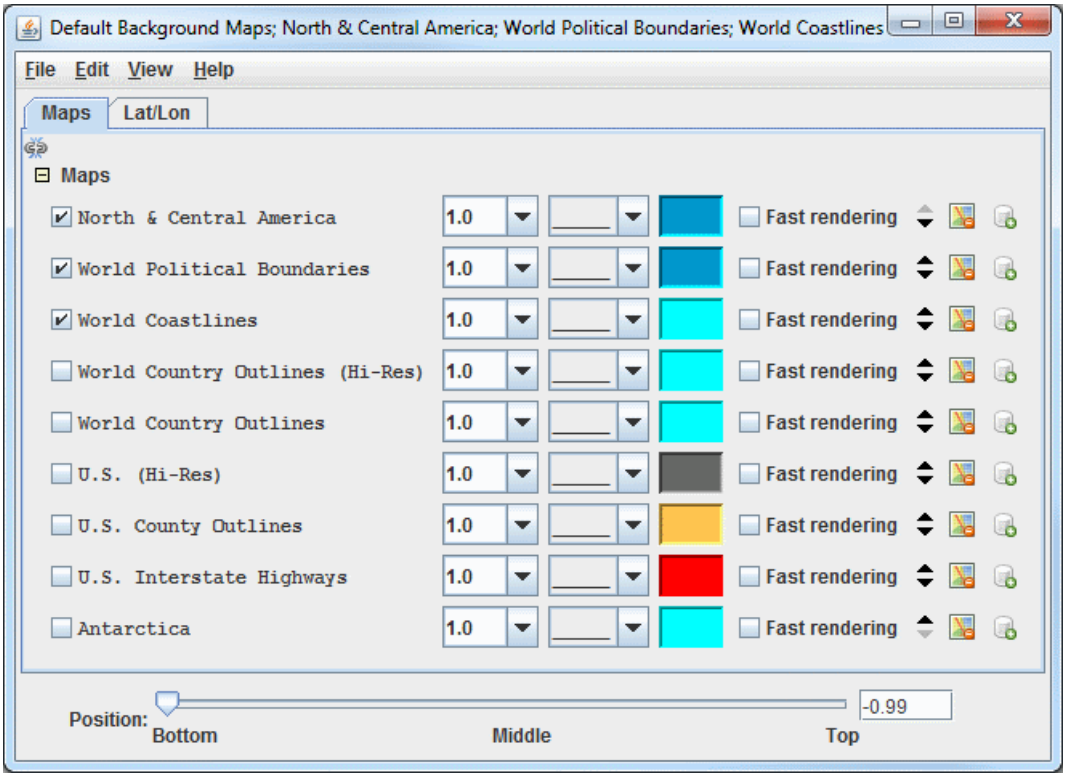


Image 1: Maps Tab of the Map Controls Window

Properties

Apply changes to all visible maps - Applies any changes to only the one map you modify. When clicked, this icon changes to , where any change made to one map will be applied to all of the currently visible maps.

Maps - Lists the set of currently loaded maps. The maps displayed in the Main Display window are are checked.

1.0 **-** Sets the thickness of the map line.

- Sets the style of the map line.

- Sets the color of the map line.

Fast Rendering - Save rendering time by not checking for projection seam crossings. Some maps display better when fast rendering is turned on, others display better when it's turned off. If a map displays poorly (e.g., has missing line segments), try switching its fast rendering settings to see if it fixes the problem. See the Fast Rendering section of the User's Guide for more information on this feature.

Move the map up/down - Shifts the map up and down in the list.

Remove the map - Removes the selected map from the list.

Load this map as a data source - Places the selected map in the **Field Selector** tab of the Data Explorer, where you can display the map with the Map Display or with the Omni Control display. This feature allows for adding multiple maps to one tab in the Main Display window. Adding a map as a data source also allows you to utilize the Maps->3D Map formula to draw a map over a topography field.

Position - Sets the vertical position of the maps and latitude/longitude lines and labels. This option is available through both the **Maps** and **Lat/Lon** tabs.

The **Lat/Lon** tab allows the user to set the visibility of and control the latitude/longitude lines and labels:

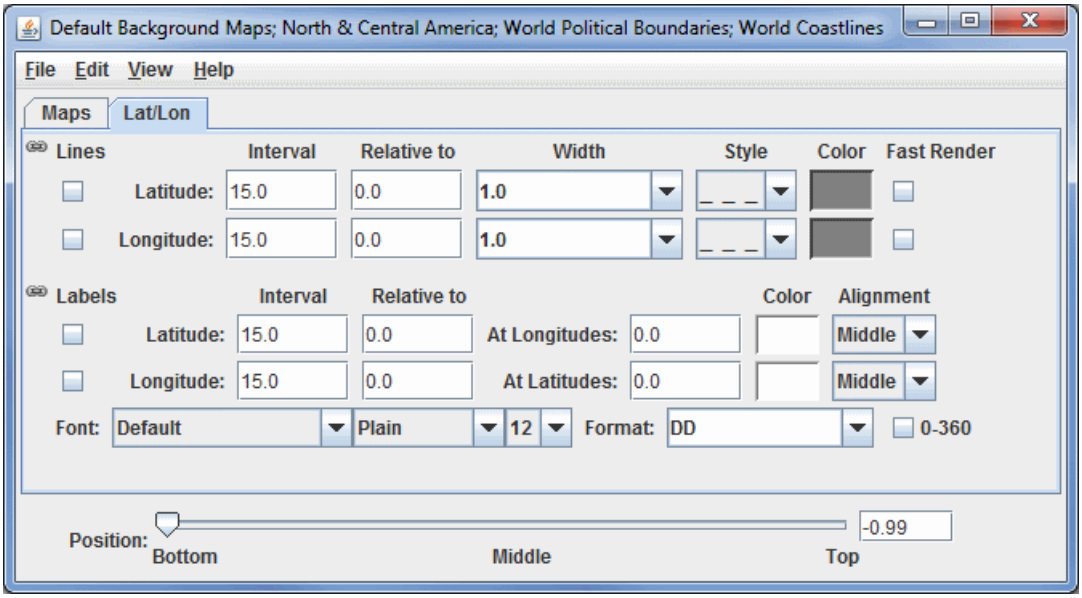


Image 2: Lat/Lon Tab of the Map Controls Window

Properties

Lines

Apply changes to all lat/lon lines - When this is selected, most changes made made to either the latitude or longitude lines will apply to both, making the latitude and longitude lines identical. Click the link icon to make the lines unlinked (), so that a change made to one line will not be applied to the other. The **Relative to** fields are not linked.

Interval - Sets the spacing between the lines, in degrees. For fewer lines, set this value higher, and for more lines, set this value lower. The valid range for **Latitude** is 0 - 180. The valid range for **Longitude** is 0 - 360.

Relative to - Sets a value, in degrees, that one of the lines will be drawn at. From this line, other lines will be drawn in both directions of the **Relative to** line at an increment specified in the **Interval** field. The valid range for **Latitude** is -90 - 90. The valid range for **Longitude** is dependent on the **0 - 360** setting. With **0-360** turned on, the valid range is 0 - 360 and with **0-360** turned off, the valid range is -180 - 180.

Width - Sets the width of the lines.

Style - Sets the style of the lines. This can be a solid line, dashes, points, or dashes and points.

Color - Sets the color of the lines.

Fast Render - Turns on and off Fast Rendering for lines. This option can be useful dependent on the projection used in the Main Display window, as there are times the lines can display with gaps and not properly connected.

Labels

Apply changes to all lat/lon labels - When this is selected, any change made made to either the latitude or longitude labels will apply to both, making the latitude and longitude labels identical (with the exception of **Relative to**, **at Longitudes/Latitudes**, and **Alignment** which are never linked). Click the link icon to make the labels unlinked (), so that a change made to one label will not be applied to the other.

Interval - Sets the spacing between the labels, in degrees. For fewer labels, set this value higher, and for more labels, set this value lower. The valid range for **Latitude** is 0 - 180. The valid range for **Longitude** is 0 - 360.

Relative to - Sets a value, in degrees, that one of the labels will be drawn at. From this label, other labels will be drawn in both directions of the **Relative to** label at an increment specified in the **Interval** field. The valid range for **Latitude** is -90 - 90. The valid range for **Longitude** is dependent on the **0 - 360** setting. With **0-360** turned on, the valid range is 0 - 360 and with **0-360** turned off, the valid range is -180 - 180.

At Longitudes - Sets the longitude line(s) to draw the latitude labels at. You can specify more than one value by separating them with a semicolon (;). The valid range is dependent on the **0 - 360** setting. With **0-360** turned on, the valid range is 0 - 360 and with **0-360** turned off, the valid range is -180 - 180.

At Latitudes - Sets the latitude line(s) to draw the longitude labels at. You can specify more than one value by separating them with a semicolon (;). The valid range is -90 - 90.

Color - Sets the color of the labels.

Alignment - Sets the alignment point of the location of the labels with respect to the actual location of the point. This can be useful to position the label at a location where it is not interfering with a latitude or longitude line. These **Alignment** options are given in

geographical coordinates (ex. NE = northeast, etc).

Font - Sets the font, style, and size of the labels.

Format - Sets the format of the labels. You can select a variety of decimal, or DMS (Degrees, Minutes, Seconds) formats.

0-360 - Uses 0 to 360 degrees to label longitudes when selected, instead of the standard -180 to 180. This changes the longitude labels in the Main Display, as well as the longitude values in the **Longitude Lines Relative to**, **At Longitudes**, and **Longitude Labels Relative to** fields.

Example - Set both the Latitude and Longitude Line **Interval** to *15 degrees* and **Relative to** to *0 degrees*. This will draw latitude and longitude lines at 0 degrees Latitude and Longitude, and draw another line at 15 degrees either direction (..., -30, -15, 0, 15, 30, ...). Set the both the Latitude and Longitude Labels **Interval** to *20 degrees* and **Relative to** to *0 degrees*. This will draw labels at 0 degrees and draw another label at 15 degrees in either direction (..., -40, -20, 0, 20, 40, ...).

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there are some options that are unique to this display.

The **File** menu has this unique option:

Default Maps - The **Save as the Default Map Set** menu item will save the maps you have selected and reopen them next time you open McIDAS-V. This menu item creates a maps.xml file in your McIDAS-V directory that includes the name of the map, its category, and other display settings. The **Remove Local Map Defaults** menu item will undo any saved changes by the user, and will revert back to the initial default map display of McIDAS-V. This removes the maps.xml file in your McIDAS-V directory. Note that this option will take a restart of McIDAS-V for the changes to take effect.

The **Edit** menu has these unique options:

Add Your Own Map... - Opens an Add a map window, where you can enter a URL of a map or select a shapefile you have locally. Here, you can name the map, choose the category it will list under, and select the style, color, and width of the map lines. This can be used in conjunction with **Save as the Default Map Set**, where a user can add their own map, save the default map set, and then this map will be retained in subsequent sessions of McIDAS-V.

Add System Map... - Allows for selecting a list of different system maps to add to the list of maps in the **Maps** tab.

The **View** menu has this unique option:

Maps - Allows you to select which maps are checked in the **Maps** tab, and thus what maps are displayed in the Main Display window.

Topography Controls

Overview

The Topography controls allow you to display topography datasets. These controls are available through the 3D Surface->Topography display type. An example of a field that can utilize this display type is the 2D 'Geopotential Height @ Surface' field in model data. The first image shows the control user interface which allows you to customize many options with this display.

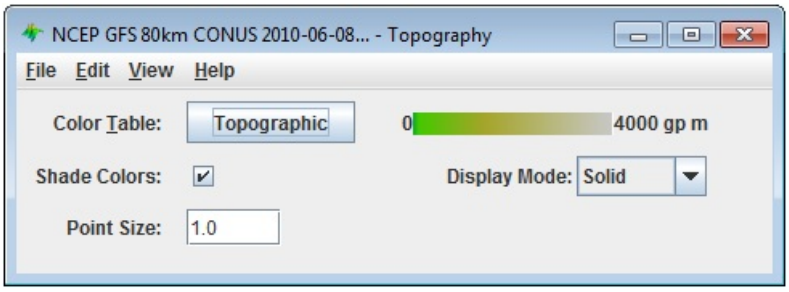


Image 1: Topography Controls Properties Dialog

This is an example of how the display may appear in the Main Display window:

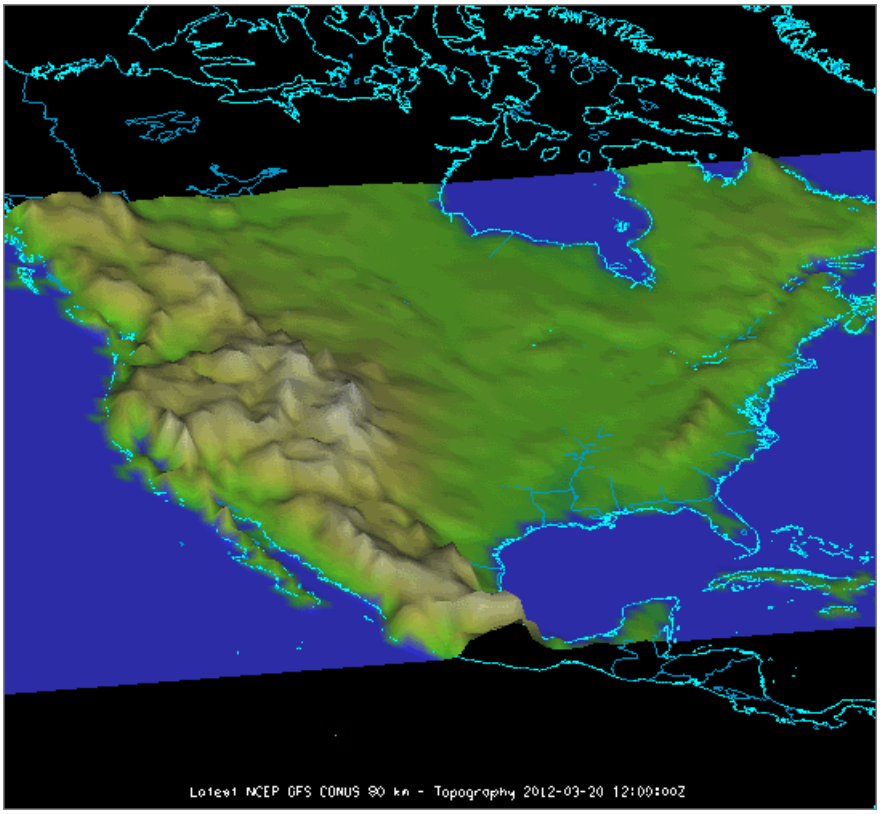


Image 2: Topography Displayed in the Main Display Window

Properties

Color Table - Shows the active color table and the associated high and low data values in the units of the display. As the mouse pointer is moved over the color bar, the value at a particular color is shown. Right click on the color bar or click on the button that displays the name of the Color Table to make modifications to the color bar. This allows you to open the Color Table Editor, change the range, select other color tables, etc.

Shade Colors - Blends neighboring colors together to smooth the image.

Display Mode - Sets the way the texture of the data is displayed. You can select Solid, Mesh, or Points. This is useful for looking at the structure of the underlying data.

Point Size - Changes the size of the points in the Main Display window when the Points **Display Mode** is chosen.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there is one option that is unique to this display.

The **View** menu has these unique options:

Use Grid Projection - Re-centers the display and resets the zoom level back to the display's initial settings without changing any other preferences you have modified.

Enable Adaptive Resolution (Under Development) - Turns adaptive resolution on or off for the layer. This menu item is only available if adaptive resolution is enabled in the User Preferences. Note that adaptive resolution is still under development.

Shapefile Controls

Overview

McIDAS-V supports the ability to load and display GIS shapefiles. You can select and load a shape file (i.e., a file that ends with .shp) from the General->Files/Directories chooser in the **Data Sources** tab of the Data Explorer using the Shapefile **Data Type**. The zipped (.zip) version of shapefiles can also be loaded.

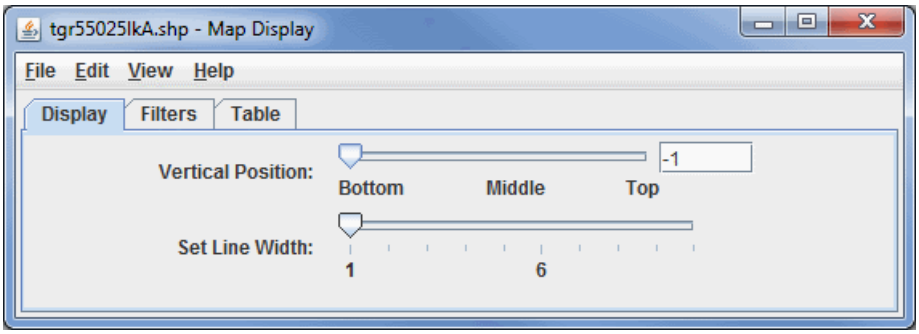


Image 1: Display Tab of the Shapefile Display Properties Dialog

Properties

Vertical Position - Defines the vertical position of the data in the Main Display window. This can be changed by using the slider or typing a value into the field.

Set Line Width - Changes the width of the lines in the display.

For shapefiles that also have a data base file (.dbf) you can control what shape segments are shown with the **Filters** tab.

Note: McIDAS-V supports a simple XML format for maps. The Shapefile Control can export the displayed shapes in this XML format the **File->Save->Export Displayed Shapes...** menu.

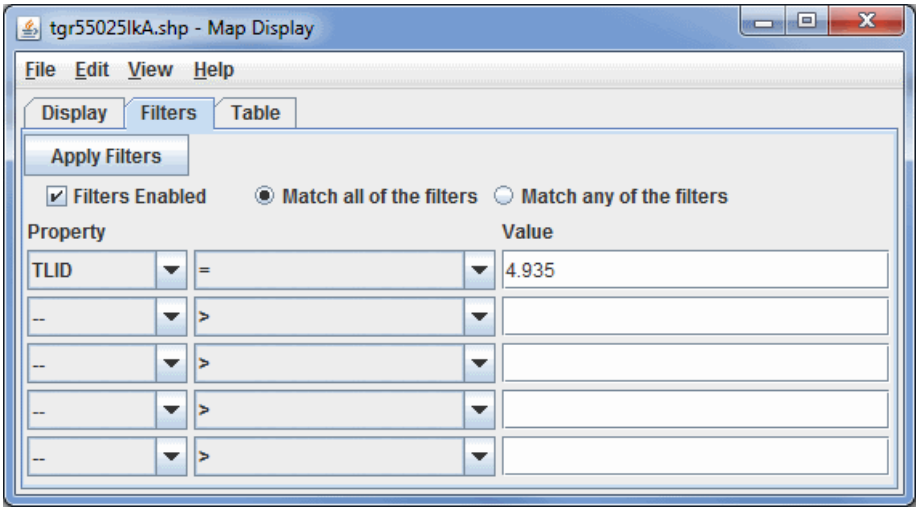


Image 2: Filters Tab of the Shapefile Display Properties Dialog

Properties

Apply Filters **-** Applies one or more filters to the current shape file display.

Filters Enabled - Enables filters to be applied to the data in the Main Display window.

Match all of the filters - Displays only data that corresponds with every filter entered.

Match any of the filters - Displays any data that matches up with one or more of the filters entered.

Property - Represents the variable or property that you want to filter.

Middle Dropdown Menu - Represents the mathematical symbol that determines your filter. This can be Greater Than, Less Than, Equal To, Not Equal To, etc.

Value - Represents the value that sets the filter.

When the shapefile has an associated data base file (.dbf) a tabular listing of the attributes is shown in the **Table** tab. Use the **Select Fields to Show**

button to select what fields to show. The table can be exported as a CSV file with the **File->Save->Export Table...** menu.

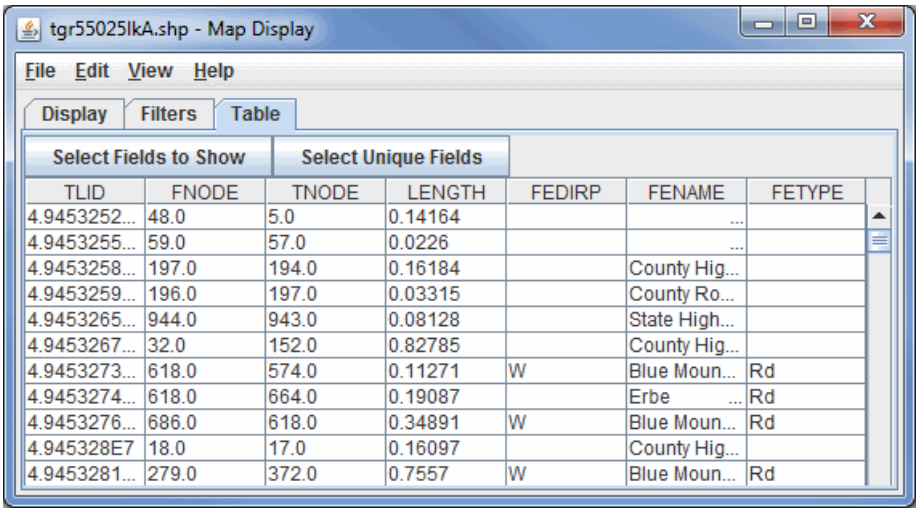


Image 3: Table Tab of the Shapefile Display Properties Dialog

Properties

Select Fields to Show - Opens a box which allows you to add, remove, and organize the list of fields to show.

Select Unique Fields - Opens a box which allows you to add, remove, and organize the list of unique fields to show.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there is one option that is unique to this display.

The **Edit** menu has this unique option:

Line Color -- Changes the color of the lines plotted in the Main Display window.

Observation and Location Controls

- Point Data Plot Controls
- Point Data List Controls
- Gridded Point Data
- Sounding Display Controls
- Front Controls
- Location Controls
- Track Controls

Point Data Plot Controls

Overview

The Point Data Plot Control displays a set of observations using a layout model. This control is accessed by selecting the Point Data field and the Point Data Plot display. The control window consists of four tabs: **Layout**, **Times**, **Plot**, and **Filters**.

- Layout
- Times
- Plot
- Filters
- Menus

The **Layout** tab allows you to control basics of the display:

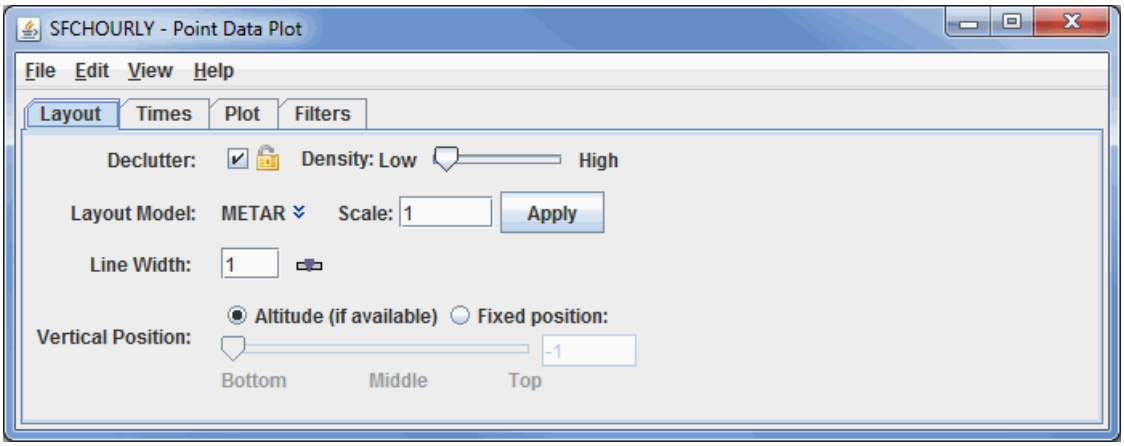


Image 1: Layout Tab of the Point Data Plot Controls Dialog

Properties

Declutter - Displays only stations that do not overlap when selected. When unchecked, all of the stations will be shown, and the **Density** slider will be grayed out. The small "lock" icon allows you to lock the stations that are currently being displayed and not have their display changed when navigating in the Main Display window.

Density - Changes how dense the display of stations is in the Main Display window when the decluttering option is selected. This option will not be available if the decluttering option is not selected, as all of the stations will then be displayed.

Layout Model - Sets the layout model that will be used to display the data. This can be one of the native layout models included with McIDAS-V, or a user-made layout model. Click on the downward facing blue arrows to change the layout model. Selecting **Edit** will open the Layout Model Editor which will allow you to create your own custom layout model.

Scale - Sets the size of the layout model displayed in the Main Display window.

Line Width - Sets the thickness of the layout model displayed in the Main Display window.

Vertical Position - Sets the vertical positioning of the layout model with respect to other variables being displayed. The Altitude option will set the vertical position of the layout models based off of the stations' altitudes (if this information is available through the data source). The Fixed Position option will uniformly set a fixed vertical position for each layout model regardless of altitude. The value for a fixed position can be set using the slider or entering a value into the field and pressing Enter.

The **Times** tab allows you to change the observation times that are shown in the display. By default, data for a single time corresponding to the current animation time will be shown. Using this widget allows you to show data from multiple times at once:

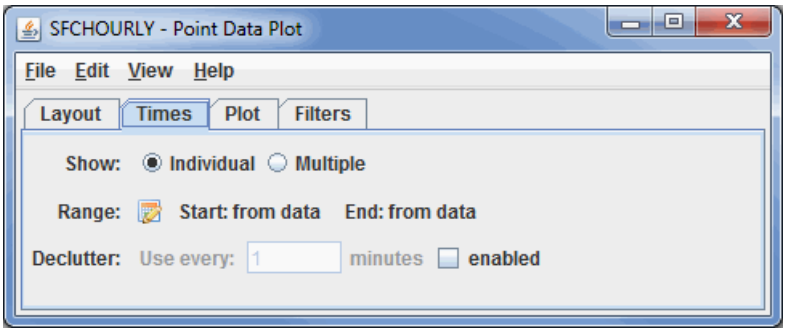


Image 2: Times Tab of the Point Data Plot Controls Dialog

Clicking opens a Time Settings window that allows you to select specific start and end times:

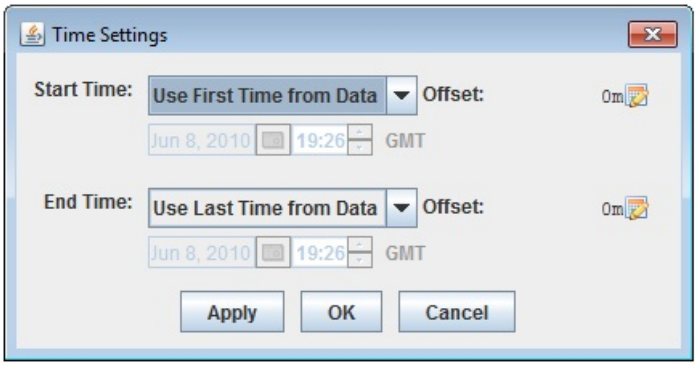


Image 3: Time Settings Dialog

Properties

Show - Displays the data on individual frames in the Main Display window with respect to the time of the data, or plots all of the data on every frame regardless of the time of the data.

Range - Changes the initial and final date and time to display in your loop.

Declutter - Subsets the data that is being displayed by only showing every N minutes. This is generally not useful for observation data (e.g., station data). However, for observation data that contains many times (e.g., airplane track data), you can use this field to subset the times. Selecting the enabled checkbox allows you to set a number of minutes.

Note: If you are displaying point data that has a large number of times, you will be prompted whether you want to view all of the times.

The **Plot** tab provides a time series chart and a data readout table of a selected station. To use this, left-click on a station in the main display. Double-click or right-click and select Add To Chart on a table row to add it to the time series chart. See the Charts page for more information about customizing the chart:

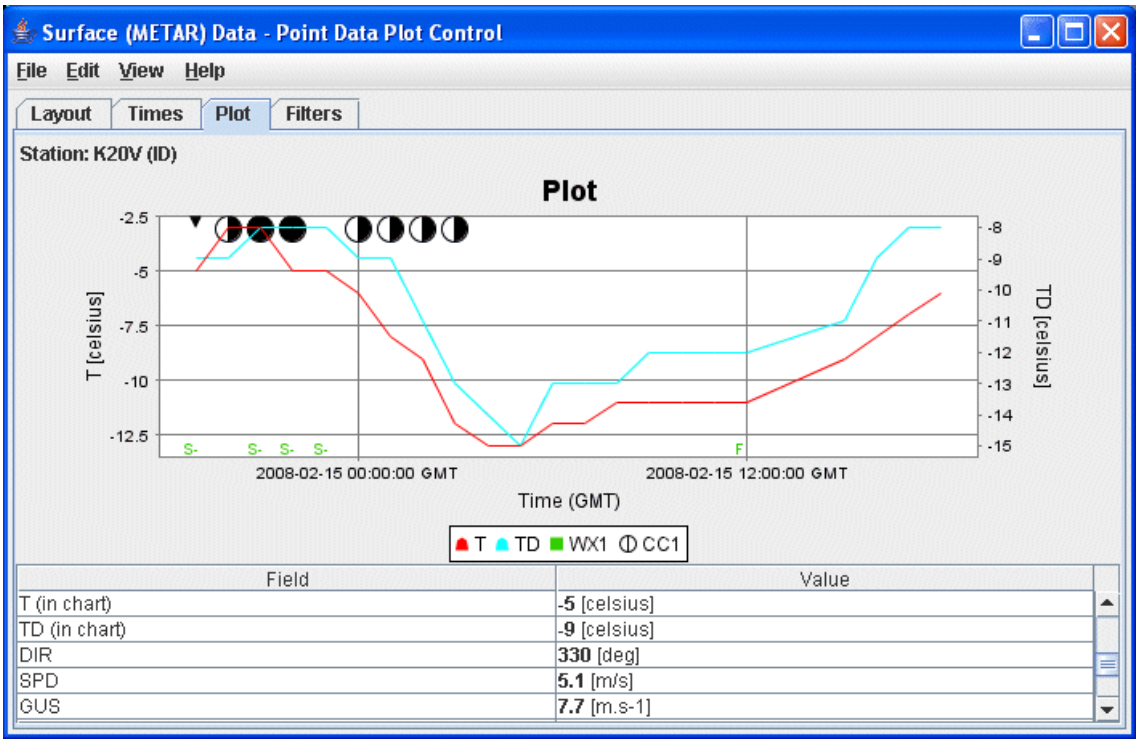


Image 4: Plot Tab of the Point Data Plot Controls Dialog

Properties

Station - Shows the station for which the data is being displayed. This can be changed by left-clicking on a different layout model in the Main Display window.

Field - Lists the different fields available from your data source that you can select from to display in the plot.

Value - Lists the numerical value of the **Field** at the time selected.

The **Filters** tab allows you to set individual or multiple filters to specify which data are shown in the Main Display window:

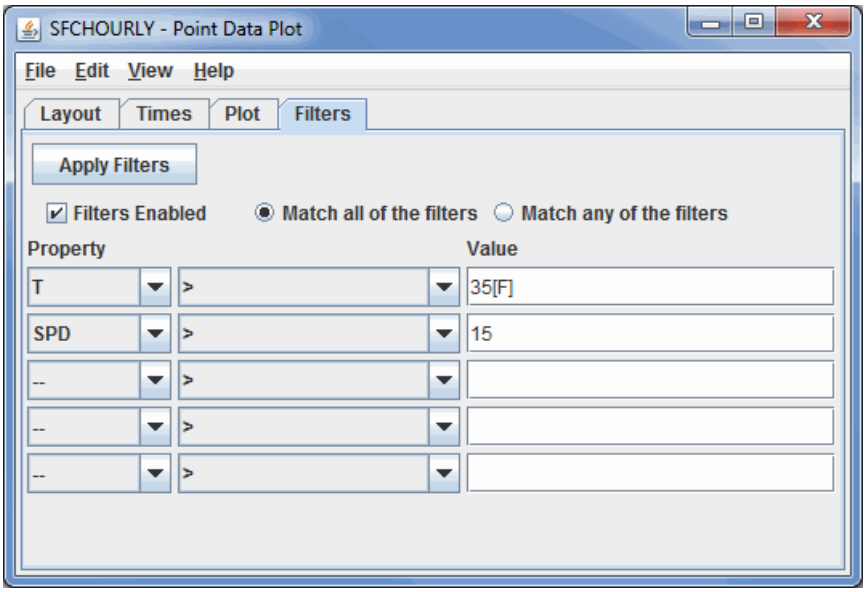


Image 5: Filters Tab of the Point Data Plot Controls Dialog

Properties

Apply Filters **-** Applies any set filters to the data displayed in the Main Display window.

Filters Enabled - Enables filters to be applied to the data in the Main Display window.

Match all of the filters - Displays only layout models that correspond with every chosen filter.

Match any of the filters - Displays any layout models that correspond with one or more of the chosen filters.

Property - Represents the variable or property that you want to filter.

Middle Dropdown Menu - Represents the mathematical symbol that determines your filter. This can be greater than, less than, equal to, not equal to, etc.

Value - Specifies the numerical value that the mathematical symbol in the middle dropdown menu will utilize.

As an example, the above image shows two filter expressions, one that states the Temperature **Property** needs to be greater that 35 F and the other states that the Wind Speed value needs to be greater than 15. The unit of [F] is entered for the Temperature **Property**. If you do not define a unit after the value, then McIDAS-V will utilize the native unit for the Property. **Match all of the filters** is selected, meaning only layout models where the Temperature is greater than 35 degrees F and the wind speed is greater than 15 will be plotted in the Main Display window.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there are some options that are unique to this display.

The **File** menu has these unique options:

Save Chart Image... - Saves an image of the chart produced in the **Plot** tab.

Export to KMZ... - Exports the data in the (*.kmz) format.

Export Selected Observation... - Exports the data in the Comma-Separated Values (*.csv) format.

The **Edit** menu has this unique option:

Layout Model... - Opens the Layout Model Editor which will allow you to create your own custom layout model.

The **View** menu has these unique options:

Use Projection From Observations - Re-centers the display and resets the zoom level back to the display's initial settings without changing any other preferences you have modified.

Enable Adaptive Resolution (Under Development) - Turns adaptive resolution on or off for the layer. This menu item is only available if adaptive resolution is enabled in the User Preferences. Note that adaptive resolution is still under development.

Chart - Allows you to display a thumbnail of the chart in the Legend, change the Grid Layout, zoom in and out, save the chart, and open the

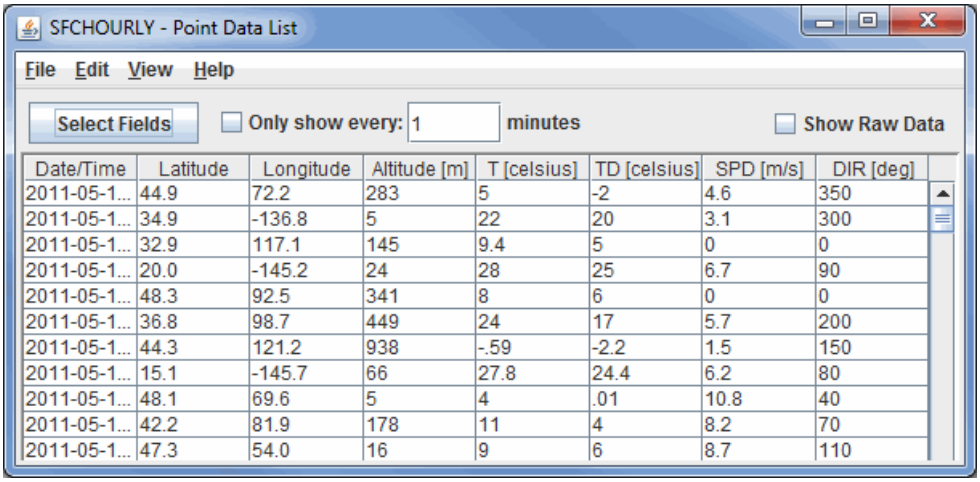
Plot Properties window.

Show Raw Data - Displays the data in its raw format in the **Value** menu of the **Plot** tab before any rounding/formatting is done to the data by McIDAS-V.

Point Data List Controls

Overview

The Point Data List Control shows a set of observation data in a textual list format. This control is accessed by selecting the Point Data field and the Point Data List display.



Date/Time	Latitude	Longitude	Altitude [m]	T [celsius]	TD [celsius]	SPD [m/s]	DIR [deg]
2011-05-1...	44.9	72.2	283	5	-2	4.6	350
2011-05-1...	34.9	-136.8	5	22	20	3.1	300
2011-05-1...	32.9	117.1	145	9.4	5	0	0
2011-05-1...	20.0	-145.2	24	28	25	6.7	90
2011-05-1...	48.3	92.5	341	8	6	0	0
2011-05-1...	36.8	98.7	449	24	17	5.7	200
2011-05-1...	44.3	121.2	938	-.59	-2.2	1.5	150
2011-05-1...	15.1	-145.7	66	27.8	24.4	6.2	80
2011-05-1...	48.1	69.6	5	4	.01	10.8	40
2011-05-1...	42.2	81.9	178	11	4	8.2	70
2011-05-1...	47.3	54.0	16	9	6	8.7	110

Image 1: Point Data List Window

Properties

Select Fields - Opens a Field Selector window that allows you to select what Fields are listed in the table.

Only Show Every - Allows you to set a time interval where data will be listed only once every N minutes. This feature can be used by selecting the **Only show every** checkbox, typing a numerical value into the field, and pressing Enter.

Show Raw Data - Displays the data in its raw format in the chart before any rounding, formatting, or changing of the native units is done to the data by McIDAS-V. This, for example, may break up the SPD field into individual U and V components.

The Select Fields button opens a Field Selector window that allows you to determine which fields are included in the table:

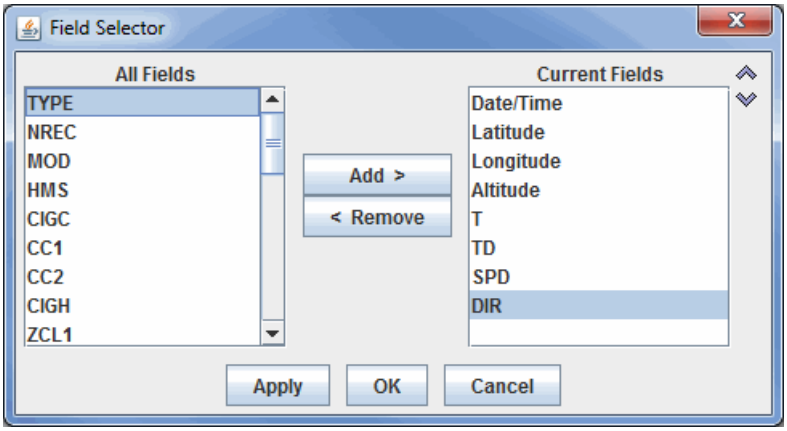


Image 2: Field Selector Window to Add or Remove Fields from the Point Data List Window

Properties

All Fields - Lists all of the fields that are included in your data source.

Current Fields - Lists the fields that are included in the chart.

Add > - Moves the selected Field from the All Fields menu to the Current Fields menu.

< Remove - Moves the selected Field from the Current Fields menu to the All Fields menu.

- Shifts the selected Current Fields item up or down, changing its position in the chart.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there is one option that is unique to this display.

The **File** menu has this unique option:

Save->Export Table to CSV... - Allows you to save the data in the Comma-Separated Values (*.csv) format.

Gridded Point Data

Overview

McIDAS-V can create gridded fields of numeric data using the Barnes Objective Analysis. You can control the parameters used to create the grid from the Data Source Properties or using the **Grid Parameters** tab in the **Data Subset** panel of the **Field Selector**. Note that since this gridded display will utilize point observation data, the display over areas with few observations (ex. open ocean) may not correctly represent the actual data over that region. To get more exact gridded displays of point data, it is best to utilize the **Region** tab to subset an area of interest with a relatively high density of point observations:

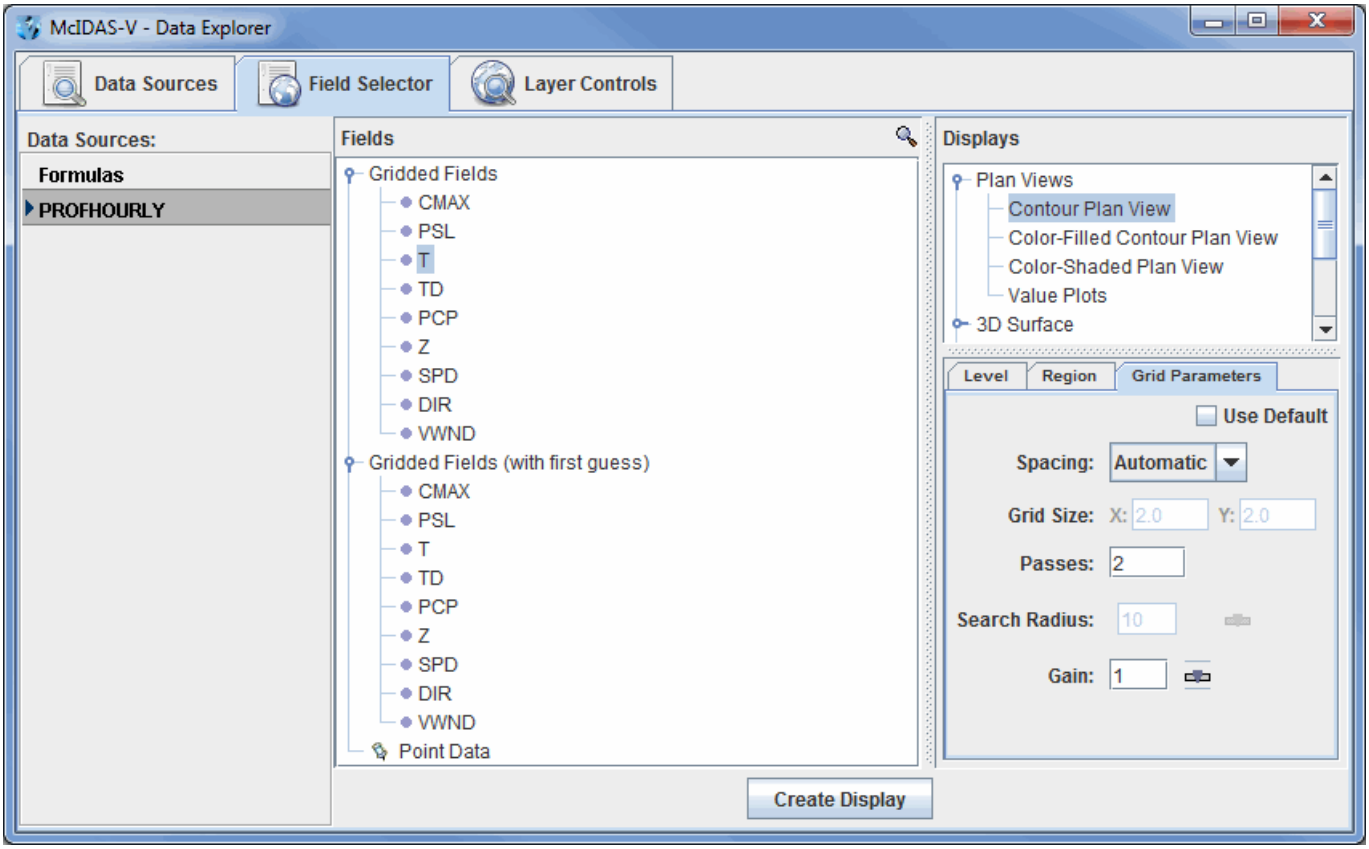


Image 1: Gridded Point Data in the Field Selector

The resulting grid can be displayed using any of the Gridded Data Displays.

Properties

Use Default - Uses the default, native values for the selected field.

Spacing - Determines the grid spacing method.

Automatic - Calculates grid spacing from the observation density.

Degrees - Uses a specific lat/lon spacing for the grid spacing.

 # Points - Sets the number of grid points in the x and y direction.

Grid Size - Specifies the grid spacing if not using automatic calculation.

Passes - Sets the number of passes for the Barnes analysis to do. Four passes are recommended for analyzing fields where derivative estimates are important (Ref: Barnes 1994b), three passes recommended for all other fields (with gain set to 1.0) (Ref: Barnes 1994c "Two pass Barnes Objective Analysis schemes now in use probably should be replaced by appropriately tuned 3pass or 4pass schemes"), and two passes are only recommended for "quick look" type analyses.

Search Radius - Sets the search radius (in grid units) for the weighting of points in determining the value at a specific grid point. This option is available with the Degrees and # Points spacing options. This should be in the range 0.2 to 1.0. Data are fitted more closely with a gain of 0.2 (at the expense of less overall accuracy over the entire grid), larger values smooth more.

Gain - Represents the factor by which scaleLength is reduced for the second pass. This should be in the range 0.2 to 1.0. Data are fitted more closely with a gain of 0.2 (at the expense of less overall accuracy over the entire grid), larger values smooth more. Suggested default: 1.0. Set the gain for each pass after the first.

First Guess Field - Uses a model grid as a first guess field for the analysis. Select the "Grid Parameters (with first guess)" field and you will be prompted to select the gridded field to use for the first guess.

References -

Barnes, S.L., 1994a: Applications of the Barnes objective analysis scheme Part I: Effects of undersampling, wave position, and station randomness. J. Atmos. Oceanic Technol. 11, 1433-1448.

Barnes, S.L., 1994b: Applications of the Barnes objective analysis scheme Part II: Improving derivative estimates. J. Atmos. Oceanic Technol. 11, 1449-1458.

Barnes, S.L., 1994c: Applications of the Barnes objective analysis scheme Part III: Tuning for minimum error. J. Atmos. Oceanic Technol. 11, 1459-1479.

Sounding Display Controls

Overview

The meteorological sounding display is available for: RAOBs, numerical weather prediction model output, and from a local file that contains aircraft track data. The dewpoint temperature is computed by internal code from temperature and relative humidity grids.

To load sounding data see Choosing RAOB Sounding Data and Displaying Gridded Data. The sounding display consists of a table of aerological (thermodynamic) parameters and three tabs: **Sounding Chart**, **Hodograph**, and **Table**.

The **Sounding Chart** tab includes an aerological diagram (e.g., skew-T, Stuve, Emagram):

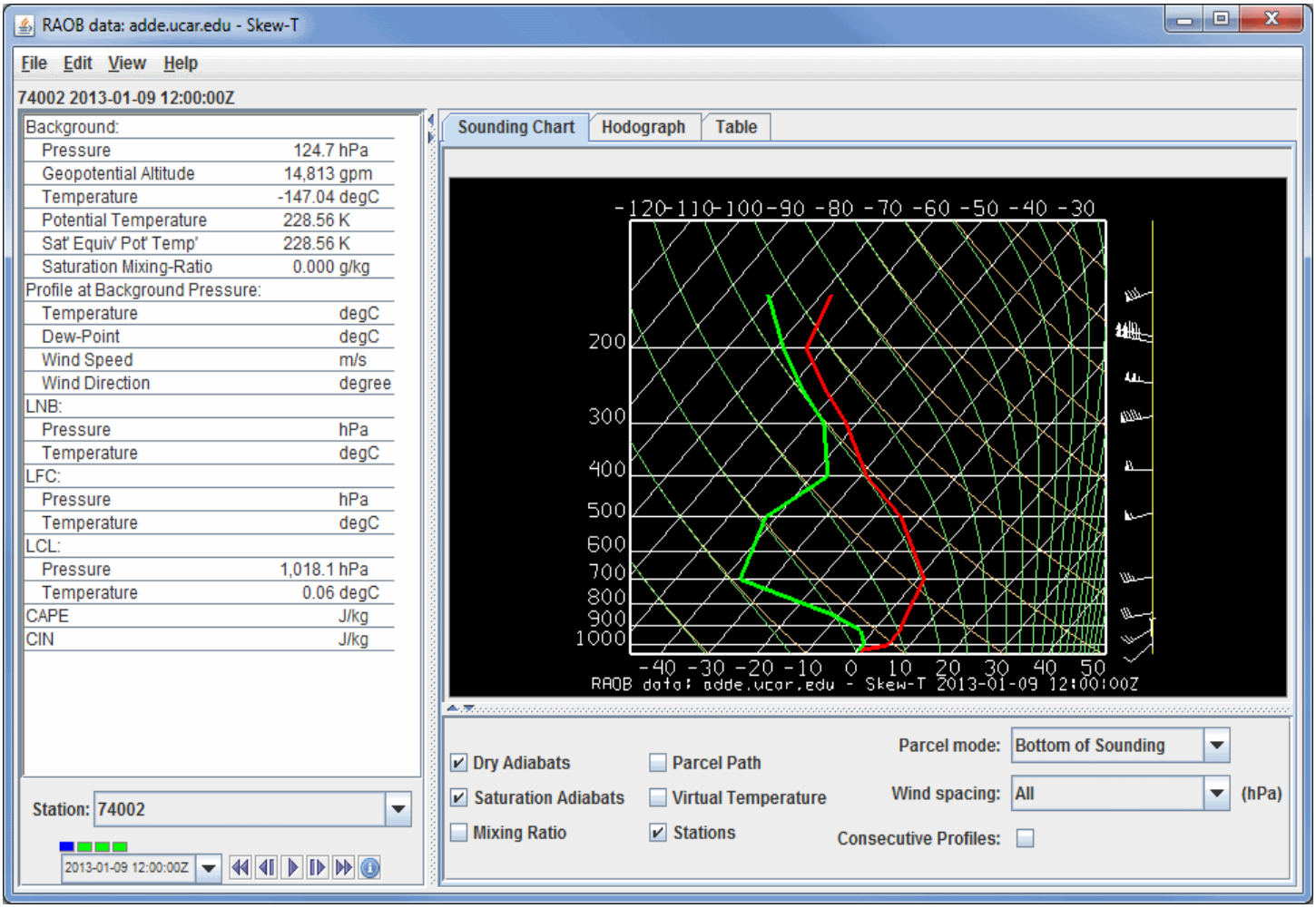


Image 1: Skew-T of Point Data

Properties

Station - Selects which station's sounding is being displayed when multiple stations are selected in the Main Display window.

Time Animation Control - Controls the looping of displays through time. See Time Animation Control for more information.

Dry Adiabats - Displays the dry adiabats on the Skew-T diagram.

Saturation Adiabats - Displays the saturation adiabats on the Skew-T diagram.

Mixing Ratio - Displays the mixing ratio lines on the Skew-T diagram.

Parcel Path - Displays the path of a parcel of air lifted pseudo-adiabatically from the initial point to the top of the Skew-T diagram.

Virtual Temperature - Displays the virtual temperatures of the environmental profile and pseudo-adiabatically lifted air-parcel.

Grid Points - Plots points in the Main Display window spatially separated by the resolution of your data. These grid points represent the actual locations of where the data values in the sounding are retrieved. Your data probe may be between one of these grid points, but the display in the sounding will be indicative of the nearest grid point to the location of the probe.

Parcel mode - Specifies how the initial conditions of the pseudo-adiabatically lifted air-parcel are determined from the environmental sounding according to the mode indicated. This will affect how the LNB, LFC, LCL, CAPE, and CIN are calculated. The choices are:

Bottom of Sounding - Determines the initial conditions of the parcel from the temperature and dewpoint at the level of highest pressure. The path will update whenever the profiles change.

Below Cursor - Determines the initial conditions of the parcel from the temperature and dewpoint profiles by computing the pressure-weighted mean potential temperature and water vapor mixing-ratio of the atmosphere that lies below the cursor when the middle mouse button is pressed. Thus, pressing the middle button at 950 hPa for a sounding that starts at 1000 hPa will effectively mix the lower 50 hPa of the atmosphere and lift the resulting parcel starting at 975 hPa. The path will update whenever the profiles change and as the cursor is dragged.

At Cursor Pressure - Determines the initial pressure, in-situ temperature, and moisture content of the parcel from the temperature and dewpoint profiles at the pressure of the cursor when the middle mouse button is pressed. The initial moisture content is determined from the dewpoint profile at the initial pressure. The path will update whenever the profiles change and as the cursor is dragged.

At Cursor (Press, Temp) - The computed path of a lifted parcel is automatically updated when appropriate. The initial pressure and in-situ temperature of the parcel equal the pressure and temperature values under the cursor when the middle mouse button is pressed. The path will update whenever the profiles change and as the cursor is dragged.

Wind spacing - Allows the user to control which wind levels are shown in the display.

Consecutive Profiles - Allows you to plot both the current sounding, as well as the sounding of the next time step in one image. The temperature and dewpoint temperature profiles of the current timestep will be dashed, and the profiles of the next timestep will be displayed as solid lines. The current time's winds will be displayed directly to the right of the sounding, and the next timestep's winds will be shown to the right of that. This makes it easy to see how a profile will change through time. This will reduce the number of time steps in your loop by 1. This option will not make any changes to the display if you only have one timestep displayed.

A label above the sounding's chart shows the station number, date, and time of the sounding. When displaying sounding plots made from gridded model output, the position of the sounding is shown in the Main Display window by a solid-color selector point and vertical line. You can move this model-output-based sounding position over the map by dragging the selector point with the left mouse button.

When displaying a sounding diagram made from gridded numerical weather model output, there is a pull-down selector menu of the model output valid times in the upper right corner.

The animation control buttons are available in either case:

To increase precision using the sounding diagram, enlarge the window by dragging on the edges. You can zoom the sounding diagram by holding down the Shift key and dragging the right button upwards; drag downwards to zoom out. Zooming can also be done by using the scroll wheel on the mouse. You can pan the diagram by dragging the mouse pointer in any direction while holding down the right mouse button.

The temperature and dewpoint traces can be modified via the cursor. Press the left button on the first data-point to be modified and drag it horizontally along an isobar to the desired position, then move the pointer diagonally along an isotherm to keep the data-point at the desired position and to pick-up the next data-point. Repeat until done and then release the mouse button.

The **Hodograph** tab shows a 3D hodograph display:

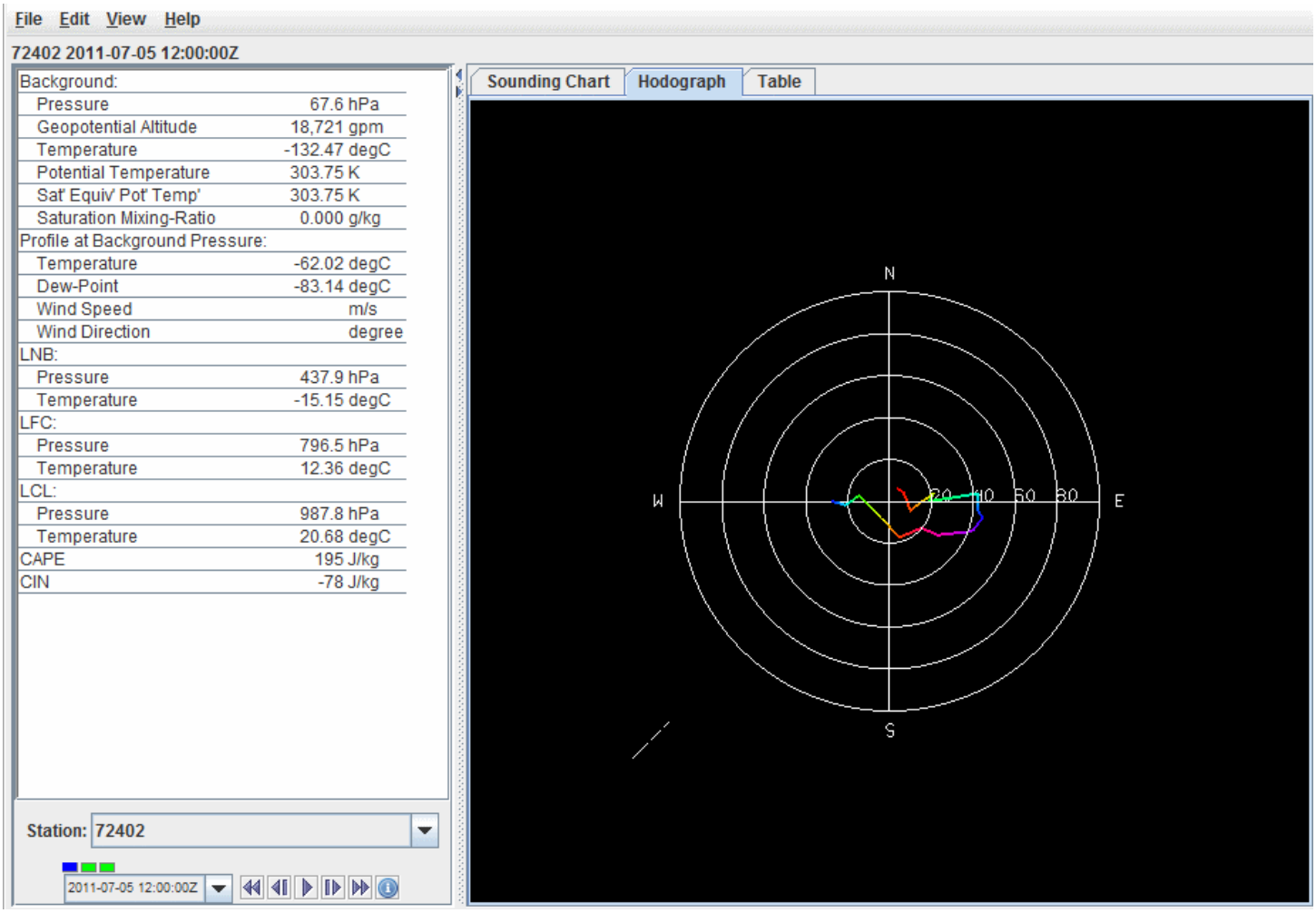


Image 2: Hodograph of Point Data

The hodograph is enabled if the plotted data includes wind fields. It can be rotated into 3D by clicking and dragging the right mouse button. You can zoom in/out by holding down Shift and *right-clicking* and dragging up/down or by using the scroll wheel on the mouse. To reset the hodograph, use Ctrl+R.

The **Table** tab shows a table of all values in the sounding:

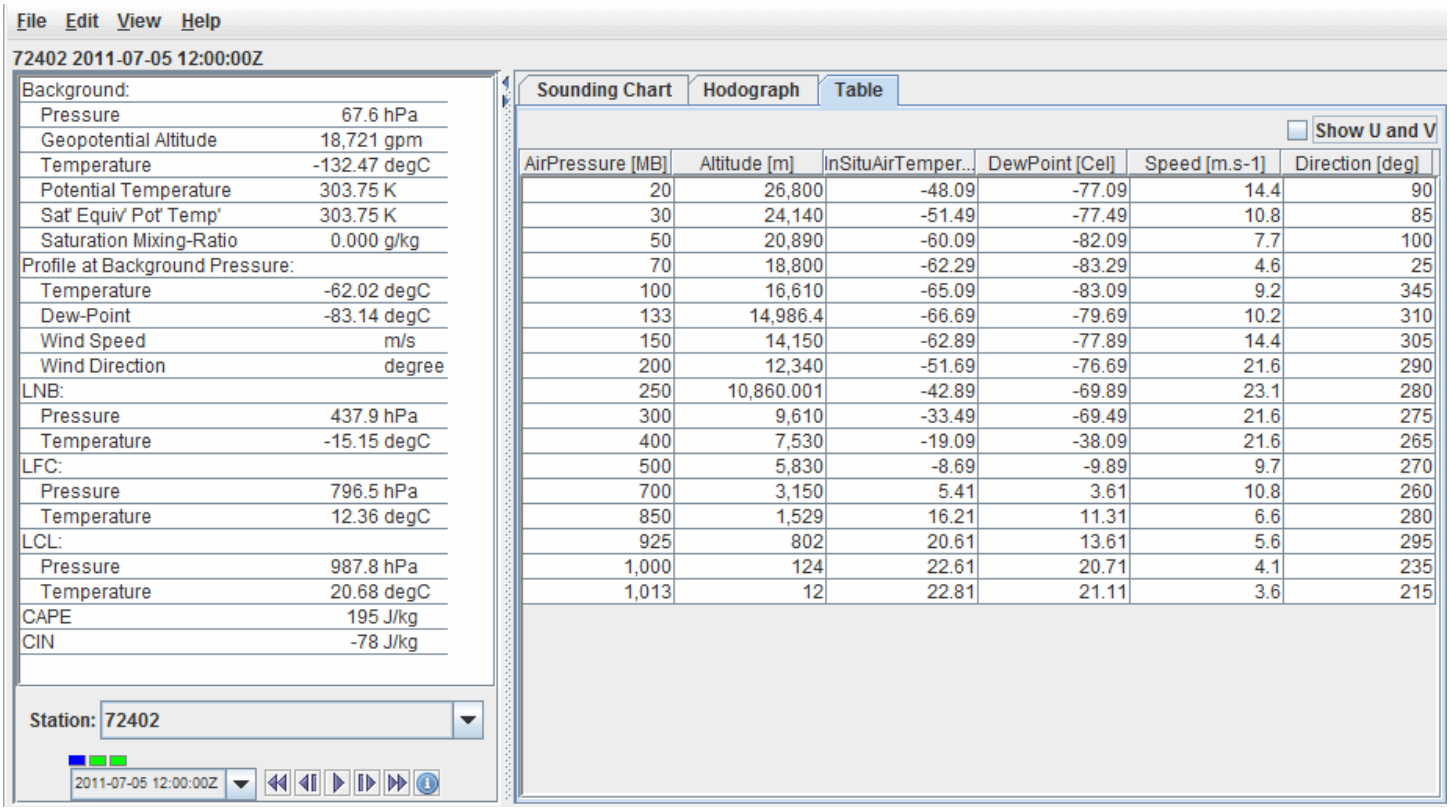


Image 3: Table of Point Data

Properties

Show U and V - Breaks the Speed and Direction categories up into the individual U and V components of the wind.

Aerological Parameters

The table to the left of the sounding diagram contains aerological parameters determined from the atmospheric sounding displayed in the diagram. The following abbreviations are used:

LCL: Lifting Condensation Level - The level at which a pseudo-adiabatically lifted air-parcel becomes saturated with water vapor.

LFC: Level of Free Convection - The level at which the virtual temperature of a pseudo-adiabatically lifted air-parcel changes from being less than the environment's virtual temperature to being greater than the environment's virtual temperature.

LNB: Level of Neutral Buoyancy - The level above the LFC at which the virtual temperature of a pseudo-adiabatically lifted air-parcel equals the environment's virtual temperature.

CAPE: Convective Available Potential Energy - The area between the virtual temperature trace of the pseudo-adiabatically lifted air-parcel and the virtual temperature trace of the environment from the LFC to the LNB in which the parcel's virtual temperature is greater than the environment's (positive CAPE connotes convective development).

CIN: Convective Inhibition - The negative of the area between the virtual temperature trace of the pseudo-adiabatically lifted air-parcel and the virtual temperature trace of the environment from the parcel's initial conditions to the LFC in which the parcel's virtual temperature is less than the environment's (negative CIN connotes initial positive work to lift the parcel).

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there are some options that are unique to this display.

The **File** menu has this unique option:

Export Sounding Table to File... - Exports the data in the **Table** tab to an Excel file.

The **Edit** menu has these unique options:

Reset Sounding - Reverts the sounding back to its initial configuration after any modifications have been made to it.

Selector Color - Changes the color of the shape representing the location of the sounding in the Main Display window.

The **View** menu has these unique options:

Use Data Projection - Re-centers the display and resets the zoom level back to the display's initial settings without changing any other preferences you have modified.

Sounding Chart - Allows you to capture an image or movie of the sounding and change many aesthetic preferences.

Hodograph - Allows you to capture an image or movie of the hodograph and change aesthetic preferences related to the Main Display window.

Front Controls

Overview

The Front Controls shows a list of the different weather features (high and low pressures, fronts, etc.) shown in the Main Display window in a textual list format. This control becomes available once the Front Positions data source has been added:

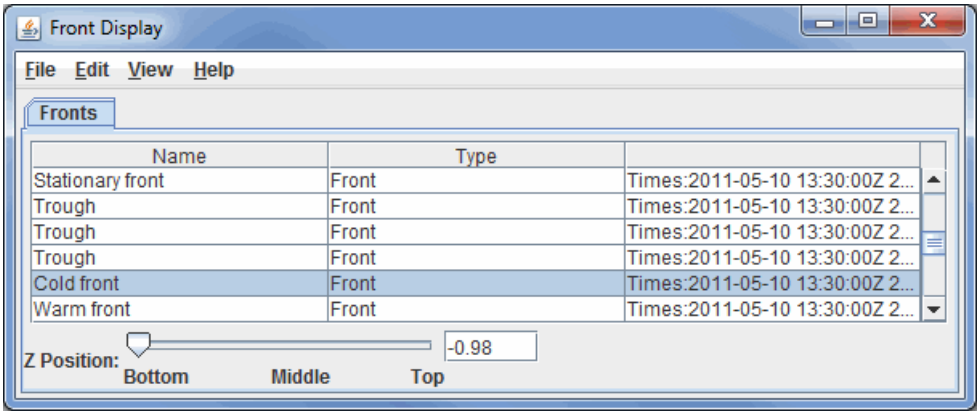


Image 1: Front Display Controls Window

Properties

Name - Lists the different features that can be seen in the Main Display window.

Type - Lists a descriptor of the name.

Third Column - Lists the times that the feature is seen in the Main Display window.

Z Position - Changes the vertical position of the features with respect to other variables being displayed in the Main Display window. You can change this with the slider, or by entering a value in the field and pressing Enter.

Double-clicking on an item in this window open the Properties Editor for that item. This window consists of two tabs: **Properties** and **Points**:

The **Properties** tab allows you to change general characteristics of the display. Note that the options that appear in this tab may differ depending on what feature's properties you are viewing:

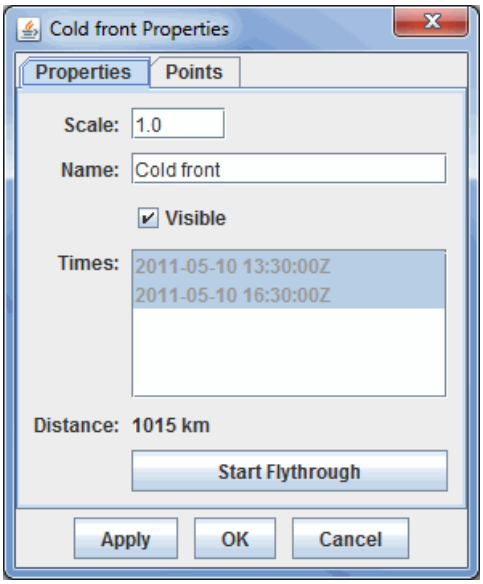


Image 2: Properties Tab of the Properties Window

Properties

Scale - Changes the thickness of the selected feature in the Main Display window.

Name - Changes the name of the feature in the **Fronts** tab of the Front Display window.

Visible - Toggles the visibility of the feature in the Main Display window.

Times - Lists the relevant times for this feature. This cannot be changed through this window.

Distance - Represents the spatial extent of the feature.

- Opens the Flythough feature which allows you to interactively explore the item.

The **Points** tab provides information about the location of the selected feature:

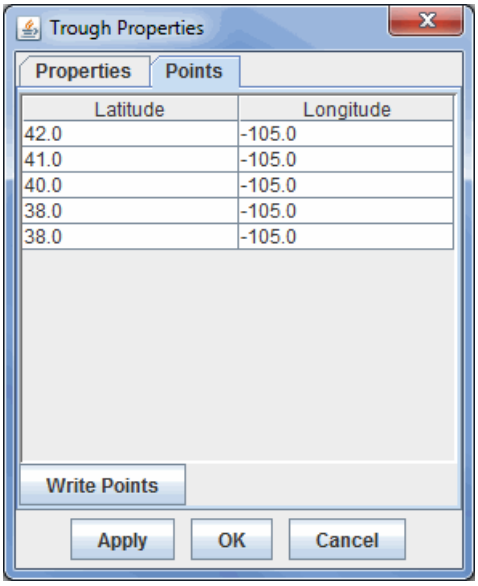


Image 3: Points Tab of the Properties Window

Properties

Latitude - Lists the Latitude of each displayed point of the feature.

Longitude - Lists the Longitude of each displayed point of the feature.

- Exports the table listed in the **Points** tab to a Comma-Separated Values (CSV) file (*.csv).

Menus

All of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page.

Location Controls

Overview

McIDAS-V provides a collection of locations. These may be NEXRAD stations, states, counties, geographical features, countries, etc. The Location Controls are used to display these locations. The list of locations is accessed through the **Display->Plot Location Labels...** menu item in the Main Display window. Local files can also use these location controls. The user interface consists of four tabs: **Display**, **Locations**, **Data Sets**, and **Filters**.

- Display
- Locations
- Data Sets
- Filters
- Menus

The **Display** tab allows the user to control how the display will appear in the Main Display window:

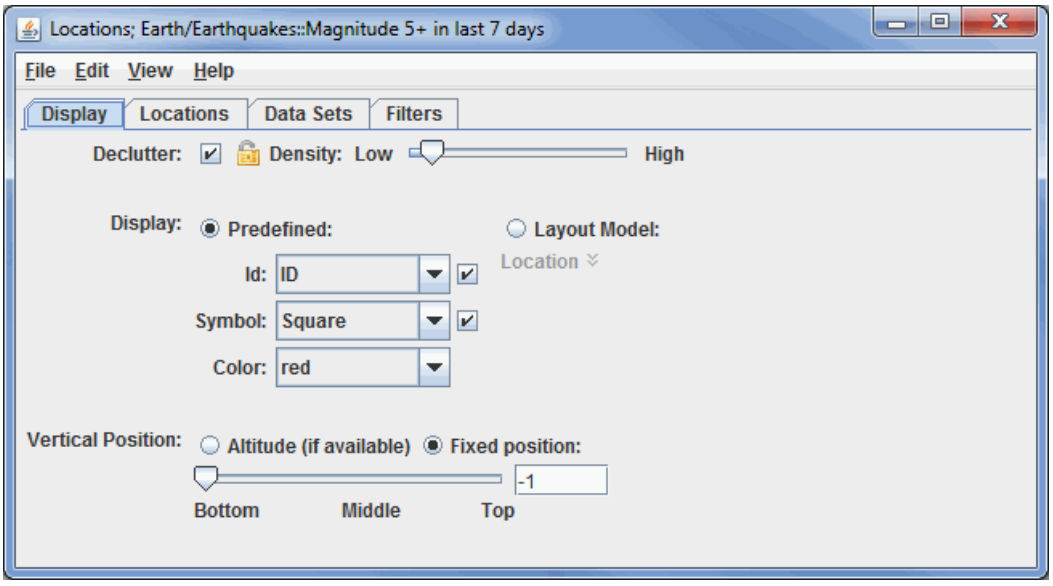


Image 1: Display Tab of the Location Controls Dialog

Properties

Declutter - Displays only stations that do not overlap. When unchecked, all of the stations will be shown, and the **Density** slider will be grayed out. The small "lock" icon allows for locking the stations that are currently being displayed and not have their display changed when navigating in the Main Display window.

Density - Changes how dense the display of stations is when the **Declutter** checkbox is selected. When the **Declutter** checkbox is not selected, the Density option will not be available, and all stations will be displayed.

Display - Displays locations as a fixed specification of a symbol and/or identifier, or as one of the available layout models.

Use the options under the **Predefined** radio button to control what station information is displayed. Use the options in the **Symbol** menu to control what marker symbol is displayed. Clicking an item will immediately change the display. Use the checkboxes to the right of **Id** and **Symbol** to trigger their visibility in the Main Display window.

Layout Model - Sets the layout model that will be used to display the data. This can be one of the native layout models included with McIDAS-V, or a user-made layout model. Click on the downward facing blue arrows » to change the layout model. Selecting **Edit** will open the Layout Model Editor which will allows to creating your own custom layout model.

Vertical Position - Displays the locations at their altitude (if there is one) or specifically defines the vertical position. This can be changed by using the slider or typing a value into the field and pressing Enter.

The **Locations** tab shows two sub-tabs, **All Locations** and **Displayed Locations**. Shown at the bottom are the details of a location:

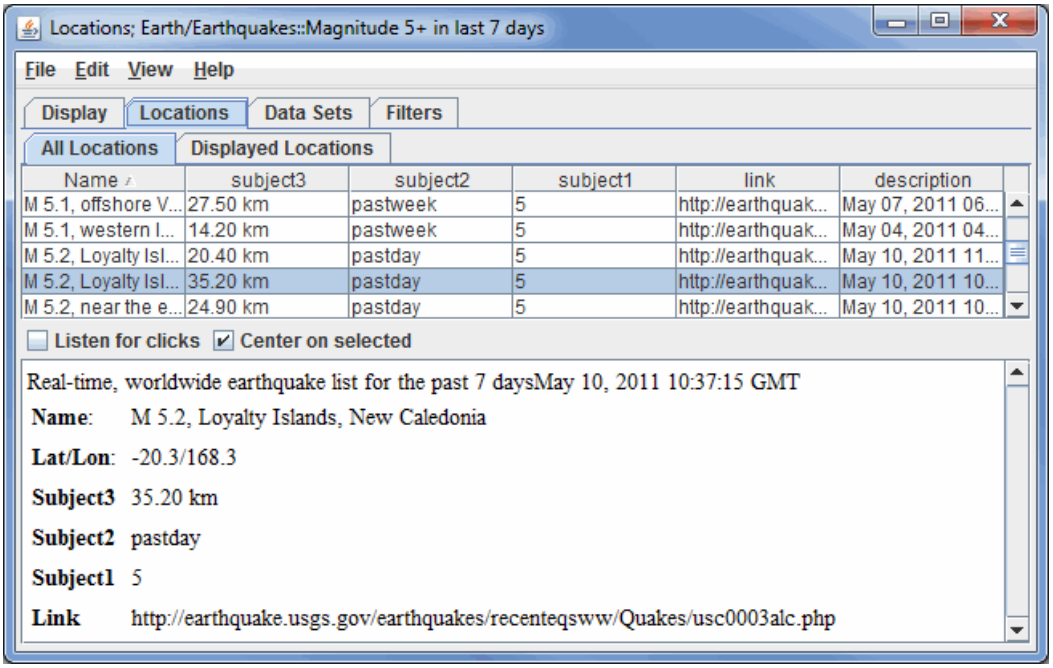


Image 2: Locations Tab of the Location Controls Dialog

Properties

All Locations - Lists all of the locations relevant to the chosen parameter.

Displayed Locations - Lists only the locations that are currently visible in the Main Display window.

Listen for clicks - Updates the current location information to the station clicked on in the Main Display window.

Center on selected - Centers the Main Display window over the location selected in this tab.

The **Data Sets** tab lists all of the location files that are being displayed. A data set can be removed by clicking on the data set and pressing Delete:

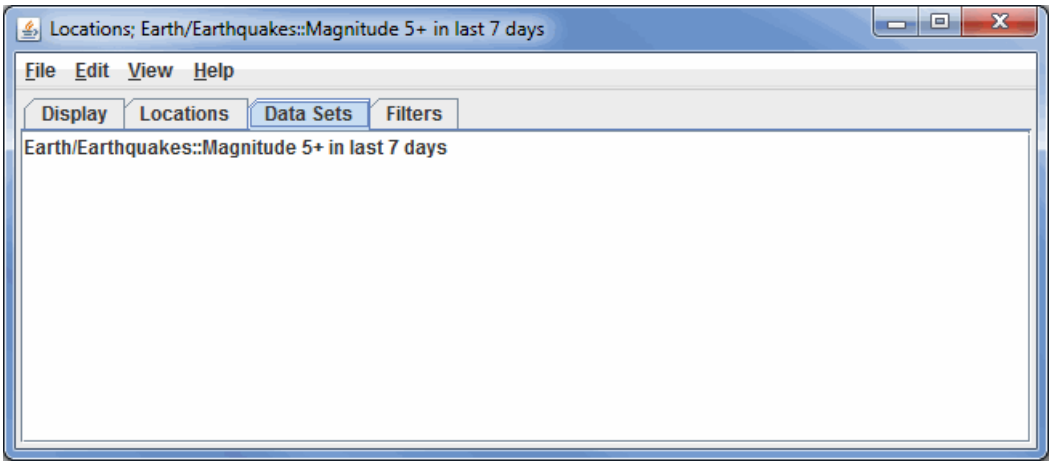


Image 3: Data Sets Tab of the Location Controls Dialog

The **Filters** tab allows for filtering what locations are being shown based on their internal attributes:

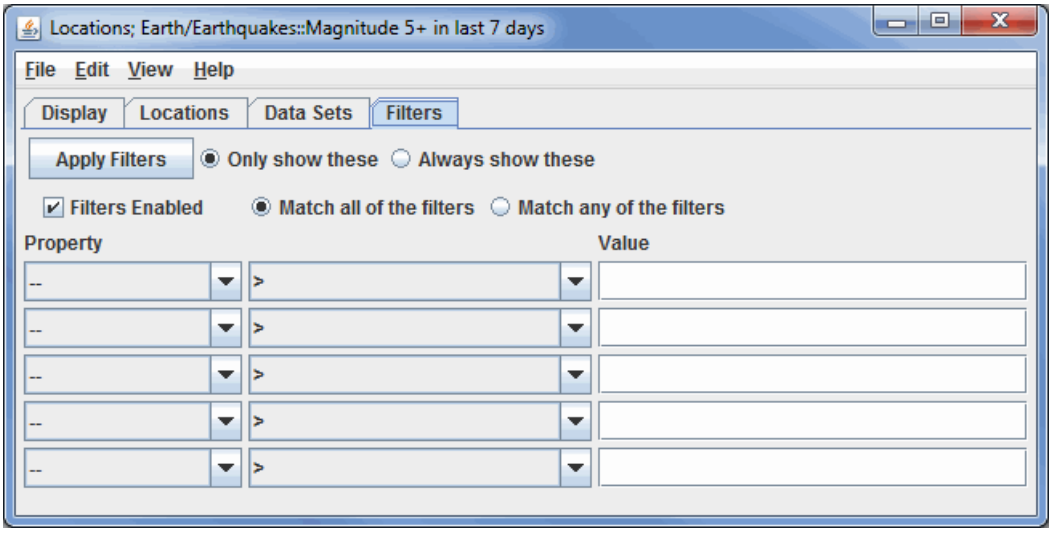


Image 4: Filters Tab of the Location Controls Dialog

Properties

Apply Filters - Applies any set of filters to the data displayed in the Main Display window.

Filters Enabled - Enables filters to be applied to the data in the Main Display window.

Only show these - Displays only the data relevant to the filters, but it will not show all of the locations, utilizing the cluttering level from the **Display** tab when creating the Display.

Always show these - Displays only the data relevant to the filters, but it will show all of the locations, regardless of the cluttering level from the **Display** tab when creating the Display.

Match all of these filters - Displays only data that corresponds with every chosen filter.

Match any of these filters - Displays data that matches up with one or more of the chosen filters.

Property - Represents the variable or property that is being filtered.

Middle Dropdown Menu - Represents the mathematical symbol that determines the filter. This can be greater than, less than, equal to, not equal to, etc.

Value - Specifies the numerical value that the mathematical symbol in the middle dropdown menu will utilize.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there are some options that are unique to this display.

The **Edit** menu has these unique options:

Add Locations - Allows for to adding more locations. This includes states, countries, Radar sites, earthquakes, glaciers, etc. to the Main Display window.

Color - Determines the color of the data being displayed in the Main Display window.

The **View** menu has these unique options:

Show Flythrough - Opens the Flythrough feature which allows for interactively exploring the display.

Use Projection From Locations - Re-centers the display and resets the zoom level back to the display's initial settings without changing any other preferences that have modified.

Chart - Allows for displaying a thumbnail of the chart in the Legend, change the Grid Layout, zoom in and out, save the chart, and open the Plot Properties window.

Track Controls

Overview

The track controls display trajectory data sets, e.g., aircraft track, ship, buoys, etc. This data can be loaded in the **General->Files/Directories** chooser of the **Data Sources** tab of the Data Explorer, with the Data Type of Track files. You can display your data in the form of a chart, table, track, or as a Point Data Plot drawn in the Main Display window. The items in the **Layer Controls** for a Point Data plot are the same as the controls for displaying regular Point Data. If you are working with data for a lot of times, or have many parameters included with your data, you may be prompted to subset the point data. This gives you the option of only including the necessary fields to cut down on memory usage and time to display the data.

To draw a track in the Main Display window, select your field in the **Fields** panel, the Track Colored By Parameter display type, and hit **Create Display**. These same controls are utilized for the Trajectory Colored By Parameter display type. The track controls consist of two tabs, **Layout** and **Times**.

The **Layout** tab controls the appearance of the display:

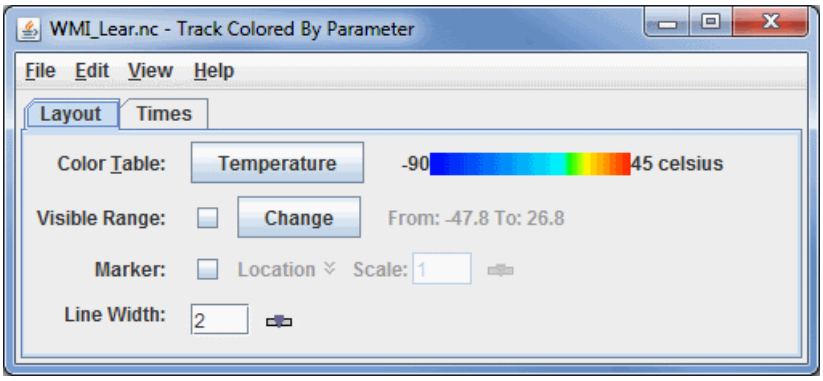


Image 1: Layout Tab of the Track Controls Dialog

Properties

Color Table - Shows the active color table and the associated high and low data values in the units of the display. As the mouse pointer is moved over the color bar, the value at a particular color is shown. Right click on the color bar or click on the button that displays the name of the Color Table to make modifications to the color bar. This allows you to open the Color Table Editor, change the range, select other color tables, etc.

Visible Range - Determines what parts of the data are actually shown. Click the Change button to set the range of data shown. Once the checkbox is checked, the Visible Range will be applied to the data in the Main Display window. If the Visible Range checkbox is not selected, the default range will be used.

Marker - Defines an end point symbol and text as well as its color with these fields when using Nominal Time in the **Times to Use** option of the **Times** tab. If you select Track Times in the **Times to Use** option of the **Times** tab, then this point will represent the current location of the track as you play through the loop of data in the Main Display window. By default, "Location" is selected as the default marker. Click the checkbox to the left of the "Location" box to enable the marker. Click on "Location" to choose another marker from the list of layouts. Click on the **Edit** icon to edit a current layout, or to create a new one. Use the slider or enter in a value and hit enter in the **Scale** option to set the scale of the marker.

Line Width - Allows you to set the width of the displayed trajectory line. You can change the line width by typing a value into the field and pressing Enter, or by clicking to use a slider.

The second tab controls the **Times** used for the display:

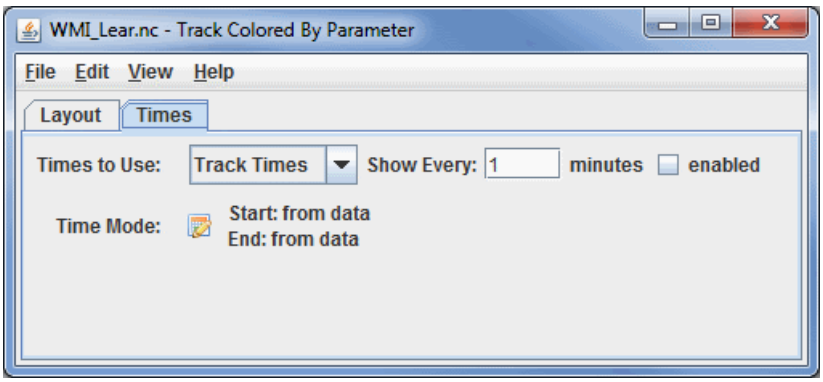


Image 2: Times Tab of the Track Controls Dialog

Properties

Times to Use - Represents if you are using nominal times or the track times from the data. You can also choose to limit the times of data shown by checking **enabled**. There are two **Times to Use** options:

Nominal Time - Displays the entire track of data in one time step, regardless of the number of observations along the track.

Track Times - Displays the track as a series of time steps, from start to finish.

Time Mode - Allows for the control of how much of the track is shown and from what time. Even though a track represents a set of observation times, there is not time set defined for animating in the main display. Click to show the Time Settings dialog. The time mode allows for the control of how much of the track is shown at each time step of the loop:

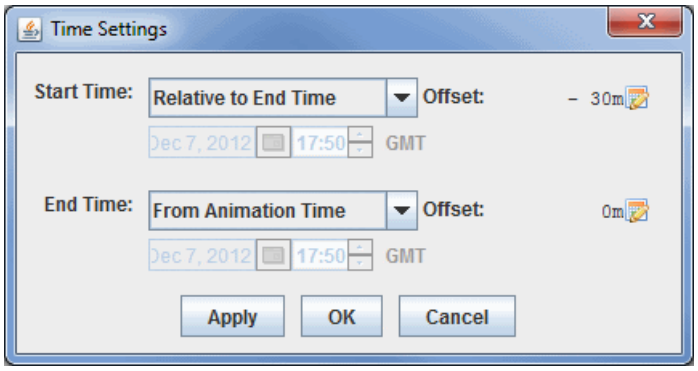


Image 3: Time Settings Dialog

This dialog allows you to define the time range to show of the track. The image above defines that the end time is the current animation time, and the start time is relative to the end time less 30 minutes. This means that the track or trajectory drawn in the Main Display window would include the current animation time of the loop, as well as the any data from 30 minutes prior this time.

This time setting is different that that used for the **Define Animation Times** tab of the Time Animation Widget since it has no influence on the number of time steps in the loop, but rather the amount of data shown at each time step. You can utilize the various options for **Start Time** and **End Time** to determine how much of the track or trajectory will be shown in each time step.

Use First Time from Data - Begins plotting the track or trajectory of your data from the first time step of the data.

From Animation Time - Begins plotting the track or trajectory of your data from the current timestep of the animation in the Main Display window.

Relative to End Time - Begins plotting the track or trajectory of your data from a time relative to the **End Time** selected for your data. You must use an **Offset** with this to determine how far back (in terms of time) to be from the final time step. The **Offset** here should be a negative value assuming your loop is progressing forwards through time.

Fixed (Start Time) - Begins plotting the track or trajectory of your data from a fixed time that will not change as your loop progresses. This does not affect the **End Time** of your data.

Use Last Time from Data - Sets a time where your path or trajectory will end.

Relative to Start Time - Stops the plotting of the the track or trajectory at a time relative to the **Start Time** selected for your data. You must use an **Offset** with this to determine how far in the future the **End Time** will be from the **Start Time**. The **Offset** here should be a positive value assuming your loop is progressing forwards through time.

Offset - Sets the temporal offset (either positive or negative) from the value selected for **Start Time** or **End Time**. This option can be used with any of the provided choices for **Start Time** and **End Time**. The default is 0m, which means that the actual starting and ending times are what was selected.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there is one item that is unique to this display.

The **Edit** menu has this unique option:

Change Parameter... - Changes the parameter that the track or trajectory is colored by.

The **View** menu has this unique option:

Show Flythrough - Opens the Flythrough feature which allows you to interactively explore the display.

Miscellaneous Controls

- Scatter Analysis Controls
- Grid Table Controls
- Omni Controls
- Jython Controls

Scatter Analysis Controls

Overview

The Scatter Analysis controls are used to create a scatter plot within McIDAS-V. The scatter controls show three different panels:

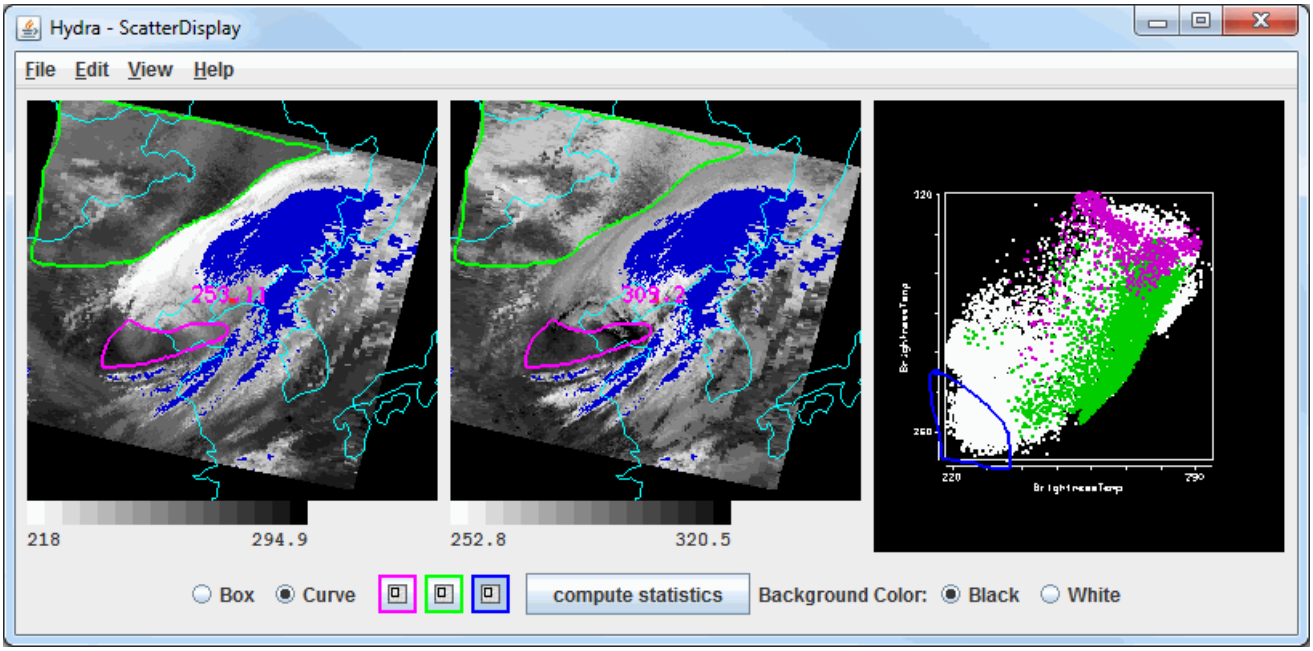


Image 1: HYDRA Scatter Analysis Display

The plot on the first panel on the left represents the first field selected in the **Field Selector**, the panel in the middle represents the second field which is selected through the Field Selector window, and the panel on the right is the scatter analysis of the two fields. The first field selected is represented on the X-axis (abscissa) and the second field selected represents the Y-axis (ordinate). The X-axis is selected in the **Field Selector** - the channel selected in the lower right **Channels** tab will be used as the X-axis.

Regions can be subsetted in any of the three panels, and the equivalent points will also be selected in the other two panels. For example, if a box is drawn in panel 1, the same box will be drawn in panel 2, and the points in these boxes will be colored the same in panel 3, the scatter analysis. To draw a box, select a Box radio icon and a color and use Shift+left-click and drag to select a region. Any enclosed shape can be drawn by selecting the Curve radio button and a color and using left-click and drag in any panel to select a region. A user is allowed one box and one curve per color in the scatter analysis (panel 3), and one box and one curve for the images (panels 1 and 2). To remove a region that has been subsetted, double-click on the color of the region to remove next to the Box/Curve radio buttons.

Right-click on the color bar below the images to open the Color Table Editor, change the range, select other color tables, etc.

Under the scatter analysis, there is a **Background Color** option that allows for setting the background color of the scatter analysis. This defaults to black. When white is selected, the background will be come white and the scatter plot axes and labels will change to black.

To the right of the Box/Curve options, there is a compute statistics button. Clicking this button will Scatter Statistics window that will list statistical information about the data as a whole, as well as the regions of the data that were subsetted with a box/curve. The values in the white columns are computed for the image as a whole, and the values in the colored columns are computed for the area of the respective box/curve.

Scatter Statistics

Stats Parameter	BrightnessTemp	Reflectance	BrightnessTemp	Reflectance	BrightnessTemp	Reflectance	BrightnessTemp	Reflectance
Maximum	327.54	1.189	215.32	1.088	323.92	0.85721	304.76	1.026
Minimum	191.37	0.02407	200.50	0.87391	216.10	0.03630	205.67	0.06618
Number of points	27608	27608	33	33	1316	1316	689	689
Mean	295.60	0.18522	209.26	0.95333	310.31	0.11123	283.47	0.31259
Median	299.51	0.12146	210.05	0.95472	310.63	0.10792	287.49	0.22282
Variance	510.51	0.02900	7.632	0.00177	63.00	0.00179	421.07	0.05082
Kurtosis	5.437	5.422	3.684	2.248	63.39	115.70	5.183	0.15094
Std Dev	22.59	0.17028	2.763	0.04206	7.937	0.04229	20.52	0.22543
Correlation	-0.75726		0.03327		-0.43178		-0.71967	
Difference Maximum	327.36		214.43		323.80		304.61	
Difference Minimum	190.47		199.59		215.45		204.77	
Difference Mean	295.42		208.31		310.20		283.16	
Area [km^2]			27.83		1857.95		523.27	

Save As CSV

Image 2: HYDRA Scatter Statistics Window

Properties

Maximum - Lists the maximum numerical value of the field within the boundaries of the entire image or a subsetted region.

Minimum - Lists the minimum numerical value of the field within the boundaries of the entire image or a subsetted region.

Number of points - Lists the total number of points within the boundaries of the entire image or a subsetted region.

Mean - Lists the mean numerical value of the field within the boundaries of the entire image or a subsetted region.

Median - Lists the median numerical value of the field within the boundaries of the entire image or a subsetted region.

Variance - Lists the variance of the field within the boundaries of the entire image or a subsetted region.

Kurtosis - Lists the kurtosis value of the field within the boundaries of the entire image or a subsetted region.

Std Dev - Lists the standard deviation of the field within the boundaries of the entire image or a subsetted region.

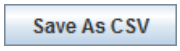
Correlation - Lists the correlation between the numerical values of the two fields within the boundaries of the entire image or a subsetted region.

Difference Maximum - Lists the maximum difference in the numerical values of the fields on a pixel-by-pixel basis.

Difference Minimum - Lists the minimum difference in the numerical values of the fields on a pixel-by-pixel basis.

Difference Mean - Lists the mean difference in the numerical values of the fields on a pixel-by-pixel basis.

Area [km^2] - Lists the area, in square kilometers, of the subsetted regions.



- Saves this statistical data as a Comma-Separated Values (CSV) file (*.csv).

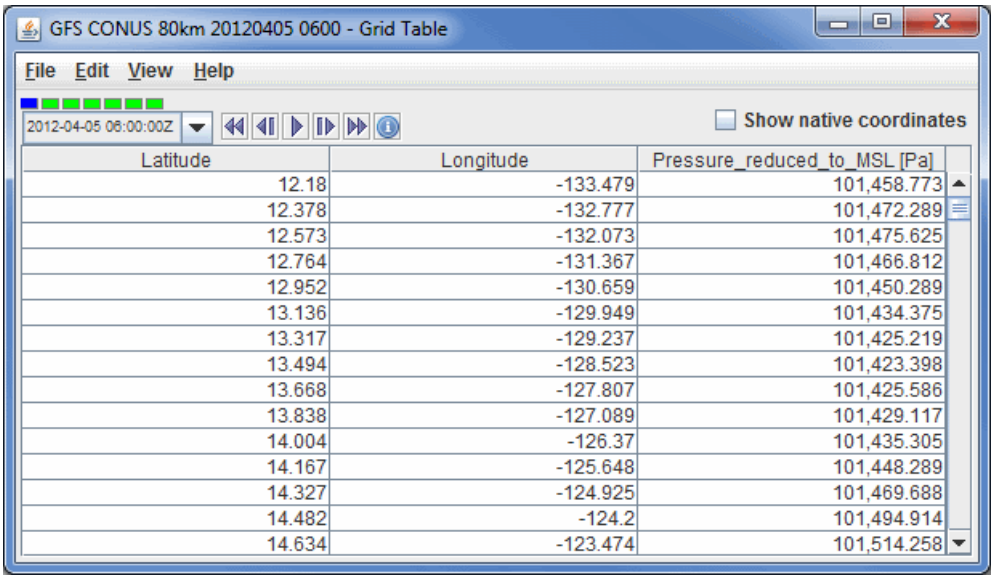
Menus

All of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page.

Grid Table Controls

Overview

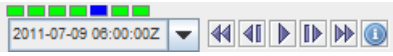
The Grid Table display in creates a table in the **Layer Controls** tab of the Data Explorer. This chart plots the numerical value of your selected field at every latitude and longitude point. You can change the order of the items in this chart by Latitude, Longitude, or field values by clicking on the title of the respective column in the table. This will change the order of the table to go from lower to higher values, or higher to lower values.



Latitude	Longitude	Pressure_reduced_to_MSL [Pa]
12.18	-133.479	101,458.773
12.378	-132.777	101,472.289
12.573	-132.073	101,475.625
12.764	-131.367	101,466.812
12.952	-130.659	101,450.289
13.136	-129.949	101,434.375
13.317	-129.237	101,425.219
13.494	-128.523	101,423.398
13.668	-127.807	101,425.586
13.838	-127.089	101,429.117
14.004	-126.37	101,435.305
14.167	-125.648	101,448.289
14.327	-124.925	101,469.688
14.482	-124.2	101,494.914
14.634	-123.474	101,514.258

Image 1: Grid Table Display

Properties



Time Animation Controls - Controls the looping of data through time. For more information, see Time Animation.

Show native coordinates - Lists X/Y values instead of Latitude/Longitude values.

Menus

All of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page.

Omni Controls

Overview

The Omni controls consist of a VisAD Spread Sheet, loaded with the parameter selected and its coordinates and units. The Spread Sheet is used to create a display where you have complete control over which coordinates are the axes, how it is colored, and so on. Use of the VisAD Spread Sheet is not described here. See the VisAD Spread Sheet document at http://www.ssec.wisc.edu/~curtis/ss.html.

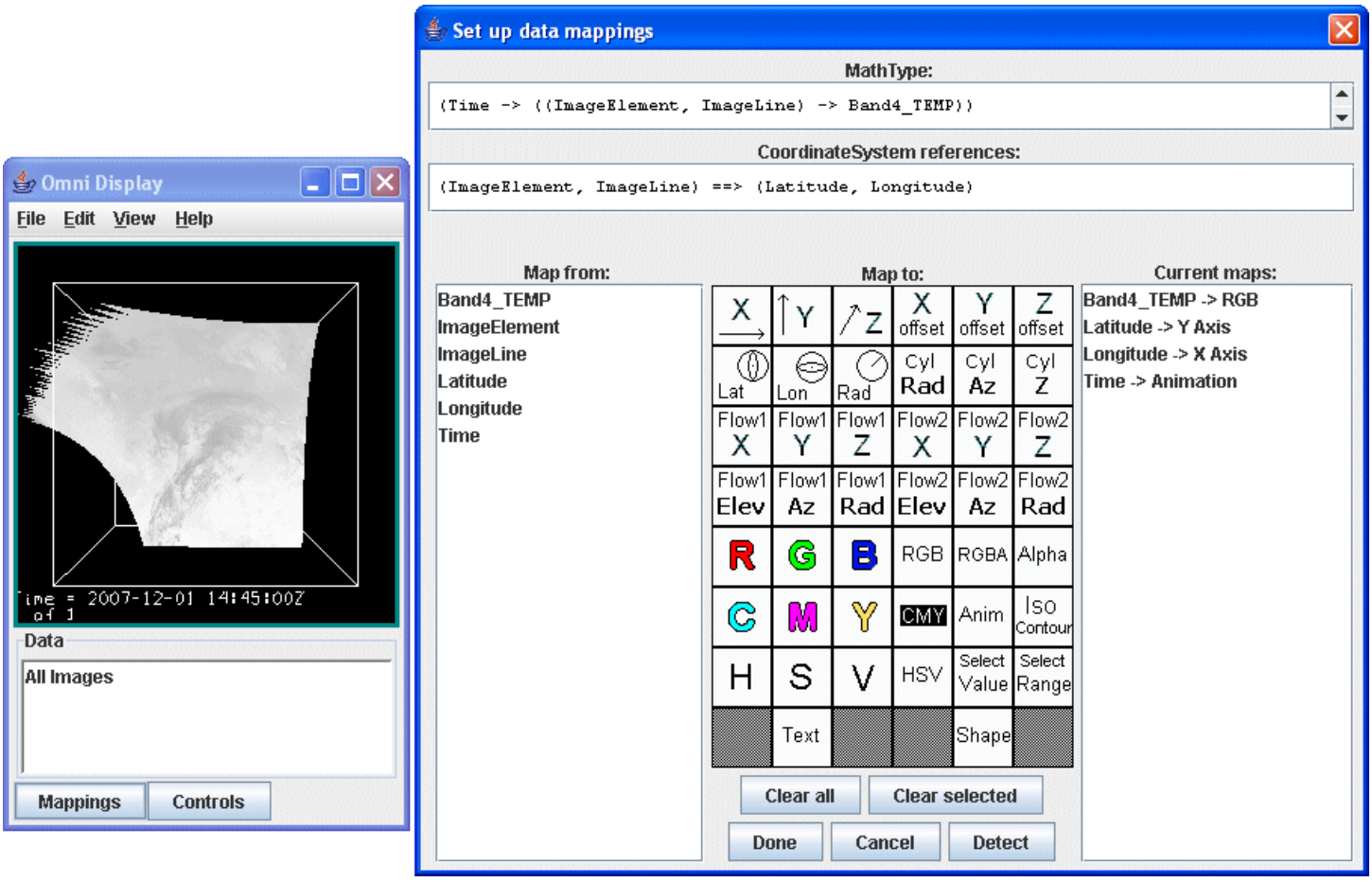


Image 1: Omni Controls Windows

Properties

Mappings - Brings up the VisAD Math Type and display mappings control box shown on the right in the image above.

Controls - Brings up the spreadsheet Controls box (not shown).

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there is one option that is unique to this display.

The **Edit** menu has this unique option:

Add Parameter - Opens a Field Selector window with the option to add another parameter to the display from one of your loaded Data Sources.

Jython Controls

Overview

The Jython Controls allow for the development of custom layer controls written in Jython. The controls operate in two modes.

First is the "developer" mode. Here the developer can create a Jython Control; specify the name of the display, any data categories, and the probe type; and write the Jython that creates a GUI and responds to data, animation time and probe position changes.

The default Jython code has examples of accessing data, etc.

The second mode is "user" mode. In developer mode you can write out an specification of the Jython Control to a plugin through the **File->Save->Write to Plugin** menu. This plugin, when loaded, will only show the user interface that is created by the developer-written Jython.

Contour Properties Editor

The **Contour Properties Editor** is invoked from any contour display control with the **Contour: Change** button or through the **Edit->Change Contours...** menu item in the **Layer Controls** tab of the Data Explorer. Use the items in this window to set contouring properties.

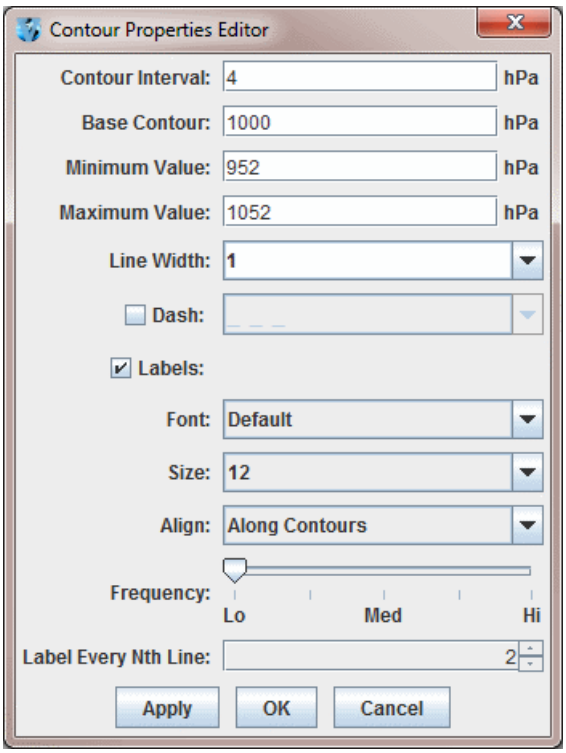


Image 1: Contour Properties Editor

Properties

Contour Interval - Sets the spacing (difference in value) between contours. There are four ways to specify the contour interval.

1. Specify a single value to denote a regular interval between contours.
2. Specify irregular contour intervals with a semi-colon separated list of values. For example:

   5400;5460;5800. This would only show contours at 5400, 5460, and 5800.
3. Specify different contour intervals for different ranges in the following format:

   cint1/min1/max1;cint2/min2/max2;...;cintn/minn/maxn

   For example, with geopotential heights: 30/0/4200;60/4200/8600;120/8600/24000 would draw contours at 30gpm between 0 and 4200, 60gpm between 4200 and 8600, and 120gpm between 8600 and 24000
4. Specify one individual contour by setting the interval, min, and max as the same value. For example:

   5400/5400/5400. This would only show the 5400 line.

Base Contour - Sets the value on which all contours are based. All contours will be integer multiples of the contour interval from the base value. For example, with a base value of 0 and a contour interval of 3 contours would be created at ..-6, -3, 0, 3, 6... A base of 1 with that interval would create contours at ..-5, -2, 1, 4, 7... The base value does not have to be the lowest contour level on a plot, or inside the range of values plotted; it is only a computational reference point. The base contour value is also used for controlling which lines are dashed.

Minimum Value - Sets the limit below which no contour lines are drawn. The minimum value may be larger than the base value, so that the base value may never appear on a plot.

Maximum Value - Sets the upper limit above which no contour lines are drawn. The minimum and maximum values do not need to match contour line values; they are only limits.

Line Width - Sets the line width (in pixels) of the contour lines and labels.

Dash - Dashes contour values less than the base value. If the base is set higher than maximum value, then all lines are dashed. Use the pulldown menu to select the dash pattern to use.

Labels - Displays contour labels on the image.

Font - Sets the font style of the contour labels.

Size - Sets the font size of the contour labels.

Align - Sets the way contour labels will be written on the contours. **Along Contours** means the labels will be written along contours, and while they will not be written upside down, there is a chance they will be written at an angle depending on the layout of the contours. **Horizontal** means the contour labels will be written on the contour, but it will be written in the horizontal and not on an angle.

Frequency - Sets the frequency of labels along the contour lines. There will be more labels displayed as the slider is moved from left to right.

Label Every Nth Line - Determines how many contour lines will be labeled in the display. By default this is set to a value of 2, which means that every other contour line will be labeled. Decrease this value to increase the number of contours with labels, and increase this number to decrease the number of contours with labels.

Properties Dialog

The Properties dialog is accessed by right clicking on a layer in the Legend of the Main Display window, and selecting **Edit->Properties** menu item. This dialog can also be accessed in the **Layer Controls** tab of the Data Explorer, by clicking the button at the bottom of the tab. The Properties dialog consists of a **Settings** tab, and possibly others depending on item being displayed:

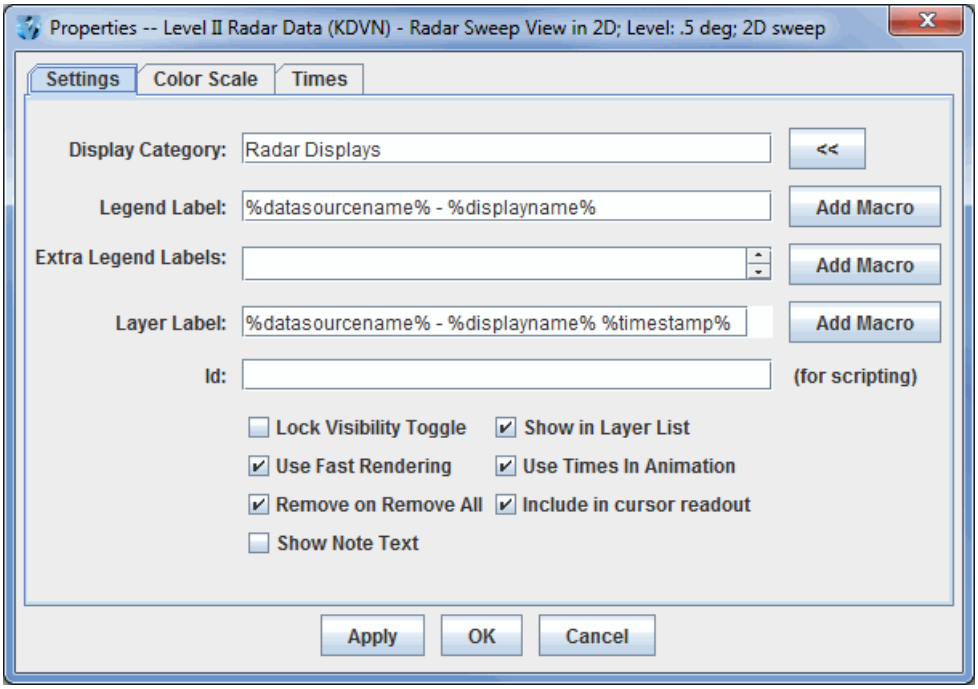


Image 1: Layer Control Properties Dialog

Properties

Display Category - Organizes the Legend by moving items from one Legend category to another. The << button shows a list of all of the current display categories and allows you to easily set this field.

Legend Label - Represents the label used in the Legend of this display control. It can contain arbitrary text as well as a set of macros. These macros can also be used in the **Extra Legend Labels** and **Layer Label** fields. The macros can be added to the label with the Add Macro button:

Display Name %displayname% - Shows name of the display.

Field Short Name %shortname% - Shows the short name of the parameter being displayed.

Field Long Name %longname%- Shows the long name of the parameter being displayed.

Data Source Name %datasourcename% - Shows the name of the data source that produced the parameter being displayed.

Display Unit %displayunit% - Shows the unit of the parameter used in the display.

Time Stamp %timestamp% - Shows the time of the data that is currently being displayed using the default time format preference. You can also use a macro of the form %time:<time pattern>% to set a specific time format other than the default. <time pattern> follows the same rules defined in the User Preferences' **Formats & Data** tab. For example, %time:HHz EEE dd MMM yyyy% would show something like **12GMT Fri 16 Feb 2007**.

Forecast Hour %fhour% - Lists the forecast hour being displayed. This is used with gridded data. The output is a numerical value for the forecast hour followed by an 'H' for 'hour'.

Forecast Hour (value only) %fhour2% - Lists the forecast hour being displayed. This is used with gridded data. The output is a numerical value for the forecast hour without an 'H' (as used with **%fhour%**).

Resolution %resolution% - Lists any data sampling applied to the display. This is only used with adaptive resolution.

Level %level% - Lists the vertical level being displayed.

Use as default for this type of display - Sets the Legend Label to default to what is entered in the text field for all displays created with the display type used to create the layer.

Use as default for all displays with data - Sets the Legend Label to default to what is entered in the text field for everything that displays in the Main Display window.

Use as default for all displays without data - Sets the Legend Label to default to what is entered in the text field for all displays

without data. Example displays without data include Drawing Controls and Location Controls.

Extra Legend Labels - Acts like the Legend Label field (e.g., with macros).

Layer Label - Acts like the Legend Label field to define the text label that is shown in the display list. The colored rectangle to the right of the layer label changes the color. Left-click and use the pull down menu to specify a color or create a custom color.

Id - Defines an ID for this display. The ID is used for accessing particular displays from the McIDAS-V Scripting Language. For example, this can be used with the **display** keyword for colorbar in the formatting of **captureImage**.

There may be a variety of checkboxes:

Lock Visibility Toggle - Locks/unlocks visibility toggling.

Use Fast Rendering - Uses fast rendering to display data layers (images, contours, etc.); see Performance Tuning for more information. A separate fast rendering option for map layers is available in the Map Controls.

Remove on Remove All - Removes the layer when the Remove all Layers or Remove all Layers and Data buttons are pressed. When this option is not selected, the layer will remain after removing all layers and data sources.

Show Note Text - Adds a text field to the bottom of the **Layer Controls** tab of the Data Explorer for the item. This allows you to enter notes/text that can be saved in bundles.

Show in Layer List - Allows for the toggling of the visibility of the label in the view window. Note that you must enable showing the list of display labels that are toggled on using the **View->Properties** dialog of the view window, or by setting the global property for all display through the User Preferences dialog.

Include Times In Animation - Includes the item in the time animation.

Include in cursor readout - Includes probe readout values for the parameter at the bottom of the Main Display window when you probe the data.

There may be other tabs shown, depending on the display. For example, the **Color Scale** tab allows for the configuration of where the color scale bar is shown. The **Spatial Subset** tab allows for defining further spatial subsetting of the data.

Color Scale

For those controls that include color tables, the color scale can be displayed in the Main Display window. Use the the **Edit->Properties->Color Scale** menu in the **Layer Controls** tab of the Data Explorer to configure the visibility, positioning, and labeling of the color scale.

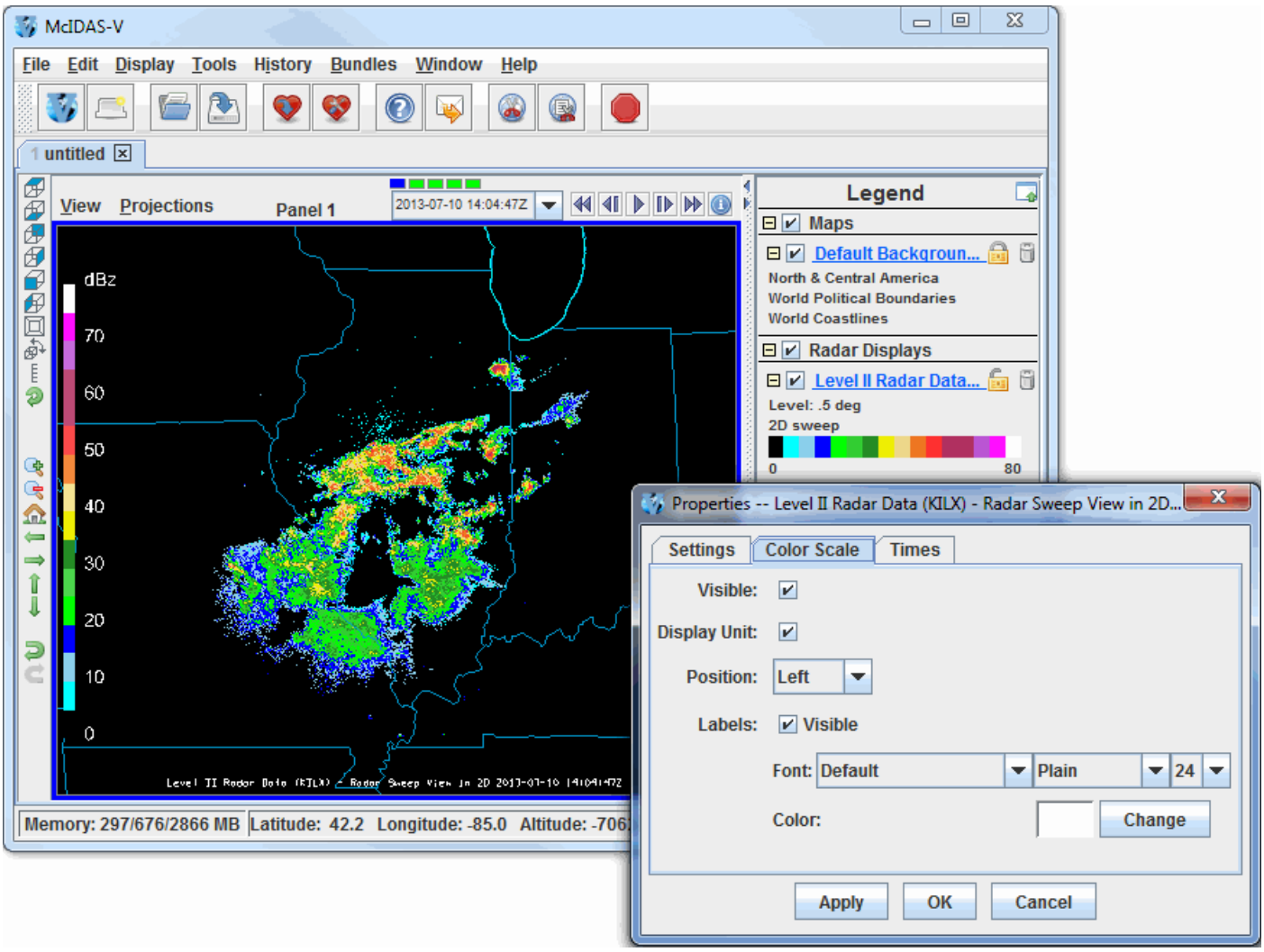


Image 1: Color Scale Properties Dialog

Properties

Visible - Determines if the color scale will be shown in the Main Display window. The scale is visible when the box is checked.

Display Unit - Adds a unit to the color scale, as long as the color scale is set as visible.

Position - Represents the location of the color scale in the display.

Labels - Determines if labels will be plotted along with the color scale. When the Visible option is checked, labels will be displayed.

Font - Represents the font, style, and size of the font plotted in the color scale's labels.

Color - Represents the color that the labels will be plotted in for the color scale.

Charts

Overview

There are many different sources of data that can make use of the charting facility in McIDAS-V. It is possible to use the charting facility to display your data by selecting Data Probe/Time Series in the Displays menu in the **Field Selector** tab of the Data Explorer. The chart will be plotted in the **Layer Controls** tab, while a square representing the location of the probe will be shown in the Main Display window. The location of the probe can be changed by left-clicking on the probe and dragging it.

There are four levels of configuration available to the user, as well as several unique menu options for this display.

- Chart Line Properties
- Plot Properties
- Chart Properties
- Chart Layout
- Menu Options

Chart Line Properties

At the lowest level, you can set the properties of how each parameter or field is shown. This is done through the Chart Line Properties dialog, which is opened by right-clicking on the parameter below the chart and selecting **Chart Properties**.

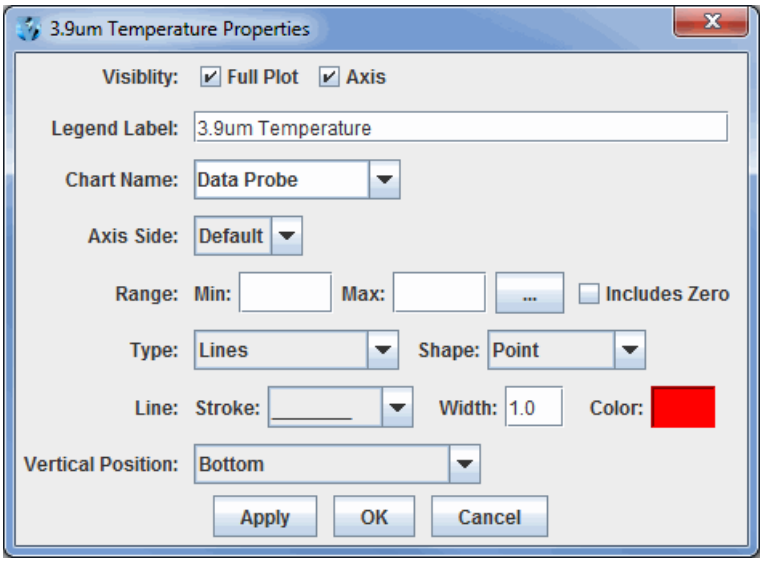


Image 1: Chart Line Properties Dialog

Full Plot - Toggles the visibility of the data displayed on the chart on or off.

Axis - Toggles the visibility of the axis on or off.

Legend Label - Sets the name of the selected parameter, both in the parameters list, and on any axes labels.

Chart Name - Select a chart name from the pull down menu, or create a new by typing a new name in the field. The display will automatically create a new chart with the new name.

Axis Side - Sets the side of the chart the axis and axis label is shown.

Range - Fixes the axis range to remain constant as the chart values change.

... **-** Allows for specifying the initial range values for the selected parameter.

Includes Zero - Includes zero on the axis range.

Type - Specifies the display of the data in the chart. It can be displayed as Lines, Lines and Shapes, Shapes, Area, Area and Shapes, or a Bar Chart.

Shape - Specifies the shape to be displayed when Shapes is included in the Type.

Line - Specifies the line stroke and width to be displayed.

Color - Specifies the color of the data being displayed.

Vertical Position - Defines where in the chart special shapes are shown (e.g., wind barbs, cloud coverage, text).

Plot Properties

For each individual plot, there are a number of settings that can be changed through the Plot Properties dialog. This is also accessed through the **View->Chart->Chart:->Properties...** menu item.

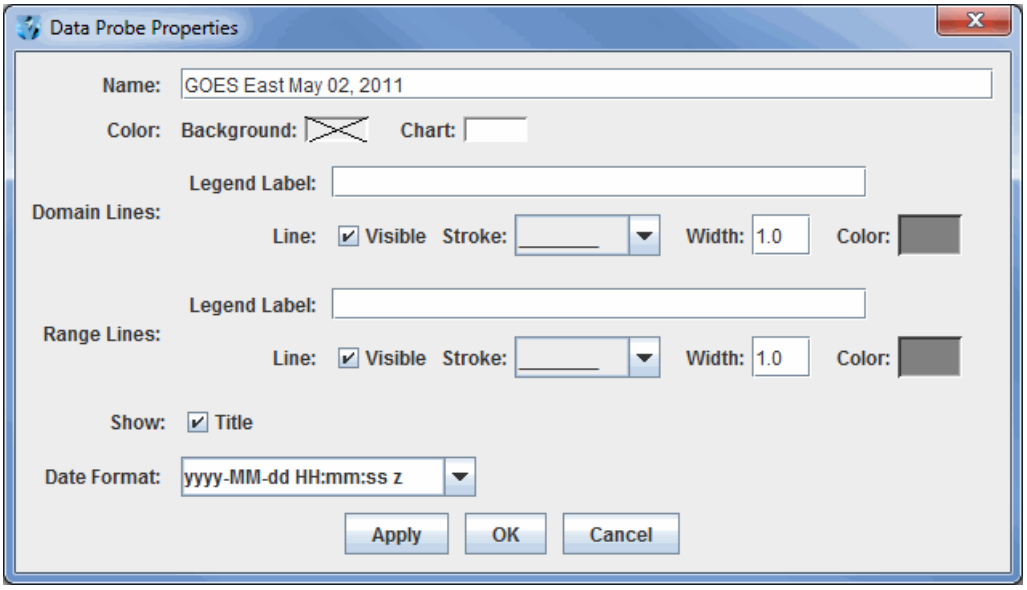


Image 2: Data Probe Properties Dialog

Name - Sets the name of the chart.

Color - Sets the background and chart colors.

Domain Lines - Sets the domain lines properties including the stroke, width, and color. The visibility of the domain lines can also be toggled on and off with the **Visible** checkbox.

Legend Label - Sets the label along the domain axis.

Range Lines - Sets the range lines properties including the stroke, width, and color. The visibility of the range lines can also be toggled on and off with the **Visible** checkbox.

Legend Label - Sets the label along the range axis.

Title - Sets the visibility of the name on the chart.

Date Format - Sets the format of the date/time labeling on the chart along the axis representing time.

When right-clicking on a chart, you can also zoom in and out and save the chart as an image. There are also a number of key and mouse bindings on the chart:

Ctrl+R: Reset any zooming.
Up/Down/Left/Right Arrows: Pan p
Left mouse drag - zoom

Chart Properties

There are several chart properties that can be changed through the Chart Properties dialog box. This is accessed by right clicking on the chart and selecting "Properties." The Chart Properties dialog box consists of three tabs: **Title**, **Plot**, and **Other**. The **Plot** tab includes three tabs within itself: **Domain Axis**, **Range Axis**, and **Appearance**.

The **Title** tab sets the chart's title and its attributes.

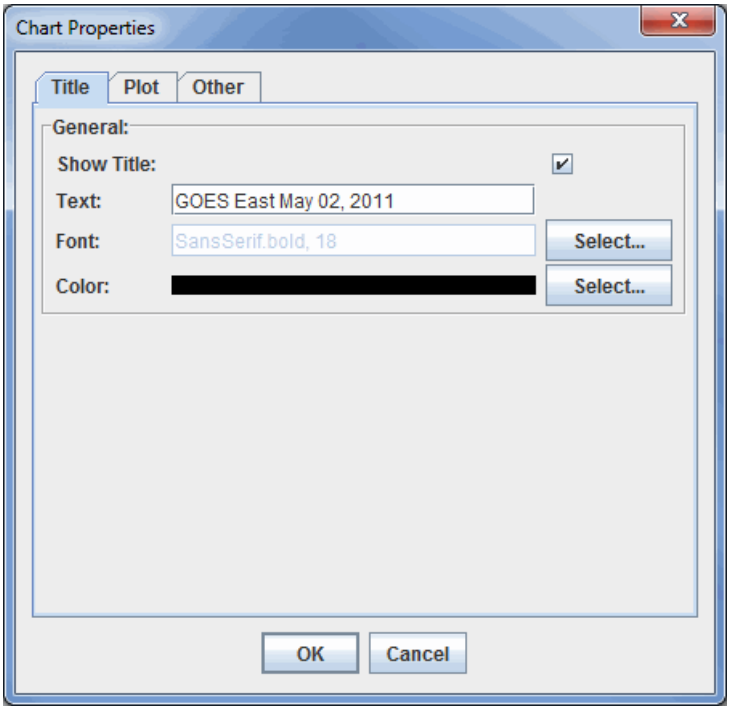


Image 3: Title Tab of the Chart Properties Dialog

Show Title - Displays the title on the chart in the **Layer Controls** tab of the Data Explorer.

Text - Lists the current title for the chart. This can be changed by typing in the field.

Font - Sets the font style and size of the title.

Color - Sets the color of the title.

The **Domain Axis** tab allows for customization of the domain axis.

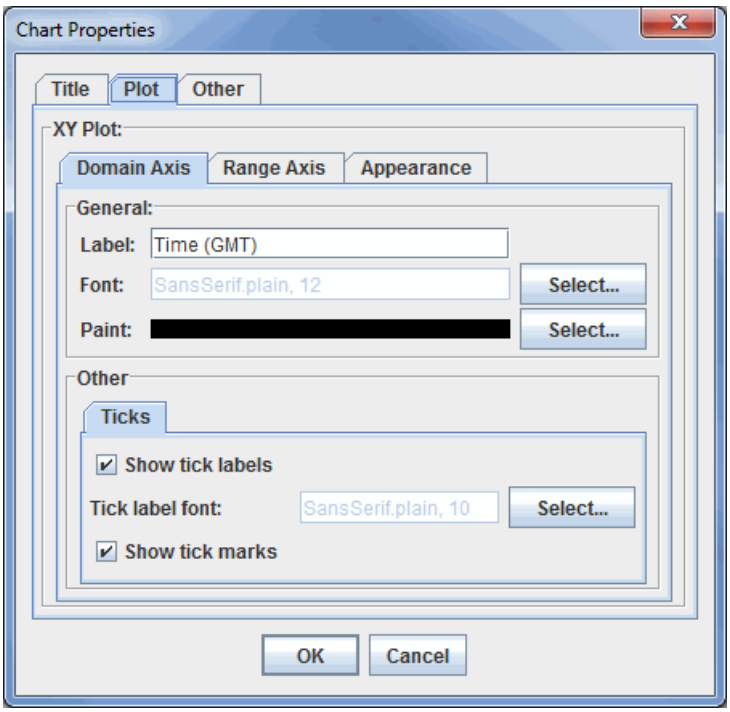


Image 4: Domain Axis Tab in the Plot Tab of the Chart Properties Dialog

Label - Sets the label for the domain axis.

Font - Sets the font style and size of the title.

Paint - Sets the color of the title.

Show tick labels - Displays labels below the tick marks on the domain axis.

Tick label font - Sets the font size and style of the tick labels.

Show tick marks - Displays tick marks, which extend just beyond the boundaries of the chart on the domain axis.

The **Range Axis** tab allows for customization of the range axis.

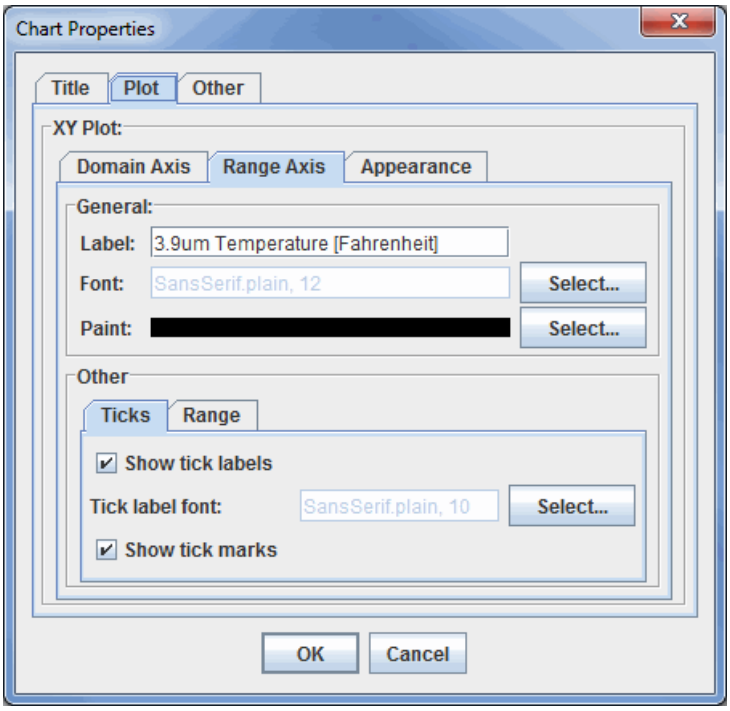


Image 5: Range Axis Tab in the Plot Tab of the Chart Properties Dialog

Label - Sets the label for the range axis.

Font - Sets the font style and size of the label.

Paint - Sets the color of the label.

Show tick labels - Displays labels next to the tick marks on the range axis.

Tick label font - Sets the font size and style of the tick labels.

Show tick marks - Displays tick marks, which extend just beyond the boundaries of the chart on the range axis.

Auto-adjust range - Computes the minimum and maximum values of the range axis automatically when checked. When unchecked, you can enter in a minimum and maximum value to set the range. This option exists under the **Range** tab of the **Other** tab.

The **Appearance** tab has several options to change the appearance of the plot.

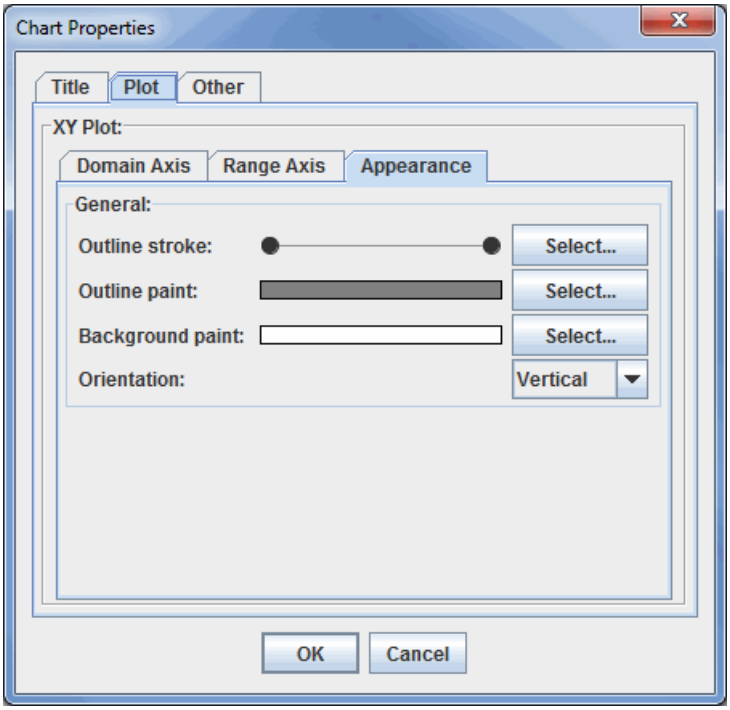


Image 6: Appearance Tab in the Plot Tab of the Chart Properties Dialog

Outline stroke - Sets the chart outline stroke style.

Outline paint - Sets the color of the chart outline.

Background paint - Sets the color of the chart plot background.

Orientation - Sets the orientation of the chart.

The **Other** tab sets general chart properties.

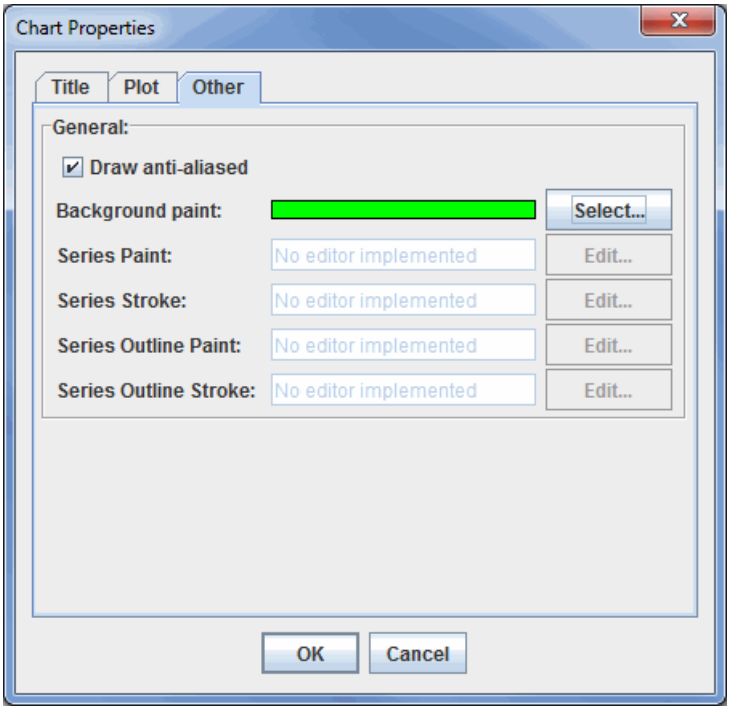


Image 7: Other Tab of the Chart Properties Dialog

Draw anti-aliased - Draws the chart using anti-aliased techniques to reduce distortion.

Background paint - Sets the chart background color.

Series - Series and Series Outline options are not implemented at this time.

Chart Layout

With multiple charts, different layouts can be set using the **View->Chart->Layout** menu item. There are a number of pre-defined layouts: Grid, Vertical, Horizontal, 2 Column, 3 Column, Tabs. The Grid Layout allows for much flexibility in how the charts are organized and laid out. The **View->Chart->Layout->Change Grid Layout** menu item brings up the Grid Layout Editor:

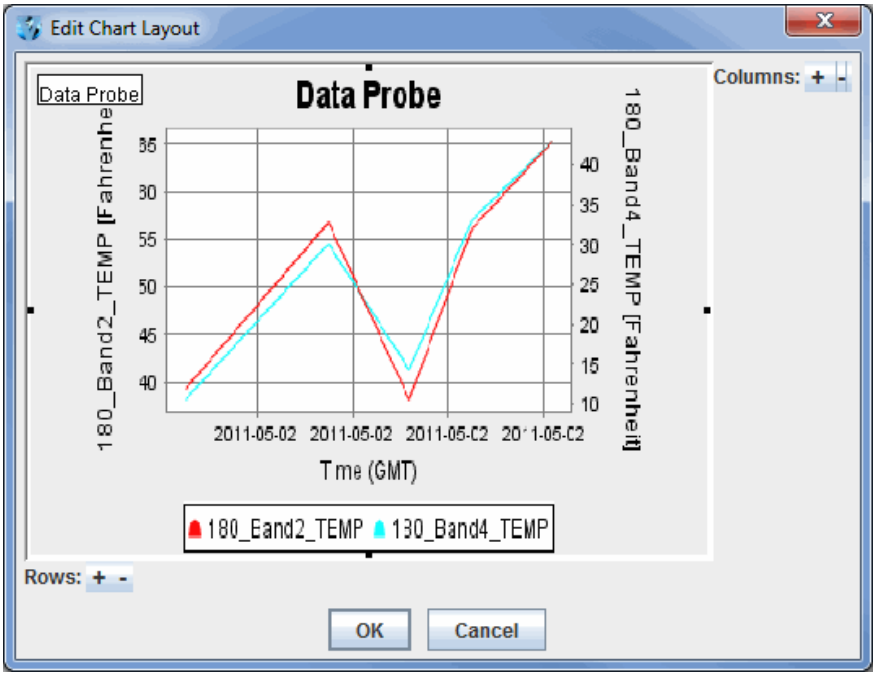


Image 8: Edit Chart Layout Window

You can add/remove rows and columns with the + - buttons. You can then drag the graphical representations of the charts to place them in the grid. A chart can also span multiple rows or columns. This is done by grabbing the black square on one side of the chart image and dragging it to change the row or column.

Menu Options

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there are several menu options that are unique to the Data Probe/Time Series display.

The **File** menu has these unique options

Export Current Time as CSV... - Exports the current time step's data or all times as a comma separated file (CSV) by selecting the **File->Save** menu.

Export All Times as CSV - Exports all times as a comma separated file (CSV).

The **Edit** menu has these unique options:

Change Display Format - Changes how the data is displayed in the table. This template is HTML with macros that get replaced with the display value, unit, raw value and raw data unit.

Probe Color - Changes the color of the probe in the Main Display window.

Add Parameter - Opens a Field Selector window with the option to add another parameter to the display from one of the loaded data sources.

The **View** menu has these unique options:

Parameters

Show Parameter Table - Displays the parameter table below the chart.

Show Readout in Legend - Displays a readout of the data in the Legend in the Main Display window.

Add Parameter - Opens a Field Selector window with the option to add another parameter to the display.

Parameter - Allows you to copy the chart, open the Chart Properties dialog window, change the unit of the selected parameter, set a sound, or remove the parameter.

Chart

Show Thumbnail in Legend - Displays a thumbnail version of the image in the Legend in the Main Display window.

Show Sunrise/Sunset Times - Displays sunrise/sunset times in the chart if applicable.

Layout - Opens the Edit Chart Layout window as well as the option to format the chart in several ways.

Chart - Allows for zooming, saving the chart, and the option to open the Data Probe Properties window.

Probe

Position - Controls how you can reposition the probe by preventing movement in the direction of certain axes. There is also an option to reset the probe back to its initial position.

Color - Changes the color of the probe in the Main Display window.

Size - Increases or decreases the size of the probe in the Main Display window.

Probe Shape - Changes the shape of the probe displayed in the Main Display window.

Ensemble Grid Controls

Overview

The Ensemble Grid feature in McIDAS-V allows you to create a plot of possible forecast scenarios from model data. This plot is produced by adding a perturbation to the initial model solution, and by adding perturbations to every subsequent perturbation. Thus, each perturbation away from the unperturbed initial model output theoretically diverges further from the initial model solution. These perturbations can be the result of slightly different initial conditions or different physics utilized by the model. Ensemble Grid displays are a valuable tool for medium range weather forecasting.

The Ensemble Grid controls are accessed through the Data Explorer window by selecting an ensemble run in the **Data Sources** tab, and then defining the parameter to display and the output format in the **Field Selector**. You can also utilize McIDAS-V's ensemble formulas to display this data.

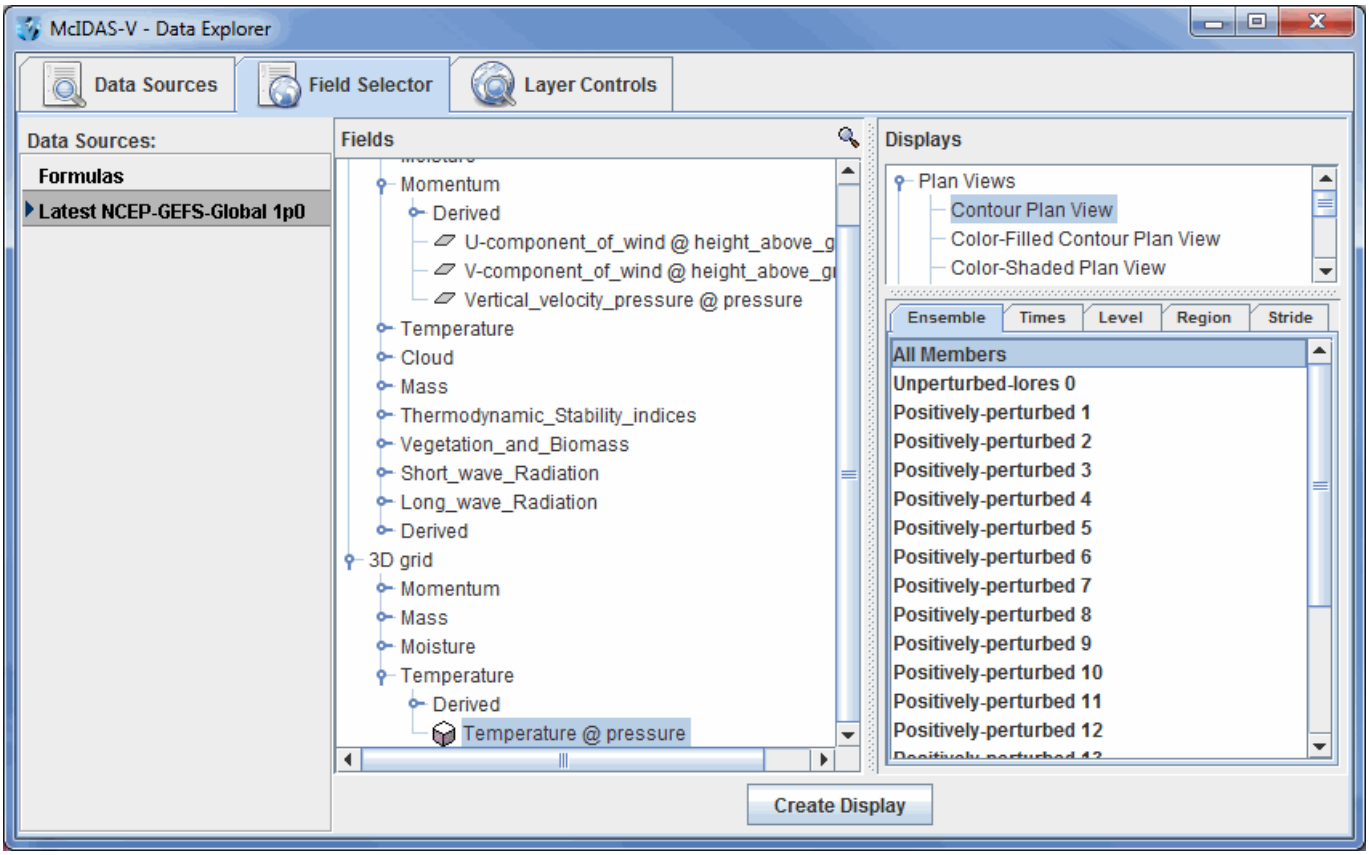


Image 1: Ensemble Grid Data in the Field Selector Tab of the Data Explorer

By default, McIDAS-V displays all ensemble members. This can be changed in the **Field Selector** by selecting the **Ensemble** tab. You can select a range of ensemble members with the Shift key, or individual ensemble members with the Ctrl key. The times used to display the data can be changed in the **Times** tab. When displaying a 3D grid parameter, use the **Level** tab to select which level(s) to display. You can select a specific region to plot the data with the **Region** tab, or select how many data points to plot with the **Stride** tab. Press Create Display to plot the data in the Main Display window.

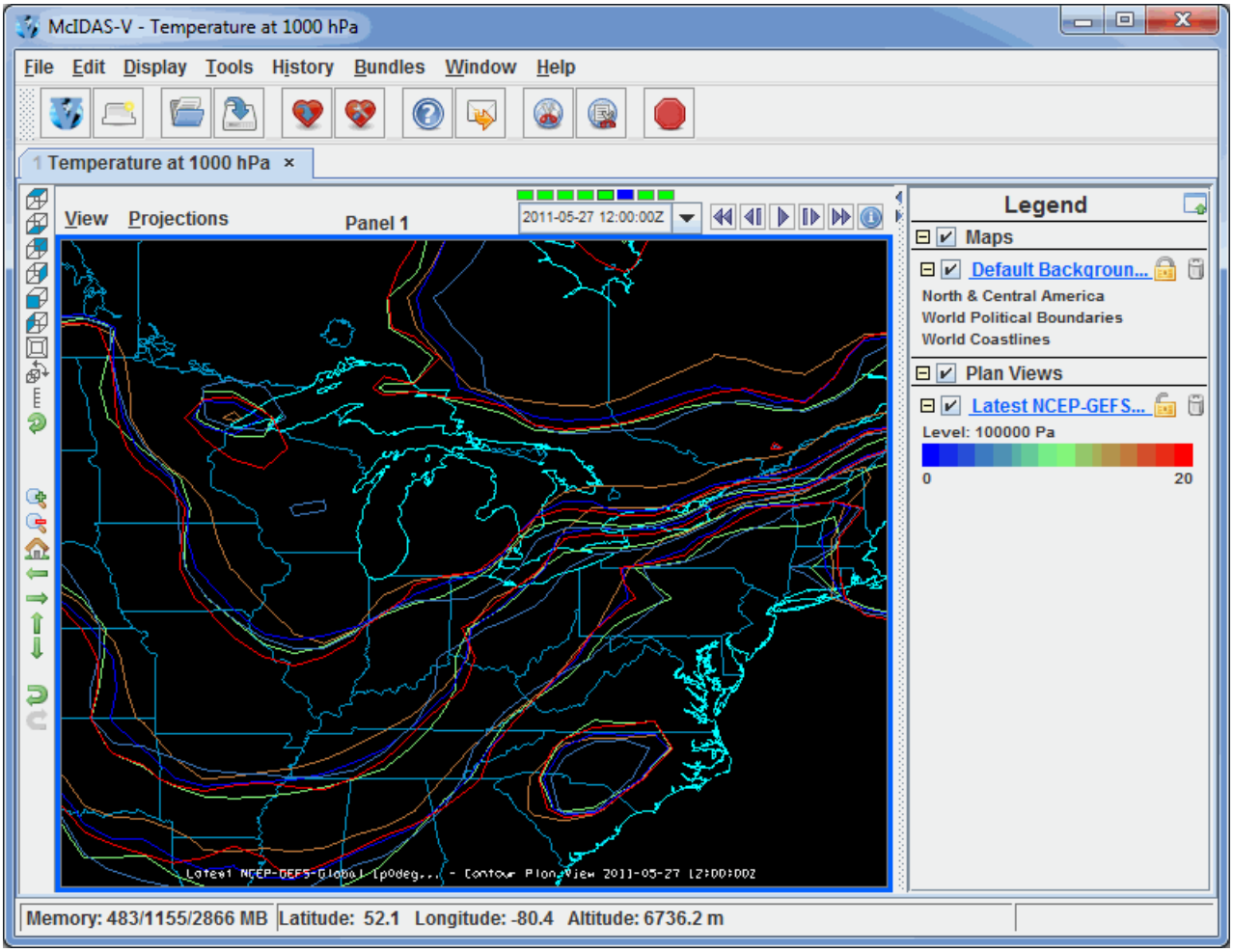


Image 2: Ensemble Grid Data Displayed in the Main Display Window

There are a variety of ways to customize the display once it has been plotted. These options can be found in the **Layer Controls** tab of the Data Explorer.

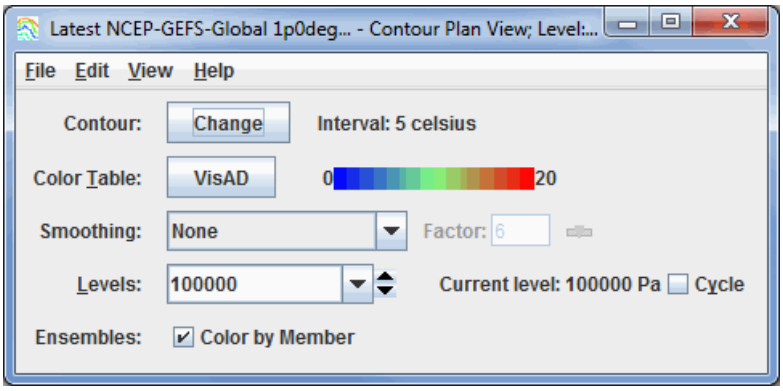


Image 3: Ensemble Grid Controls

Properties

Contour - Opens the Contour Properties Editor to change how the contours appear in the Main Display window.

Color Table - Shows the active color table and the associated high and low data values in the units of the display. As the mouse pointer is moved over the color bar, the value at a particular color is shown. Right click on the color bar or click on the button that displays the name of the Color Table to make modifications to the color bar. This allows you to open the Color Table Editor, change the range, select other color tables, etc.

Smoothing - Smooths the grid. There are seven types of smoothing: None, 5-point, 9-point, Gaussian Weighted, Cressman Weighted, Circular Aperture, and Rectangular Aperture. The amount of smoothness can be set for all except the 5 and 9-point smoothers. The higher the amount, the smoother the grid. For the Cressman, Circular and Rectangular aperture smoothing types, the smoothing factor is the radius in grid spacing units.

Levels - Shows the current level being displayed. The dropdown menu lists the native grid levels. Click on one level value to reset the plan to

that level. The plan level in use is shown in the data's native altitude units. The **Levels** box is editable. Click in the box, enter a value and hit Enter to set your own value. Additionally, you can click on the arrows to the right of the **Levels** box to switch levels, or click on the **Cycle** checkbox to animate vertically through all available levels.

Ensembles - Colors the contours by the ensemble member number when the **Color by Member** checkbox is checked. When this box is unchecked, the contours will be colored by the physical parameter being displayed. Note that the enhancement range for **Color Table** may need to be adjusted to match the values of the parameter. This option is only available for the Contour Plan View display. With the Color-Filled Contour Plan View and Color-Shaded Plan View display types, the default is to color by the parameter values.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there are a couple of options that are unique to this display.

The **Edit** menu has this unique option:

Change Contours - Opens the Contour Properties Editor to change how the contours appear in the Main Display window.

The **View** menu has this unique option:

Use Grid Projection - Re-centers the display and resets the zoom level back to the display's initial settings without changing any other preferences you have modified.

Enable Adaptive Resolution (Under Development) - Turns adaptive resolution on or off for the layer. This menu item is only available if adaptive resolution is enabled in the User Preferences. Note that adaptive resolution is still under development.

Main Display Window

The Main Display window within McIDAS-V contains:

- A 3D view of the displays.
- A **Legend** panel that shows information about the current displays.
- A main menu bar and main toolbar that allow you to control the application.
- A subsidiary view menu bar that is relevant to the 3D display.
- Time animation display and control widgets.
- Navigation toolbars.

This section describes:

- Menu Bar
- Main Toolbar
- Drag and Drop Tabs
- Display Menus
- Properties Dialog
- Visibility Animation
- Time Animation
- Legend
- Modify the Color Bar Interactively
- Status Bar
- Zooming, Panning and Rotating
- Transect Views

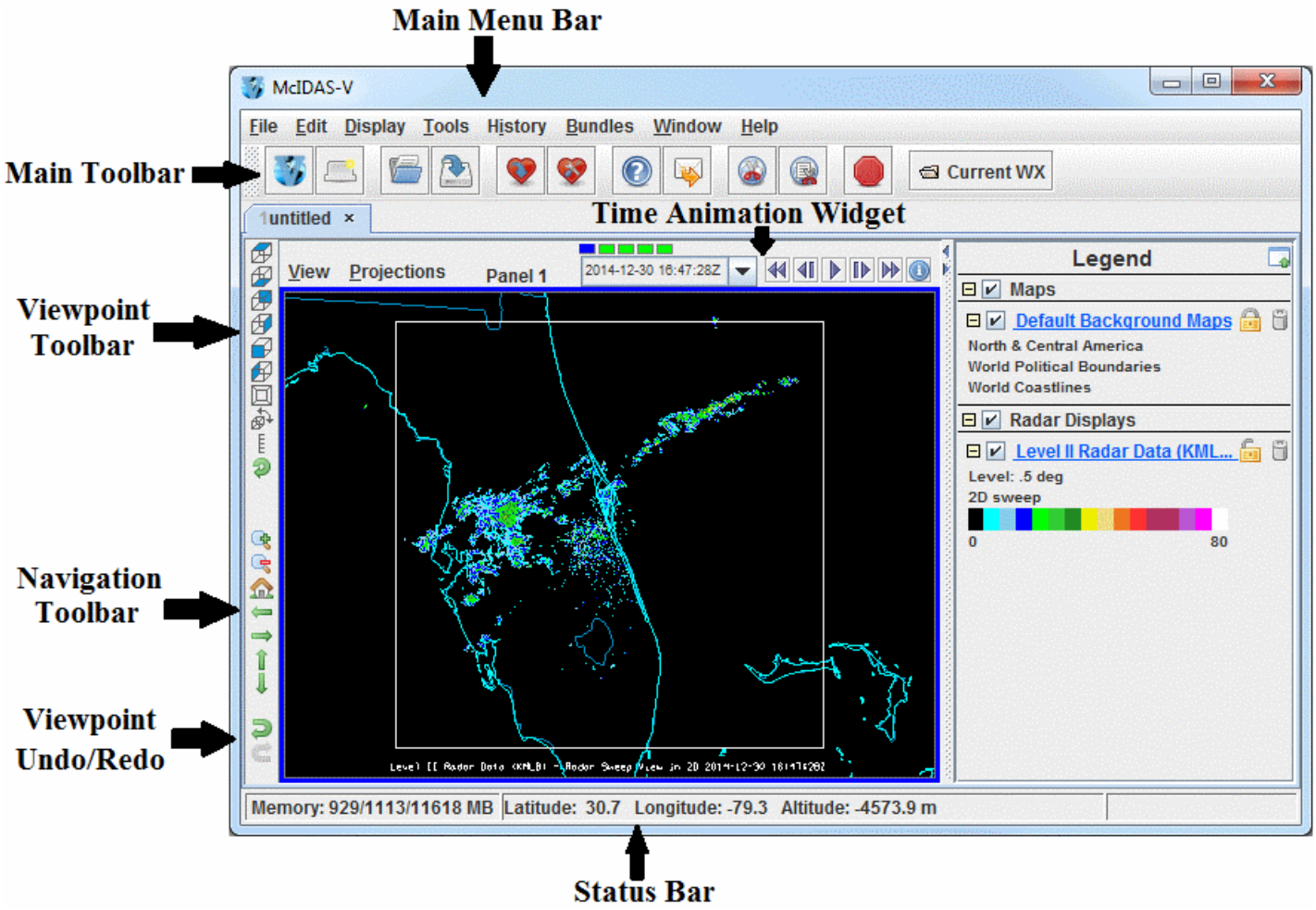


Image 1: McIDAS-V Main Display Window

Menu Bar

The main menu bar shown at the top of the Main Display window has several different menus associated with it.

- File Menu
- Edit Menu
- Display Menu
- Tools Menu
- History Menu
- Bundles Menu
- Window Menu
- Help Menu

File Menu

New Display Window - Opens a new display window which can be a map or globe display with one to four panels. Other speciality displays are also available.

New Display Tab - Adds a new display tab to the currently active display window. This tab can be a map or globe display with one to four panels. Other speciality displays are also available.

Open File... - Opens an Open File window, that allows for loading a bundle into the session. The option for loading the bundle can be set in the **General** tab of the User Preferences. There are four options when loading in a bundle:

Create new window(s) - Displays the bundle's data in a separate Main Display window without changing anything with any previously existing Main Display windows.

Merge with active tab(s) - Adds the a display of the bundle's data to the currently active tab in the Main Display window. This will not remove any previously existing displays in the tab.

Add new tab(s) to current window - Adds tabs to the currently active Main Display window to display the bundle's data. This will not remove any previously existing displays in other tabs.

Replace session - Removes any previously existing displays, data, and tab/panel configuration to load the bundle in from scratch.

Save Favorite - Allows for creating a set of favorite bundles and readily access them through the **Bundles** menu. A favorite bundle can also be used as the Default Bundle.

Save Bundle - Allows for saving the current application state as a bundle.

Default Layout - Allows for managing the default layout of McIDAS-V. See a list of the display settings stored in the default layout below.

Save - Saves the current layout as the default layout. This creates a layout.mcv file in the McIDAS-V directory.

Remove - Removes the currently saved default layout.

Below is a list of the items contained in the default layout:

All items in every tab of the Properties dialog of the panels.

The projection used in the panels.

Rotation and zoom level in the panels.

Panel and tab names.

Main Display window location, size, and tab/panel configuration.

Data Explorer window location and size.

Note: Saving the default layout does not affect the maps displayed in each panel or the data loaded at the beginning of each McIDAS-V session. Map defaults can be set in the **Layer Controls** tab of the Data Explorer in the Map Controls. To change map defaults, use the **File->Default Maps->Save as the Default Map Set** menu item. To load data automatically, set a default bundle by selecting a Favorite bundle in the **Defaults** panel of the **Advanced** tab of the User Preferences window.

Exit - Exits McIDAS-V.

Edit Menu

Remove - Removes all layers, all data, or all layers and data from the Main Display.

All Layers and Data Sources - Removes all layers and loaded data sources.

All Layers - Removes all layers. This will remove any displays or items listed in the Legend of the Main Display window, but no data will be removed.

All Data Sources - Removes all loaded data sources without removing any layers. This will retain the displays.

Preferences... - Opens the User Preferences window, allowing for editing of settings for McIDAS-V.

Display Menu

The display menu contains facilities in creating new displays.

Create Layer from Data Source... - Brings the **Data Sources** tab of the Data Explorer to the front.

Layer Controls... - Brings the **Layer Controls** tab of the Data Explorer to the front.

Add Range Rings - Creates a Range Ring display, with the initial position centered in the current projection.

Add Range and Bearing - Adds a Range and Bearing display to show the distance, azimuth, and back azimuth of a great circle line connecting two positions on the Earth's surface. The initial position is near the center of the current entire map area. If zoomed in on the display, the range and bearing line may be off the screen.

Draw Transect... - Opens the Transect Drawing Control window that allows for viewing, creating and modifying transects for the Transect View.

Drawing Freely... - Opens the Drawing Control window which allows for drawing polygons, lines, shapes, and annotations McIDAS-V displays.

Add Location Indicator - Creates a location indicator cross-hair on the display. See the Location Indicator Controls page for more information.

Plot Location Labels - Lists a variety of point location plots that can be created: NEXRAD sites, state names, state locations, etc. This will create a Location Control with the chosen location information.

Add Background Image - Adds a background image to the display that can be changed using the Web Map Server(WMS)/Background Image Controls.

Reset Map Layer to Defaults - Resets the map layer to default, or re-displays the map if it has been deleted.

Tools Menu

This menu allows for configuration and editing of different McIDAS-V resources.

Manage ADDE Datasets - Opens the ADDE Data Manager, which allows for creating and editing remote and local datasets.

Text Data - Allows access local text products or ATCF storm data.

Weather Text Products (from server) - Shows the Weather Text Products window.

Weather Text Products (from NWX files) - Opens a window where GEMPAK tables can be loaded.

ATCF Tropical Storm Data - Adds ATCF Storm Data as a data source in the **Field Selector** tab of the Data Explorer.

Color Tables - Opens the Color Table Editor, which allows for viewing, creating, and modifying color tables.

Layout Model Editor - Opens the Layout Model Editor, which allows for viewing, creating, and modifying layout models for plotting point data.

Parameters - Contains items related to parameters in McIDAS-V. Parameters are used to determine how field names from different data sources are read and interpreted into McIDAS-V.

Aliases - Opens the Parameter Alias Editor, which allows for defining aliases for parameters in data sets that McIDAS-V does not know about.

Defaults - Opens the Parameter Defaults Editor, which allows for defining the default display conventions (e.g., color tables, ranges, etc.) for parameters.

Groups - Opens the Parameter Groups Editor, which allows for defining the groups of parameters for use in derived data formulas.

Projections Manager - Contains items related to projections.

Edit Map Projections - Opens the Projection Manager, which allows for choosing, editing, and saving map projections for use in McIDAS-V.

Restore Saved View - Restores the previously saved view. This will list out various previously saved views and allows for deleting previously saved views as well.

Delete Saved Views - Deletes a previously saved view.

Save Current View - Saves the current view. This does not include any layers that are loaded in, only the zoom level, projection, and location. When saving a current view, a name will be applied to the viewpoint. This name will be used to list out the viewpoint under the **Projections** menu of the Main Display as well as under **Restore Saved View**. Any saved viewpoints will be saved in the viewpoints.xml file stored in the McIDAS-V directory.

Formulas - Contains items related to end user formulas.

Create Formula - Opens the Formula Editor to allow for creating a new formula.

Edit Formulas - Gives a list of all current formulas to edit. Selecting a formula will open the Formula Editor with that formula entered into the fields.

Jython Library - Opens the Jython libraries window.

Jython Shell - Opens the Jython Shell window.

Import - Imports a formula from a file.

Export - Exports a formula to a file. This opens an Export Formulas window that lists out all of the native formulas in McIDAS-V, as well as any formulas created by the user. The format of the file containing the formula is *.xml.

Plugins

Create... - Opens the Plugin Creator window, which allows for creating plugins.

Manage... - Opens the Plugin Manager window, which allows for managing McIDAS-V plugins.

History Menu

This menu lists the recently accessed data sources and layers and allows for them to be reloaded. This includes data sources from the current McIDAS-V session, and from previous sessions.

Bundles Menu

This menu allows for managing and loading favorite bundles.

Manage... - Brings up the Local Favorites Bundles Manager.

Favorite Bundles - Brings up the folders and list of bundles saved as favorites. Note that this menu item is only available if a favorite bundle has been saved.

Window Menu

This menu allows for bringing the Data Explorer for the front, as well as selecting which tab/panel is visible and active in the Main Display window.

Show Data Explorer - Brings the Data Explorer to the front.

Next Display - Brings the next display tab/window to the front. Note that this menu item is only available if more than one tab or window is open. The keyboard combination for this is Ctrl+N. Note that this does not change which panel is active.

Previous Display - Brings the previous display tab/window to the front. Note that this menu item is only available if more than one tab or window is open. The keyboard combination for this is Ctrl+P. Note that this does not change which panel is active.

List Displays... - Opens a List Displays window, which allows for selecting which tab/panel to view and make active. Note that this menu item is only available if more than one tab or window is open. The keyboard combination for this is Ctrl+L.

Help Menu

This menu allows for viewing the User's Guide, showing error messages, etc.

User's Guide - Opens the McIDAS-V User's Guide.

Getting Started - Opens to the Getting Started section of the McIDAS-V User's Guide.

Show Help Tips - Shows the McIDAS-V Help Tips window.

Show Console - Opens a Console window which has the error messages and other text output from McIDAS-V.

Show Support Request Form - Opens a Request McIDAS-V Support window that allows for posting support requests to the McIDAS Help Desk.

Visit Online Forums - Brings up the McIDAS-V Support Forums in the default browser.

Search Online Resources - Brings up the Search McIDAS-V Documents webpage in the default browser. This allows for searching the User's Guide, the McIDAS-V Support Forums, the McIDAS-V website, and the Java Docs in one search.

Check for new version - Checks to see if the current version of McIDAS-V is up to date.

Check for new notice - Checks to see if a new notice about McIDAS-V is available.

Release Notes - Displays the Release Notes for this version of McIDAS-V.

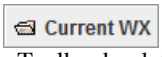
About McIDAS-V - Gives information about the version of McIDAS-V.

Main Toolbar

Below the main menus is the Main Toolbar of the Main Display window.

Image 1: Main Toolbar (Default)

Many of the more commonly used features of McIDAS-V can be accessed here. Hold your mouse over a toolbar button to get a popup tip on what that button does. The Main Toolbar is user configurable. Right-click on the toolbar to change the icon sizes and select "Customize..." to open the User Preferences' **Toolbar Options** tab where you can add, remove, and change the position of the buttons in the toolbar.

The 

button contains a variety of system bundles to demonstrate various functionalities of McIDAS-V. This button appears on the Main Toolbar by default, and can be removed through either the **General** tab of the User Preferences or through the Local Favorite Bundles Manager. Clicking on this button opens a dropdown with several sample real-time bundles:

4 Panel GFS - Creates a 4-panel forecasting chart of GFS 80km CONUS data from UCAR's THREDDS server.

Global Temps and Winds - Creates a globe display of GFS 1.0 degree global data from UCAR's THREDDS server. Displayed at the surface is temperature data, and there is an 3D isosurface of wind speed at 45 m/s.

PWAT and Winds - Creates a display of GFS 80km CONUS data from UCAR's THREDDS server. At the surface is precipitable water drawn over topography. There is also a cross section of wind speed, an isosurface of wind speed at 40 m/s, and flow vectors at 250hPa.

Satellite and Surface Temps - Creates a display of GOES-East 10.7um Temperature data from the adde.ssec.wisc.edu/RTIMAGES server/dataset with the GE-IR Image Type. This satellite data is overlaid with surface temperatures, colored by temperature, from the adde.ssec.wisc.edu/RTPTSRC server/dataset with the SFCHOURLY Data Type.

Surface Observations - Creates a Color-Filled Contour Plan View display of surface temperatures overlaid with a plot of METARs. This data is displayed from point data from the adde.ssec.wisc.edu/RTPTSRC server/dataset with the SFCHOURLY Data Type.

Along with the **Current WX** real-time bundles, there are also a variety of archive bundles that can be added to the Main Toolbar through the Plugin Manager. Under the **Sample Bundles** tree in the Plugin Manager, there are five separate plugins for bundles that demonstrate many of the same features as the real-time bundles. Once these plugins are added and McIDAS-V is restarted, a toolbar button called **Archive WX** will be added to the toolbar. This button behaves similarly to the **Current WX** button, where clicking **Archive WX** opens a dropdown containing any of the sample bundle plugins that were added. Once these Archive WX bundles are added, they can be removed only through the Plugin Manager.

The Main Toolbar can be undocked from the Main Display window by left-clicking and dragging the textured area on the left side of the toolbar. This will place the Main Toolbar in its own window. To dock the toolbar back into the Main Display window, click the 'x' in the toolbar's window.

Drag and Drop Tabs

McIDAS-V has drag and drop tabs which allow you to organize multiple tabs and windows.

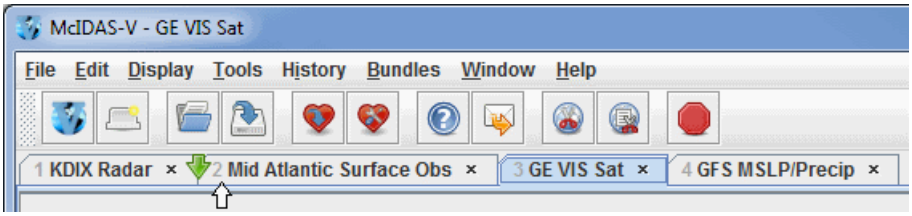


Image 1: Drag and Drop Tabs in the Main Display Window

Drag and drop tabs allow you to separate tabs into individual windows, combine windows into tabs, as well as reorganize the layout of tabs in a window. Drag tabs into separate windows by using the left-click and drag option to drag the tab outside of the Main Display window. When the last tab in a window is moved into another window, the window will disappear. When tabs are rearranged or added from a different window, green arrows will point to the location the new tab will be placed.

Rename the tab by double clicking on it. Close a tab by clicking on the `×` on the right side of the tab. Closing a tab will remove all layers associated with the display, but will not remove the data sources.

Display Menus

The **View** and **Projections** menus are associated with the 3D display and are located in the Main Display window.

- View Menu
- Projections Menu

View Menu

The **View** menu lists the displays shown in this window, allows you to change the point of view, capture images and movies, and make some other changes to the overall display.

Displays - Controls many basic aspects of the Main Display window.

Hide/Embed Legend - Removes the Legend and docks the Legend back to the Main Display window.

Float/Embed Legend - Floats the Legend in a separate window and docks the Legend back to the Main Display window.

Remove All Displays - Removes the displays shown in this view. While the display is removed from the Main Display window, the data is still in the **Field Selector** tab of the Data Explorer.

Visibility Animation - Cycles through the visibility of each layer, showing one at a time. Click the checkbox on to start animation and check it off to stop. You can increase or decrease the speed with the provided Faster and Slower choices.

Capture - Captures the current view as an image, sends it to a printer, or captures a movie. See the Image and Movie Capture page for more information about available image and movie types.

Show - Allows you to turn on or off different flags relating to the display.

Wireframe Box - Displays the white wireframe box around the area of interest in the display. This wireframe box is useful for navigating in the 3D.

"Please Wait Message" - Shows the please wait message on the bottom left of the Main Display window when McIDAS-V is loading data.

Display List - Lists the names of products you are displaying at the bottom of the Main Display window.

Top Bar - Toggles the visibility of the top menu bar in the panel, which includes the View and Projections menu, the panel name, and the Time Animation Widget.

Clip View At Box - Shows only the background map and data in the area inside of the Wireframe Box.

Cursor Readout - Displays the Latitude, Longitude, and Altitude at the location of the mouse over the Main Display window without having to probe the data with the middle mouse button.

Display Scales - Adds a scale to the edge of the Wireframe Box.

Times In View - Lists the time and time step at the bottom of the Main Display window for each image.

Overview Map - Adds an overview map to the Legend, showing the area where you are viewing in the Main Display window.

Earth Navigation Panel - Adds an **Earth Navigation** panel to the bottom of the Main Display window. You can use the arrows to navigate through space, or enter in an address in the Go To Address field.

Logo - Shows/hides a logo that was added through the Properties dialog.

Viewpoint - Allows you to change your point of view.

Top View through West - Sets the point of view to one of the orthogonal directions.

Perspective View - Provides an alternate 3D view of the display. The default is a parallel projection.

Viewpoint Dialog - Shows a dialog box for you to enter the azimuth and tilt of a desired point of view. Azimuth is from North, clockwise to 360 degrees. Tilt is degrees down from overhead, vertical.

Vertical Range - Shows a dialog box to set the vertical scaling between the top and bottom of the wire frame box. The scale is linear. You can specify the units for the max and min values. Units must be convertible with meters (e.g., km, ft, fathoms, etc).

Auto-Rotate View - Turns on/off an automatic rotation of the display.

Color - Changes the background and foreground colors of the display (not the map lines) to the selected colors. When setting your own colors you can also save off the chosen color pair as a named predefined color pair which will appear in the list.

Full Screen - Shows the current view in full screen mode.

Animation Timeline - Shows the Animation Timeline

Flythrough - Allows the user view the data in the Main Display window from the perspective of an airplane dashboard. The gauges on the dashboard will represent the probed values of the data on the map at the location of the airplane. This is an IDV tool, and more information about this feature can be found in the *IDV User's Guide*.

Properties - Opens the Properties dialog for the view. Allows you to set aspect ratio, vertical scale, flags, color, etc.

Projections Menu

The **Projections** menu lets you change the map projection in the 3 dimensional display.

Predefined - Contains the list of pre-defined projections you can choose from, including both system-supplied and your own projections.

From Displays - Lists the native data projections of any data added to the tab.

Viewpoints - Allows you to define, select, or delete saved viewpoints.

History - Lists the projections that have been used in this tab. This allows you to easily revert back to a previously-used projection.

New/Edit - Opens the Projection Manager dialog to view, create and edit projections.

Use Displayed Area - Maintains your current projection and viewpoint, but wraps a wireframe box around the region you are zoomed in over.

Go to Address - Centers the display over a given address, zip code, city, specific locations, etc.

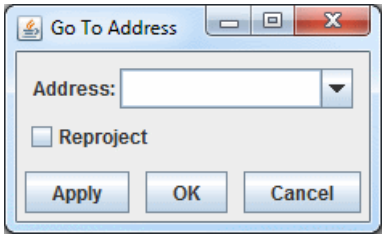


Image 1: Go To Address Dialog

Address - Specifies a location to center the display over. Listed below are valid options for this field:

12345 oak street, my town, my state

my town, my state

80303 (zip code)

latitude longitude

specific locations (e.g. Millersville University)

Reproject - Reprojects the display over the location in **Address** and zooms in on the location. If this option is not checked, the projection does not change, but the display will center itself over the location specified in the **Address** field.

Auto-set Projection - Toggles the behavior of automatically setting the projection to the projection of the most recent display that has been added. When checked on, the map projection will be automatically switched to match the native projection of the newest data source added. When checked off, the current map projection will remain for any additional data source added to the display. This may be desirable when you have set up a view of a particular area and want to retain it when displaying new data.

Enable Adaptive Resolution (Under Development) - Toggles adaptive resolution to be active or inactive for the view. If active, then any layers capable of utilizing adaptive resolution will use it. If inactive, then no layers will use adaptive resolution. Note that this feature is still under development. For more information, see Adaptive Resolution. This menu item is only available if adaptive resolution is enabled via the **Enable Adaptive Resolution** option in the User Preferences.

Share Views - Controls whether Sharing is turned on or off for this view. If sharing is turned on then the view point and projection changes are shared with any other views that also have sharing turned on. This is used if you have multiple panels in the same tab.

Set Share Group - Enables you to select different share groups for multiple panels. Note that the Share Views option must be checked on for this to work.

Properties Dialog

Accessed through the **View->Properties** menu item of a display panel, this Properties dialog allows for controlling many aesthetic aspects of the display. The Properties dialog window is composed of five tabs: **Main**, **Aspect Ratio**, **Lighting**, **Vertical Scale**, and **Horizontal Scale**. If working with a globe display, there is no **Horizontal Scale** tab, but there is an additional tab for **Globe Background**.

- Main
- Aspect Ratio
- Lighting
- Vertical Scale
- Horizontal Scale
- Globe Background

The **Main** tab of the Properties dialog allows for changing several general settings pertaining to the display. Many of the items in this tab can also be found in the **Display Window** tab of the User Preferences window.

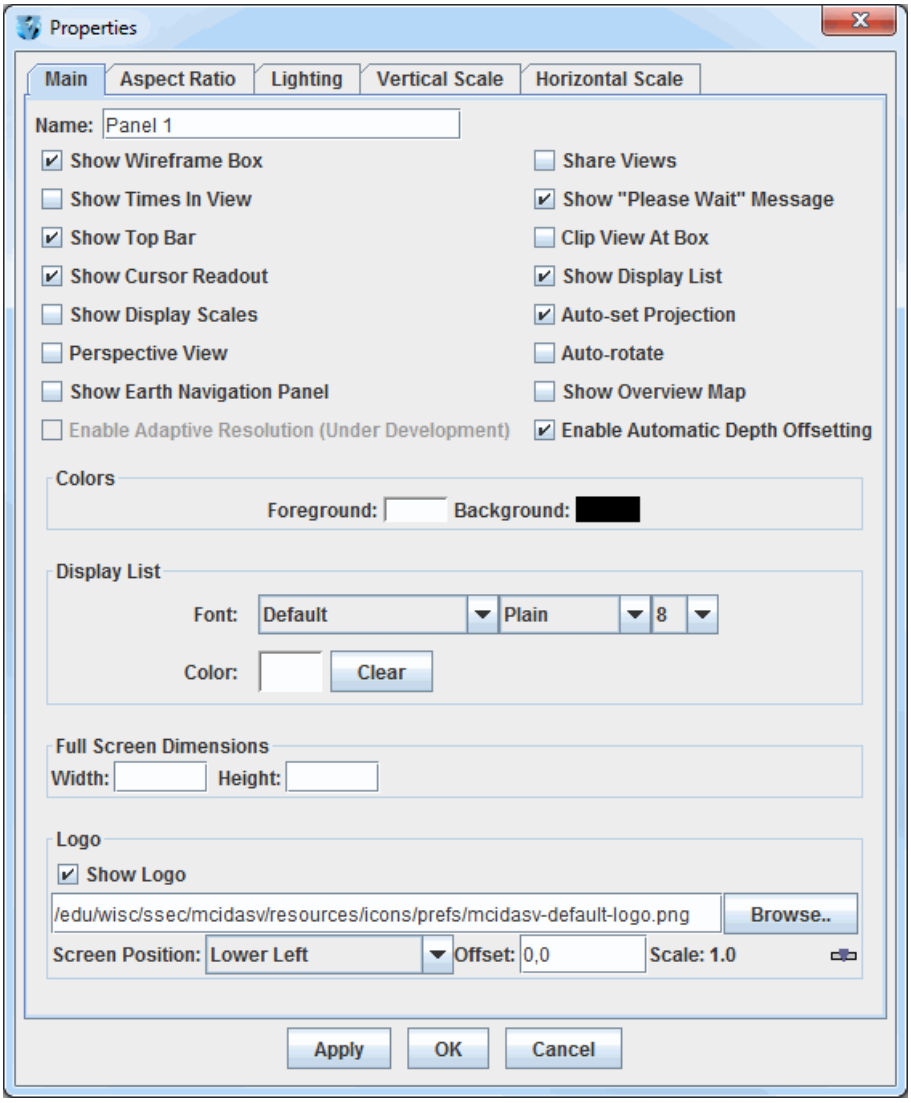


Image 1: Main Tab of the Properties Dialog (Default)

Properties

Name - Sets the name of the panel. This name will be centered between the **Projections** menu and the Time Animation Widget.

Show Wireframe Box - Toggles the visibility of a 3D wireframe box around the data. This box helps provide orientation in 3D views.

Share Views - Controls whether sharing is turned on or off for the display. If sharing is turned on, then the viewpoint and projection changes are shared with any other displays that also have have sharing turned on.

Show Times In View - Adds a label to the display panel that shows the current animation time and step in the loop.

Show "Please Wait" Message - Displays a "Please Wait" message in the bottom left of the display panel when McIDAS-V is in the middle of a process.

Show Top Bar - Sets the visibility of the Display Menus bar at the top of the display panel. This includes the Time Animation Widget.

Clip View At Box - Allows the user to omit from view all display elements outside of the wireframe box. This is helpful to remove map lines outside the area of data.

Show Cursor Readout - Displays a label of latitude, longitude, and altitude at the cursor position over the display, shown in the lower border of the Main Display window without having to probe the data.

Show Display List - Includes layer labels at the bottom of the display panel.

Show Display Scales - Adds vertical and horizontal scales to the wireframe box in the display panel.

Auto-set Projection - Changes the projection to match the native projection of the newest data source added. When checked off, the current map projection will remain unchanged for any additional data source added to the display. This may be desirable when a user has set up a view of a particular area and wants to retain it when displaying new data.

Perspective View - Provides an alternate 3D view of the display. This sets the 'set parallel/perspective projection' option in the Viewpoint Toolbar of the Main Display window.

Auto-rotate - Turns on/off an automatic rotation of the display.

Show Earth Navigation Panel - Shows an Earth Navigation panel at the bottom of the display panel.

Show Overview Map - Adds an overview map to the Legend, showing the area currently being viewed in the display panel.

Enable Adaptive Resolution (Under Development) - Toggles adaptive resolution to be active or inactive for the view. If active, then any layers capable of utilizing adaptive resolution will use it. If inactive, then no layers will use adaptive resolution. Note that this feature is still under development. For more information, see Adaptive Resolution. This menu item is only available if adaptive resolution is enabled in the User Preferences.

Enable Automatic Depth Offsetting - Displays overlapping layers of differing resolutions in a way that there is no display interference when the display is rotated.

Show Globe Background - Shows/hides the globe background. Turning this option on makes a globe background by filling a solid color on the surface of the globe; off removes the background by making it 100% transparent. This option is present only with Globe Displays.

Colors - Sets the background and foreground (e.g. wireframe box) colors of the display (not the map lines).

Display List - Controls how the list of the layers listed at the bottom of the display panel will be written. There are options to modify the font, style, size, and color of the text.

Full Screen Dimensions -

Width - Sets the width of the display when in full screen mode. Set this value to 0 or leave blank for the standard full screen display.

Height - Sets the height of the display when in full screen mode. Set this value to 0 or leave it blank for the standard full screen display.

Logo -

Show Logo - Sets the visibility of the logo in the display panel. The text entry box specifies the logo file. This can either be a local file (found via the

button) or a URL pointing to an image file.

Screen Position - Sets the location of the logo in the panel. The options are Lower Left, Upper Left, Upper Right, Lower Right, and Center.

Offset - Adds an offset of the logo from the screen position selected. This is in the format of (X,Y).

Scale - Scales the size of the logo. Use the slider to change this value. A value of 1.0 uses the full size for the image, values below 1.0 make the image smaller, and values greater than 1.0 make the image larger.

The **Aspect Ratio** tab of the Properties dialog allows for changing the aspect ratio of the display with respect to the X, Y, and Z directions. X, Y, and Z values can be changed by using the slider. Any changes will be made to the display with Apply or OK. The **Display Matrix Settings** panel will actively update as the X, Y, and Z values are changed, and as rotation or zooming is applied to the Main Display window.

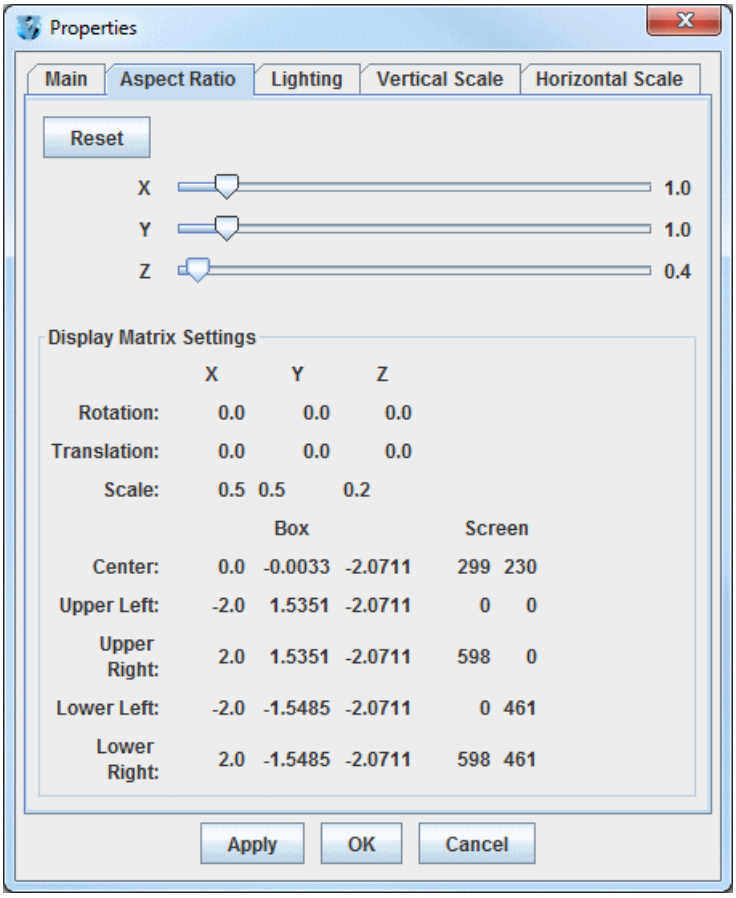


Image 2: Aspect Ratio Tab of the Properties Dialog (Default)

Properties

Reset **-** Resets the X, Y, and Z values back to the last values applied to the image. If Apply has not been selected, then the values will return to default.

X - Stretches the display along the X-axis. The higher the value, the more stretched in the east-west direction the display will be. The default value for this is 1.0.

Y- Stretches the display along the Y-axis. The higher the value, the more stretched in the north-south direction the display will be. The default value for this is 1.0.

Z - Stretches the display along the Z-axis. The higher the value, the more stretched in the vertical the display will be. The default value for this is 0.4.

Display Matrix Settings - Displays information pertaining to the rotation, translation, and scale of the X, Y, and Z axes. This also displays numerical values pertaining to boundaries of the display panel and also the wireframe box. These values will actively update as the X, Y, and Z values are changed, and as rotation or zooming is applied to the display.

The **Lighting** tab of the Properties dialog allows for adding the effect of light shining on the display from different angles along the X, Y, and Z axes. The default values are listed in the image below.

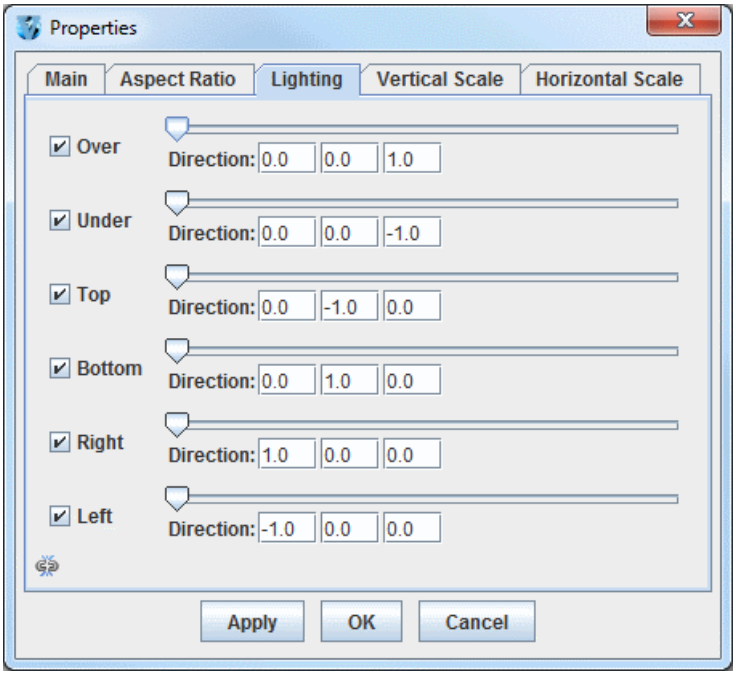


Image 3: Lighting Tab of the Properties Dialog (Default)

Properties

Left Column - Denotes the direction that the light will be shining from. Uncheck the checkboxes in order to not add lighting for specific directions.

Slider - Controls the intensity of the light. When the slider is on the far left, there is no light, and the brightness increases as the slider is moved to the right.

Direction - Sets the direction that the light will be coming from. The first box is from the X direction, with positive values aiming the light right along the X-axis. The second box is from the Y direction, with positive values aiming up along the Y-axis. The third box is from the Z direction, with positive values aiming up along the Z-axis.

- When this is button is seen, all of the components in this tab are controlled individually. This means that a change to one item (ex. Over), will not effect any of the other items in this tab. When this button is clicked, the image will change to . When this image is seen, the components are linked together. Therefore, any change to the visibility checkboxes or the slider for brightness will be shared between all components of this tab.

The **Vertical Scale** tab of the Properties dialog allows for changing the vertical scale used for the Z-axis of the display panel.

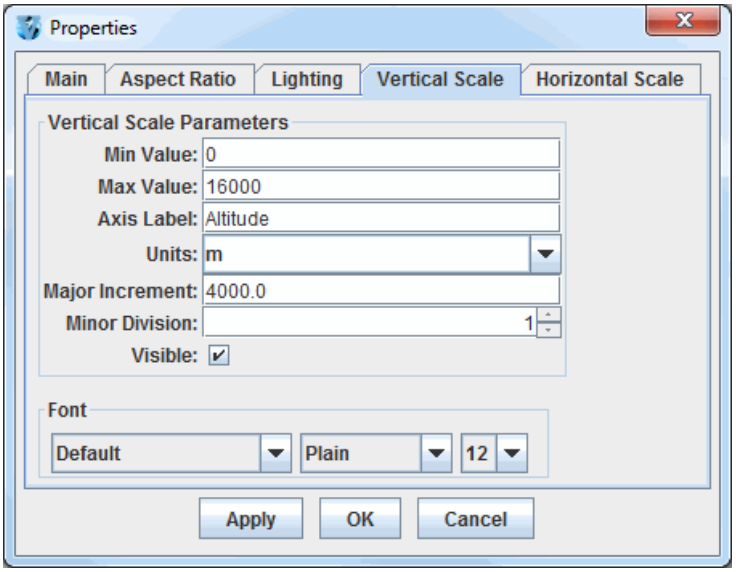


Image 4: Vertical Scale Tab of the Properties Dialog (Default)

Properties

Min Value - Sets the minimum vertical value to use for the Z-axis in the display panel. The default value for this is 0.

Max Value - Sets the maximum vertical value to use for the Z-axis in the display panel. The default value for this is 16,000.

Axis Label - Sets the label of the vertical axis in the display panel. The default for this is 'Altitude'.

Units - Sets the units used for the vertical scale in the display panel. The default value for this is 'm' for meters.

Major Increment - Sets the spacing of the labels on the vertical axis.

Minor Division - Sets the number of minor divisions, denoted by small tick marks, between the **Major Increment** tick marks. The default value is 1, meaning that there is one division between major increment tick marks, so there will be no small tick marks between them. A value of 2 will place one small tick mark between the major increment tick marks, a value of 3 will place two small tick marks between the major increment tick marks, etc..

Visible - Sets the vertical scale labels along the wireframe box as visible.

Font - Sets the **Font**, **Style**, and **Size** of the vertical scale labels.

The **Horizontal Scale** tab of the Properties dialog allows for setting the visibility and properties of the latitude/longitude labels along the outside of the wireframe box.

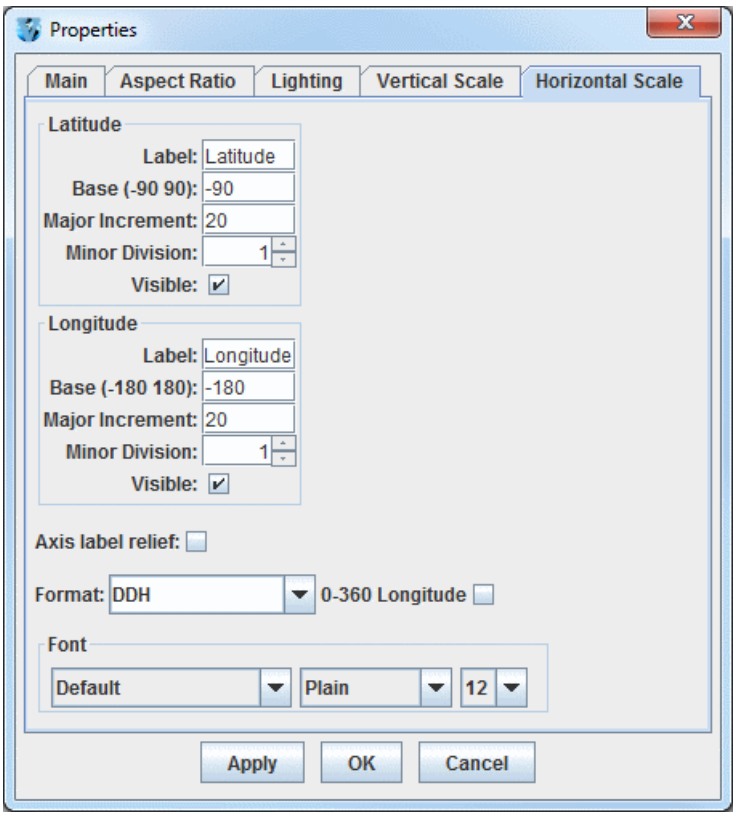


Image 5: Horizontal Scale Tab of the Properties Dialog (Default)

Properties

Label - Sets the label along the latitude/longitude axes. The default values are "Latitude" and "Longitude".

Base - Sets the lowest numerical value of latitude/longitude that will be plotted.

Major Increment - Sets the spacing in degrees of the labels along the latitude/longitude axes. There are also large tick marks drawn along the wireframe box at this increment.

Minor Division - Sets the number of minor divisions, denoted by small tick marks, between the **Major Increment** tick marks. The default value for both **Latitude** and **Longitude** is 1, meaning that there is one division between major increment tick marks, so there will be no small tick marks between them. A value of 2 will place one small tick mark between the major increment tick marks, a value of 3 will place two small tick marks between the major increment tick marks, etc..

Visible - Sets the latitude/longitude labels along the wireframe box as visible.

Axis label relief - Sets how the text will be oriented with respect to the x-axis of the display. When this option is turned off, the labels will be parallel to the x-axis and thus display flat. When this option is turned on, the labels will be rotated slightly about the x-axis to make the text more visible when the display is rotated.

Format - Sets the format of the latitude/longitude **Major Increment** labels. You can change the structure of the labeling to show degrees out to various decimal values, latitude/longitude labels in DMS (Degrees, Minutes, Seconds) format, and include a label for hemisphere (N, S, E, W) by choosing a **Format** value with an **H** at the end.

0-360 Longitude - Uses a 0-360 degree range for the labeling of the Longitude's **Major Increment**. The default is to have this checkbox turned off, which uses a -180-180 degree range.

Font - Sets the **Font**, **Style**, and **Size** of both the **Major Increment** labels for latitude and longitude, as well as the **Labels**.

The **Globe Background** tab of the Properties dialog allows for setting the color and the vertical positioning of the globe background. Note that you must have the **Show Globe Background** option in the **Main** tab of the Properties dialog selected to use the globe background. This tab is only available if using a Globe Display.

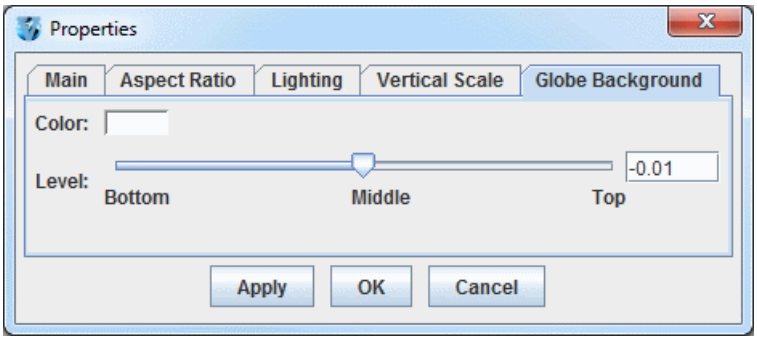


Image 6: Globe Background Tab of the Properties Dialog (Default)

Properties

Color - Sets the color of the globe background.

Level - Sets the vertical positioning of the globe background. The default value is -0.01 so it is just below the surface of the earth, making map lines visible. Change this value by using the slider or by entering a value into the field and pressing Enter.

Visibility Animation

In the Legend of the Main Display window, the **Layer Visibility** checkbox to the left of each layer's label can be used to toggle the visibility of that layer. This checkbox can also be selected in the item's **Layer Controls** tab by selecting **View->Visible**. Visibility animation cycles through the visibility of each layer, showing them one at a time. This is not a time animation loop; it loops through the visibility of the layers present in the Main Display window.

The padlock icon on the right side of each layer in the Legend is used to block the effects of the visibility animation described above. When locked (), the visibility of the layer is not affected by the animation.

Visibility Animation can be invoked via the **Layer Visibility Animations** button. You can add this button to your main toolbar in the **Toolbar Options** tab of the User Preferences window.

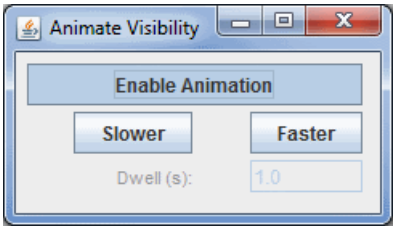


Image 1: Animate Visibility Window

Properties

Enable Animation - Begins layer visibility animation. Click this button again to stop the animation.

Slower - Makes the layer visibility animation loop slower.

Faster - Makes the layer visibility animation loop faster.

Dwell (s) - Corresponds to the dwell rate of the layer visibility animation, or how long (in seconds) each layer is displayed before cycling to the next layer.

You can also access this tool in the Main Display window through the **View->Displays->Visibility Animation** menu item. In this menu, you can turn visibility animation on/off, and change the speed of the animation.

As an alternative to the **Layer Visibility Animations** tool, the function keys **F1, F2, F3*** can be used to cycle visibility as follows:

The **F1** key cycles visibility through all non-locked layers, looping through each layer one at a time.

The **F2** turns on all non-locked layers.

The **F3** turns off all non-locked layers.

***On a Mac laptop, you may need to press the "Fn" key along with the particular function key.*

Time Animation

- Time Animation Widget
- Time Animation Properties Dialog
- Define Animation Times Tab

Time Animation Widget

Each McIDAS-V display area has a set of time animation controls above the Main Display window.

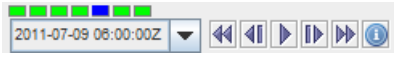


Image 1: Time Animation Widget

The Time Animation Widget controls looping of displays through time. A series of small green boxes is displayed representing each frame of the animation. The box corresponding to the current time is colored blue. Click on a box to select a different time. Right-click on a box to disable that frame in the animation. Disabled boxes will be colored red. You can also Ctrl+left click on a box to turn on/off all of the frames to the left of the box you clicked on, and Shift+left click to turn on/off all of the frames to the right of the box you clicked on.

The time of the data is displayed in the labeled pull-down list and in the entries of the pull down list on the left. Holding the mouse over the time will show information about how many frames are in the loop, and what the starting and ending times are. The toolbar of button icons, on the right, control time animation. The Time Animation Widget buttons do the following:

- **Beginning -** Shows the first frame, and stop looping if looping is on.
- **Back One -** Steps back one frame.
- **Play/Stop -** Toggles looping on or off.
- **Forward One -** Steps forward one frame.
- **End -** Shows the last frame, and stop looping if looping is on.
- **Properties -** Shows the Time Animation Properties dialog box.

Time Animation Properties Dialog

Click on the in the animation controls to see the Time Animation Properties Dialog box. This dialog has two tabs: **Settings** and **Define Animation Times**.

The **Settings** tab allows for defining how looping will work for the display:

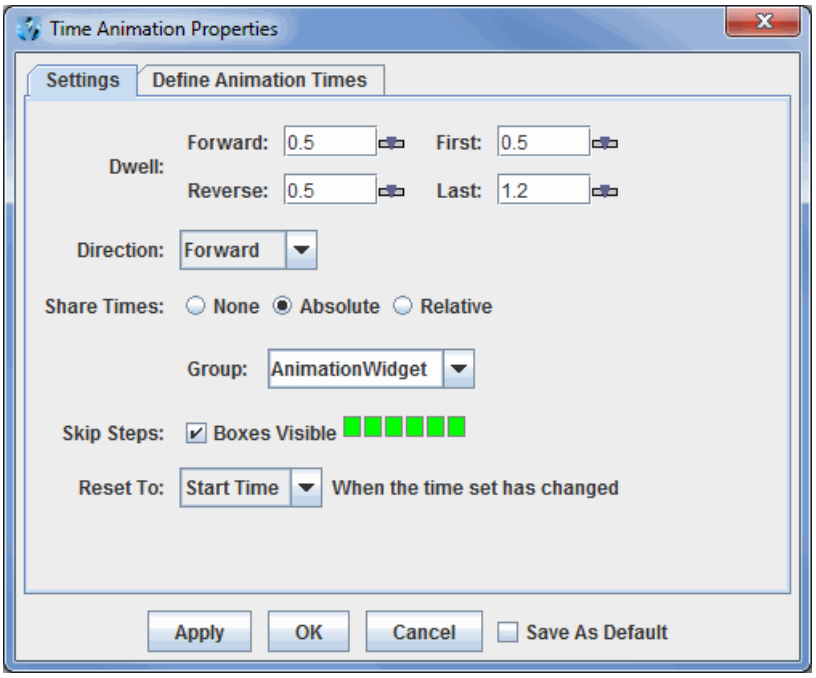


Image 2: Settings Tab of the Time Animation Properties Dialog

By pressing Apply or OK, the properties will be set in the Animation Widget. If the **Save As Default** checkbox checked, then the properties will be saved and used every time a new Animation Widget is created. For example, you may find that you are always setting the dwell rate to a particular value. You can save that state as the default state for all Animation Widgets that are subsequently created, both in the current run of McIDAS-V and in future runs.

Properties

Dwell - Controls how fast the animation occurs. Click on the slider icon: to change the values or type a value into the field and press Enter. Values are seconds/frame.

Forward - Controls speed of looping forward.

Reverse - Controls speed of looping backwards.

First - Chooses how long first frame is seen.

Last - Chooses how long last frame is seen.

Direction - Controls which direction the loop goes when you press play.

Forward - Loops forward in time.

Backward - Loops backward in time.

Rocking - Alternates looping between forward and backward directions.

Share Times - Shares the time animation in a display with the animation in other displays with the **Share Times** button. This allows for animation properties to be synced between panels. See the Sharing page for more information.

None - Does not share any times with any other displays.

Absolute - Shares absolute times with other displays. For example, if one panel has 30 minute timesteps and another has 60 minute timesteps, if both panels are configured with the **Absolute Share Times** option, then both panels will loop when the times are the same (at 60 minute intervals).

Relative - Shares relative times with other displays. For example, if one panel has 10 timesteps and the other has 5 timesteps, if both panels are configured with **Relative Share Times**, then only the first 5 frames in each panel will be looped through.

Group - Allows for the sharing time animations properties with some panels, while not sharing with others. You can set up to four different share groups. This allows for things like different panels looping at different speeds and different timesteps used in the loops of different panels.

Skip Steps - Works the same as in the Main Display window, you can right click on a square to make that time step not visible in a loop. The Boxes visible checkbox enables the time animation boxes to be visible in the Main Display window.

Reset To - Determines which time step will be displayed when the time set changes.

Start Time - Returns to the first time step when the time set has changed.

No Change - Remains at the time step you were at when the time set has changed.

End Time - Displays the final time of the loop when the time set has changed.

Define Animation Times Tab

The **Define Animation Times** tab allows for defining a custom animation time set:

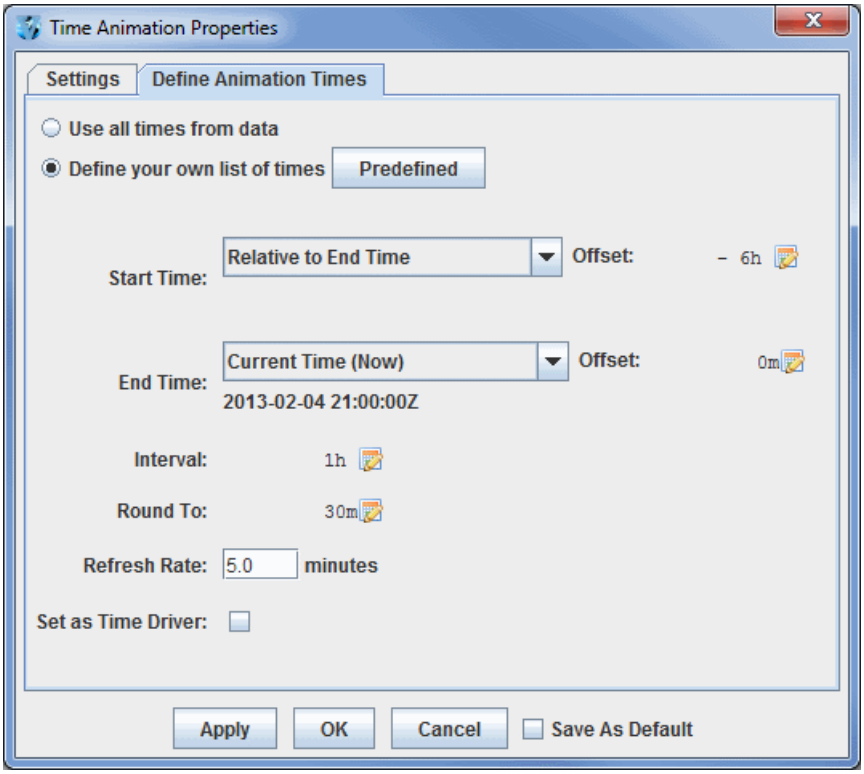


Image 3: Define Animation Times Tab of the Time Animation Properties Dialog

By default, the times used in the animation time set are all of the times from the data that is being displayed. However, a specific time set can be defined by selecting the **Define your own list of times** button.

This allows for defining the start time, end time and a time interval. The time interval is used to create the set of time steps (inclusive) between the start and end times. The start time and end time modes are determined one of four ways:

Use Minimum/Maximum Time from Data - Sets the beginning/end of the loop to be the minimum/maximum times included with your data.

Current Time (Now) - Sets the animation time set to use the current clock time. This is useful for animation of real time data. If you select this option you can then define how often the animation set is updated with the **Refresh Rate** field.

Fixed - Sets a fixed date/time to start/end the loop.

Relative to End/Start time - Allows you to specify the beginning/end of your loop at a time relative to the end/beginning time. For example, you could set the end time to be the Current Time, and set the start time to be relative to the end time minus 1 hour (using the start time offset field). This would have a loop of data over the last hour, with a time step as defined in the interval field. Note: You cannot have start and end times both be relative to one another.

Interval - Sets the time interval between time steps in the loop.

Round To - Sets the rounding factor for the end time in the loop. The **Round To** field always rounds down to ensure that no future times are used in the loop. For example, if the ending time was 10:23, a 10 minute **Round To** would end the loop at 10:20, and a 30 minute **Round To** would end the loop at 10:00.

Refresh Rate - Sets the number of minutes that the Time Animation Widget will check the current time to see if the timesteps should be updated. This is used if the **End Time** is set to **Current Time (Now)** and is used in conjunction with the **Round To** field. For example, if the time is 10:10 with a **Round To** value of 15 minutes, the end time of the loop would be 10:00. With a **Refresh Rate** of 5 minutes, at 10:15, the Time Animation Widget would update itself to have an end time of 10:15.

Set as Time Driver - Defines the current timesteps in the Main Display to be the time driver. Now, any other field selected to match the time driver will select times that match the Time Animation Widget times. For example, if **End Time** is set to **Current Time (Now)**, that rounds down to the nearest hour, and the **Start Time** is **Relative to End Time** with an offset of -4 hours, there would be 5 timesteps in hourly increments. If these times are set as the time driver, any fields selected to match the time driver will load in data for the times that match closest to the hourly timesteps defined in the Time Animation Widget. For more information, see Time Matching.

Once the start and end time modes have been set, an offset can be added (or subtracted) to the base time. To change the offset select the button. When doing this, the Offset dialog will be shown:

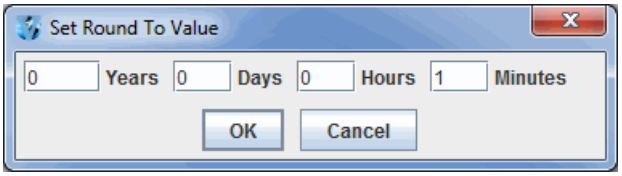


Image 4: Set Round To Value Dialog

This allows for defining a time offset by entering years, days, hours and minutes. Note that this Offset dialog will also include a +/- option when selected from **Start Time** or **End Time**.

The Predefined button gives another way to adjust the items in the **Define Animation Times** tab. The two options from this button are Uniform Across Data Range and Real Time.

Uniform Across Data range - Opens a Uniform Data Range window, which allows for controlling the **Interval**.

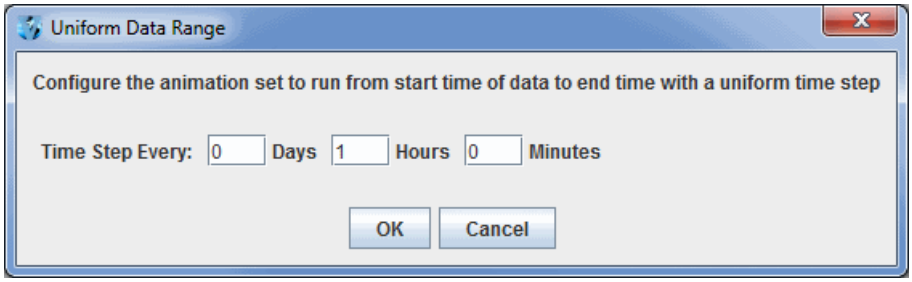


Image 4: Uniform Data Range Window

Real Time - Opens a Real Time window, which allows for controlling the length of the loop, the length of each time step, and how often the data is updated.

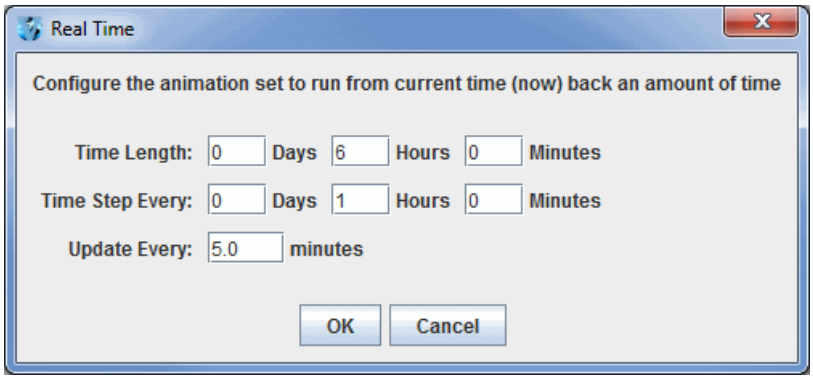


Image 5: Real Time Window

Legend

The Legend in the Main Display window lists the set of Layer Controls within that view. The Legend can be floated from the Main Display window. This is done with the **Float Window** button (the **Embed Window** button will move the Legend back into the Main Display window).

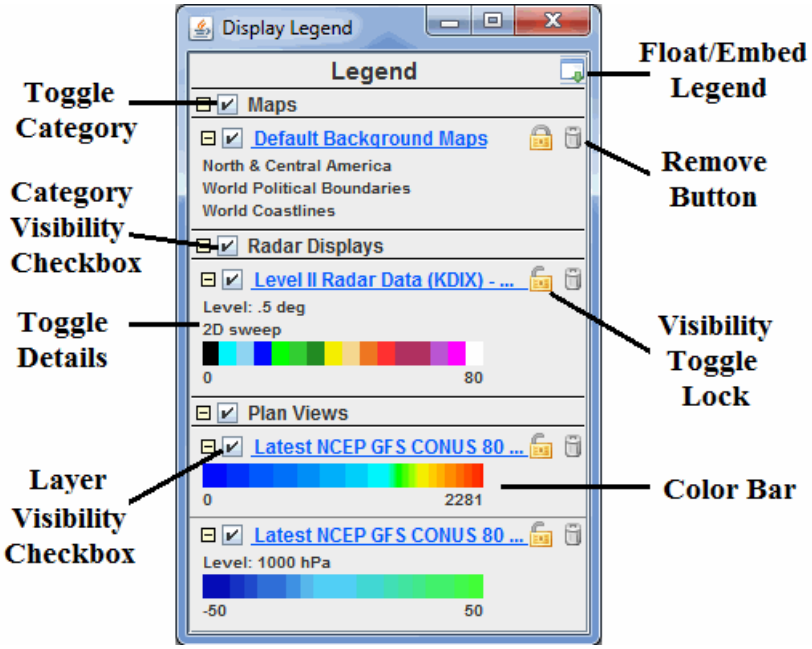


Image 1: Side Legend in the Main Display Window

The Legend shows each layer under the Layer Category of that display. For example, the Legend in the above image shows the categories "Maps", "Radar Displays", and "Plan Views". The Layer Category may be changed. This is useful for grouping and controlling the visibility of a group of layers.

The Legend Label shows the parameter or Field name, the display type, and sometimes other information such as the level of a plan view or value of an isosurface. The label may be changed using items under the **Edit->Properties** menu item. Clicking on the blue, highlighted part of the label will bring up the **Layer Controls** tab of the Data Explorer. Right-clicking will allow you to open the **Layer Controls** tab for that parameter, or access the menu options in the **Layer Controls** tab.

Each layer category within the Legend can be toggled to show or hide the layers under that category with the **Toggle Category** button. The visibility of the layers under a category (e.g., Radar Displays, Plan Views, etc.) can be changed with the **Category Visibility** checkbox. The visibility of an individual layer can be changed with the **Layer Visibility** checkbox.

The **Remove** button quickly removes a layer. The **Visibility Toggle Lock** "locks" the current visibility of the layer and does not change it while cycling visibilities.

Detailed information about a layer may also be shown in the Legend. For example, for those layers that use a color table, the color bar will also be shown in the Legend. Moving the mouse over the color bar shows intermediate values. Right-click on the color bar to open the Color Table Editor, change the range, select other color tables, etc. You can also modify the color bar interactively for each display.

If using adaptive resolution, certain layers may list out data sampling text above the colorbar, as well as an extra **Resolution Control** button to the right of the blue text of the Legend Label for the layer. This button allows for turning adaptive resolution on or off for the layer. This button is only available if adaptive resolution is enabled in the User Preferences. Note that adaptive resolution is still under development. For more information, see Adaptive Resolution.

Modify the Color Bar Interactively

Click the color bar in the Legend to interactively modify the color bar. Holding the cursor over the color bar shows the interactive color bar editor instructions.

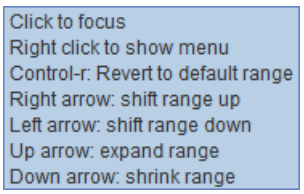


Image 1: Interactive Color Bar Editor

These controls are activated once the color bar is clicked on in the Legend.

Right-clicking on the color bar will open a drop-down menu with an option to open the Color Table Editor, change the range of the color, change the color bar to a different saved color bar, etc.

Ctrl+R will revert the color bar back to its initial range after modifications have been made to it.

The Right arrow shifts the range of the color bar up, raising both the upper and lower bounds.

The Left arrow shifts the range of the color bar down, lowering both the upper and lower bounds.

The Up arrow expands the range of the color bar by lowering the lower bound and raising the upper bound.

The Down arrow shrinks the range of the color bar by raising the lower bound and lowering the upper bound.

Status Bar

At the bottom of the Main Display window is a status bar. This bar is useful for seeing how much memory has been used, the current time, what McIDAS-V is doing, as well as the value of the parameter probed in the Main Display window. You can change the panel on the left back and forth between displaying time or memory by left-clicking on the time or memory that is currently being displayed.

Time

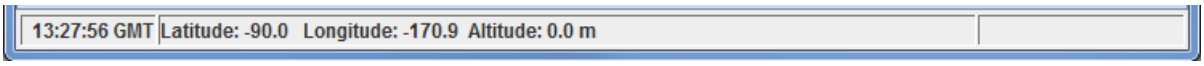


Image 1: Time Readout

The time displayed in the left panel of the status bar is not the time associated with the data you have loaded into McIDAS-V, but rather the current time in GMT.

Memory

Image 2: Memory Readout

The memory displayed in the left panel of the status bar is in the format of (Currently used memory)/(Max used memory thus far in the session)/(Max memory available for McIDAS-V to use) in MB. You can change the amount of memory allocated by McIDAS-V at startup in the **Advanced** tab of the User Preferences window. When McIDAS-V has used up the majority of its available memory, the memory panel of the status bar will turn pink and then red. This will cause McIDAS-V to slow down, and may eventually prevent new data sources from being loaded. You can mitigate this problem by right-clicking on the memory and selecting: Clear Memory & Cache. This will clear out some memory so you can still work efficiently in your current session.

Messages

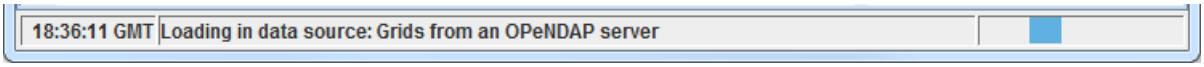


Image 3: Messages Readout

To the right of the **Time/Memory** readout panel is a **Messages** readout panel that tells you what McIDAS-V is doing. If no data is being loaded or no data sources are being loaded into McIDAS-V, this panel will be reserved for displaying the Latitude, Longitude, and Altitude information at the location of your cursor over the Main Display window. In the example above, a Grids data source is being loaded from an OPeNDAP server. If you are loading data into McIDAS-V as a loop, the middle message panel will list the data source name and also indicate how much data has loaded. To the right of this message is a loading panel. When data is loading into McIDAS-V, you will see this blue bar move from side to side. When McIDAS-V is completing various processes, different messages may be overlaid on top of this loading bar, including "Reading Data" and "Creating Layers".

Probe Readout

Image 4: Probe Value Readout

As a default in the **Navigation Controls** tab of the User Preferences window, holding down the middle mouse button over your display will probe the data and give a numerical readout of your displayed parameter(s). The probe value(s) will be listed at the bottom of the **Probe Readout** panel. This panel also lists the location of your mouse when you probe the data with respect to Latitude and Longitude. As a default, this panel will list your data source and the display type. You can change how your data source will be labeled in this panel by right-clicking on the item in the Legend, and going to **Edit->Properties...**. In the **Settings** tab of this Properties dialog, you can change the Legend Label to say anything, including adding macros to further customize the readout in this panel.

Zooming, Panning and Rotating

There are several methods to zoom, pan, and rotate in McIDAS-V. You can use the mouse, the arrow keys, a rubber band box, or the Zoom/Pan Toolbar. To reset to the initial base viewpoint use the key combination Ctrl+R.

Note: You need to click in the Main Display window when using key combinations.

Note: If you are using an Apple Mac with a single button mouse, see Apple Mac One Button Mouse Controls.

Zooming	Panning	Rotating
Mouse		
Shift-Left Mouse Drag: Select a region by pressing the **Shift** key and dragging the left mouse button (MB1). **Shift-Right Mouse Drag:** Hold **Shift** key and drag the right mouse button (MB3). Moving up zooms in, moving down zooms out.	**Ctrl-Right Mouse Drag:** Hold **Control** key and drag right mouse to pan.	**Right Mouse Drag:** Drag right mouse to rotate. This works for a globe display.
Scroll Wheel		
Scroll Wheel-Up: Zoom out. **Scroll Wheel-Down:** Zoom in.		**Ctrl-Scroll Wheel-Up/Down:** Rotate clockwise/counter clockwise. **Shift-Scroll Wheel-Up/Down:** Rotate forward/backward clockwise.
Arrow keys		
Shift-Up Arrow: Zoom in. **Shift-Down Arrow:** Zoom out.	**Ctrl-Up arrow:** Pan down. **Ctrl-Down arrow:** Pan up. **Ctrl-Right arrow:** Pan left. **Ctrl-Left arrow:** Pan right.	**Left/Right Arrow:** Rotate around vertical axis. **Up/Down Arrow:** Rotate around horizontal axis. **Shift-Left/Right Arrow:** Rotate clockwise/counter clockwise.

The default mouse and keyboard controls can be customized using the User Preferences window's **Navigation Controls** tab by selecting **Edit->Preferences** from the main menu.

Apple Mac One Button Mouse Controls

Mouse controls are a bit more challenging if you are running McIDAS-V on a Mac with a single mouse button. The typical left mouse button (MB1) functions are done with a click of the button. Right mouse options (MB3) are simulated using the **Option** key with a mouse click. Use the following:

- Option + click to rotate
- Shift + Option + click to zoom

There is no replacement for the mouse panning actions on the Mac. Use the keyboard arrow functions or the Viewpoint toolbar instead.

The Viewpoint Toolbar

The Viewpoint Toolbar allows you to quickly switch between different viewpoints, change the perspective of the display, and add rotation.

Rotate to top viewpoint - Rotates the display to a view from the top, looking down along the z-axis for a map display panel. For a globe display, this rotates the display to a northern hemisphere viewpoint.

Rotate to bottom viewpoint - Rotates the display to a view from the bottom, looking up along the z-axis for a map display panel. For a globe display, this rotates the display to a southern hemisphere viewpoint.

Rotate to north viewpoint - Rotates the display to a view from the north, looking down along the y-axis for a map display panel. For a globe display, this rotates the display to a western hemisphere viewpoint.

Rotate to east viewpoint - Rotates the display to a view form the east, looking left along the x-axis for a map display panel. For a globe display, this rotates the display to a Pacific region viewpoint.

Rotate to south viewpoint - Rotates the display to a view from the south, looking up along the y-axis for a map display panel. For a globe display, this rotates the display to a eastern hemisphere viewpoint.

Rotate to west viewpoint - Rotates the display to a view from the west, looking right along the x-axis for a map display panel. For a globe display, this rotates the display to an Atlantic region viewpoint.

Set parallel/perspective projection - Maintains the selected viewpoint, and adds the more of a perspective of working in a 3D space.

Rotate to a user specified view - Opens a Viewpoint Settings window, where you can enter numerical values for **Azimuth from North** and **Tilt down from top**. This allows you to set a viewpoint without having to navigate through the display to get to it.

Set the vertical range - Opens a Vertical Scale window, which allows for setting the vertical scale (height) of the wireframe box in the Main Display window, as well as the units to utilize. This feature is useful when working with a 3D display to either make features stand out

more or less. The Vertical Scale window also allows for setting how the vertical scale will appear in the display as far as labeling. For more information on this functionality, see the Vertical Scale tab of the Properties window. For a globe display, this sets the vertical exaggeration of the display. A lower value brings layers in the 3D closer to the surface of the globe, and a higher value brings the layers further away from the surface.

Auto-rotate - Rotates the display. Right click on this icon to select which direction to rotate the display and to set a speed for the rotation.

The Zoom/Pan Toolbar

The Zoom/Pan Toolbar assists in navigating the 3D space.

Zoom in - Zooms in on the display, towards the center of the Main Display window.

Zoom out - Zooms out of the display, away from the center of the Main Display window.

Rest display projection - Undoes any zoom, translation and rotation done to the display.

Translate left - Shifts the display to the left.

Translate right - Shifts the display to the right.

Translate up - Shifts the display up.

Translate down - Shifts the display down.

The Undo/Redo Toolbar

The Viewpoint Undo/Redo buttons allow you to undo/redo any zoom/pan/rotation/projection change made to the display. Note that you can hold down Shift and click these buttons to go forward/back 10 changes at once.

Undo the viewpoint/projection change - Undoes the last change to zoom level, pan, rotation, or change in projection made to the display.

Redo the viewpoint/projection change - Redoes the last event that was undone with the **Undo the viewpoint/projection change** button.

Transect Views

The Transect View is a 2-Dimensional display that shows data along a transect line. This type of view can be created through the **File->New Display Tab(Window)->Transect Display** menu item in the Main Display window.

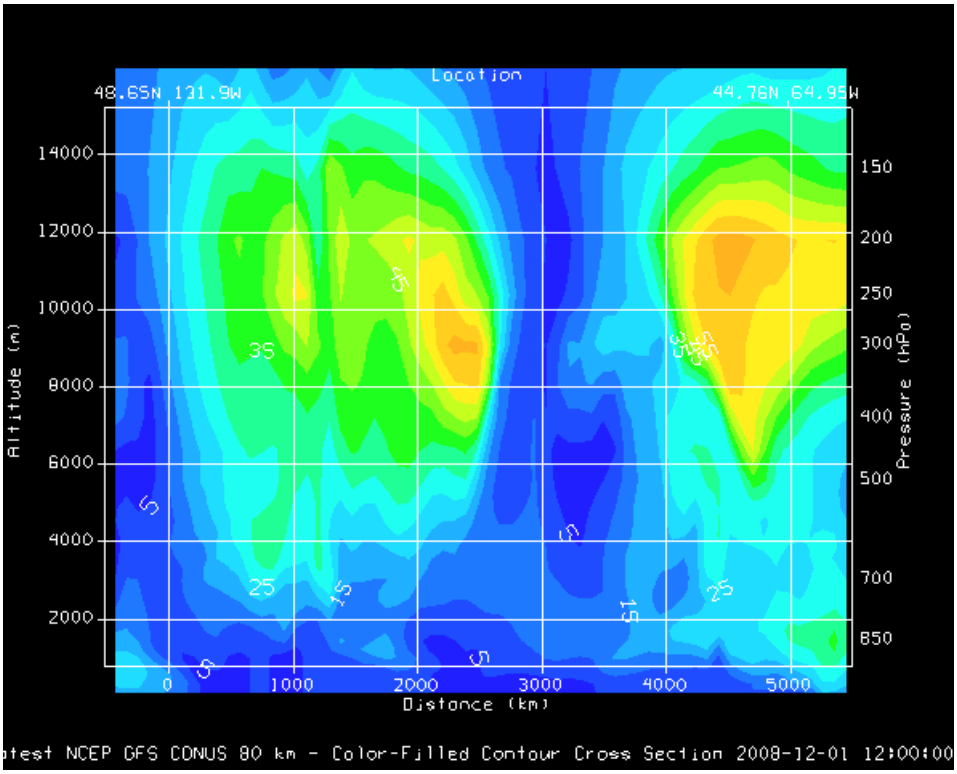


Image 1: Transect View of Wind Speed

The left vertical axis shows altitude in meters, the right axis shows pressure levels. The bottom horizontal axis shows distance along the transect. The top horizontal axis shows the latitude and longitude locations of the end points of the transect line drawn in the map display. You can zoom and pan in this display with the normal key and mouse combinations. The transect display will also be duplicated in the **Layer Controls** tab of the Data Explorer.

To work with a transect display, both a transect panel and a map panel must be open. A transect display can be opened in the Main Display window using the **File->New Display Tab(Window)->Transect Display** menu item to select one through four transect panels. With the transect panel selected, display any 3D data using one of the **Vertical Cross Section** display types available in the **Displays** panel of the **Field Selector**. This will create a display similar to the image above. The transect line used to create this display will be drawn in the map display panel.

To control the location of the transect, select **Transects->Edit** in the transect panel. This opens a Transect Drawing Control window that allows for modifying the transect lines in the map display. Using the **Create a transect** mode, click and drag in the map display to draw the transect. The transect drawn in the transect display will be representative of the most recent transect line you have drawn, assuming the **Automatically update transects** option is selected in the **Controls** tab of the Transect Drawing Control window. While multiple transect lines can be drawn in the map display, the transect used for the display in the transect panel will be green in color. When multiple transects are drawn in the map display, you can change which transect is being used for the transect display from the **Transects** menu of the transect display.

In the **Transects** tab of the **Properties** dialog for the Transect View (from **View->Properties** menu item in the transect display window/tab) you can define a maximum distance to show. Normally, data that lies with the bounding lines that are orthogonal to the transect line is shown in this display. The max distance gives a display radius. Data that lies past this max distance is not displayed.

An alternative to having the transect and map panels in different tabs or windows is to use one tab that contains both panels in one. To access this display, in the Main Display window, use **File->New Display Tab(Window)->Misc->Transect and Map**, **1 Map and 2 Transects**, or **2 Maps and 1 Transect**. Below is an example showing the **1 Map and 2 Transects** panel configuration:

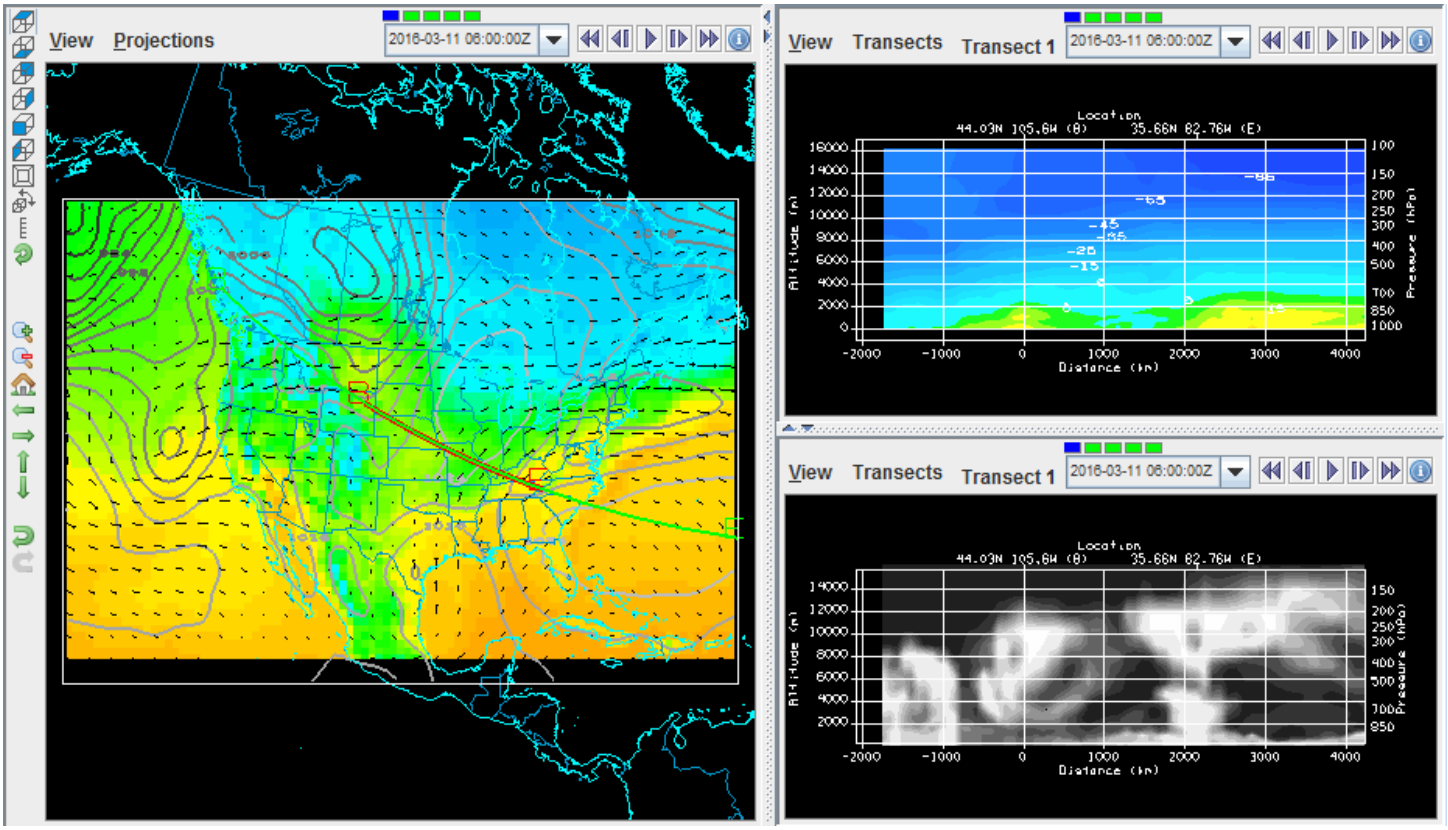


Image 2: Map and Transect Display

Display Controls

This section contains information about the different display controls that you can utilize in McIDAS-V. All of these display controls can be found in the menus of the Main Display window.

- Range Ring Controls
- Range and Bearing Controls
- Transect Drawing Controls
- Drawing Controls
- Location Indicator Controls
- Web Map Server(WMS)/Background Image Controls
- Quicktime Movie Controls
- Image and Movie Capture Controls
- Timeline Controls

Range Ring Controls

Overview

The range rings control displays a set of concentric circles labeled by distance from the central point, with radial lines, useful for judging distance and angle from a geographic location. Range rings can be added to the Main Display window with the **Display->Add Range Rings** menu item. Range rings are often used with radar imagery, but they can be used with any data. The control window is composed of two tabs: **Location** and **Settings**.

The **Location** tab allows for specifying the location to center the range rings:

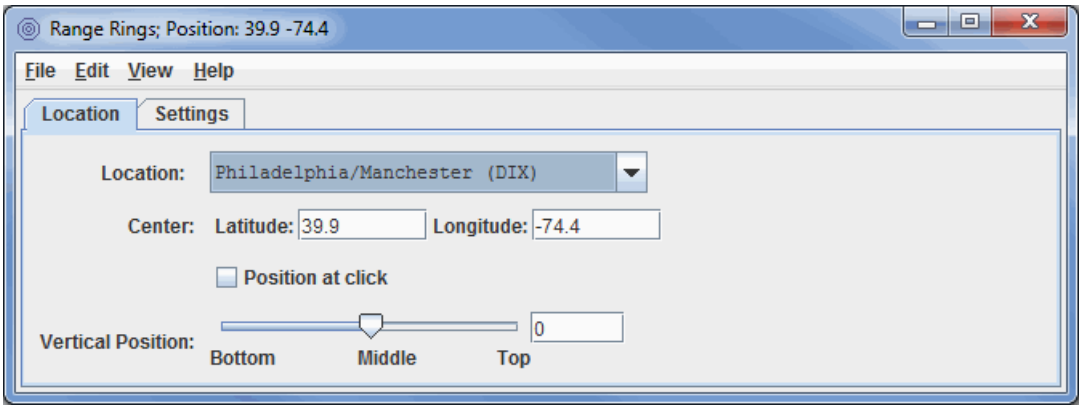


Image 1: Location Tab of the Range Rings Properties Dialog

Properties

Location - Displays range rings centered at the location chosen in the drop-down menu. This defaults to listing NEXRAD stations. The **Edit->Set Locations** menu item allows for changing this menu to list other locations.

Center - Centers the range rings at the specified lat/lon values. Note: West longitudes are negative.

Position at click - Centers the range rings where the mouse is left-clicked in the Main Display window.

Vertical Position - Sets the vertical position of the range rings with respect to other data being displayed. This can be changed by dragging the slider or typing in a value and pressing Enter.

The **Settings** tab allows for controlling how the range rings are displayed:

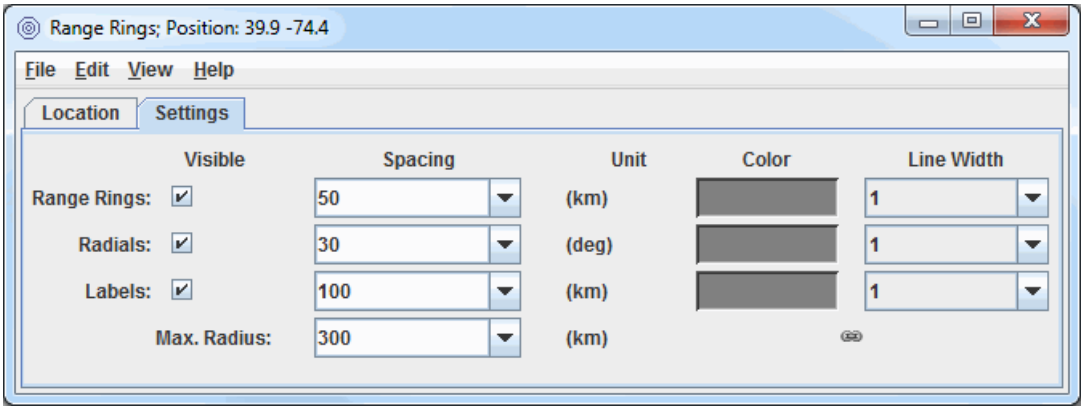


Image 2: Settings Tab of the Range Rings Properties Dialog

The range rings are oriented with local north-south on the displayed map projection. In some cases, the eastward radial line may not be horizontal. The range rings will appear centered on the map projection. The range rings can be moved by resetting the latitude-longitude or the station. McIDAS-V can display multiple range rings at once and at any location.

Properties

Visible - Toggles the visibility of the range rings, labels, and radials on and off with the **Visible** checkboxes. To toggle the entire range ring display at once, use **View->Visible** checkbox menu item.

Spacing - Sets the ring spacing, label spacing, and the azimuth interval of the radials using the control window. The values appear in the text fields under **Spacing**. This can be set in two ways: enter a new value in the text field and press Enter, or click on the pull-down arrow on the right side of the text field to see a list of common values.

Max. Radius - Sets the maximum radius of the range rings from the center location.

Unit - Determines the unit that is used for the numerical values in the **Spacing** and **Max. Radius** fields.

Color - Sets the color of the range rings, radials, and labels.

Line Width - Sets the width of the range rings, radials, and labels.

Link - Links the Color and Line Width settings between the Range Rings, Radials, and Labels. The default is for the Color and Line Width to be linked ( ). Click this link icon to unlink Color and Line Width and the icon will change to being unlinked ( ) so changing the Color or Line Width in one place won't change it elsewhere.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there is one option that is unique to this display.

The **Edit** menu has this unique option:

Set Locations - Allows the user to select a specific location, radar site, earthquake location, etc. to center the range rings about. This menu item controls the listing of locations under the **Location** dropdown above, where the default it to list all NEXRAD stations.

Range and Bearing Controls

Overview

The Range and Bearing Controls show the distance, azimuth, and back azimuth of a great circle line connecting two positions on the Earth's surface. This feature can be found in the Main Display window in the **Display->Add Range and Bearing** menu item.

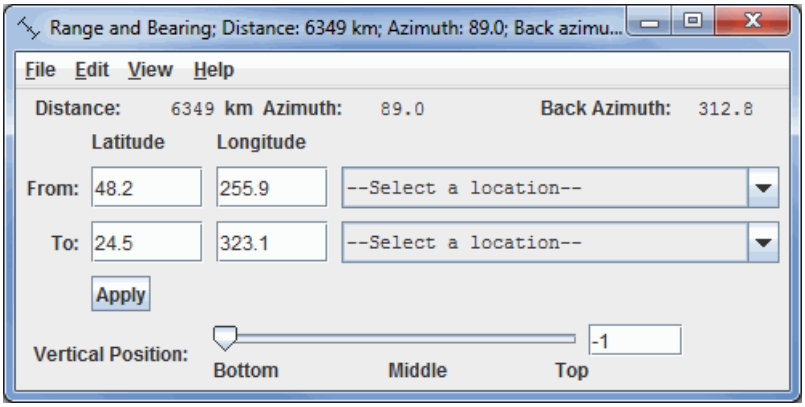


Image 1: Range and Bearing Properties Dialog

When the range and bearing controls are first created, a range and bearing line is added to the Main Display window. The distance, azimuth, and back azimuth values are shown on the Legend and at the top of the Range and Bearing control window. The latitude/longitude position values of the endpoints are shown in the control window. Computations are based on the WGS-84 reference ellipsoid, using computation code from the U.S. National Geodetic Survey. You can reposition the endpoints by left-clicking and dragging them in the Main Display window, entering new values into the Latitude/Longitude boxes in the control window and pressing Enter or clicking Apply, or selecting a location in the dropdown menu to the right of the **Latitude** and **Longitude** fields.

Note The line shown on the display is not the great circle path connecting the end points. The values are computed for a great circle path on the ellipsoidal Earth, using the numerical latitude and longitude values, not the line on the display. The line shown in the display is a straight line on whatever map projection you happen to have; usually it will not coincide with the great circle line.

Note If you change the map projection, an existing range and bearing map line will stay at the same location in the display, hence the end points on the map are in new locations. The distance, azimuth, etc. values in the control window reflect the latitude-longitude positions in the control window and hence do not match the display picture until an end point is moved by hand.

Properties

End Points - Represents the latitude and longitude values of either end point of a line. Click in the text window of "From:" or "To:" as to which values you want to save. Clicking Apply or pressing Enter will move the endpoint of the line to the new position, and show the new distance and azimuth values. You can also select locations from the dropdown menus. By default, this dropdown menu lists out states. You can change this through the **Edit->Set Locations** menu item, where you can change the items in this list to be cities, radar sites, etc.

Vertical Position - Changes the vertical position of the data transect line with respect to other variables being displayed in the Main Display window. This can be changed by using the slider or typing a value into the field and pressing Enter.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there are a couple options that are unique to this display.

The **Edit** menu has these unique options:

Set Locations - Changes the items in the "--Select a location--" dropdown menus to be a specific location, radar site, earthquake location, etc.

Selector Color - Changes the color of the endpoints and line of the range and bearing in the Main Display window.

Transect Drawing Controls

Overview

The transect drawing controls are a version of the Drawing Controls that allows you to view, create, and modify the transect lines that are used in the Transect Views. This option can be found in the Main Display window under the **Display->Draw Transect** menu item or through the **Transects** menu in the Transect View.

This display control is a representation of the set of transects that are defined by the transect resource. Not only does it have its own state (that can be saved in a bundle, for example), but it also writes out any transects you may create or change into your local McIDAS-V state directory in a transects.xml file. This transects.xml file (if one is created) is carried over from session to session. Therefore, if you draw transects in one session and save the transects (via the **File->Save** or **Automatically update transects items**), the same transects will appear in subsequent sessions when you open the Transect Drawing Control widget.

In this control, there is only one shape that you can draw, a Transect Line. This control also shows a non-editable Transect Shape which displays the full transect line used by any Transect Views, called the "Active Transects". There are also a set of transect lines that are non-editable that are from the system transects property. For an active transect, if the Transect View that it represents has a max distance set then the transect will show this max distance as a rectangular box.

The Transect Drawing Control window consists of three tabs: **Controls**, **Style**, and **Shapes**.

- Controls
- Style
- Shapes
- Menus

The **Controls** tab allows for the user to draw features in the Main Display window:

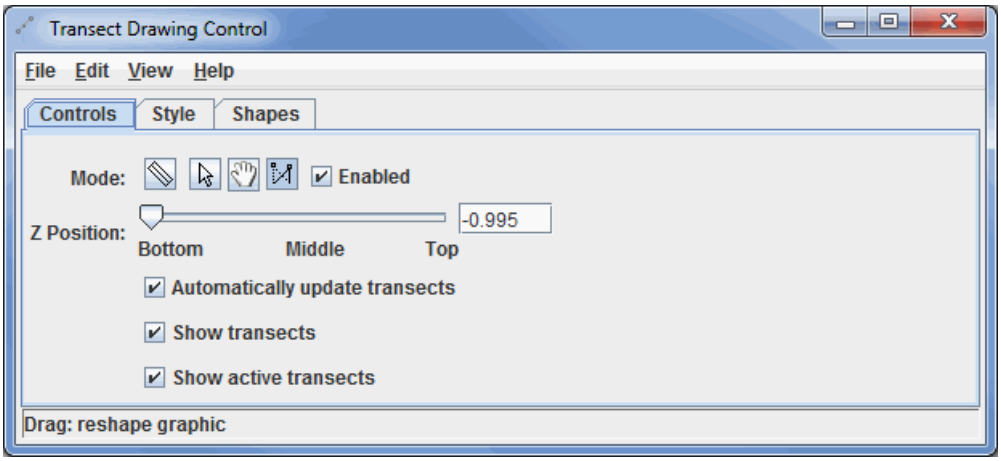


Image 1: Controls Tab of the Transect Drawing Control Properties Dialog

Properties

Mode -

Create a transect - Creates a transect in the Main Display window by left-clicking and dragging.

Select - Allows you to select one or more transect drawings. To select multiples press the control key. The selected transects will be shown with small magenta rectangles. Once selected you can bring up the transect's property editor by pressing Ctrl+P. You can also delete the selected objects by pressing Ctrl+X. You can select all of the objects by pressing Ctrl+A.

Move or stretch graphic - Allows you to reposition a transect without stretching (changing the distance between the endpoints) it.

Stretch Graphic - Allows you to move one of the endpoints of a transect. The other endpoint will remain in its fixed location.

Enabled - Allows you to utilize the different mode options. If you are done creating/modifying transect lines, you can unselect this option to allow you to work in the Main Display window without creating/modifying any existing transect lines.

Z Position - Allows you to define the Z-position of the transect line. This is the vertical positioning of the transect line in the Main Display window.

Automatically update transects - Makes your most recently drawn transect line the active transect, and it will control the display if you are working with a Transect Display. This will also write out all transects (active and inactive) to a transects.xml file stored in your McIDAS-V directory.

Show transects - Toggles the visibility of all transect lines drawn in the display, other than the active transect, which is controlled by the **Show active transects** item.

Show active transects - Toggles the visibility of the active transects. Active transects are transects that are currently being utilized to create a display in a Transect Display. Active transects are drawn in the color green in the Main Display window.

The **Style** tab controls the appearance of the transect lines in the Main Display window:

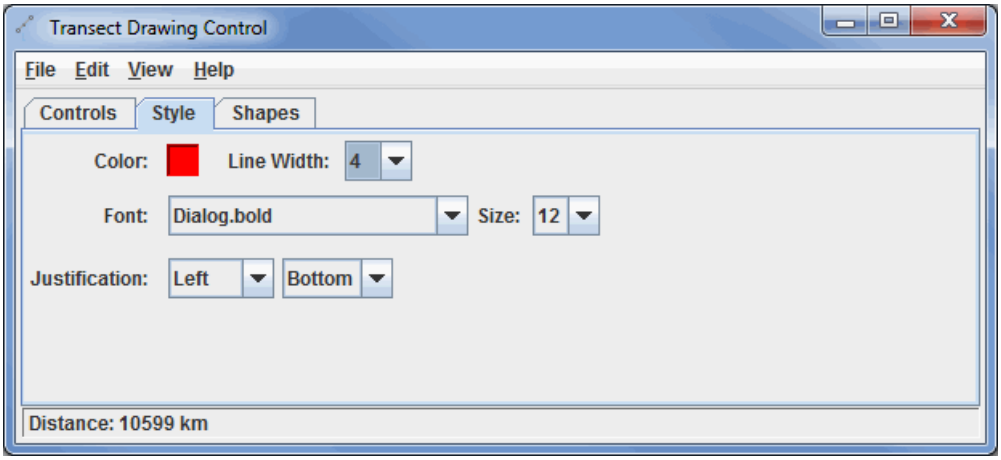


Image 2: Style Tab of the Transect Drawing Control Properties Dialog

Properties

These menu options apply to the shapes listed in the **Controls** tab. Once modifications have been made in this tab, they will be applied to the next transect you draw in the Main Display window, without changing any transects already created. Note that **Font** and **Justification** are not valid options for this control, since there is no text component in the **Controls** tab.

Color - Sets the color of the transect in the display.

Line Width - Sets the thickness of the transect drawn in the display.

The **Shapes** tab lists all of the graphical elements:

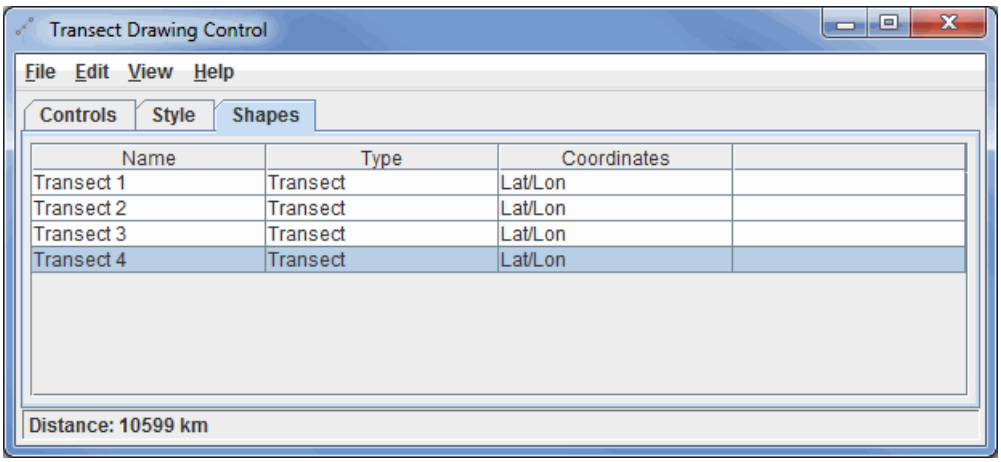


Image 3: Shapes Tab of the Transect Drawing Control Properties Dialog

Properties

Name - Lists the names of the transects.

Type - Lists the type of shape in the display. This will always be listed as 'Transect' because that is the only shape you can create from the **Controls** tab

Coordinates - Lists the coordinates used to display the transect line.

Double-clicking on an element in the **Shapes** tab will show its properties editor, which consists of two tabs: **Properties** and **Points**.

The **Properties** tab gives general information about each transect:

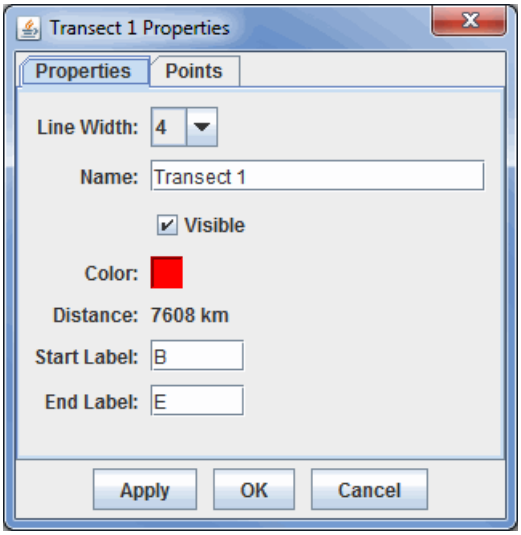


Image 4: Properties Tab of the Properties Dialog

Properties

Line Width - Sets the thickness of the transect line.

Name - Sets the name of the transect. This is the name that will be listed in the **Name** column of the **Shapes** tab of the Drawing Control window. Setting names of items can make it easier to keep multiple shapes organized, as opposed to the default of "Transect 1", "Transect 2", etc.

Visible - Toggles the visibility of the transect line in the Main Display window. If this item is unchecked, it will not be visible in the Main Display, but the shape itself will not be deleted. Any transects that aren't visible will have '(hidden)' listed next to their names in the **Shapes** tab of the Transect Drawing Control window.

Color - Sets the color of the transect line in the display.

Distance - Lists the geographical distance the transect covers in the Main Display window. This cannot be changed here, and is listed for informative purposes only.

Start Label - Sets the label at the beginning of your transect line in the Main Display window. The default value here is **B**, for Beginning.

End Label - Sets the label at the end of your transect line in the Main Display window. The default value here is **E**, for Ending.

The **Points** tab gives general information about each shape:

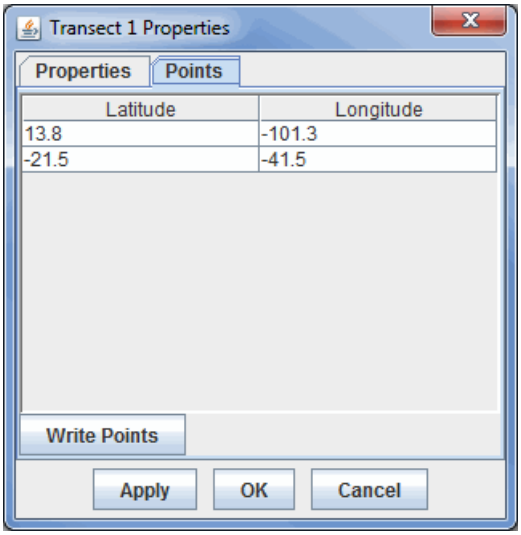


Image 5: Points Tab of the Properties Dialog

You can modify a latitude/longitude value here by double-clicking in one of the cells for latitude or longitude, entering a new value, clicking in another cell, and clicking Apply or OK. The new latitude/longitude values will be applied to the endpoints of your transect line in the Main Display window.

Properties

Latitude/Longitude - Lists the latitude/longitude values of the starting and ending points of the transect line.

Write Points - Allows you to save the list of points as a Comma-Separated Values (CSV) file (*.csv).

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there are several options that are unique to this display.

The **File** menu has these unique options:

Save Transects - Allows you to save your transect display. This will save information about your transect lines currently displayed in the Main Display window to a transects.xml file stored in your McIDAS-V directory. This file contains information about transect line beginning and end points, color, and starting/ending labels.

This transects.xml file is important when working with a Transect Display, as these are the transect lines that are listed out under the **Transects** menu item in the Main Display window. This makes it easy to switch between different transect lines for your transect display without having to re-draw lines.

Save - Allows you to save the transect display as a bundle or a favorite.

The **Edit** menu has these unique options:

Remove All - Removes all transects from the Main Display window without removing any other items. Note, if you have the **Automatically update transects** option turned on, this will delete all transects from your transects.xml file.

Apply Color to Selected - Changes the color of the selected transect drawn in the Main Display window. After an item is drawn, if you want to change its color in the Main Display, you can make the item active with the **Select** mode, change the **Color** in the **Style** tab of the Drawing Control window, and use the **Apply Color to Selected** menu item to change the color of the item to the new color you selected.

Apply Z Position to Selected - Applies a modified Z-position (height) to the selected transect drawn in the Main Display window. After an item is drawn, if you want to change its vertical positioning in the Main Display, you can make the item active with the **Select** mode, move the **Z-Position** slier in the **Controls** tab of the Drawing Controls to your new desired position, and use the **Apply Z Position to Selected** menu item to move the item to the new Z-position.

Drawing Controls

Overview

The drawing controls consists of a drawing editor that supports polygons, lines, shapes and text. This tool allows for creating and moving graphics in the Main Display window. Drawing and selecting in 3D can be difficult and sometimes it is best to be in the main overhead view. This feature can be found in the Main Display window in the **Display->Draw Freely** menu item.

- Controls
- Style
- Shapes
- Properties
- Menus

The Drawing Control window consists of three tabs: **Controls**, **Style**, and **Shapes**.

The **Controls** tab is used to draw features in the Main Display window:

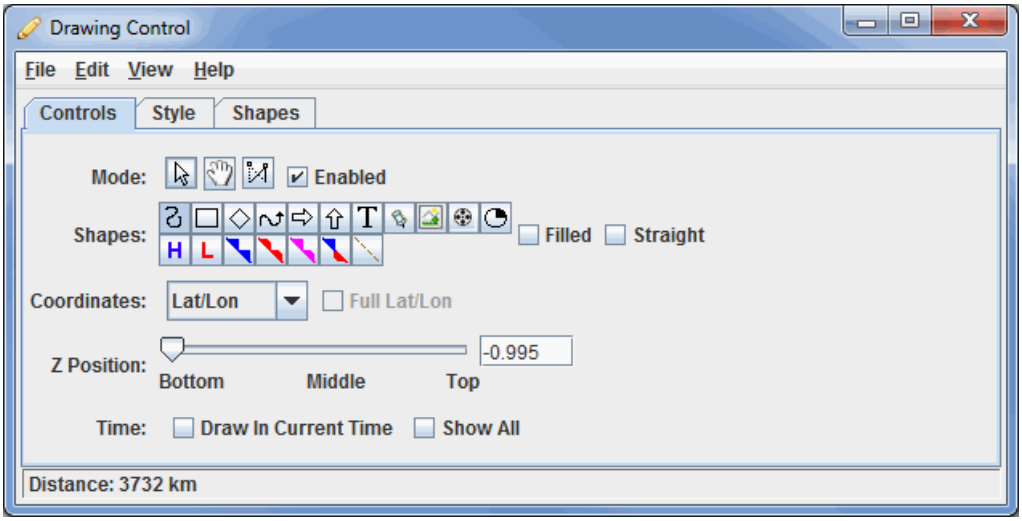


Image 1: Controls Tab of the Drawing Control Dialog

Properties

Mode - There are three editing modes; **Select**, **Move** and **Reshape**:

Select - Selects one or more drawing objects. To select multiples press the Control key. The selected objects will be shown with small magenta rectangles. Once selected, the object's property editor can be opened by pressing Ctrl+P. Objects can also be deleted by pressing Ctrl+X. All of the objects can be selected by pressing Ctrl+A.

Move - Activates and moves the active object (the object with pink squares at its corners/along the line). Do this by left-clicking and dragging the object.

Reshape - Stretches an object drawn in the Main Display. To use this, left-click and drag on a pink square of an active object. As this point is moved, other points in the object will move as well to keep the object smooth.

Enabled - Turns on/off the ability to use the modes. This makes it easy to modify other objects that may be in the Main Display window without moving the position of the shapes.

Shapes - Sets the shapes to be drawn in the Main Display window. Utilize the **Style** tab of the Drawing Control to specify line/text color, thickness, size, and other items pertinent to the shape. To use this feature, select the shape to draw, and left-click and drag in the Main Display to draw the shape. See the Properties Editor of the shapes for further customization after an item has been drawn:

Create a polygon - Creates a smooth polygon.

Create a rectangle - Creates a rectangle.

Create a diamond - Creates a diamond.

Create an arrow - Creates an arrow that can face in any direction.

Create a horizontal arrow - Creates an arrow in the horizontal direction.

Create a vertical arrow - Creates an arrow in the vertical direction.

Create text - Opens a Text entry window, where the user can type in text or HTML. Click OK when done, and the text will appear in the Main Display window.

Create waypoint - Opens a Text entry window, where the user can type in text or HTML. Click OK when done, and the text will appear in the Main Display window along with a marker to represent the exact location that was clicked in the Main Display window.

Create image - Places a saved image or an image from an HTML address on the Main Display window. Select an image file from the file chooser or enter a URL. When using this **shape**, you can use the **Full Lat/Lon** option next to **Coordinates**. This controls how the corners of the image are positioned. If you are adding a large image and you want to display the full image right away without having to stretch it, check this option. Otherwise, your image will be compressed in the horizontal.

Create quicktime movie - Places a movie on the Main Display window. Select the movie from the file chooser or enter a URL. This can only work with certain types of Quicktime (*.mov) files.

Create a symbol - Places a cross (+) symbol on the display. This symbol can be changed in the Properties Editor of the shape. You can get to this through the **Shapes** tab of the Drawing Control and double-clicking on the item. Use the **Symbol** button to change the symbol to a variety of meteorological symbols including various types of weather conditions, clouds, and turbulence.

Create high pressure symbol - Adds a high pressure symbol to the Main Display window with a user-specified pressure.

Create low pressure symbol - Adds a low pressure symbol to the Main Display window with a user-specified pressure.

Create a cold front - Adds a cold front to the display.

Create a warm front - Adds a warm front to the display.

Create an occluded front - Adds an occluded front to the display.

Create a stationary front - Adds a stationary front to the display.

Create a trough - Adds a trough to the display.

Filled - Fills in the outline of a shape. This can be used with the Polygon, Front, and Rectangle shapes.

Straight - Creates straight lines when drawing freely. This can be used with the Polygon and Front shapes.

While the icon buttons only allow you to draw 5 different front types, there are 20+ front types to choose from in the Properties dialog for the shape.

Coordinates - Draws in four different coordinate systems. This affects how the **Points** tab of the Properties Editor for the item will be formatted. Ex: If you select X/Y, your points will list out in columns with values of X and Y, and if you choose Lat/Lon, your points will list out in columns with values of Latitude and Longitude:

X/Y/Z - Draws in the 3D box coordinate space. Re-projections will not affect the shape.

X/Y - Draws in the 3D box coordinate space, fixing the Z position. Re-projections will not affect the shape.

Lat/Lon/Alt - Defines the points of the shapes by Latitude/Longitude/Altitude. When you reproject the display the shape will also be reprojected.

Lat/Lon - Defines the points of shapes by Latitude/Longitude, but the Z position is fixed using the Z Position slider. When you reproject the display the shape will also be reprojected.

Z Position - Changes the vertical position of the features with respect to other variables being displayed in the Main Display window. You can change this with the slider, or by entering a value in the text field and pressing Enter.

Time - Determines the visibility of your drawing items as you progress through time steps in a loop.

Draw In Current Time - Draws the features only on the time step you are looking at. As you step through the animation, the features will not be visible in any subsequent time steps.

Show All - Displays all of the features drawn at any time step, regardless of if Draw In Current Time was selected.

A graphic can be shown at more than one time using the Properties Editor. Select the object and press Ctrl+P to bring up the Properties Editor. Select the times to be displayed in in the **Times** list (Shift+click or Ctrl+click to select multiples) and press **Apply** or **Ok**.

The **Style** tab controls the style that the drawings take in the Main Display window:

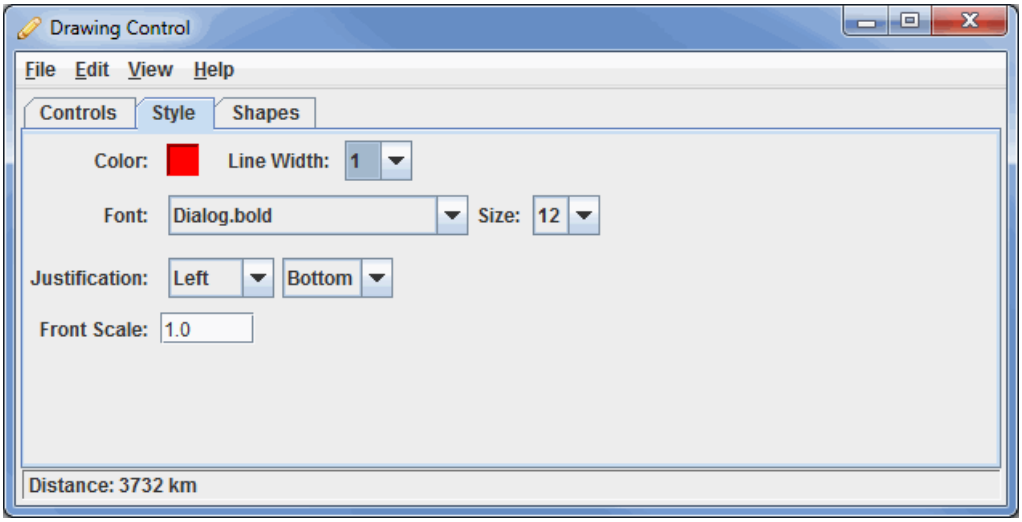


Image 2: Style Tab of the Drawing Control Dialog

Properties

These menu options apply to the shapes listed in the **Controls** tab, excluding the High/Low pressures/fronts. Once modifications have been made in this tab, they will be applied to the next shape you make in the Main Display window, without changing any shapes already created.

Color - Sets the color of the shape/text in the display.

Line Width - Sets the thickness of the shapes in the display. This **Line Width** control sets the thickness of arrows, polygons, rectangles, and diamonds. This does not control the line width of fronts. The default value is 1.0.

Font - Sets the font of the text in the display.

Size - Sets the size of the text in the display.

Justification - Sets the placement of the shape with respect to the latitude/longitude location where you clicked in the Main Display window to draw the shape. The first dropdown controls the left/right justification, and the second dropdown controls the top/bottom justification. Ex.: To center an item directly where you click in the Main Display window, choose Center, Center.

Front Scale - Sets the scale of the fronts. A larger value will make the front thicker, and you may see fewer details about the front (ex. Fewer blue triangles along a cold front). This works similarly to **Line Width**, but for fronts instead of shapes. The default value is 1.0.

The **Shapes** tab lists all of the graphical elements:

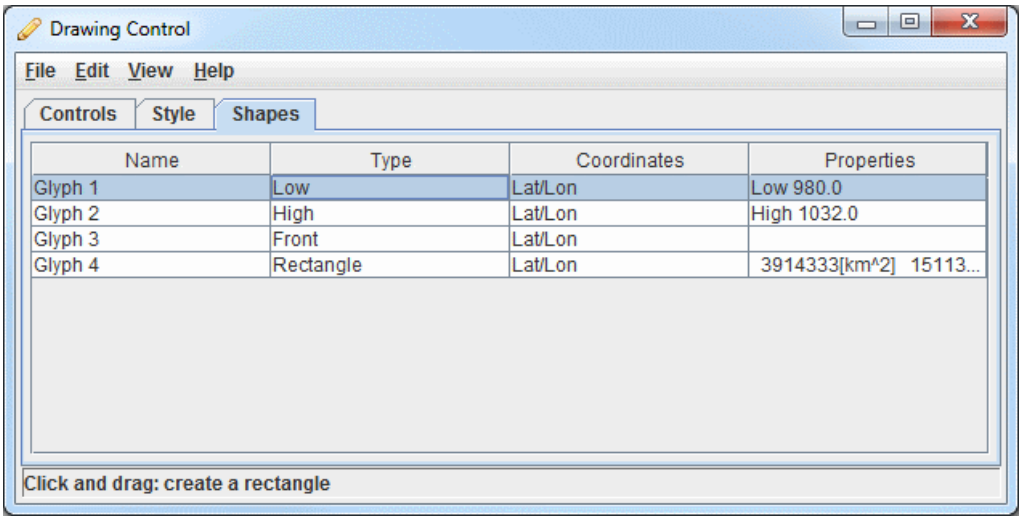


Image 3: Shapes Tab of the Drawing Control Dialog

Properties

This tab lists out the different shapes drawn in the Main Display window from the **Controls** tab, as well as other information about them.

Name - Lists the names of the shapes currently drawn in the Main Display.

Type - Lists the type of shape in the display (ex. Front, Low, High, Shape, Smooth Polygon).

Coordinates - Lists the Coordinates selected in the **Controls** tab.

Properties - Lists properties about some of the items, including pressure, area, and distance values.

Double-clicking on an element in the **Shapes** tab will open its Properties Editor, which consists of two tabs: **Properties** and **Points**.

The **Properties** tab gives general information about each shape:

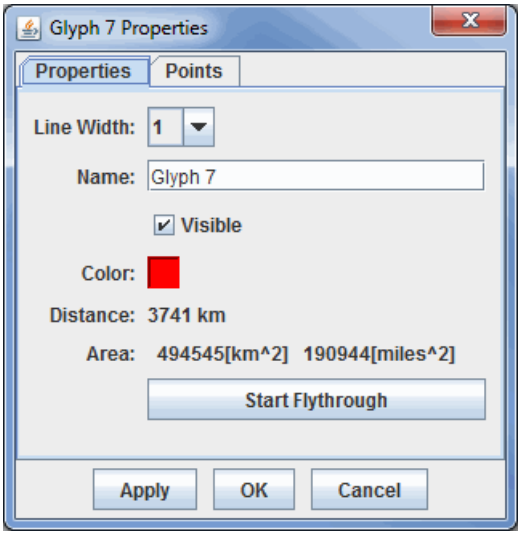


Image 4: Properties Tab of the Properties Dialog

This tab allows you to control many aspects of the individual shapes. After making any modifications to this window, click **Apply** or **OK**, and the changes will be applied to the shape in the Main Display window. When editing the properties of a High or Low shape, there is the ability to change these shapes to 'A' (Spanish 'Alto' for High) or 'B' (Spanish 'Bajo' for Low). Note: The different types of shapes will have different menu options.

Properties

Line Width - Sets the thickness of the shapes being displayed.

Name - Sets the name of the shape. This is the name that will be listed in the **Name** column of the **Shapes** tab of the Drawing Control window. Setting names of items can make it easier to keep multiple shapes organized, as opposed to the default of "Glyph1", "Glyph 2", etc.

Visible - Determines if the shape will be visible in the display. If this item is unchecked, it will not be visible in the Main Display, but the shape itself will not be deleted. Any shapes that aren't visible will have '(hidden)' listed next to their names in the **Shapes** tab of the Drawing Control window.

Color - Sets the color of the shape in the display.

Distance - Lists the distance the object covers in the Main Display window. This cannot be changed here, and is listed for informative purposes only. The **Distance** will also be listed out in the fourth column of the **Shapes** tab of the Drawing Control window.

Area - Represents the area of a shape being displayed in the Main Display window. This cannot be changed here, and is listed for informative purposes only. The **Area** will also be listed out in the fourth column of the **Shapes** tab of the Drawing Control window.

Pressure - Sets the pressure when your shape is a high or low pressure.

Front Type - Changes the type of front displayed for the selected element. There are a variety of fronts available from this control that are not available in the **Controls** tab of the Drawing Control window.

Flip the front orientation - Changes the display to represent the front traveling in the opposite direction (i.e., what side the cold front the blue triangles are drawn on).

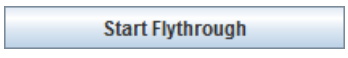
Scale - Changes the size of the item (ex. front) without changing its spatial extent.

Text - Allows you to view the current text of the item and change it. You can also change the **Font**, **Size**, and **Alignment** with respect to the lat/lon where you clicked to create the text.

Marker - Allows you to add a marker for the originating point of a text display.

BG Color - Allows you to set a background color for text.

Times - Determines what times the shape will appear when you are displaying a loop of data. You can specify which times the item will be visible by selecting individual times with Control/Shift+click. This menu item will only be used if you have a loop of data displayed.



- Opens the Flythrough feature which allows you to interactively explore the feature.

The **Points** tab gives general information about each shape:

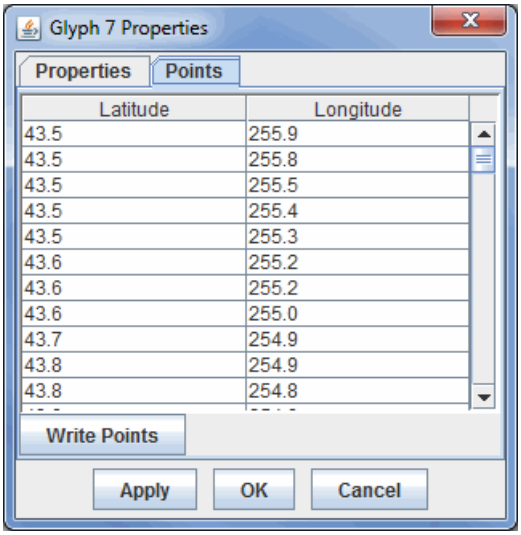


Image 5: Points Tab of the Properties Dialog

This tab lists out location coordinates of your shape. The points listed can be seen in the Main Display window, and are represented by the pink squares along the boundaries of the shape. These values can be changed by double clicking on a coordinate, and typing in a new value. Once you click on a different coordinate, and then press Apply or OK, the change will be made in the Main Display window.

Properties

Latitude/Longitude - Lists the latitude/longitude values at a variety of points in the shape. If your properties are for a rectangle, the points listed will be the four corner points. If your properties are for a line (including a front), you will see several latitude/longitude points along the length of the line.

Write Points **-** Saves the list of points as a Comma-Separated Values (CSV) file (*.csv) or as an Excel file. This file can subsequently be loaded in through the **General->Files/Directories** chooser of the **Data Sources** tab of the Data Explorer and the points can be used to create a Point Data display.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there are several options that are unique to this display.

The **File** menu has these unique options:

Export Drawing - Exports all drawings created from the Drawing Control in the IDV Drawing files (*.xgrf) format. This file can later be loaded into McIDAS-V in two ways. First, you can load the file through the **General->Files/Directories** chooser of the **Data Sources** tab of the Data Explorer with the Drawing Files **Data Type**. This will display your saved drawings in the Main Display window with controls similar to the **Shapes** tab of the original Drawing Control window. Secondly, you can import this file through the **File->Import Drawing** menu item of the Drawing Controls window.

When exporting your drawing, there is a checkbox in the Save window called **Load as map data**. If you select this option, when your data is saved, a new layer will also be added to the **Field Selector** tab of the Data Explorer. This layer will be the drawing you saved loaded in as a map layer. This enables you to do a variety of things. First, you can create a simple Map Display of your data with the Map Display display type in the **Field Selector**. Secondly, if you load in a topography field (ex. GFS Global 'Geopotential_height @ surface' data), you can create a 3D map over topography using the Maps->3D Map native formula. For the **MapData** field, select your exported drawing, and for **Topography**, select your topography field. You must make sure that your topography field is large enough to cover the entire domain of your map layer (your drawing).

Import Drawing - Imports files in the IDV Drawing files (*.xgrf) format. These files contain previously drawn shapes created from the Drawing Controls.

The **Edit** menu has these unique options:

Remove All - Removes any drawings from the Main Display window without removing any other items. While all drawings will be removed, the Drawing Control will remain open.

Apply Color to Selected - Changes the color of the selected item drawn in the Main Display window. After an item is drawn, if you want to change its color in the Main Display, you can make the item active with the **Select** mode, change the **Color** in the **Style** tab of the Drawing Control window, and use the **Apply Color to Selected** menu item to change the color of the item to the new color you selected.

Apply Z Position to Selected - Applies a modified Z-position (height) to the selected item drawn in the Main Display window. After an item is drawn, if you want to change its vertical positioning in the Main Display, you can make the item active with the **Select** mode, move the **Z-**

Position slier in the **Controls** tab of the Drawing Controls to your new desired position, and use the **Apply Z Position to Selected** menu item to move the item to the new Z-position.

Location Indicator Controls

Overview

The location indicator controls display a configurable axis in the Main Display window and (optionally) a bearing point. This option can be found in the Main Display window under the **Display->Add Location Indicator** menu item. The Location Indicator window consists of three tabs: **Location**, **Settings**, and **Orient**.

- Location
- Settings
- Orient
- Menus

The **Location** tab displays and allows you to modify the position of the origin and the bearing point:

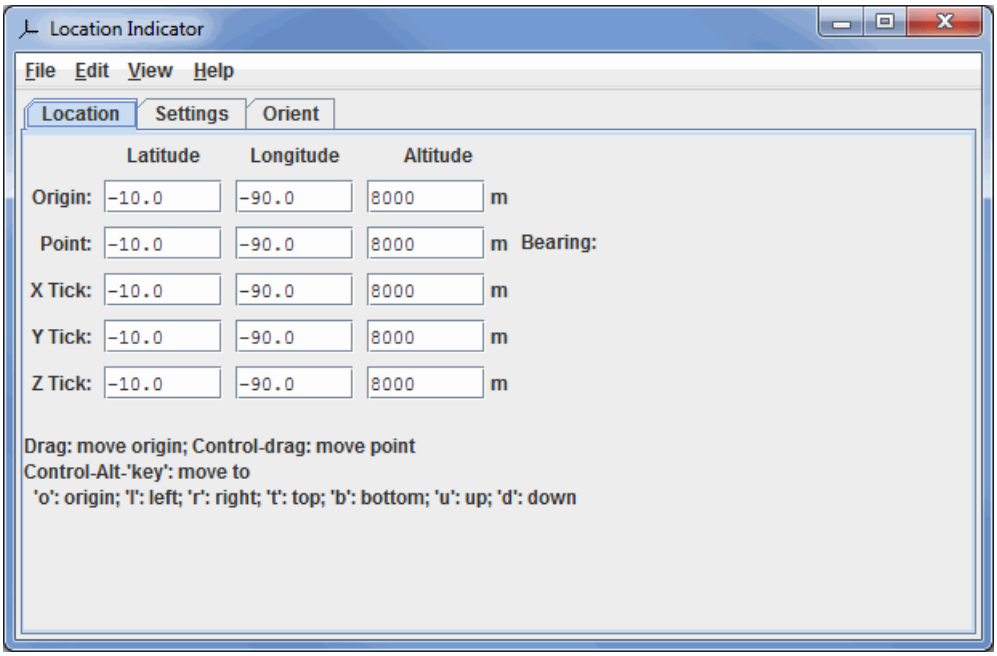


Image 1: Location Tab of the Location Indicator Dialog

Properties

Origin - Represents the latitude, longitude, and altitude of the origin point in the Main Display window.

Point - Represents the latitude, longitude, and altitude to set the location of the bearing point in the Main Display window.

Bearing - Lists the bearing point degree.

X Tick - Sets the location of the X tick mark in the Main Display window.

Y Tick - Sets the location of the Y tick mark in the Main Display window.

Z Tick - Sets the location of the Z tick mark in the Main Display window.

The center point of the Location Indicator can be moved by left-clicking and dragging on the lines produced in the Main Display window. You can also move the center point of the Location Indicator with a series of Ctrl+Alt key combinations.

Ctrl+Alt+o - Moves the center point of the Location Indicator to the origin (center in the x, y, and z-axes) of the display.

Ctrl+Alt+l - Moves the center point of the Location Indicator to the left side of the display (in the x-axis), maintaining the previously existing top/bottom and up/down positions.

Ctrl+Alt+r - Moves the center point of the Location Indicator to the right side of the display (in the x-axis), maintaining the previously existing top/bottom and up/down positions.

Ctrl+Alt+t - Moves the center point of the Location Indicator to the top of the display (in the y-axis), maintaining the previously existing left/right and up/down positions.

Ctrl+Alt+b - Moves the center point of the Location Indicator to the bottom of the display (in the y-axis), maintaining the previously existing left/right and up/down positions.

Ctrl+Alt+u - Moves the center point of the Location Indicator vertically (in the z-axis) to the top of the display, maintaining the previously existing left/right and top/bottom positions.

Ctrl+Alt+d - Moves the center point of the Location Indicator vertically (in the z-axis) to the bottom of the display, maintaining the previously existing left/right and top/bottom positions.

The **Settings** tab allows for the configuration of display settings:

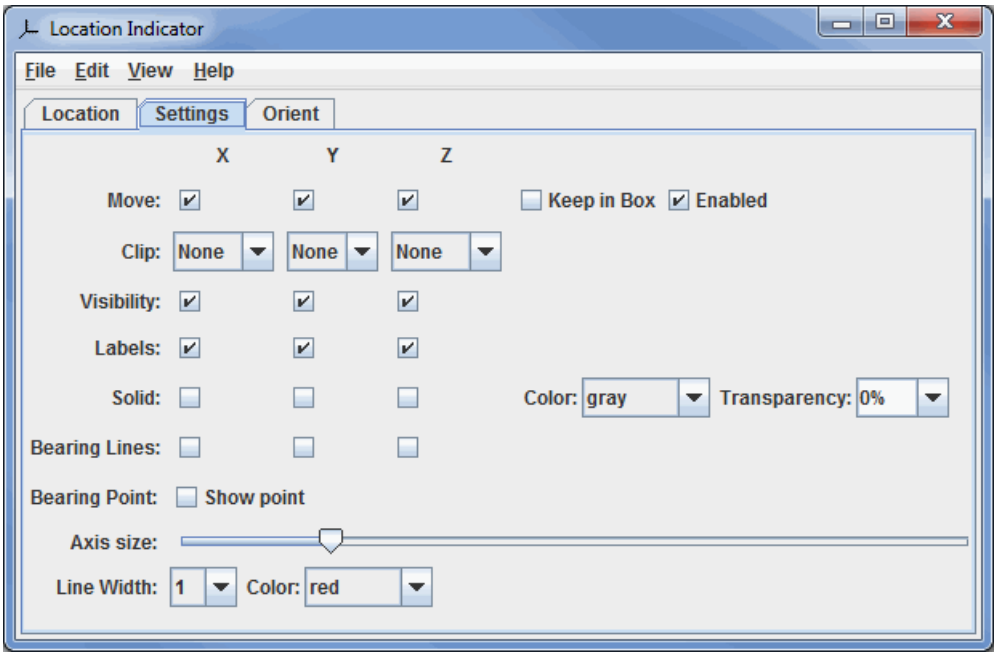


Image 2: Settings Tab of the Location Indicator Dialog

Properties

Move - Constrains along which axis the center point of the Location Indicator can be moved.

Keep in Box - Constrains the movement to be within the main 3D bounding box.

Enabled - Enables the option to drag points.

Clip - Clips the Location Indicator as well as the display in the Main Display window in relation to the center point of the Location Indicator.

Visibility - Turns on/off the visibility of the X, Y, and Z axes in the Main Display window.

Labels - Turns on/off the visibility of the X, Y, and Z labels in the Main Display window.

Solid - Shades in the plane of any of the axes selected. You can select a color and a transparency for this plane.

Bearing Lines - Shows or hides the bearing lines. These are dashed lines from the respective axis to the bearing point.

Bearing Point - Turns on/off the display of the bearing point.

Axis size - Expands/contracts the length of the origin axis.

Line Width - Sets the line width of the Location Indicator lines.

Color - Sets the color of the Location Indicator lines.

The **Orient** tab allows for the orienting the display based on the location. To change the origin, click and drag in the main display. To show and/or change the bearing point, do a Control+drag in the Main Display window. The x/y/z locations of the bearing point are shown on the origin axis as tick marks and, optionally, as longitude/latitude/altitude readouts:

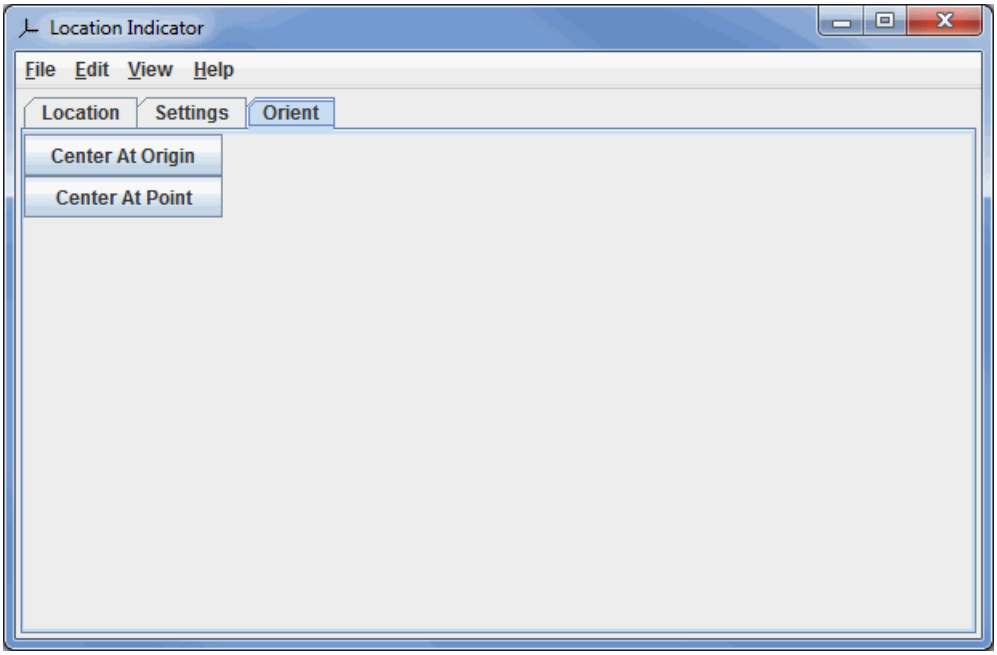


Image 3: Orient Tab of the Location Indicator Dialog

Properties

Center At Origin - Centers the display at the origin of the Location Indicator.

Center At Point - Centers the display at the center of the image, not taking into account the location of the center point of the Location Indicator.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there are some options that are unique to this display.

The **Edit** menu has this unique option:

Selector Color - Changes the color of the Location Indicator display in the Main Display window.

The **View** menu has these unique options:

Set origin to address - Changes the location of the origin to a given address, zip code, city, etc. See the Go to Address section of the Display Menus page for more information.

Set point to address - Changes the location of the point to a given address, zip code, city, etc. See the Go to Address section of the Display Menus page for more information.

Web Map Server(WMS)/Background Image Controls

Overview

The WMS Controls display imagery from WMS servers. A set of predefined links to WMS servers for topographic, shaded relief and aerial imagery is also provided with the Background Image control.

To use the pre-defined background images, in the Main Display window, select the **Display->Add Background Image** menu item. To choose imagery from web map servers, bring up the Catalog Chooser in the Data Explorer and enter the URL that points to the *Capabilities* document of the desired WMS. We also provide links to a set of useful WMSs from the *idvcatalog*. If it is not in the Catalog pull down menu, enter the following url:

```
http://www.unidata.ucar.edu/georesources/idvcatalog.xml
```

From this catalog open the **Web Map Servers** tab and select the WMS you would like to access.

The WMS Controls makes a request to the Web Map Server for an image that covers the area currently being displayed in the Main Display window. Due to the time it takes to access remote servers, the WMS Control does not request new images while the user pans and zooms.

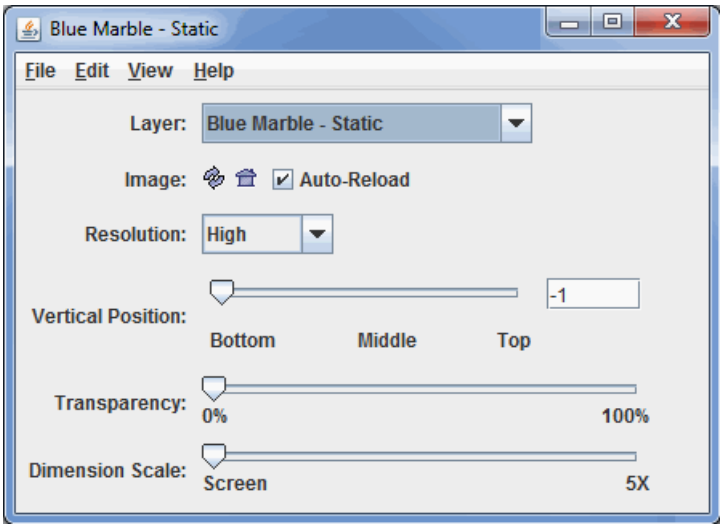


Image 1: WMS Control Dialog

Properties

Layer - Selects which background image to add to the **Main Display**. Listed below are the different **Layers** included with McIDAS-V.

- Blue Marble (BBM) - Static
- Blue Marble (BBM) - Dynamic
- Bathymetry/Topography - Static
- World Topography - Static
- World Day - Static
- Lights - Static
- USGS Topography - Static
- Topography/Political - Static
- Biosphere - Static
- Land/Sea Mask - Static
- Land Mask - Static
- Sea Mask - Static
- Global Topography - Dynamic
- Topographic Map
- Digital Ortho-Quad
- Shaded Relief
- Urban Area
- Solid Blue
- Solid Light Blue
- Solid White
- Solid Green
- Solid Gray

Image Buttons -

Reload the image - Reloads the image from the server at the current screen location.

Reproject to image - Sets the projection in the display to the current image bounds.

Auto-Reload - Fetches a new image every time the Main Display window is panned or zoomed. There is a slight delay so that successive zooms do not cause successive image requests.

Resolution - Allows you to change the resolution of the image. A lower resolution image will have a smaller image file size and quicker requests from the server.

Vertical Position - Sets the vertical position of the image. You can adjust this value by dragging the slider or by typing a value into the field and pressing Enter.

Transparency - Adjusts the overall transparency of the image. Note: Some Web Map Servers provide images that contain transparent sections. Currently, McIDAS-V does not support the display of transparent sections.

Dimension Scale - Allows you to fetch a larger image than the default one. By default, the bounds of the image that is retrieved from the server is the size of the display.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there are several options that are unique to this display.

The **File** menu has this unique option:

Save As Image XML/KML File... - Saves the most recently displayed image as an Image XML file (*.ximg) or as a Google Earth File (*.kml, *.kmz). The Image XML format references the image as well as the geolocation boundaries.

The **View** menu has these unique options:

Reproject Image - Re-centers the display and resets the zoom level back to the display's initial settings without changing any other preferences you have modified.

Go to Address - Changes the projection to a given address, zip code, city, etc. See the Go to Address section of the Display Menus page for more information.

Use Native Projection - Re-centers the display and resets the zoom level back to the display's initial settings without changing any other preferences you have modified.

QuickTime Movie Controls

Overview

McIDAS-V can display QuickTime movies. You can pause, single step and play a movie. This option can be found in the Main Display window under the **View->Capture->Movie** menu.

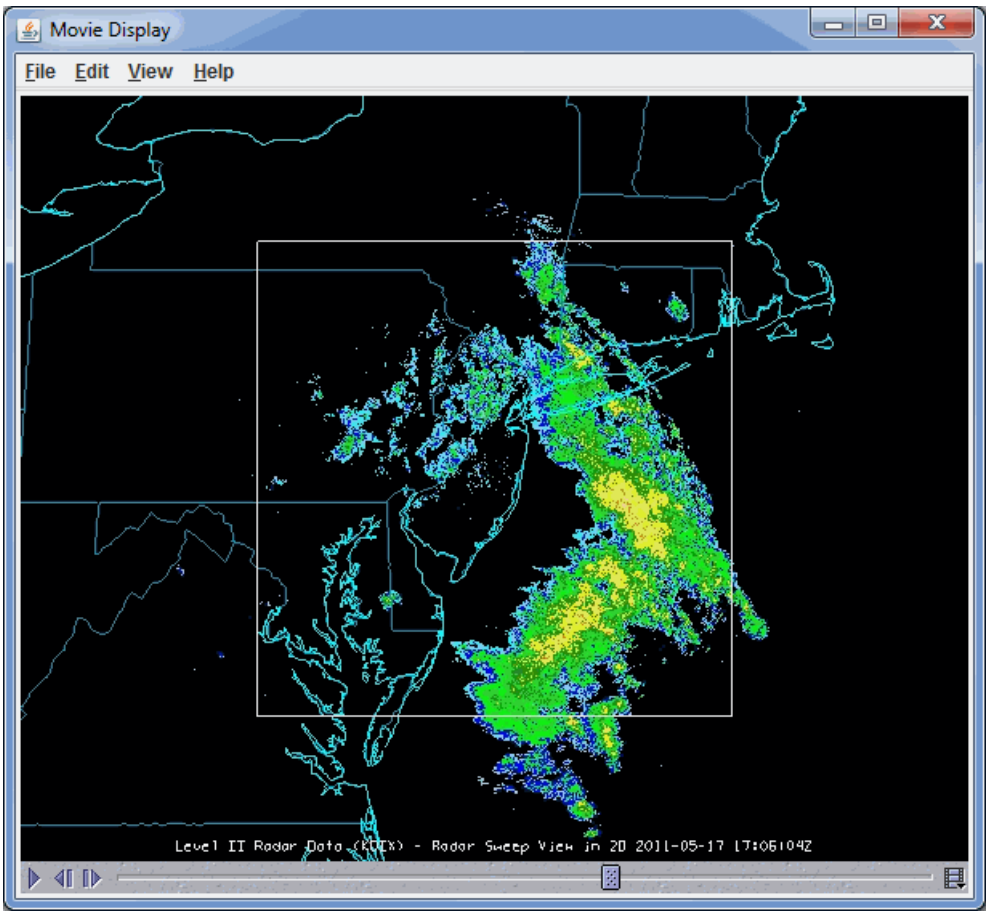


Image 1: Movie Display Window

Properties

- **Play -** Starts the QuickTime movie.
- **Pause -** Pauses the QuickTime movie.
- **Step Backward -** Moves backwards a single step in the movie.
- **Step Forward -** Moves forwards a single step in the movie.
- **Media Properties -** Opens the QuickTime media properties. Right-click to change the rate of the movie.

The media properties is composed of three tabs, **General**, **Video**, and **Plug-in Settings**.

The **General** tab has general information about the QuickTime movie:

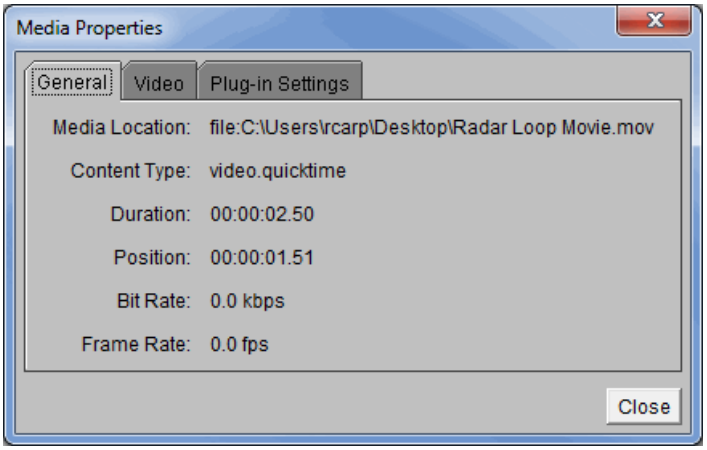


Image 2: General Tab of the Media Properties Window

Properties

Media Location - Represents the location of the movie file on your computer.

Content Type - Represents the content type of your movie file.

Duration - Displays the length of the movie.

Position - Displays how far you are into the movie.

Bit Rate - Represents the number of bits that are conveyed or processed per unit time.

Frame Rate - Represents the speed at which the movie is playing.

The **Video** tab lists the specific video information:

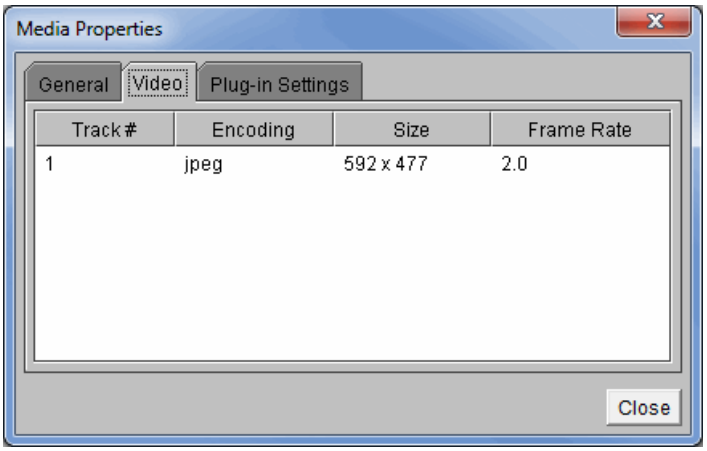


Image 3: Video Tab of the Media Properties Window

Properties

Track # - Represents the order of videos when multiple videos have been added.

Encoding - Represents the image type of the frames in the movie.

Size - Displays the size of the frames in terms of pixels.

Frame Rate - Represents the speed at which the movie is playing.

The **Plug-in Settings** tab has access to the PlugIn Viewer details:

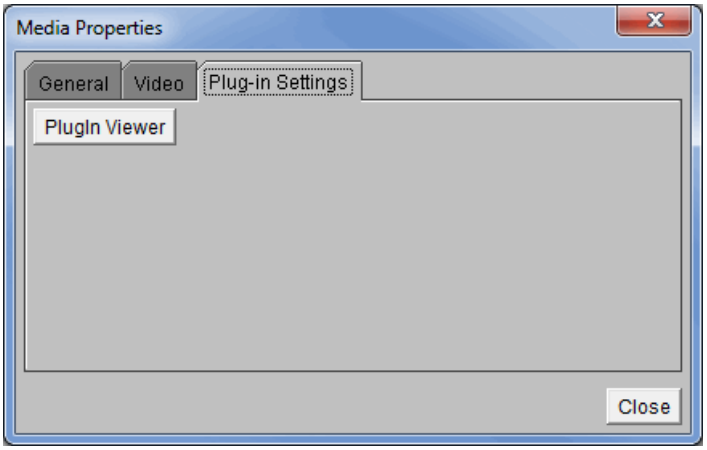


Image 4: Plug-in Settings Tab of the Media Properties Dialog

Properties

PlugIn Viewer - Opens a PlugIn Viewer window, where you can choose a Parser for QuickTime file format, or a JPEG Renderer.

Menus

All of the menu items seen utilizing the movie display are standard options that can be found in the Menus section of the Layer Controls page.

Image and Movie Capture Controls

You can capture the Main Display window as an image, a QuickTime movie or an animated GIF.

- Saving Images
- Printing Current View
- Saving QuickTime Movies
- Creating a Movie
- Playing QuickTime Movies

Saving Images

You can save a display as an image by selecting the **View->Capture->Image...** menu item in the Main Display window. A file dialog will open where you can enter a file name for the image file. McIDAS-V supports JPEG, PNG, GIF, PDF, PS, and SVG formats. From this File Dialog you can also specify the image quality (only used for JPEGs) and what to capture. You can also select whether or not the background is transparent.

Note: When capturing an image, the Main Display window cannot be obscured.

McIDAS-V can also write out an image and the corresponding Google Earth KML or KMZ file. For this to be correct, the projection must be a Lat/Lon geographic projection (i.e., rectilinear) and in an overhead view. Some of the default projections that are Lat/Lon include World, Africa, Asia, Australia, and the individual state projections (US->States->...). You can also create your own Lat/Lon projection using the Projection Manager. The simplest way to get a correct projection is to select the **Projections->Use Displayed Area** menu item in the Main Display window. If you specify a .kml file, McIDAS-V will generate an image with the same file prefix and the kml file that refers to the image. If you specify a .kmz file (which is a zip format) it will contain the image and the kml file.

Printing Current View

You can send any display to a printer. Select the **View->Capture->Print...** menu item in the Main Display window. A **Print** dialog will popup where you can configure and print an image.

Saving QuickTime Movies

You can save any sequence of displays as a movie. Select the **View->Capture->Movie...** menu item in the Main Display window to open the Movie Capture window:

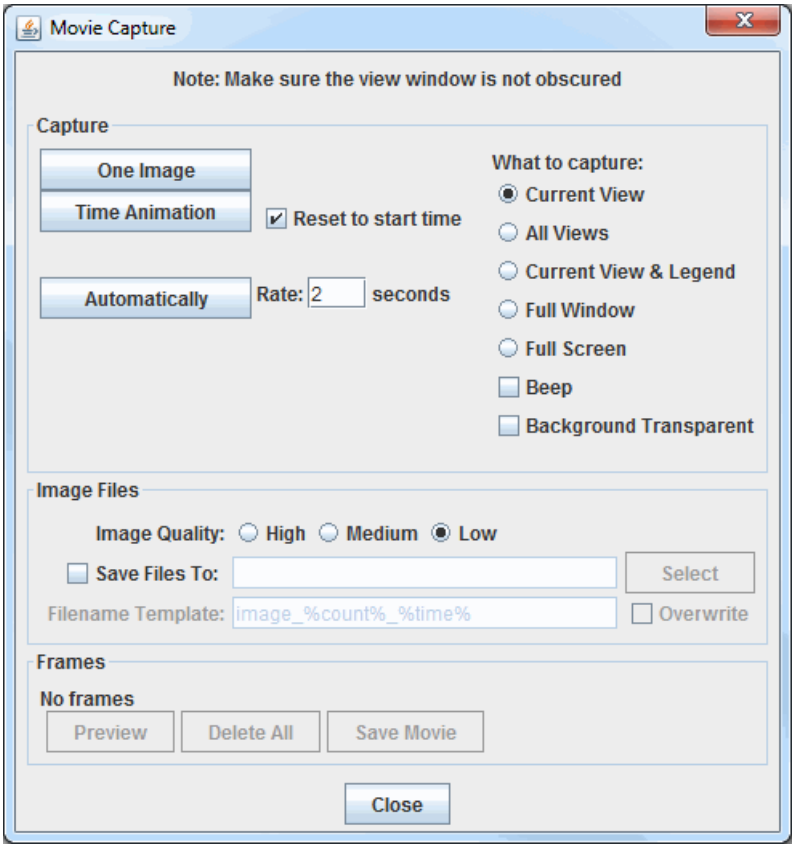


Image 1: Movie Capture Window

Properties

Note: More information about these controls is found in the Creating a Movie section below.

Capture -

One Image - Captures one image to create a movie.

Time Animation - Captures a loop of images at the specified dwell rate through the Time Animation Controls.

Reset to start time - Resets the loop to the initial timestep before recording the video.

Automatically - Creates a new frame in the movie every given number of seconds.

What to capture -

Current View - Captures only what is in the view screen of the Main Display window.

All Views - Captures all of the panels in the Main Display window without including any legends or toolbar buttons.

Current View & Legend - Captures both the view and the Legend.

Full Window - Captures the entire Main Display window, including the toolbars.

Full Screen - Captures everything visible on the monitor.

Beep - Produces a beeping noise at the beginning of each frame captured in the movie.

Background Transparent - Captures the movie with the background image transparent.

Image Files -

Image Quality - Sets the quality of the images. Lower quality images will utilize less memory, but will not look as good.

Save Files To - Allows you to individually save each image in your movie. To use this option, click the checkbox for **Save Files To** and specify a directory.

Filename Template - Sets the naming structure for the images. This option is only available if you are saving the individual images in your movie with the **Save Files To** option. There are several ways you can customize the output, described in the section below.

Frames -

 # frames - Displays the number of frames in the movie.

Preview - Opens a Movie Preview window, where you can see individual slides before saving the movie.

Delete All - Deletes every frame saved in the movie.

Save Movie - Saves the movie to the specified location using the chosen format type.

Creating a Movie

To make a movie, there are three steps: capturing the frames, previewing the frames, and creating the movie. McIDAS-V supports QuickTime movies, animated GIF and AVI files, Compressed ZIP, Google Earth KMZ and AniS or FlAniS HTML file formats.

To capture frames, in the **Capture** section of the Movie Capture window, do the following:

Capture one image - Makes a single frame of the McIDAS-V display. Progressively change the display and capture one frame at a time to create a movie.

Capture animation - Captures all frames in a display time sequence that you control with the usual Time Animation Controls. Check **Reset to start time** to ensure you capture the entire animation sequence. The QuickTime animation capture starts on the first frame visible in McIDAS-V and goes to the end. This tool can be used to capture part of a loop.

Capture automatically - Takes snapshots of the frames in McIDAS-V display while you make changes, such as changing the view point, zooming, rotating, etc. Click the button again to stop the snapshot. You can change the sampling rate of the snapshots with the **Rate** field.

You can combine these three different methods of capture. The list of frames is additive.

You can **Preview** the movie by pressing the Preview button. This opens a Movie Preview window, where you can see the individual slides before saving the movie. The Movie Preview window also allows you to remove individual frames from the movie before saving it with the Delete this frame button.

If you want to save the individual intermediate files that are used to create the movie, check the **Save Files To** box and specify a directory and file name format. Otherwise, the intermediate files will be saved in a temporary directory and will be removed. You can use the following templates to customize the name of the output file:

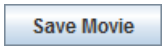
%count% - Represents the image counter.

%count:decimal format% - Allows you to format the count using the same rules defined in the lat/lon format section of the User Preferences window's **Formats & Data** tab. You can also specify a Java DecimalFormat, e.g., %count:000% outputs three-digit counts

with leading zeros (001, 002, etc.).

%time% - Represents the animation time in the default format.

%time:time format% - Begins with "time:" and contains a time format string using the the same date formatting rules described in the User Preferences window's **Formats & Data** tab.

When done capturing the frames, select the 

button to specify the name and format of the movie you want to save.

When saving a movie, in the Save dialog, there is an option for '**Use 'global' GIF color palette**'. This option is applicable for animated GIF movies, and it is enabled by default. Animated GIFs are limited to 256 colors, and this option uses the same 256 colors for every frame in the loop when the setting is enabled. Enabling this option allows for certain display settings such as a color scale to remain constant throughout the loop. If this option is disabled, then each frame uses it's own color palette, so one color may represent one value in one frame, and the same color may represent a different value in the next frame. One circumstance where disabling this option may be ideal is if the movie starts with a low-light scene (not many colors) and there is no color scale in the display.

Playing QuickTime Movies

McIDAS-V supports displaying certain types of QuickTime movies (including the ones McIDAS-V generates). These movies can be loaded in the General->Files/Directories Chooser in the **Data Sources** tab of the Data Explorer.

Timeline Controls

McIDAS-V makes use of a timeline widget in a variety of areas. The timeline allows for viewing the temporal distribution of a set of times and selecting them. There can also be a date selection mechanism (see below) that allows for selecting based on a range, interval, etc. The **Match Time Driver** checkbox automatically selects the dates and times that match closest to the time driver, assuming a time driver has been set. For more information, see Time Matching.

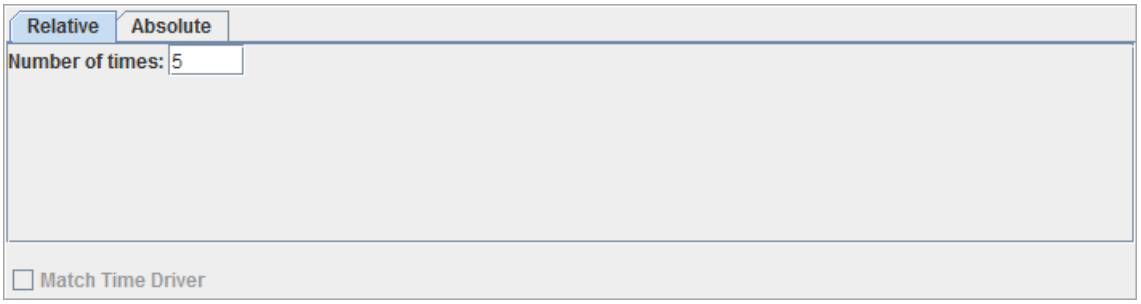


Image 1: Relative Times Chooser

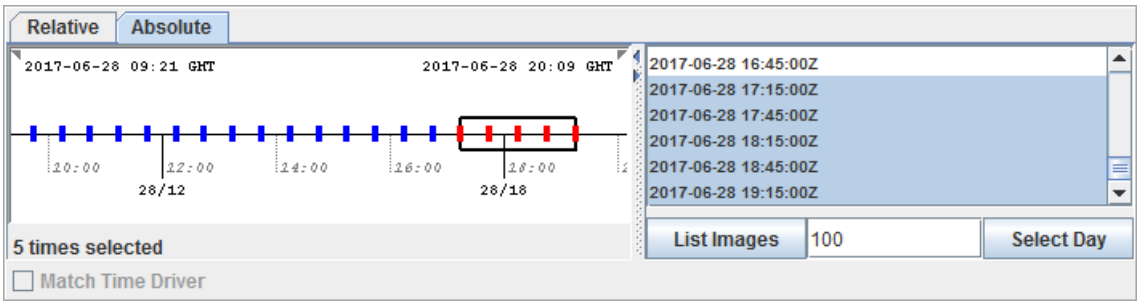


Image 2: Absolute Times Chooser

Date Selection

The date selection settings can be accessed by right-clicking in the timeline to show a popup menu. The menu allows for defining these settings through a Properties dialog or setting them directly with sub-menu choices. The date selection settings are listed below.

Properties - Opens a Date Selection window, where a starting and ending time, as well as an interval, max number of images, and a skip factor can be set.

Set Visible Range - Stretches out the timeline seen in the **Absolute** tab to cover the selected time range.

Set Date Selection - Selects all of the times in the time range selected.

Use Visible Range - Selects all of the times currently visible in the **Absolute** tab.

Start/End date - Defines the range to look within.

Interval - Allows for selecting dates every N time units.

Skip Factor - Skips every N'th time that would be selected.

Count - Specifies a max number of times that will be selected. Only the most recent N times will be selected.

Sunrise/Sunset - Shades the background of the times in yellow when the sun is up, and in white when the sun is down.

Before/After Range - Displays as the little gray triangles in the timeline. By default, the ranges that we use are one half the size of the interval. However, the user can set the range both before and after the interval tick. So for example, if the user want to just consider times within 15 minutes before the interval but nothing after the interval set the Before Range to be 15 minutes and the After Range to be 0 minutes.

The View Managers use the timeline to show the animation time set and the times of the different displays. Here, the timeline is used for informational purposes and is not used to select times. This can be shown through the **View->Animation Timeline** menu from the Main Display window. The gray timeline represents non-visible displays. Double clicking in a timeline sets the animation step to that time.

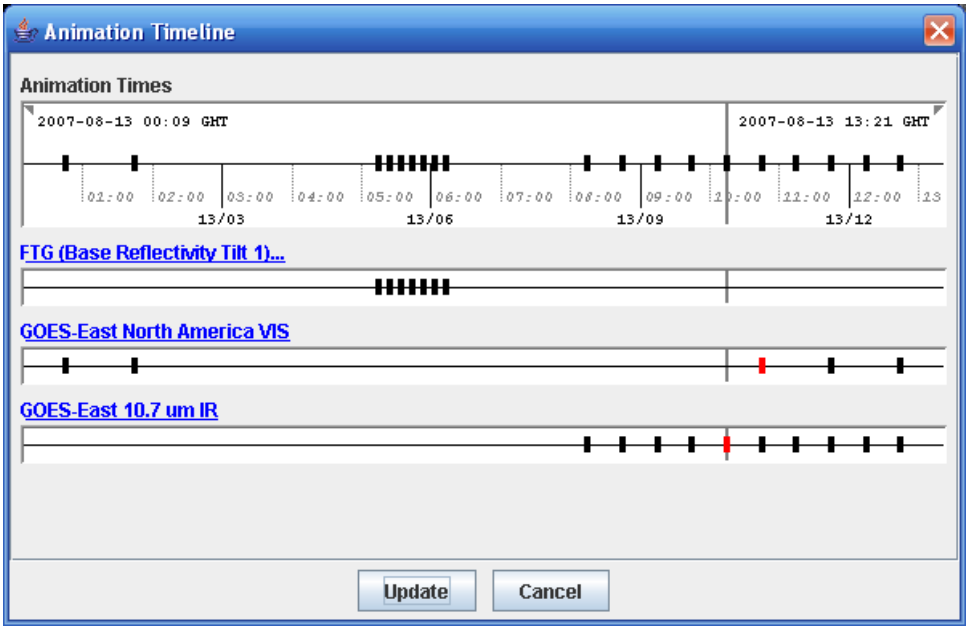


Image 3: Animation Timeline Window

Timeline Navigation

The timeline supports a variety of navigation mechanisms:

Event	Action
Left Mouse Drag	Change visible range or date selection range.
Left/Right Arrow	Change visible range. Use Ctrl+Key to change date selection. Use Shift+Key to use larger increment.
Up/Down Arrow	Zoom in/out visible range. Use Ctrl+Key to change date selection. Use Shift+Key to use larger increment.
Mouse Click; Control-Click; Shift-Click	Select individual times, multiple times or a range of times
Shift-Drag	When not showing the date selection mechanism you can choose a range of times with shift-drag
Right Mouse Click	This brings up a popup menu that allows you to show the properties dialog, go to particular current date ranges, set the interval, range, skip factor and count of the date selection.

Tools

- User Preferences
- Remote Data Manager
- Local Data Manager
- Weather Text Product Controls
- Storm Track Controls
- Color Table Editor
- Layout Model Editor
- Parameter Alias Editor
- Parameter Defaults Editor
- Parameter Groups Editor
- Projection Manager
- Data Analysis
- Display Settings
- Plugin Creator
- Plugin Manager

User Preferences

Preferences are used to save standard settings of McIDAS-V, such as the map projection to show when McIDAS-V starts. The Preferences Dialog is opened in the Main Display window through the Edit menu with **Edit->Preferences**.

Click on Cancel if you wish to exit preferences setting, Ok to accept the changed preferences and close this window, and Apply to accept the preferences and keep this window open.

Note: Some of these preferences only take effect the next time you run McIDAS-V or when you create a new view window. The preferences also may be overwritten when you use bundles.

The follow sections describe the different user preference options for McIDAS-V:

- General Preferences
- Display Window Preferences
- Toolbar Options Preferences
- Data Sources Preferences
- ADDE Servers Preferences
- Available Display Preferences
- Navigation Controls Preferences
- Formats and Data Preferences
- Advanced Preferences

General Preferences

The User Preferences window is accessed in the Main Display window through the **Edit->Preferences** menu. The **General** tab allows the user to configure many of the general settings within McIDAS-V. The image below represents the default settings for the **General** tab.

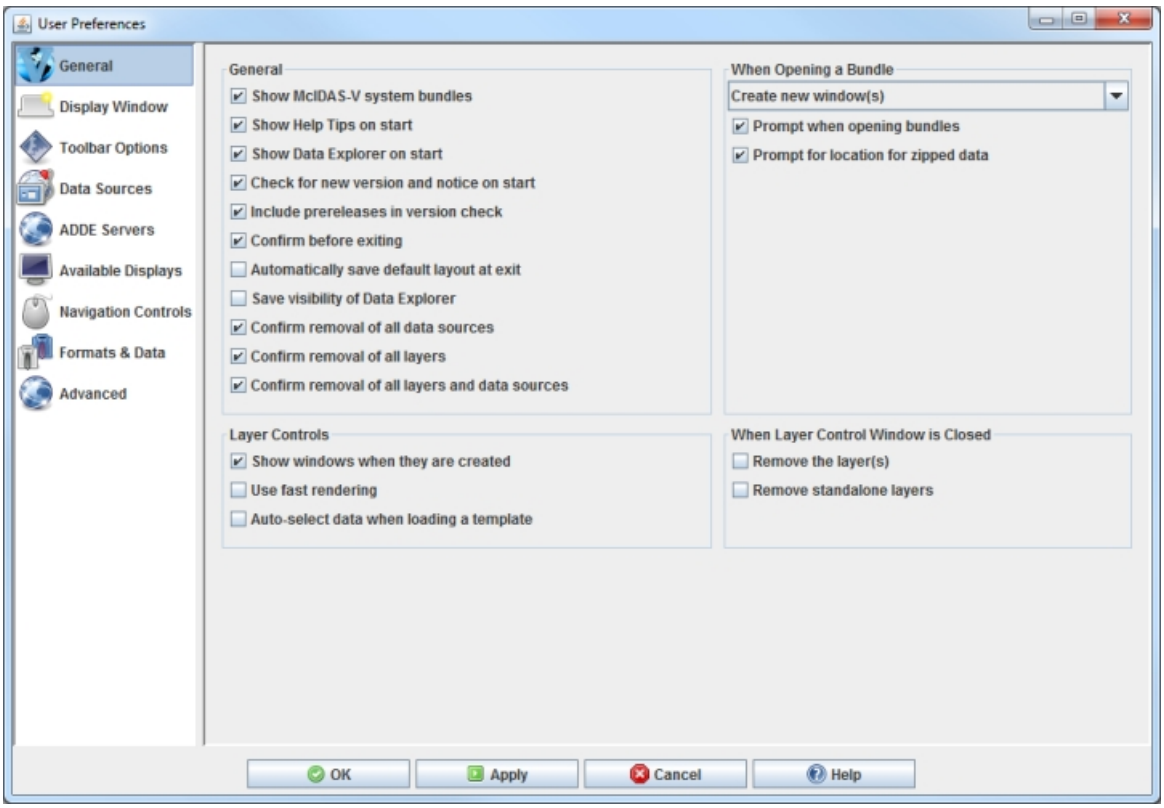


Image 1: General Preferences (Default)

General

Shows McIDAS-V system bundles - Includes the Current WX System Bundles on the Main Toolbar of the Main Display window. These are bundles that are designed to show some general features of McIDAS-V.

Show Help Tips on start - Displays the help tip window on start up.

Show Data Explorer on start - Opens the Data Explorer window when McIDAS-V starts.

Check for new version and notice on start - Checks at startup to see if the current version of McIDAS-V is up to date and checks for important notices from SSEC.

Include prereleases in version check - Checks at startup to see if there is an updated prerelease version ready for download.

Confirm before exiting - Asks the user to confirm before the exiting McIDAS-V.

Automatically save default layout at exit - Stores the position of the Data Explorer for the next session.

Save visibility of Data Explorer - Stores the visibility of the Data Explorer for the next session.

Confirm removal of all data sources - Asks the user to confirm before removing all data sources.

Confirm removal of all layers - Asks the user to confirm before removing all layers.

Confirm removal of all layers and data sources - Asks the user to confirm before removing all layers and data sources.

When Opening a Bundle

How to open bundle - Determines how the bundle will open. The dropdown list contains four options for opening bundles: Create new window(s), Merge with active tab(s), Add new tab(s) to current window, and Replace session.

Prompt when opening bundles - Opens a window asking how to open the bundle, allowing for the user to choose each time a bundle is opened.

Prompt for location for zipped data - Allows for specifying a directory to place zipped data files, or choose to create a temporary directory.

Layer Controls

Show windows when they are created - Specifies that when a display is created its control window is automatically shown.

Use fast rendering - Uses fast rendering to display data layers (images, contours, etc.); see Performance Tuning for more information. A separate fast rendering option for map layers is available in the Map Controls.

Auto-select data when loading a template - Auto-selects the data when loading in a display template bundle. A display template is created in the Layer Controls tab through the Save Display as Favorite menu item. Note that display templates don't store the data, so in order to load in a display template bundle, the data must first be added by the user. When this option is turned off, a Field Selector window will appear when loading a display template bundle that allows for the selection of a field to display. When the option is turned on, the same field that was displayed when the display template was created will be automatically selected and displayed. Note that this option does not impact a user when selecting a display template through the Displays panel of the Field Selector.

When Layer Control Window is Closed

Remove the layer(s) - Specifies that when a display's window is closed then the layer itself is removed.

Remove standalone layers - Removes the layer when the window is closed for a standalone layer (i.e., one that does not have a display component in the Main Display window).

Display Window Preferences

The User Preferences window is accessed in the Main Display window through the **Edit->Preferences** menu. The **Display Window** tab allows the user to set preferences related to the Main Display window. The image below represents the default settings for the **Display Window** tab.

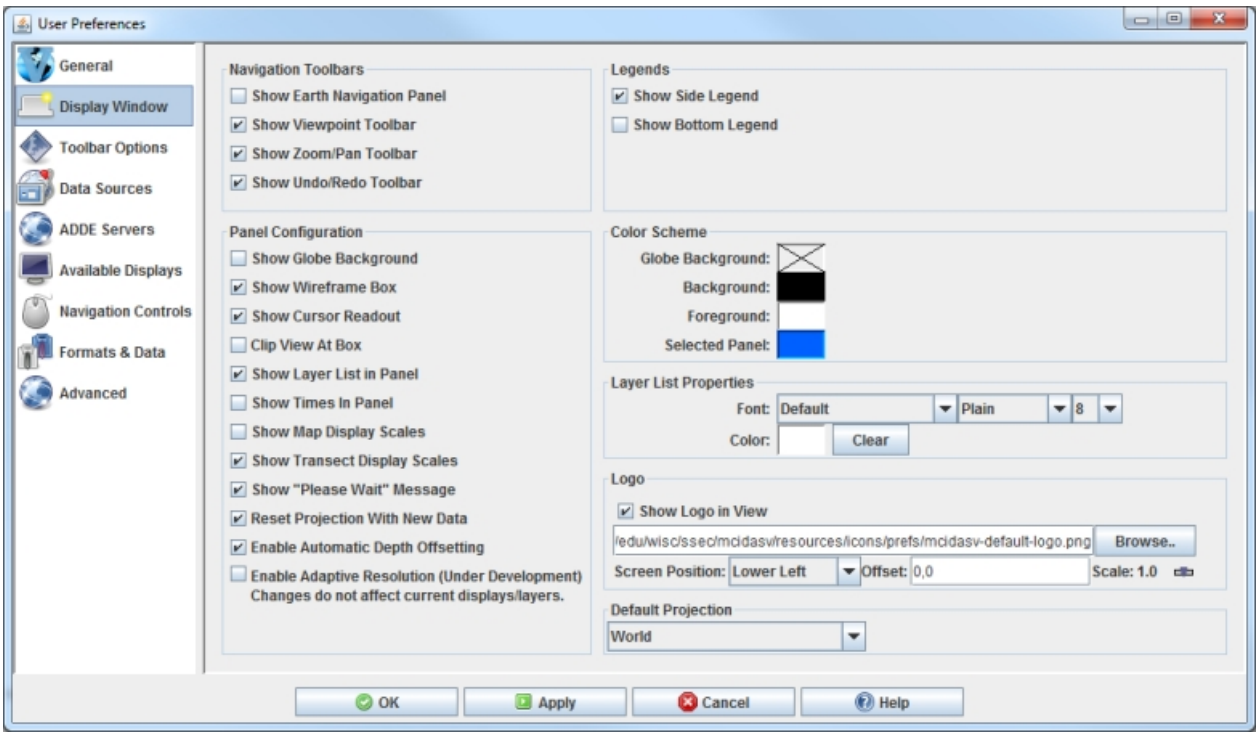


Image 1: Display Window Preferences (Default)

Navigation Toolbars

Show Earth Navigation Panel - Shows an Earth Navigation panel at the bottom of the display panel.

Show Viewpoint Toolbar - Enables the Viewpoint toolbar.

Show Zoom/Pan Toolbar - Enables the Zoom/Pan toolbar.

Show Undo/Redo Toolbar - Enables the Undo/Redo toolbar.

Legends

Show Side Legend - Lists the loaded layers into the Legend of the Main Display window. Note that you must create a new tab/window for a change to this preference to take effect.

Show Bottom Legend - Lists the loaded layers in a Legend at the bottom of the Main Display window. Note that you must create a new tab/window for a change to this preference to take effect.

Panel Configuration

Show Globe Background - Displays a solid globe background.

Show Wireframe Box - Toggles the visibility of a 3D wireframe box around the data. This box helps provide orientation in 3D views.

Show Cursor Readout - Displays a label of latitude, longitude, and altitude at the cursor position over the display, shown in the lower border of the Main Display window.

Clip View At Box - Allows the user to omit from view all display elements outside the wireframe box. This is helpful to remove map lines outside the area of data.

Show Layer List in Panel - Shows/hides the Layer Label at the bottom of the display panel.

Show Times In Panel - Adds a label to the display panel that shows the current animation time and step in the loop.

Show Map Display Scales - Adds vertical and horizontal scales to the wireframe box in the display panel.

Show Transect Display Scales - Shows a vertical scale for transect displays.

Show "Please Wait" Message - Displays a "Please Wait" message in the bottom left of the display panel when McIDAS-V is in the middle

of a process.

Reset Projection With New Data - Changes the projection to match the native projection of the newest data source added. This can be undesirable when overlaying several kinds of data, some of which have differing projections. However, it works well when working with data based on the same projection. Another option related to this is Auto-Set Projection.

Enable Automatic Depth Offsetting - Displays overlapping layers of differing resolutions in a way that there is no display interference when the display is rotated.

Enable Adaptive Resolution (Under Development) - Toggles adaptive resolution to be active or inactive for the session as a whole. If active, then any layers capable of utilizing adaptive resolution will use it. If inactive, then no layers will use adaptive resolution. Note that this feature is still under development. Any change to this setting will take affect for only new display panels created in the session. For more information, see Adaptive Resolution.

Color Scheme

Globe Background - Sets the color of the globe's background.

Background - Sets the color of the background behind the image being displayed.

Foreground - Sets the color of the wireframe box in the foreground.

Selected Panel - Sets the color in the frame around the selected panel/tab. This is the panel/tab that changes will be made to if you have multiple tabs open.

Note: The color of the maps is controlled by the individual map control. The selected panel color changes the color used to highlight the current panel.

Layer List Properties

Font - Sets the style of the text at the bottom of the display panel listing the layers. Using the dropdown lists, the user can define the font, style, and size of text.

Color - Sets the color of the text at the bottom of the display panel.

Logo

Show Logo in View - Sets the visibility of the logo in the display panel.

File - Sets the logo file to use. This can be an image file with the form of *.jpg, *.gif, or *.png.

Screen Position - Sets the position of the logo in the display panel. This can be Lower Left, Upper Left, Upper Right, Lower Right, or Center.

Offset - Sets the x,y pixel offset value from the **Screen Position** field. For example, to place a logo in the lower left of the display, but with a 10 pixel offset between the logo and the boarder of the window, you can specify a **Screen Position** of Lower Left with an **Offset** of 10,-10.

Scale - Sets the size of the logo in the display. A **Scale** of 1 would be the actual size of the image, anything less than 1 will scale the image down to make it smaller, and values greater than 1 will scale the image up to make it larger.

Default Projection

Default Projection - Sets the default map projection. This is the map projection that will be used in the display panel when McIDAS-V is started.

Toolbar Options Preferences

The User Preferences window is accessed in the Main Display window through the **Edit->Preferences** menu. The **Toolbar Options** tab allows the user to define what actions/icons are displayed in the toolbar. The list on the left shows all of the available actions. The list on the right shows the actions that make up the toolbar. The image below represents the default settings for the **Toolbar Options** tab.

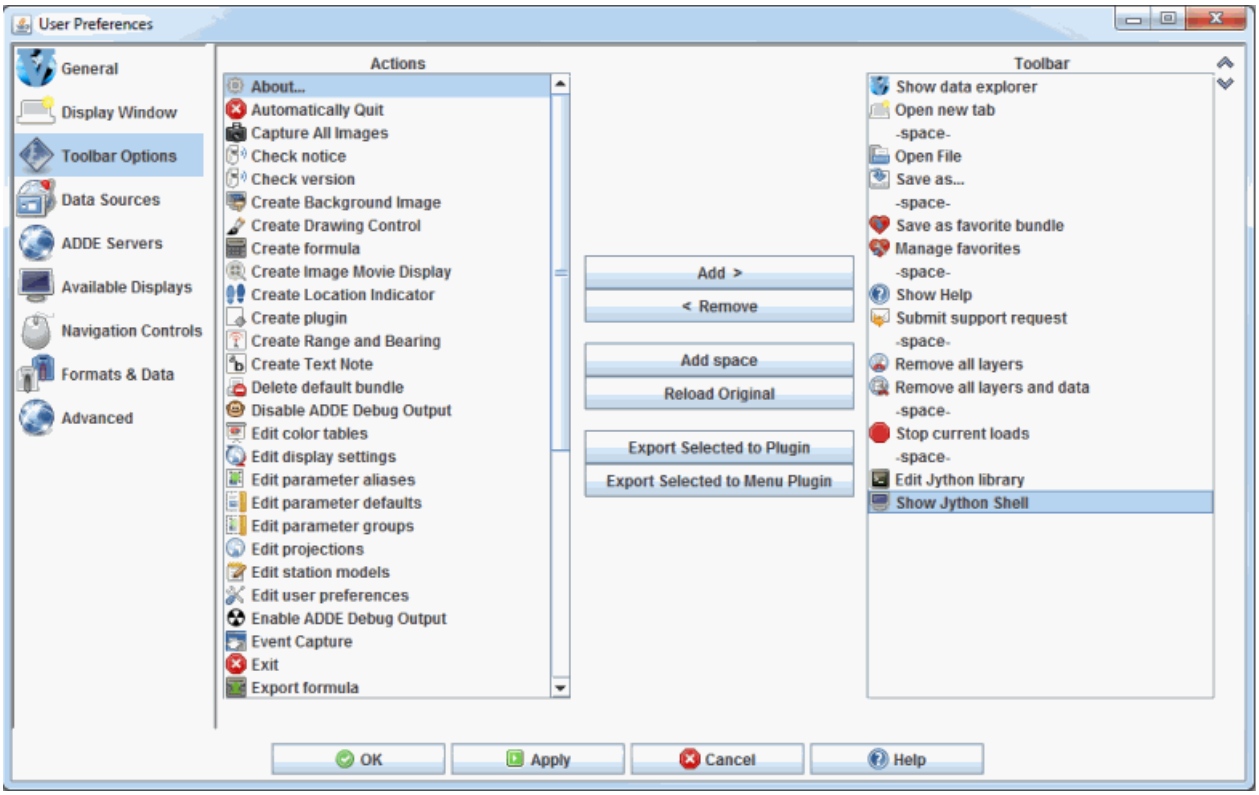


Image 1: Toolbar Options Preferences (Default)

Properties

Add > - Adds selected item on left column to the right column, bringing this item to the toolbar. You can also add an item by hitting the Right arrow.

< Remove - Takes selected from right column to the left column, removing this item from the toolbar. You can also remove an item by hitting the Left arrow or Delete.

Add space - Adds a space between the icons on your toolbar.

Reload Original - Undoes any user changes to the **Toolbar Options** tab, returning the Actions and Toolbar columns to the the way they were at the start of the session.

Export Selected to Plugin - Brings up the Plugin Creator window with the selected action included under the **Resources** tab.

Export Selected to Menu Plugin - Brings up the Export to Menu window where the user can enter in a Menu Name and select which menu to add the action under.

- Moves the selected action in the toolbar column up in the list, changing the location of the action in the toolbar.

- Moves the selected action in the toolbar column down in the list, changing the location of the action in the toolbar.

Data Sources Preferences

The User Preferences window is accessed in the Main Display window through the **Edit->Preferences** menu. The **Data Sources** tab allows the user to define what types of data choosers to use. This is a way to simplify the Data Explorer window by only showing the choosers that you want to use. Note that you must restart McIDAS-V for any changes made in this tab to take effect. The image below represents the default settings for the **Toolbar Options** tab, with all data sources turned on.

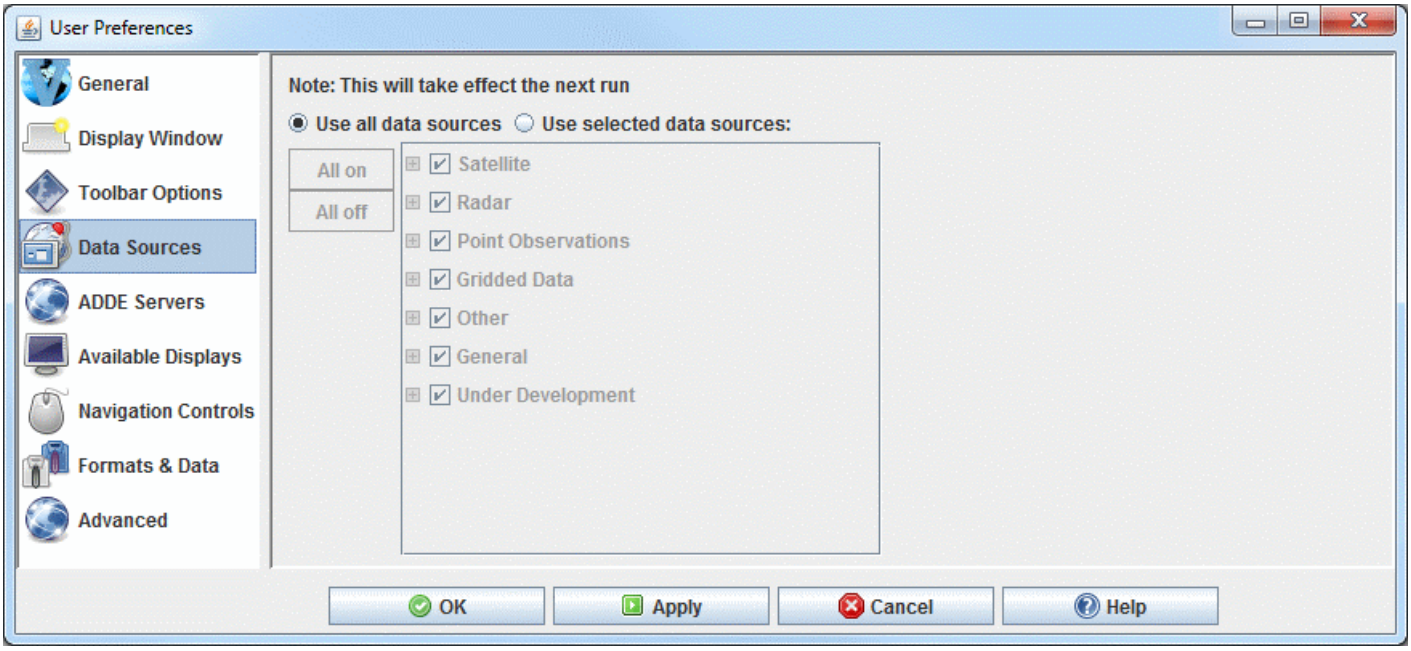


Image 1: Data Sources Preferences (Default)

Properties

Use all data sources - Utilizes all data sources. This makes all choosers available in the **Data Sources** tab of the Data Explorer

Use selected data sources - Utilizes only selected data sources. This allows the user to turn on or off individual data sources. Only data sources that are on will appear as choosers in the **Data Sources** tab of the Data Explorer.

All on **-** Selects all data sources. This makes all choosers appear in the **Data Sources** tab of the Data Explorer.

All off **-** Unselects all data sources. This makes no choosers appear in the **Data Sources** tab of the Data Explorer.

ADDE Servers Preferences

The User Preferences window is accessed in the Main Display window through the **Edit->Preferences** menu. The window is also accessible by clicking the **Manage servers** button ( ) next to the server name of the applicable choosers in the **Data Sources** tab of the Data Explorer. The **ADDE Servers** tab allows the user to add and manage a list of active ADDE servers separated by data type. The selected ADDE entries will be included in the list of servers in the **Data Sources** tab of the Data Explorer. Limiting the number of servers in the **Data Sources** tab will make it easier to find the desired sources of data.

The list of ADDE Servers is hierarchial, meaning that you can turn off all servers, specific groupings of servers (ex. Point), or individual servers within a group (ex. adde.ssec.wisc.edu/RTPTSRC can be turned off under POINT, but the rest can remain selected).

The image below represents the default settings for the for the **ADDE Servers** tab. All of the ADDE entries are checked on except for 'NAV' and 'UNKNOWN'.

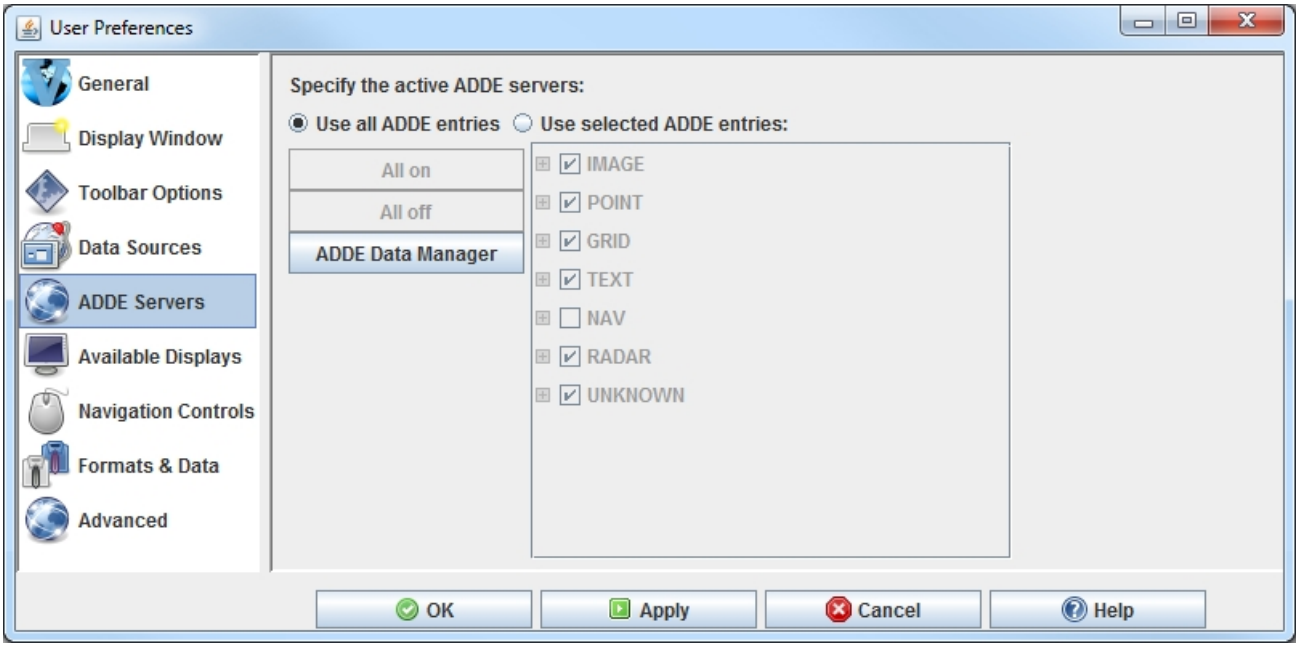


Image 1: ADDE Servers Preferences (Default)

Properties

Use all ADDE entries - Selects all of the ADDE entries. With this option selected, it is possible to use every type of ADDE data in McIDAS-V.

Use selected ADDE entries - Uses only selected ADDE entries. This option allows you to individually select which types of ADDE servers are available to be used.

All on - Selects all of the ADDE entries. With this option selected, it is possible to use every type of ADDE data in McIDAS-V.

All off - Unselects all of the ADDE entries.

ADDE Data Manager - Opens the ADDE Data Manager where a remote server or a local server can be added, removed, or edited.

Available Displays Preferences

The User Preferences window is accessed in the Main Display window through the **Edit->Preferences** menu. The **Available Displays** tab allows the user to specify what types of displays to use. The chosen displays can possibly be included in the Displays list in the **Field Selector** if the field you are displaying incudes the display type in its properties. Choosing what displays you want to appear in the **Field Selector** will limit the number of displays in the list, making it easier to create your desired image.

The list of display types is hierarchial, meaning that you can turn off all displays, specific groupings of displays (ex. Plan Views), or individual display types within a group (ex. Color-Shaded Plan View can be turned off under Plan Views, but the rest can remain selected).

The image below represents the default settings for the **Available Displays** tab. Every display is selected on by default.

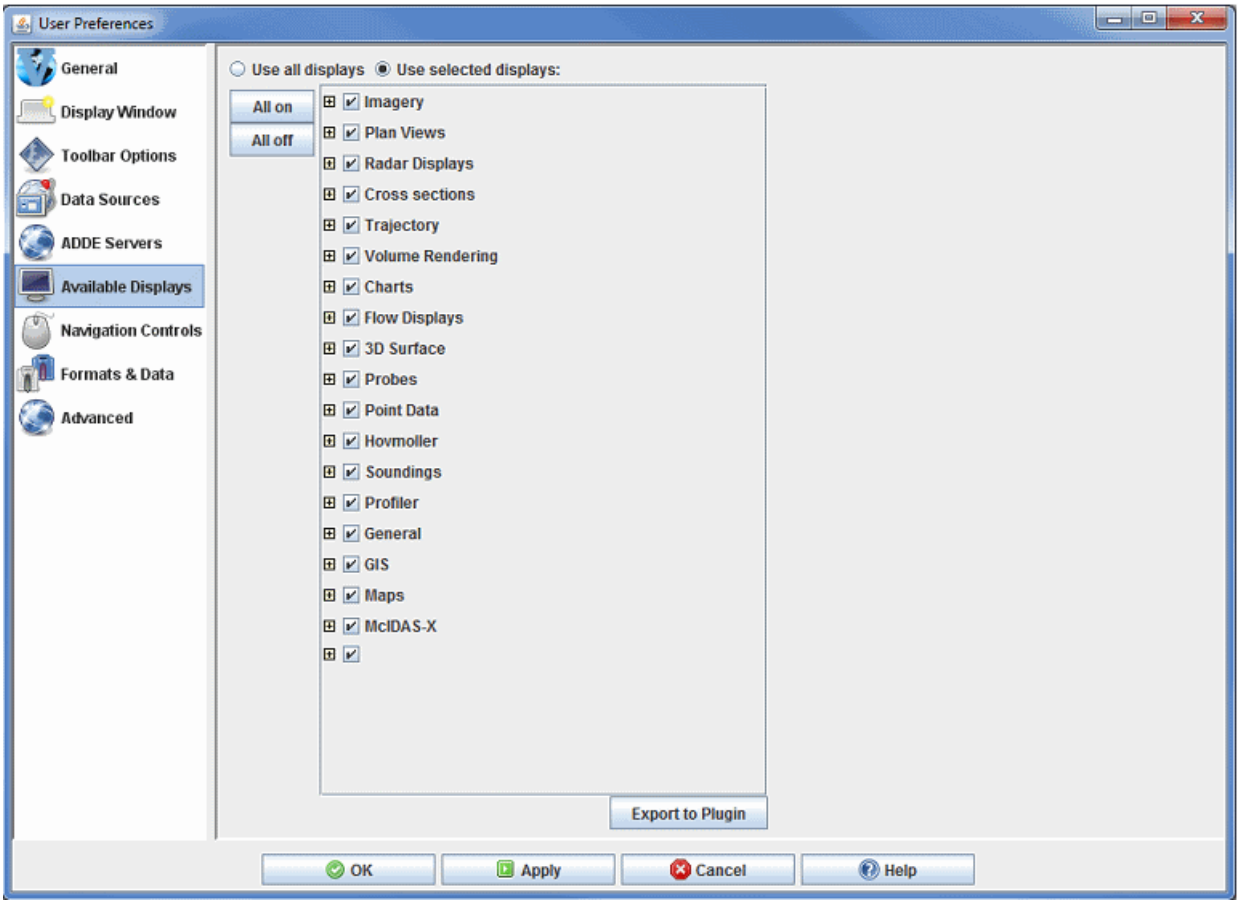


Image 1: Available Displays Preferences (Default)

Properties

Use all displays - Selects all of the displays. With this option selected, it is possible for every display type in McIDAS-V to be used to create a display.

Use selected displays - Uses only selected displays. This option allows you to individually select which display types are available to be used. The display types you leave checked can be used by McIDAS-V to create displays.

All on **-** Selects all of the displays. With this option selected, it is possible for every display type in McIDAS-V to be used to create a display.

All off **-** Unselects all of the displays. With none of the display types selected, you will not be able to create any displays in McIDAS-V. However, this can be a useful starting point if you only want to utilize specific displays, as it allows you to individually select on a few display types without having to unselect the rest of them.

Navigation Controls Preferences

The User Preferences window is accessed in the Main Display window through the **Edit->Preferences** menu. The **Navigation Controls** tab allows the user to change how McIDAS-V interprets mouse and keyboard events for navigating in 3D space. The user can choose to use the navigation defaults for the IDV, VisAD, Google Earth, or create their custom navigation settings. The below images represent the default **Custom** settings for the mouse and keyboard in the **Navigation Controls** tab.

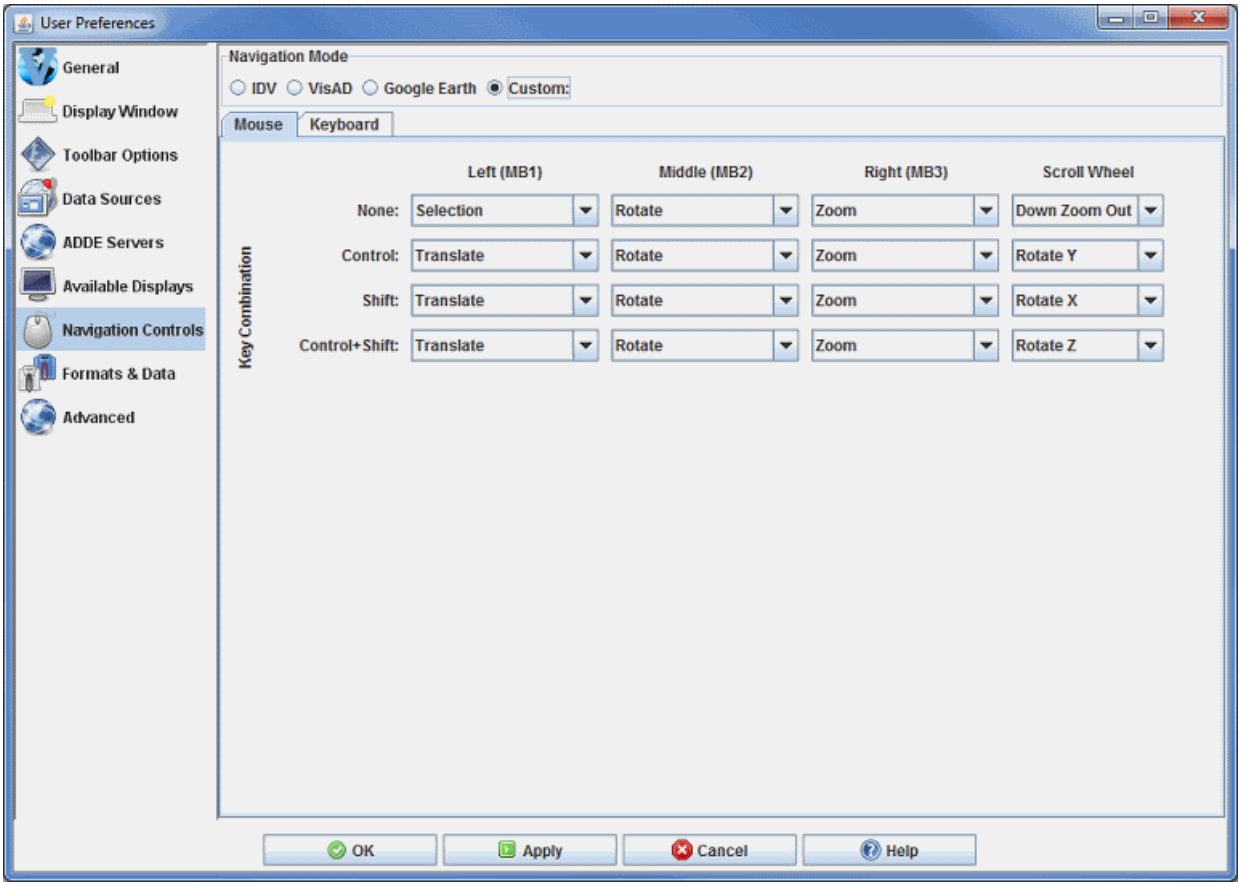


Image 1: Mouse Navigation Controls (Default)

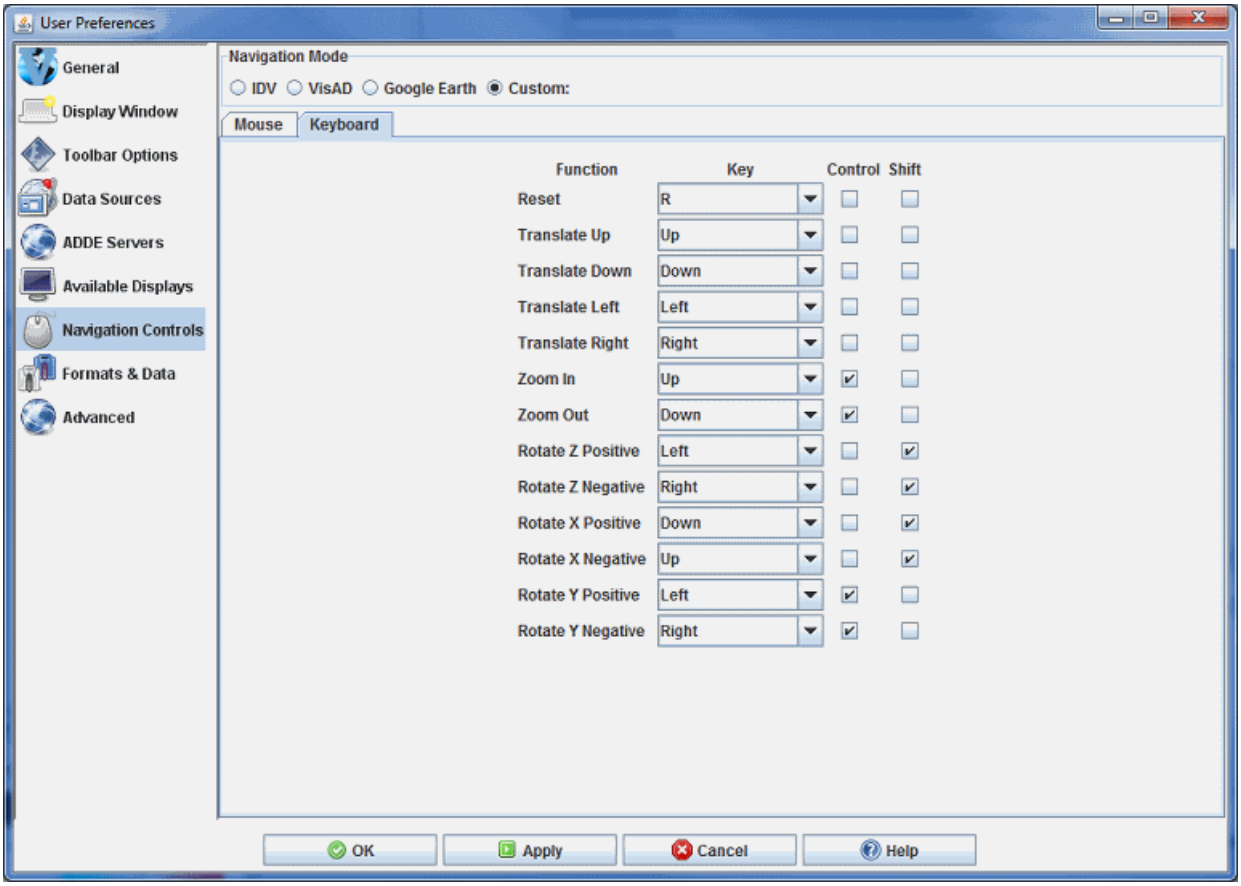


Image 2: Keyboard Navigation Controls (Default)

Properties

Function - This is how McIDAS-V interprets mouse and keyboard events for navigating in 3D space. The functions for each key combination can be changed in the dropdown boxes in the **Mouse** tab, and are listed in the Function column of the **Keyboard** tab. The available functions are listed below.

None - Will not perform any tasks when the key combination on the mouse or keyboard is performed.

Rotate - Rotates the display. While most useful in the globe projection, it can be used at any time. If Rotate is followed by X, Y, or Z, that is the axis the display will rotate about. If there are no letters proceeding rotate, then the user can rotate the image about any axis. Negative and positive denote the direction that the image will rotate.

Zoom - Zooms in to magnify a specific portion of the display, or zooms out to get a broader view. On the scroll wheel, **Down Zoom In** means if you scroll down, the image will be magnified at the center of the display, while scrolling up will zoom out. The opposite is true for **Down Zoom Out**.

Translate - Shifts the entire image in any direction with respect to the stationary background.

Selection - Moves selector points in displays when no keys are pressed or when Ctrl is pressed. Creates a rubber band zoom box when pressing the Shift key or Ctrl+Shift.

Cursor/Data Readout - Probes the data. Information of latitude/longitude and other variables plotted on the map will be displayed at the location your cursor is centered over the image.

Key Combination - Mouse and keyboard key combinations can be defined to perform the above functions in McIDAS-V. The available keys are listed below.

None - With None selected, it is not necessary to hold down a key while pressing your defined key or mouse click for a given function.

Control - The Control key must be held down while pressing your defined key or mouse click for a given function.

Shift - The Shift key must be held down while pressing your defined key or mouse click for a given function.

Ctrl+Shift - The Control and Shift keys must be held down while pressing your defined key or mouse click for a given function.

Left (MB1) - The left mouse button must be held down while pressing your defined key for a given function.

Middle (MB2) - The middle mouse button must be held down while pressing your defined key for a given function.

Right (MB3) - The right mouse button must be held down while pressing your defined key for a given function.

Scroll Wheel - The scroll wheel must be scrolled down or up while pressing your defined key for a given function.

Key - The keyboard key must be held down while pressing your defined key for a given function.

Formats and Data Preferences

The User Preferences window is accessed in the Main Display window through the **Edit->Preferences** menu. The **Formats & Data** tab allows the user to define data formats and defaults to be used when displaying data. The below image represents the default values for the **Formats & Data** tab.

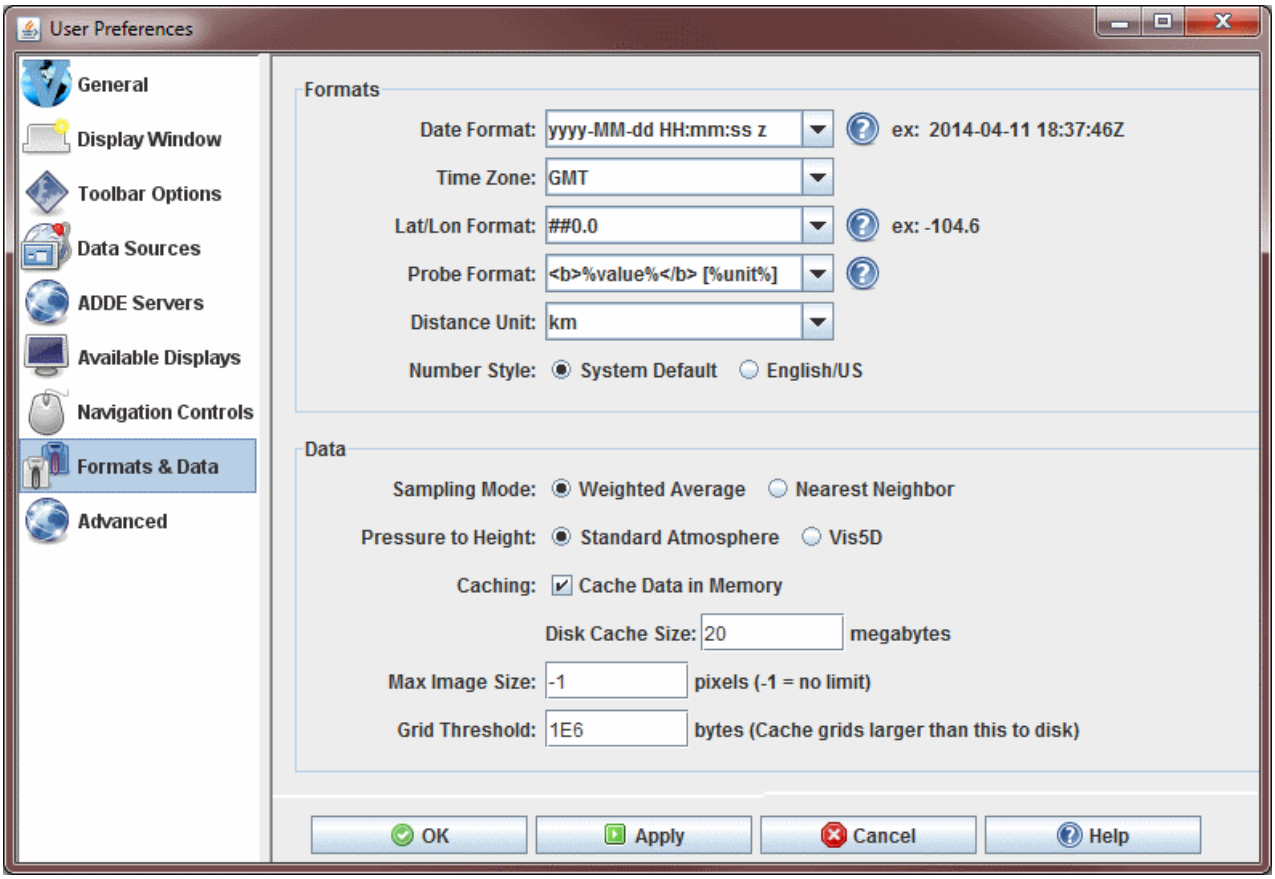


Image 1: Formats and Data Preferences (Default)

Formats

Date Format - Sets the format used when McIDAS-V displays dates. The date format string uses the following symbols. Note, these symbols can be repeated to give different results.

For example:

```
"MMMM" gives full month name "MMM" gives short month name "MM" gives 2 digit month
number "M" gives 1 or 2 digit month number
```

Symbol	Description	Presentation	Example
G	Era designator	Text	AD
y	Year	Number	1996; 96
M	Month in year	Text and Number	July; Jul; 07
w	Week in year	Number	27
W	Week in month	Number	2
D	Day in year	Number	189
d	Day in month	Number	10
F	Day of week in month	Number	2
E	Day in week	Text	Tuesday; Tue
a	Am/pm marker	Text	PM
H	Hour in day (0-23)	Number	0
h	Hour in am/pm (1-12)	Number	12
K	Hour in am/pm (0-11)	Number	0
k	Hour in day (1-24)	Text	24
m	Minute in hour	Number	30
s	Second in minute	Number	55

S	Millisecond	Number	978
z	Time zone	Text and Number	Pacific Standard Time; PST; GMT-08:00
Z	RFC 822 Time zone	Number	-0800
'	Escape for text	Delimiter	
''	Single quite	Literal	

Note: The "yyyy" year symbol can also be written as "yy" for recent data. However, it cannot be written as "y".

Ex: The day 215 in the year 2009 would be written as "09215" yyDDD and not "9215" yDDD.

Time Zone - Sets the time zone used by McIDAS-V. McIDAS-V will utilize this time zone for labeling the times of data that you bring in, as well as for listing the time in the status bar in the Main Display window. This field defaults to GMT. Note that you must restart McIDAS-V for a change in this field to take effect.

Lat/Lon Format - Represents the format used when McIDAS-V displays latitudes and longitudes. The following symbols are valid in the decimal formatting.

0	Digit
#	Digit, zero shows as absent
.	Decimal separator or monetary decimal separator
-	Minus sign
,	Grouping separator
E	Separates mantissa and exponent in scientific notation.
;	Subpattern boundary Separates positive and negative subpatterns

The table below shows a list of example formats and the resulting display in the latitude and longitude values.

Format	**Example**
##0	-95
##0.0	-94.6
##0.0#	-94.56
##0.0##	-94.563
0.0	-094.6
0.00	-094.56
0.###E0	1.04E2
000.#E0	104.6E0

Probe Format - Represents the HTML template that is used to display data readouts in the data probe display. This HTML template can contain macros that are replaced with the probed values. Macros are:

%value%	Formatted value
%unit%	Display unit
%rawvalue%	Unformatted value
%rawunit%	Original unit

Distance Unit - Represents the default unit that is used when displaying distances (e.g., in the Range and Bearing Control). Note that you must restart McIDAS-V for this change to take effect.

Number Style - Sets the format for how numbers will be written with regards to the decimal symbol and digit grouping symbol (either a comma or a period). The default for this option is **System Default**, which means that your computer's preference will be used for the number style in McIDAS-V. If your computer's format differs from English, you can set **Number Style** to **English/US**. For example, **English/US** will write out the numerical value of one thousand as "1,000.00". McIDAS-V must be restarted in order for a change to this preference to take effect.

Data

Sampling Mode - Represents the sampling method used by data probes in McIDAS-V. Choose between a weighted average sampling or nearest neighbor.

Pressure to Height - Represents the type of algorithm McIDAS-V uses for converting from pressure coordinates to height. See the FAQ for more information on this option.

Cache Data in Memory - Attempts to cache data that McIDAS-V loads into memory for quicker data access. For more information, see Data Caching.

Disk Cache Size - Represents the maximum amount of disk space used when caching data. McIDAS-V will cache some datasets to disk to eliminate network latency.

Max Image Size - Represents the maximum image size (in pixels) that is to be displayed. When this preference is set, the image display will adjust the Pixel Sampling to reduce the image to less than the preferred value. This allows for the initial display of large images without causing memory issues. A value of -1 in this field imposes no limit on the maximum image size.

Grid Threshold - Sets the size limit for holding grids in memory. Grids larger than this size will be cached to disk instead of held in memory during the McIDAS-V session. This allows loading large grids and long loops of grids without a major performance hit.

Advanced Preferences

The User Preferences window is accessed in the Main Display window through the **Edit->Preferences** menu. The **Advanced** tab allows for changing options that require a restart in order for them to take effect. To configure the settings before running McIDAS-V, execute the *runMcV-Config* command from the directory where McIDAS-V was installed (normally McIDAS-V-System) or by selecting **Configure McIDAS-V** in the Windows **Start** menu. The below image represents the default settings for the **Advanced** tab.

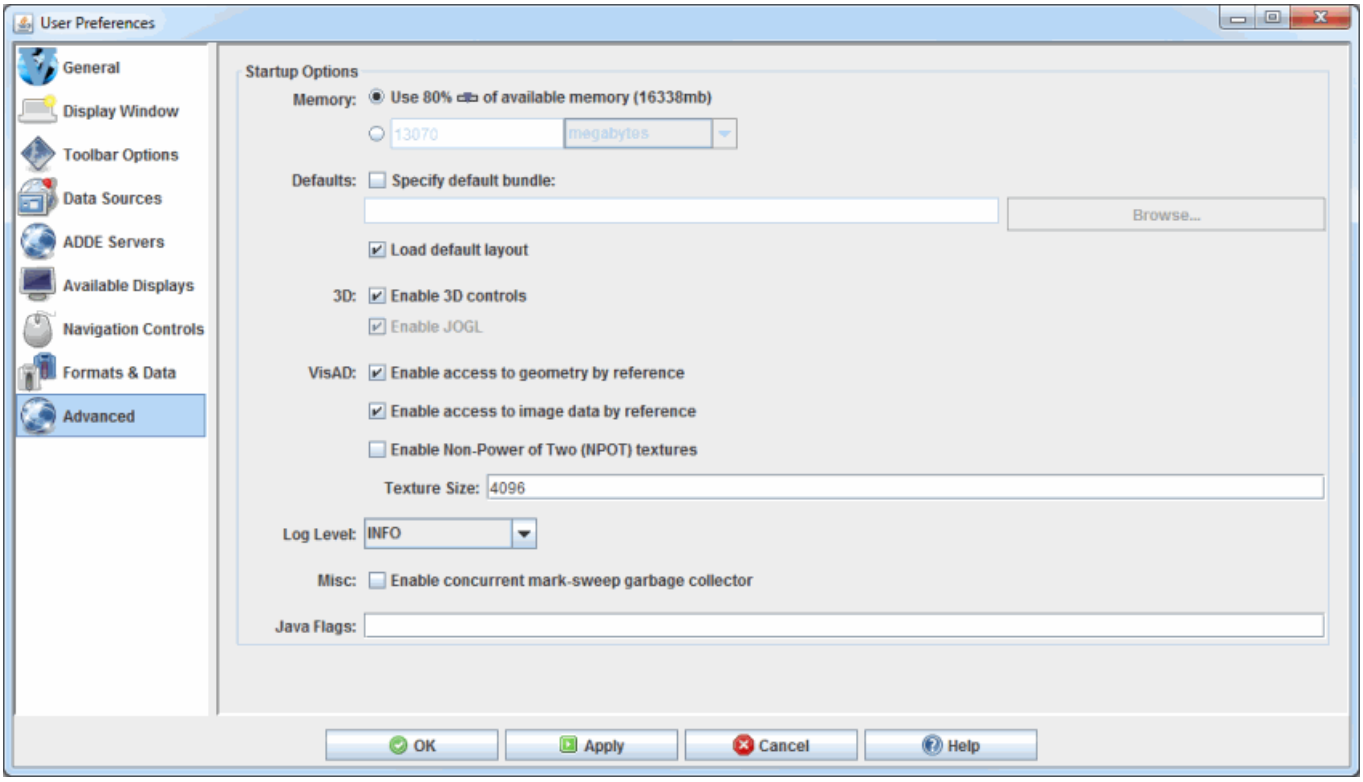


Image 1: Advanced Preferences (Default)

Startup Options

Memory - Sets the Java heap size, which is the amount of memory allocated by McIDAS-V at startup. Use the first bubble to choose a percentage of available memory, or use the second bubble to enter a specific value. The new amount of memory will be saved and used in subsequent sessions. For more information, see the Setting Memory Usage section in Downloading and Running McIDAS-V.

Specify default bundle - Loads the selected bundle at startup by setting the "-bundle" command line flag. Select a default bundle by clicking the Browse... button. This navigates to the McIDAS-V/bundles directory, where any favorite bundles will be listed.

Load default layout - Restores the previously-saved window configuration upon startup. Uncheck to use the initial window layout of one Main Display window with one panel. For more information, see the Menu Bar's Default Layout section.

Enable 3D controls - Controls the value of the "idv.3d" IDV property and gives the ability to view and navigate in 3D space with the 3D controls in the Main Display window's Viewpoint Toolbar. Uncheck to override the default 3D behavior of McIDAS-V and to switch to a 2D view with the Viewpoint Toolbar removed.

Enable JOGL (Mac OS X only) **-**Sets the "j3d.rend" property to "jogl", which sets Java3D to use JOGL (Java OpenGL) as the graphics rendering backend. Disabling will omit the "j3d.rend" property, causing Java3D to use its default OpenGL backend.

Enable access to geometry by reference - Sets the "visad.java3d.geometryByRef" property to true and enables the visualization of larger datasets because of the more efficient use of memory. Unchecking this option can help to remove random/extraneous map lines that sometimes appear in displays of image data. This is a problem that may occur more frequently on systems with ATI graphics cards.

Enable access to image data by reference - Sets the "visad.java3d.imageByRef" property to true and improves the rendering of satellite imagery in the satellite's native projection, removing the jagged edges at the limb and/or gaps at the dateline that sometimes appear in displays of image data. It is recommended that this option be checked.

Enable Non-Power of Two (NPOT) textures - Sets the "visad.java3d.textureNpot" property to true and enables the visualization of larger datasets because of the more efficient use of memory. Unchecking this option may be necessary on machines with graphics cards that do not support NPOT.

Texture Size - Sets the maximum number of pixels in a single texture or image. Textures that exceed the pixel count specified will be transparently split into multiple textures as needed.

Log Level - Sets the amount of logging information that will go to the mcidasv.log file in the /McIDAS-V/ directory. The options for this

menu item are **TRACE**, **DEBUG**, **INFO**, **WARN**, **ERROR** and **OFF**. **TRACE** puts the most logging information into the log file and the subsequent options put less information into the log file until **OFF** doesn't put anything in the log file. The default logging level is **INFO**. The log file will include lines for the chosen logging level, as well as any lesser logging levels. For example, **INFO** will include **INFO**, **WARN** and **ERROR** lines in the log file. Listed below is a description of what will be put in the log file for each of the settings:

TRACE - Outputs all logging information.

DEBUG - Outputs information about choosers, the start and exit of the session, error messages and stack traces.

INFO - Outputs information about the start and exit of the session, error messages and stack traces.

WARN - Outputs error messages and stack traces.

ERROR - Outputs error messages.

OFF - Outputs no information.

Enable concurrent mark-sweep garbage collector - Passes "-XX:+UseConcMarkSweepGC -XX:+CMSClassUnloadingEnabled" to the McIDAS-V JVM (Java Virtual Machine) and uses shorter garbage collection pauses by performing most garbage collection activity while the McIDAS-V threads are running. Unchecking this option uses the JVM defaults, which vary by Operating System.

Java Flags - Allows for manually entered Java flags to be used at the startup of McIDAS-V.

Remote ADDE Data Manager

The Local and Remote ADDE Data Managers are accessible in the Main Display window through the **Tools->Manage ADDE Datasets** menu item. Click the **Remote Data** tab to manage access to data on other workstations, or the **Local Data** tab to manage access to data on your workstation. Continue below for more information about the Remote ADDE Data Manager, or go to the Local ADDE Data Manager page for more information.

- Viewing the Existing Remote Datasets
- Adding a New Remote Dataset
- Editing an Existing Remote Dataset
- Removing an Existing Remote Dataset
- Importing MCTABLE...
- Menus

Viewing the Existing Remote Datasets

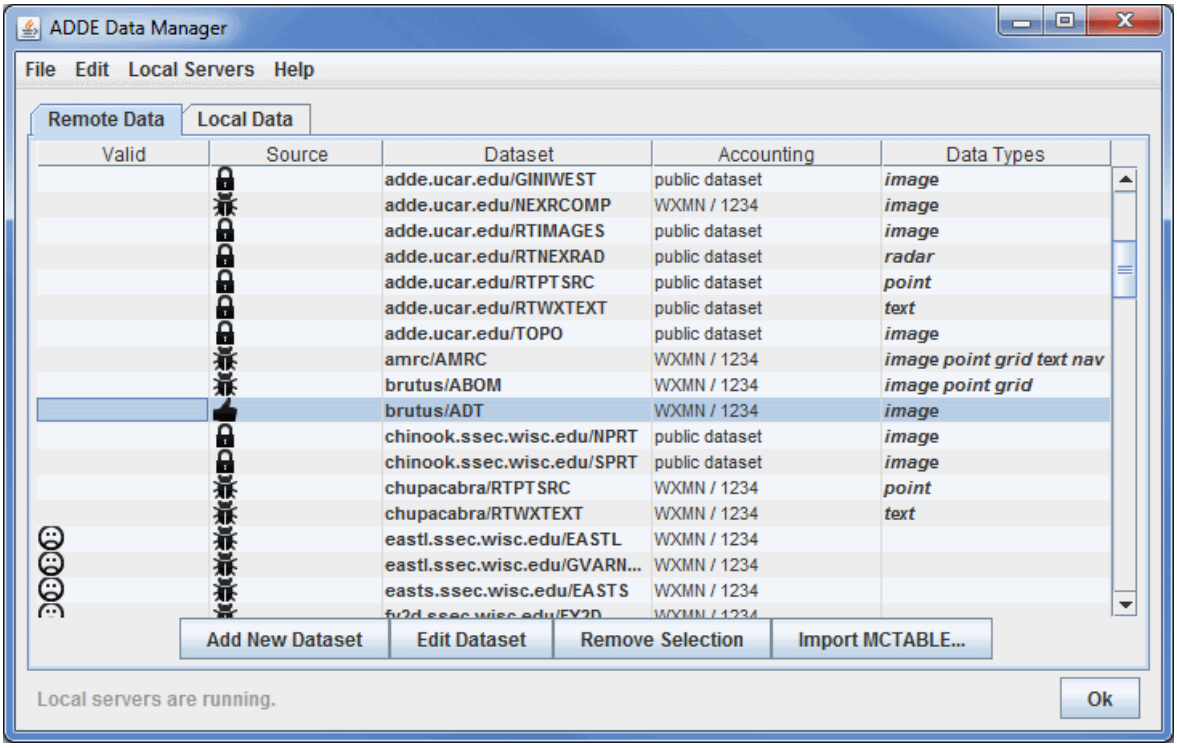


Image 1: Remote ADDE Data Manager

The Remote ADDE Data Manager lets you add, delete or edit access to remote datasets that are available through the **Satellite->Imagery** chooser. You can also import a MCTABLE.TXT file that contains a preexisting set of entries for the Remote ADDE Data Manager.

The columns in the table are defined below.

> **Valid -** An empty column (no icon) means that the entry passed a verification check (the specified dataset and data type exists on the server) when it was added. A sad-face icon (☹) indicates that the entry failed the verification check and thus will not work if you attempt to access data from the dataset. Once a MCTABLE is imported, this column will change to saying 'Checking...' while the datasets are being verified. If the dataset is valid, this column will be empty, or a sad-face icon will appear if there is a problem verifying the dataset.
>
> **Source -** Indicates the source of the entry. System entries (🔒) are ones supplied in the McIDAS-V package and thus are not editable. User entries (👍) are ones that were added by the user and thus are editable. MCTABLE entries (🐞) are ones that were added by importing MCTABLE.TXT file and are also editable.
>
> **Dataset -** Lists the server IP address and dataset name for the entry. When you access the dataset (by pressing the **Connect** button in the Data Explorer), an ADDE request is sent to the server, which then returns the requested data.
>
> **Accounting -** Indicates whether the entry includes accounting information (username and project number) for the server. These are the values specified in the **Username** and **Project #** fields in the Define New Remote Dataset window that appears when the **Add New Dataset** button is clicked. If accounting information was not specified, then the Accounting field entry says "public dataset".
>
> **Data Types -** Indicates the values that were selected in the Dataset Types section in the Define New Remote Dataset window that appears when the **Add New Dataset** button is clicked.

The rows in this window are listed in the alphabetical order of the datasets by default, and this order can be reversed by clicking on the name of the column ('**Dataset**'). Each column can be sorted alphabetically by clicking on the name of the column. At the bottom of this window, there is a status message that lets you know if local servers are running and does not affect remote servers. For more information this, please see Local ADDE Data

Manager.

The four buttons at the bottom of the window are described in the corresponding section below.

Add New Dataset - Opens the Define New Remote Dataset window.

Edit Dataset - Opens an Edit Remote Dataset window.

Remove Selection - Removes the selected dataset.

Import MCTABLE... - Opens an Open window that allows you to import a MCTABLE file.

Ok - Closes the ADDE Data Manger window and saves any changes.

Adding a New Remote Dataset

The window below appears if you click the **Add New Dataset** button or select the **File->New Remote Dataset** menu in the ADDE Data Manager window.

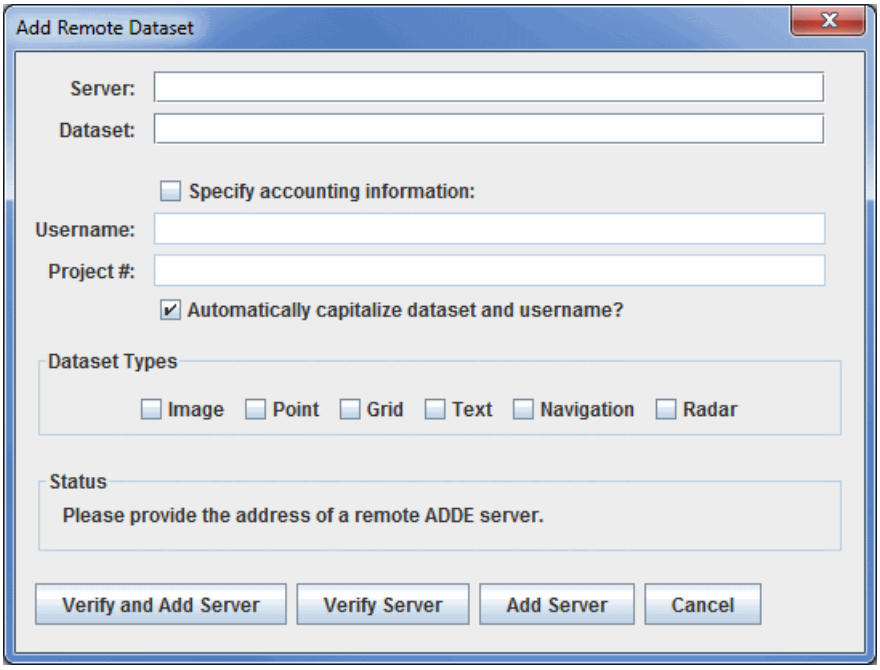


Image 2:Add Remote Dataset Window

The Add Remote Dataset window lets you add access to remote datasets so they are available through the Data Explorer.

The fields and buttons are defined below.

Server - Represents the IP address of the server workstation.

Dataset - Represents the ADDE dataset name. In McIDAS-X, this is often called the ADDE group name.

Specify accounting information - Enables text entry into thte fields if the server uses ADDE accounting to require the user to enter a username and project number to access the dataset. If the dataset is a public dataset, meaning that the server allows users to access the dataset without specifying a username and project number, then leave this box unchecked. If you are unsure whether it's a public dataset or one that requires a username and project number, click the **Verify Server** button and the Status field will say "Incorrect accounting information", and the **Username** and **Project #** fields will be highlighted in pink if a username and project number are required.

Username and **Project # -** Sets the username and project number required to be granted access to a dataset on a server that uses ADDE accounting to limit access to specific users. The valid usernames and project numbers for each server are assigned and maintained by the server administrator.

Dataset Types - Sets each of the types of data in the dataset. To find which types are available, click the **Verify Server** button and it will check the box of each available type.

Status - Indicates the status and provides instructions.

Verify and Add Server - Contacts the server and verifies that the valid dataset exists. Then, if everything is passes the verification tests, the new entry is added to the Remote ADDE Data Manager containing the information specified in this window. If the dataset is not valid, the **Status** will read "Dataset does not appear to be valid", and the **Dataset** field will be highlighted in pink. If there are problems connecting to the server listed, then the **Status** will read "Could not connect to the given server", and the **Server** field will be highlighted in pink.

Verify Server - Contacts the server and verifies that the valid dataset exists. Then, if everything is passes the verification tests, it adds a new entry to the Remote ADDE Data Manager containing the information specified in this window. If the dataset is not valid, the **Status** will read "Dataset does not appear to be valid", and the **Dataset** field will be highlighted in pink. If there are problems connecting to the server listed, then the **Status** will read "Could not connect to the given server", and the **Server** field will be highlighted in pink.

Add Server - Adds a new entry to the Remote ADDE Data Manager containing the information specified in this window. This option does not do any verification testing, so it's possible to add an incorrect dataset name, username, project number,etc.

Cancel - Closes the window and discards any information that was entered.

Editing an Existing Remote Dataset

If you highlight an editable entry in the ADDE Data Manager window and then click the **Edit Dataset** button, the window and fields are the same as above, except that the window title is **Edit Remote Dataset** and the bottom buttons say Verify and Save Changes, Verify Changes, and Save Changes (rather than Verify and Add Server, Verify Server, and Add Server).

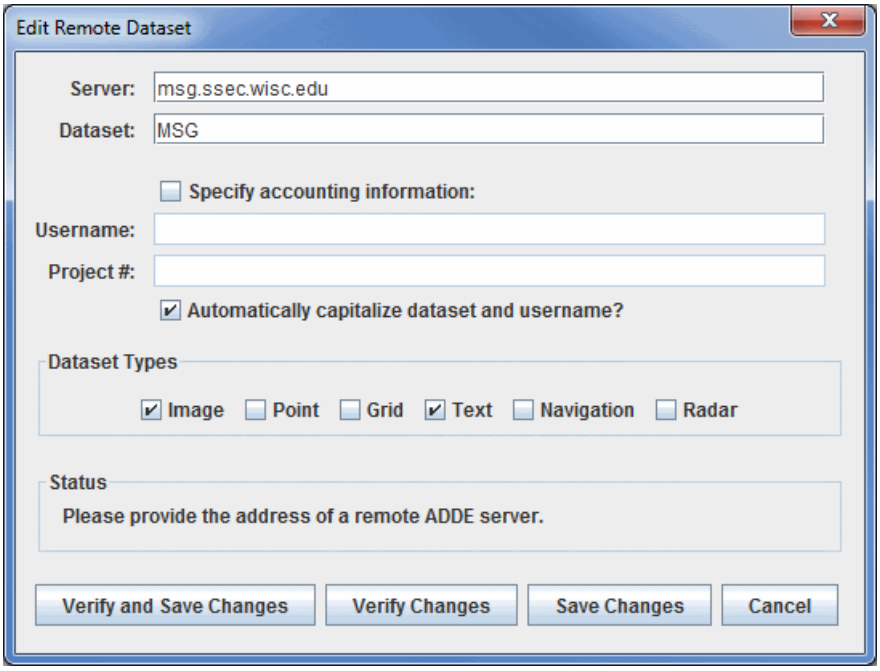


Image 3: Edit Remote Dataset Window

Note that you cannot edit any of the remote datasets that come with McIDAS-V.

Removing an Existing Remote Dataset

If you highlight an editable entry in the ADDE Data Manager window and then click the **Remove Selection** button, it immediately removes the entry from the table. There is no recovery option, so if you accidentally remove an entry you need, you will have to remake the entry using the **Add New Dataset** button. Note that you cannot remove any of the native remote datasets that come with McIDAS-V.

Importing MCTABLE...

The window below appears if you click the **IMPORT MCTABLE...** button in the Remote ADDE Data Manager window.

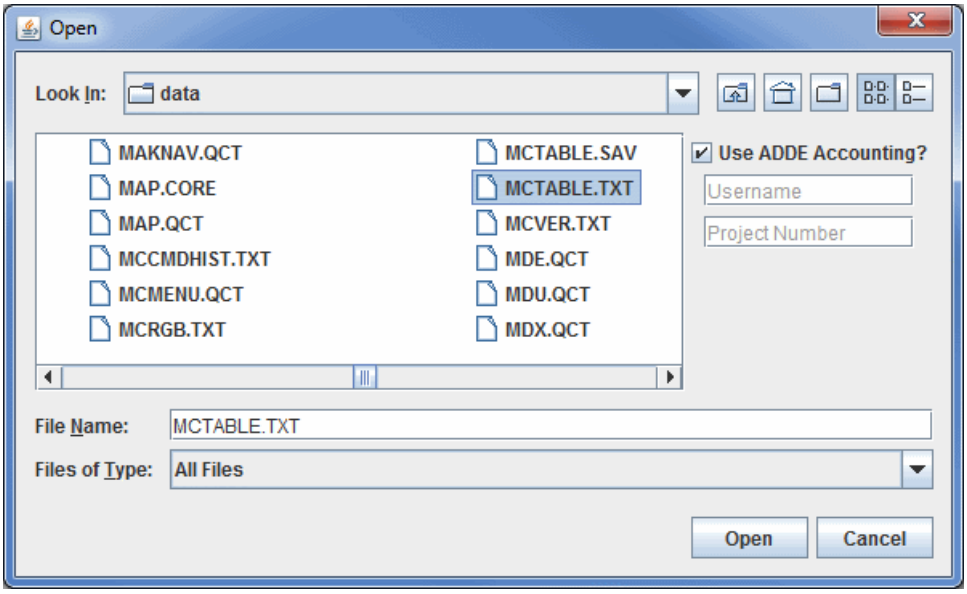


Image 4: Import MCTABLE Window

This window lets you import a MCTABLE.TXT file that contains a preexisting set of entries for the Remote ADDE Data Manager. For example, McIDAS-X users may have added access to many servers via the DATALOC command. Those entries are stored in the MCTABLE.TXT file, which can be imported to McIDAS-V.

The fields and buttons are defined below.

Look In - Selects the location of where to look for your MCTABLE.TXT file.

Up One Level - Moves you up one folder level in your local file system.

Desktop - Takes you to the Desktop folder of your local file system.

Create New Folder - Creates a new folder.

List - Switches the view to a listing of all folders and files in the current path.

Details - Switches the view to a detailed list of all folders and files in the current path.

Use ADDE Accounting? - Enables you to enter a Username and Project Number if the servers in the MCTABLE.TXT file you are importing use ADDE accounting. If you use different usernames and/or project numbers on some servers, you can edit them (via the **Edit Dataset** button in the Remote ADDE Data Manager window) after you import the file.

File Name - Selects the file that you are importing as your MCTABLE.

Files of Type - Narrows down the files shown in a folder to a specific data type.

Open **-** Imports the selected file so that its entries are added to the **Remote Data** tab of the ADDE Data Manager.

Cancel **-** Closes the window and discards any information that was entered.

Menus

A couple of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there are several menu options that are unique to this tool.

The **File** menu has these unique options:

New Remote Dataset - Opens a Add Remote Dataset window that prompts for information about the dataset.

New Local Dataset - Opens an Add Local Dataset window that prompts for information about the dataset.

Import MCTABLE... - Opens an Open window that allows you to import MCTABLE ADDE entries into the ADDE Data Manager.

Import from URL... - Opens an Import from URL window that allows you to specify a URL for a MCTABLE along with accounting information.

Close - Closes the ADDE Data Manager window.

The **Edit** menu has these unique options:

Edit Entry... - Opens the Edit Remote Dataset window, where you can edit the information about your local dataset. This window is the same as the Add Remote Dataset window.

Remove Selection - Removes the selected dataset from the list of local datasets. Note that you cannot remove the native datasets that come with McIDAS-V.

The **Local Servers** menu has these unique options:

Start Local Servers - Starts a new local server if your current one has stopped working.

Stop Local Servers - Stops the currently running local server.

Local ADDE Data Manager

The Local and Remote ADDE Data Managers are accessible in the Main Display window through the **Tools->Manage ADDE Datasets** menu item. Select the **Local Data** tab to manage access to image data on your workstation, or the **Remote Data** tab to manage access to data on other workstations. Continue below for more information about the Local ADDE Data Manager, or go to the Remote ADDE Data Manager page for more information.

- Viewing the Existing Local Datasets
- Adding a New Local Dataset
- Editing an Existing Local Dataset
- Menus

Viewing the Existing Local Datasets

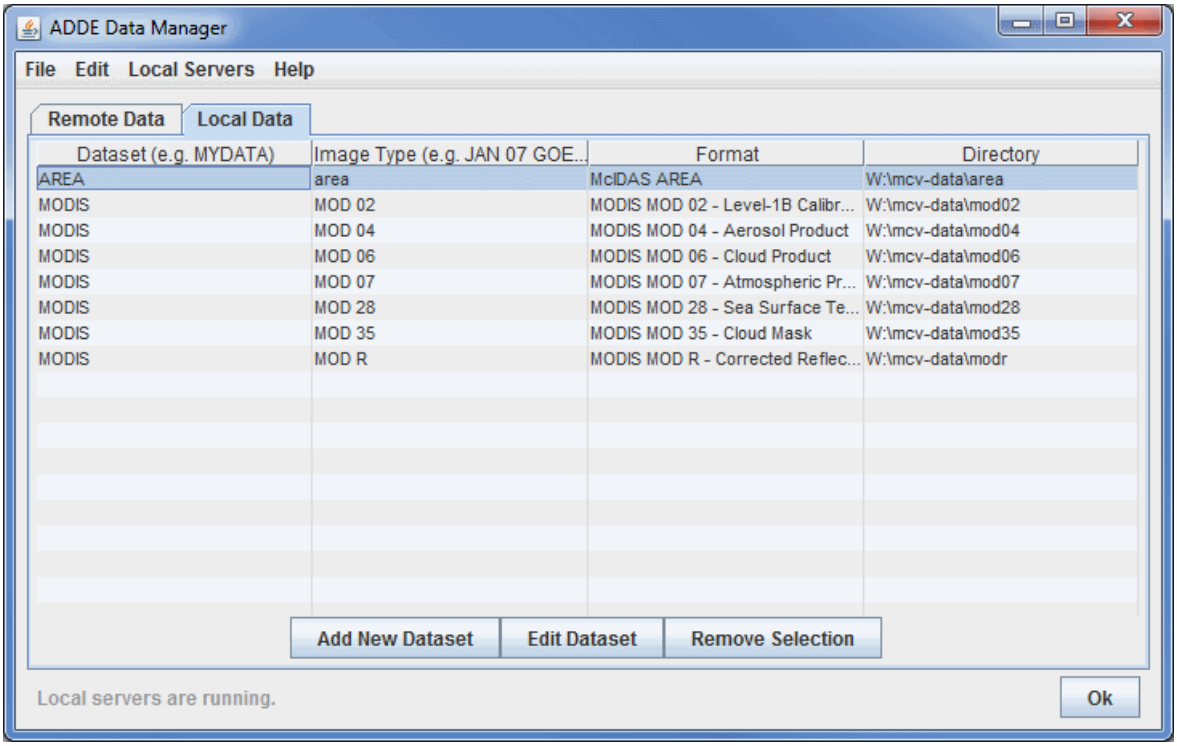


Image 1: Local ADDE Data Manager

The Local ADDE Data Manager lets you add, delete or edit local image datasets that are available through the **Satellite->Imagery** chooser when you select <LOCAL-DATA> in the **Server** field. Other types of data (e.g., grib or point) in local files can be accessed directly through other choosers (e.g., the **General->Files/Directories** chooser).

The columns in the table and buttons are defined below.

Dataset - Sets the dataset name for the local server entry. The dataset name is limited to eight characters or less.

Image Type - Sets the image type name for the new local server entry. This will appear under the **Image Type** pull down menu in the Satellite Imagery chooser.

Format - Sets the format of the image files. The following formats are supported in McIDAS-V:

- AMSR-E L 1b
- AMSR-E L 2a
- AMSR-E Rain Product
- GINI
- LRIT GOES-9
- LRIT GOES-10
- LRIT GOES-11
- LRIT GOES-12
- LRIT MET-5
- LRIT MET-7
- LRIT MTSAT-1R
- McIDAS AREA
- Meteosat OpenMTP
  - Note: There is a very specific file name convention that must be used for this server. This file name format differs from that of data ordered from EUMETSAT. For example, Meteosat-7 OpenMTP data ordered from EUMETSAT has these file name

conventions for IR, VIS, and WV bands:

IR - OpenMTP_2015-01-15_25_712345_1_1_1.IR
VIS - OpenMTP_2015-01-15_25_712345_1_1_1.VISSN
WV - OpenMTP_2015-01-15_25_712345_1_1_1.WV

These file names must be changed to:

IR - aixxx_m07_d20150115_s120000_n40_cness.omf
VIS - avxxx_m07_d20150115_s120000_n40_cness.omf
WV - awxxx_m07_d20150115_s120000_n40_cness.omf

Note that the time information in the modified file names (s120000 for 12 UTC) is not included in the original file names.

- Metop AVHRR L 1b
  - Note: This server works with data ordered from NOAA CLASS. This data must not be geographically subsetted. The data can be ordered in 10-bit files or 16-bit files (as long as all channels are included).
- MODIS L1b MOD02 (MODIS Level 1b)
- MODIS L2 MOD04 (MODIS Level 2 Aerosol)
- MODIS L2 MOD06 (MODIS Level 2 Cloud Top Properties)
- MODIS L2 MOD07 (MODIS Level 2 Atmospheric Profile)
- MODIS L2 MOD28 (MODIS Level 2 Sea Surface Temperature)
  - Note: When loading this data, you must use line/element for the Location, and use the raw size of the image, or a magnification with the lock icon unlocked)
- MODIS L2 MOD35 (MODIS Level 2 Cloud Mask)
- MODIS L3 MODR (MODIS Level 2 Corrected Reflectance)
- MSG HRIT FD and HRV
  - Note: McIDAS-V reads segmented MSG Level 1.5 files transmitted by EUMETSAT. The prologue files (*PRO*) must be in the same directory as the segmented data files or the images will not display. Note: To order segmented MSG files from EUMETSAT's Earth Observation (EO) Portal, select 'HRIT data sets in tar file' in the Format Type section of the Shopping Trolley tab.
- MTSAT HRIT
- NOAA AVHRR L 1b
  - Note: This server works with data ordered from NOAA CLASS. This data must not be geographically subsetted. The data can be ordered in 10-bit files or 16-bit files (as long as all channels are included).
- SSMI (TeraScan netCDF)
- TRMM (TeraScan netCDF)
- GOES-16 ABI
  - Note: This server is available on Linux and OS X platforms.
  - The files must be mission-standard Level 1b files in netCDF-4 format (like those from NOAA CLASS or decoded from the GRB data stream using CSPP Geo) or mission-standard Level 2+ products in netCDF-4 format (like those from NOAA CLASS). The names of files should look similar to **ABI-L1b-RadC-M3C01_G16_s2015229195720.nc** (current CSPP Geo naming convention) or **OR_ABI-L1b-RadC-M4C16_G16_s20151702215532_e20151702220362_c20151702220394.nc** (GOES-R Ground System naming convention).
- Himawari 8
  - Note: This server is available on Linux and OS X platforms.
  - The file names must match the JMA HSD (Himawari Standard Data) image file naming convention, **HS_aaa_yyyymmdd_hhnn_Bbb_cccc_Rjj_Skkll.DAT**, described in the *Himawari Standard Data User's Guide*.
- INSAT-3D Imager
  - Note: This server is available on Linux and OS X platforms.
- INSAT-3D Sounder
  - Note: This server is available on Linux and OS X platforms.

Directory - Represents the location of the local files using the pop up navigation box. **At this time, only a directory can be selected. An option to add files by file mask will be added in the future.**

Add New Dataset **-** Opens the Add Local Dataset window, allowing you to create a new local dataset.

Edit Dataset **-** Opens the Edit Local Dataset window, allowing you to edit the dataset that is currently selected in the **Local Data** tab.

Remove Selection **-** Removes the currently selected local dataset.

Ok **-** Closes the ADDE Data Manager window and saves any changes.

The rows in this window are listed in the alphabetical order of the datasets by default, and this order can be reversed by clicking on the name of the column ('Dataset'). Each column can be sorted alphabetically by clicking on the name of the column. At the bottom of this window, there is a status message that lets you know if local servers are running. The Server Manager will attempt to connect to ports 8112 to 8122. When port 8112 cannot be connected to, port 8113 will be attempted, and then 8114 and so on. After these ports have been stopped or cannot be connected to, the status message will say "Local servers have been stopped". When this status message is showing, you cannot connect to any local servers. To help avoid

connection problems, your firewall software must allow connections to port 8112.

Adding a New Local Dataset

To add a new local dataset entry, select **File->New Local Dataset** from the ADDE Data Manager menu, or click Add New Dataset.

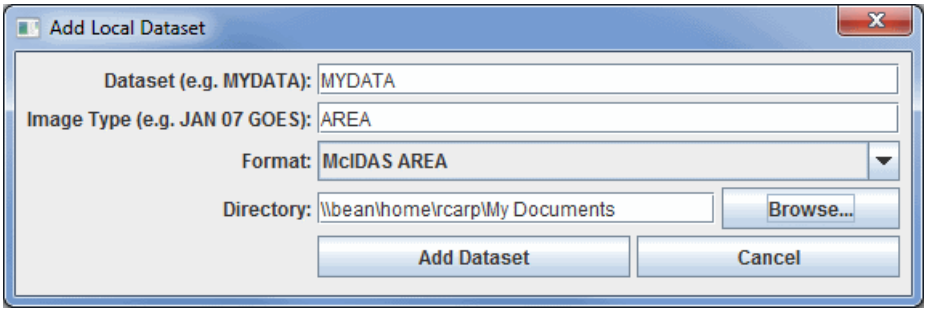


Image 2: Add Local Dataset Window

The Add Local Dataset window lets you add access to local image datasets so they are available through the **Satellite->Imagery** chooser. The fields and buttons are defined below.

Dataset - Represents the dataset name for the local server entry. The dataset name is limited to eight characters or less.

Image Type - Represents the image type name for the new local server entry. This will appear under the **Image Type** pull down menu in the Satellite->Imagery chooser. The image type name is limited to twelve characters or less.

Format - Represents format of the image files. See the above list for data formats that are supported as local datasets in McIDAS-V.

Directory - Represents the location of your files.

Add Dataset **-** Adds the new entry to the Local ADDE Data Manager containing the information specified in this window.

Cancel **-** Closes the window and discards any information that was entered.

Editing an Existing Local Dataset

To edit an existing entry, double click on the entry, select **Edit->Edit Entry...**, or click Edit Dataset to bring up the Edit Local Dataset window. Make the needed changes and click Save Changes (or click Cancel to discard any changes and close the window).

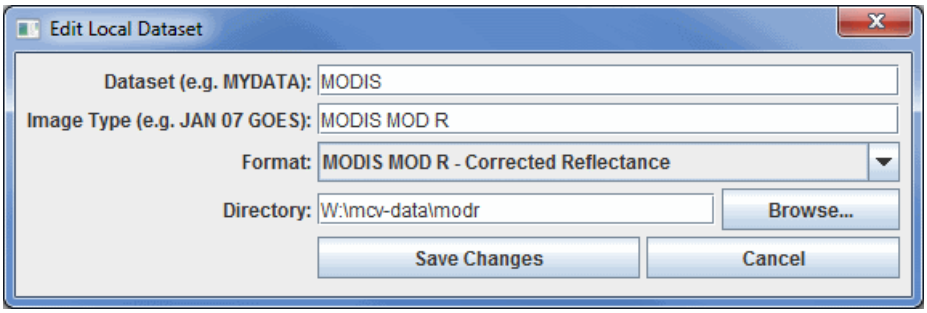


Image 3:Edit Local Dataset Window

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there are several menu options that are unique to this tool.

The **File** menu has these unique options:

New Remote Dataset - Opens a Define New Remote Dataset window that prompts for information about the dataset.

New Local Dataset - Opens an Add Local Dataset window that prompts for information about the dataset.

Import MCTABLE... - Opens an Open window that allows you to import MCTABLE ADDE entries into the ADDE Data Manager.

Import from URL... - Opens an Import from URL window that allows you to specify a URL for a MCTABLE along with accounting information.

Close - Closes the ADDE Data Manager window.

The **Edit** menu has these unique options:

Edit Entry... - Opens the Edit Local Dataset window, where you can edit the information about your local dataset. This window is the same as the Add Local Dataset window.

Remove Selection - Removes the selected dataset from the list of local datasets.

The **Local Servers** menu has these unique options:

Start Local Servers - Starts a new local server if your current one has stopped working.

Stop Local Servers - Stops the currently running local server.

Weather Text Product Controls

Overview

The Weather Text Product Control is used to display weather text products (forecasts, warnings, watches, etc.) produced by the National Weather Service and other international meteorological agencies. The Weather Text Product Display is accessed through the Main Display window via **Tools->Text Data->Weather Text Products(from server)**. The user interface consists of three tabs, **Products**, **Display**, and **Locations**.

The **Products** tab selects and displays the text products. When a product is selected, the available stations are plotted in the Main Display window. One or more stations can be selected by clicking on the station in the Main Display window (or Ctrl+click for multiple stations). When a station is selected, the text product for that station is displayed in the Weather Text Product Display:

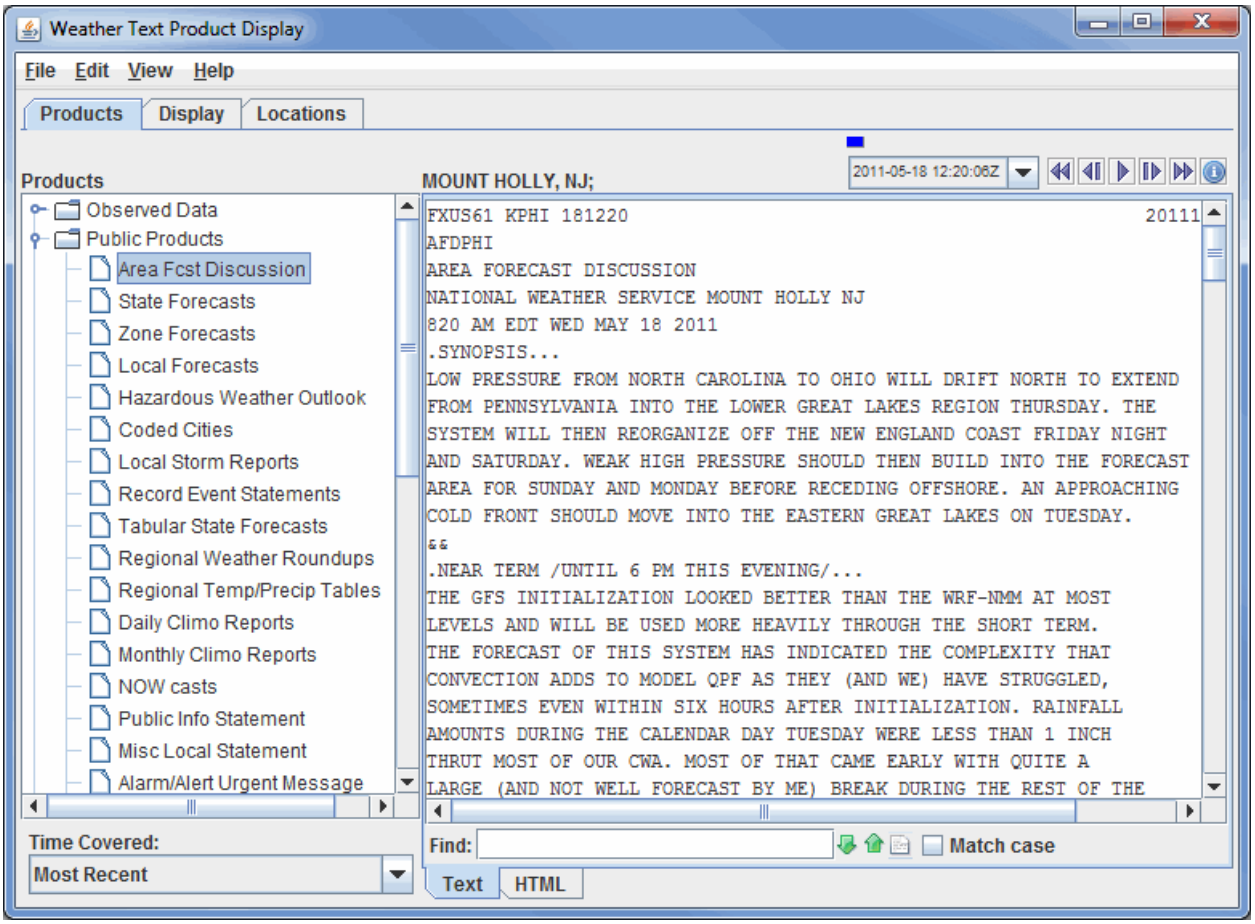


Image 1: Weather Text Product Display in the Text View

Find - Searches for the text string.

Find Next - Finds the next occurrence of the searched for text string.

Find Previous - Finds the previous occurrence of the searched for text string.

Highlight All - Highlights all occurrences of the text string. When all items are highlighted in the text, this button will change from white to yellow.

Match Case - Finds only items in the text that match the case of the entry in the **Find** field.

By default, the text product is displayed as raw text. Click on the **HTML** tab at the bottom of the display window to view the product in HTML.

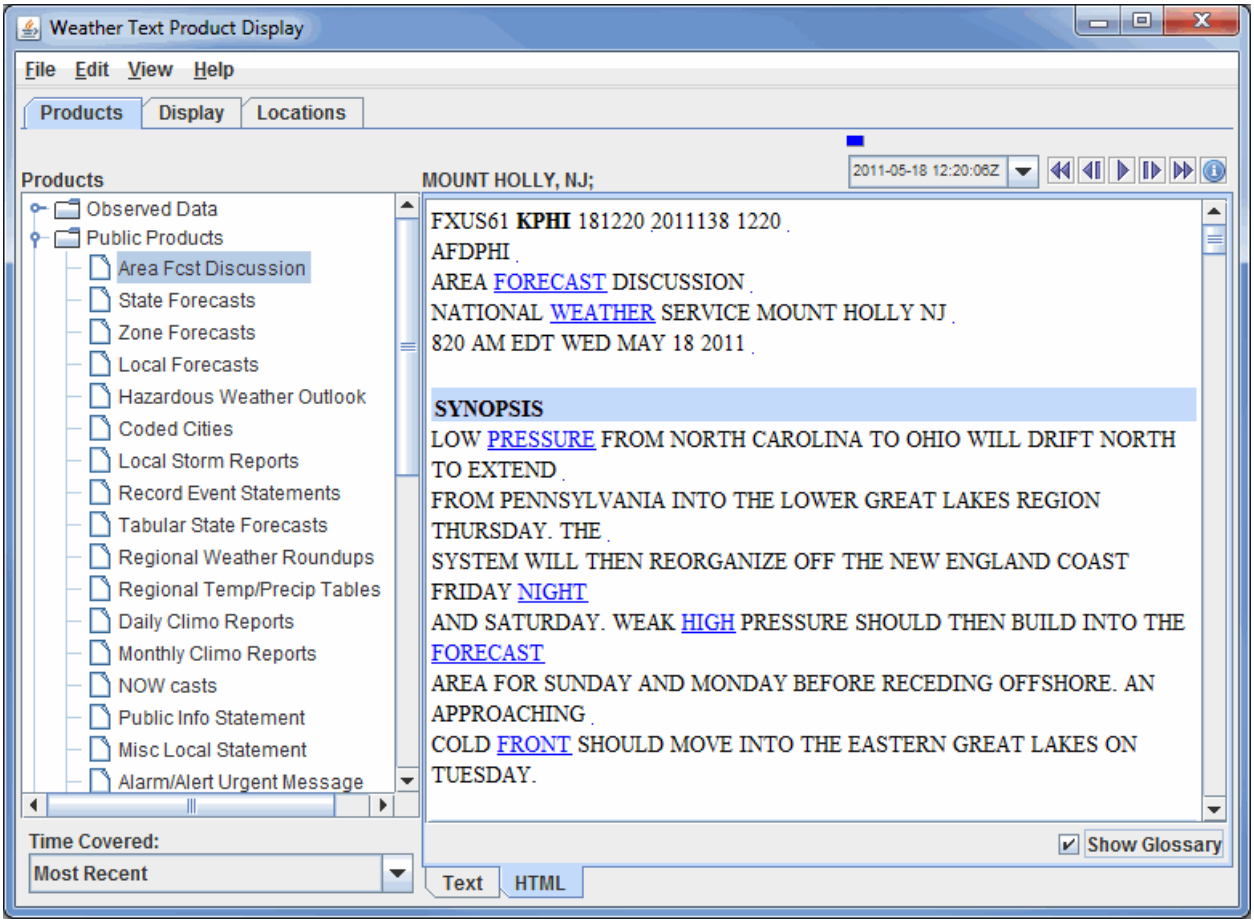


Image 2: Weather Text Product Display in the HTML View

Show Glossary - Toggles a glossary which will highlight certain terms in the text. When the links are clicked, a dialog will pop up with an explanation of the term.

By default, the most recent text product is displayed. Previous versions of the products can be displayed by selecting a time range from the **Time Covered** drop-down list. Use the Time Animation Widget to loop through multiple products. The time animation will be synced with any other data in the Main Display window.

The **Display** tab controls the display of the station locations in the Main Display window:

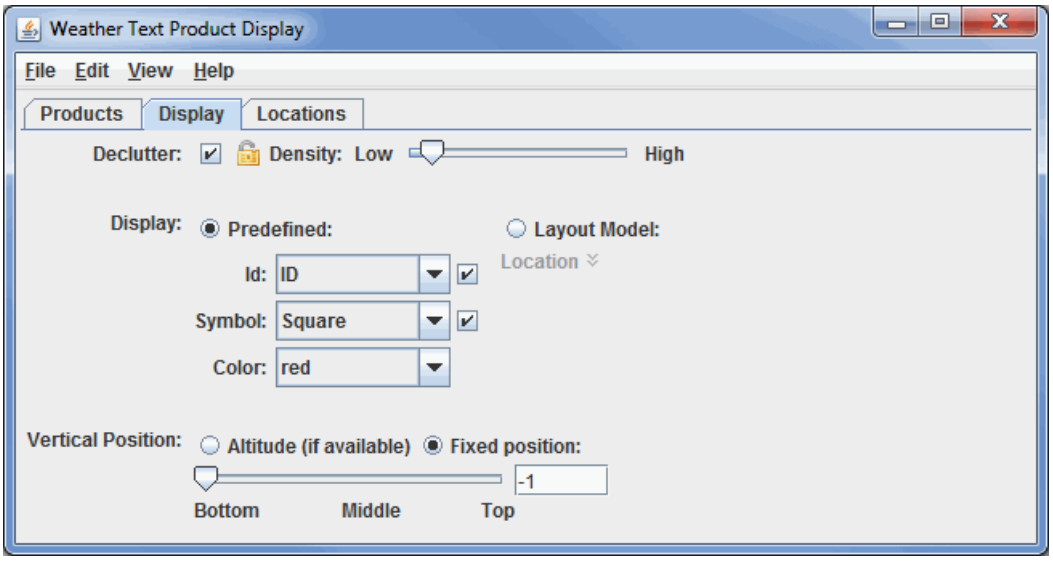


Image 3: Display Tab of the Weather Text Product Display Window

Properties

Declutter - Displays only stations that do not overlap. When unchecked, all of the stations will be shown. The icon allows for locking the stations that are currently being displayed and not have their display changed when navigating.

Density - Changes how dense the display of stations is when decluttering. More stations will appear in the Main Display window with a higher **Density** value. This option is only available if the **Declutter** checkbox is selected.

Display - Displays locations as a fixed specification of a symbol and/or an identifier or as one of the available layout models.

Use the options under the **Predefined** radio button to control what station information is displayed. Use the options in the **Symbol** panel to control what marker symbol is displayed. Clicking an item will immediately change the display. Use the **Visible** checkboxes to trigger the visibility of the ID or Symbol in the Main Display window. **Color** sets the color of the Symbol and ID in the Main Display window.

When the **Layout Model** radio button is selected the layout model facility is used to display the location. The Layout Model Editor can be opened by clicking the **Edit** icon.

Vertical Position - Displays the locations at their altitude (if there is one) or specifically defines the vertical position for all stations. This can be changed by using the slider or entering a value into the field.

The **Locations** tab lists information about the selected location and shows lists of all the locations and the locations currently visible in the Main Display window:

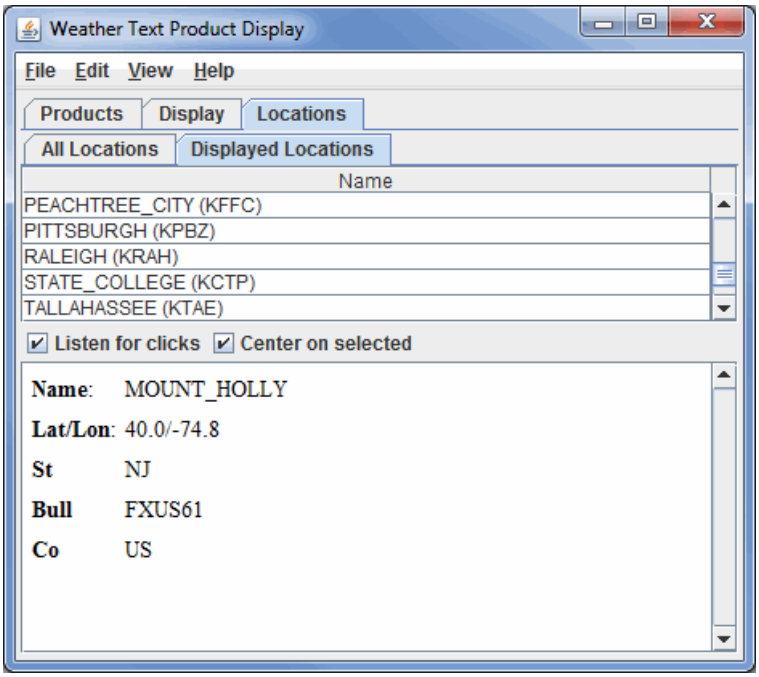


Image 4: Displayed Locations Tab in the Locations Tab of the Weather Text Product Display Window

Properties

All Locations - Lists all of the locations relevant to the chosen parameter.

Displayed Locations - Lists only the locations that are currently visible in the Main Display window.

Listen for clicks - Updates the current location information to the station selected in the Main Display window.

Center on selected - Centers the Main Display window over the location selected in this tab. This only works if **Listen for clicks** is selected.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there are some options that are unique to this display.

The **Edit** menu has these unique options:

Add Locations - Adds the locations of a variety of features, including city labels, states, oceans, earthquakes, etc. to the display.

Color - Changes the color of the location labels in the Main Display window.

The **View** menu has these unique options:

Show Flythrough - Opens the Flythrough feature which allows for interactively exploring the display.

Use Projection From Locations - Re-centers the display and resets the zoom level back to the display's initial settings without changing any other preferences that have been modified.

Chart - Allows for displaying a thumbnail of the chart in the Legend, change the Grid Layout, zoom in and out, save the chart, and open the

Plot Properties window.

Show Raw Data - Displays the data in its raw format in the chart before any rounding/formatting is done to the data by McIDAS-V.

Storm Track Controls

Overview

The Storm Track Control displays tropical storm observation and model output tracks. Currently the McIDAS-V supports both the Automated Tropical Cyclone Forecasting System (ATCF) data as well as data from the Shanghai Typhoon Institute.

To load in ATCF data select the **Tools->Text Data->ATCF Tropical Storm Data** menu item in the Main Display window. This creates a data source with a predefined path to the National Hurricane Center ftp site. Then, create the Storm Track display.

The display control shows the set of available storms on the left panel organized by year and basin, e.g., Atlantic (AL), Eastern Pacific (EP) and Central Pacific (CP).

Year Display

At the top of the list is an option (Yearly Tracks) which allows the user to display the observed tracks for all the storms in a given year. You can load and/or unload any number of years worth of observed tracks. The color swatch changes the color of the tracks for a given year. The Time Mode menu allows one to change the animation mode, e.g., use the year or use the storm start time.

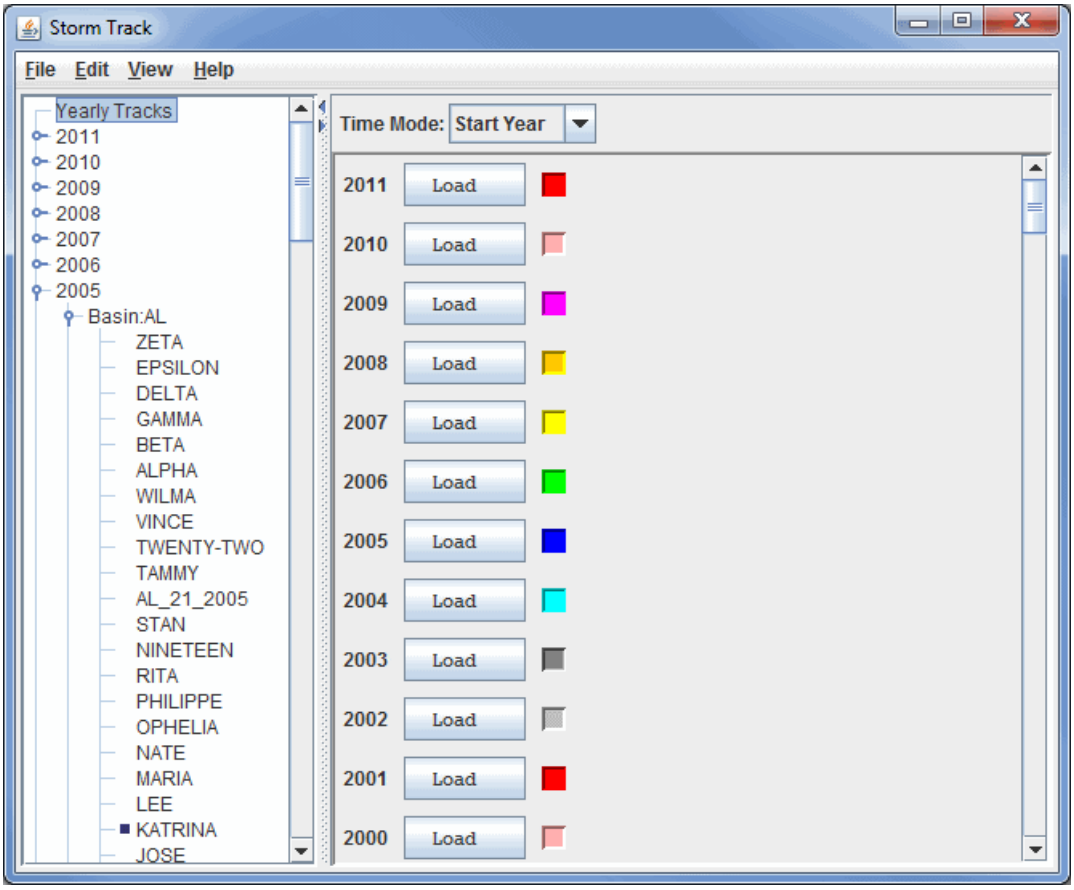


Image 1: Storm Track Window

Storm Display

To show the observation and all of the model results for a single storm select the storm in the list and press the Load Tracks: button. You can load any number of storms but they are shown in different panels. You can use the **View->Storm Tracks** menu to list out all of the loaded storms, remove them all, etc. Once a storm is loaded it can be removed with the icon shown in the upper right.

Once a storm is loaded the first thing you should do is to specify which "Techs" (or models) to use by bringing up the control's Properties dialog **Edit->Properties** menu. Use Ctrl+A to select all items in the tab, the left/right arrows to remove/add an item from/to the **Use** column, or Delete to remove an item from the **Use** Column.

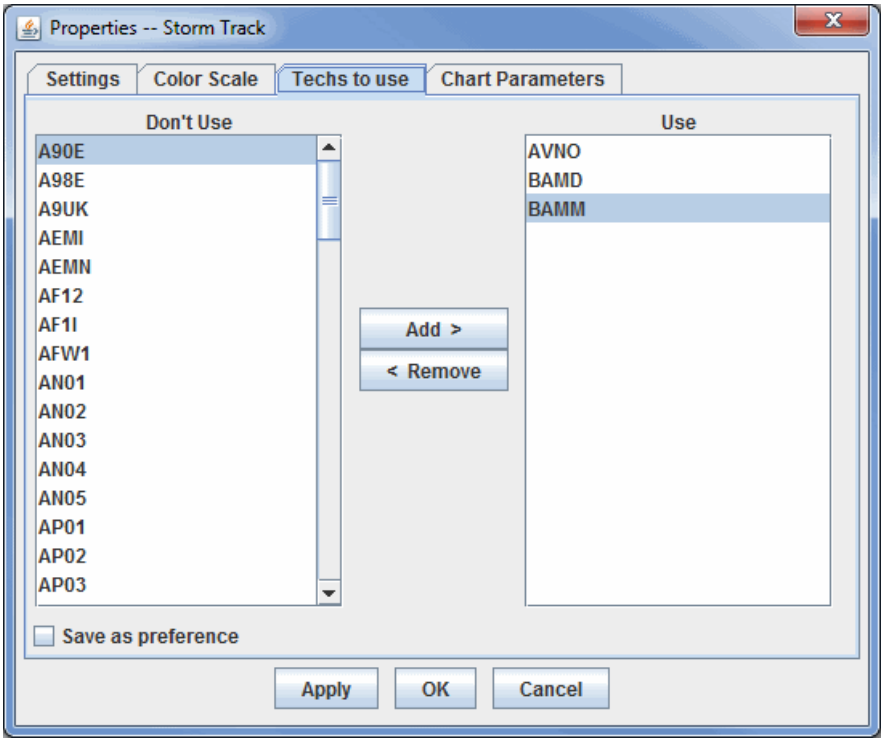


Image 2: Techs to Use Tab of the Storm Track Properties Window

Properties

Add > **-** Adds the selected item from the **Don't Use** column to the **Use** column, adding the Tech to the **Tracks** tab of the Storm Track window.

< Remove **-** Removes the selected item from the **Use** column and adds the item to the **Don't Use** column, removing the Tech from the **Tracks** tab of the Storm Track window.

Save as preference - Saves the setup of the **Don't Use** and **Use** columns for future displays.

The Storm display panel consists of three tabs: **Tracks**, **Table** and **Storm Chart**.

Tracks

The **Tracks** tab controls the display and animation of the tracks.

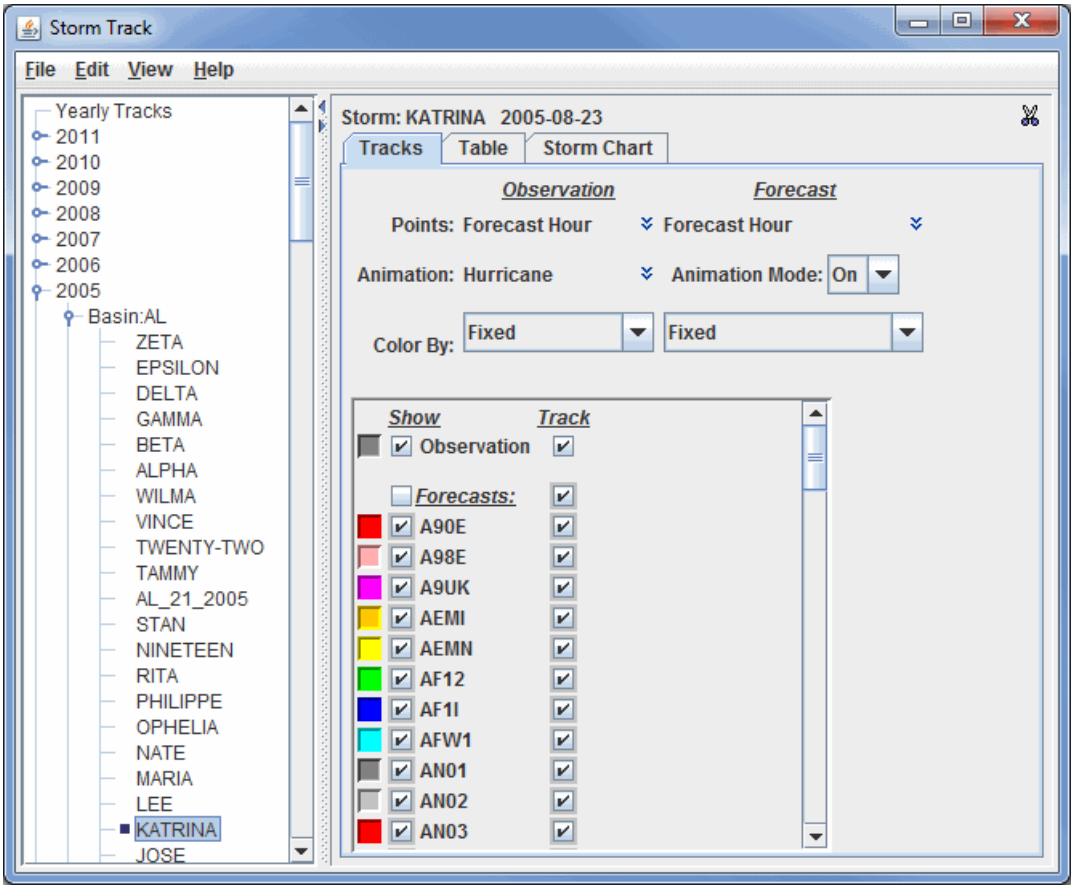


Image 3: Tracks Tab of the Storm Track Window

Properties

Points - Specifies which layout model to use for both the Observation as well as the Forecast tracks.

Animation - Specifies the layout model to use for the Observation track that moves along with the time animation.

Animation Mode - Determines whether to animate the tracks or show all of the tracks.

Color By - Specifies whether the track is shown with a fixed color or using a color table. The color table used is a single one for the entire display control and is set through the main **Edit** menu.

Show - Specifies what is to be shown. One can toggle on/off the visibility of the Observation track, all of the forecast tracks, or individual forecast tracks.

Table

The **Table** tab shows a tabular listing of all of the observational track data and individual forecast model runs. On the left is a tree view organized by the Tech and model run time. Selecting one of the model runs will display the data in the table. The main **File->Save->Export to Spreadsheet** menu allows you to export the track data to an Excel spreadsheet. In the File Dialog are options to select what is to be saved.

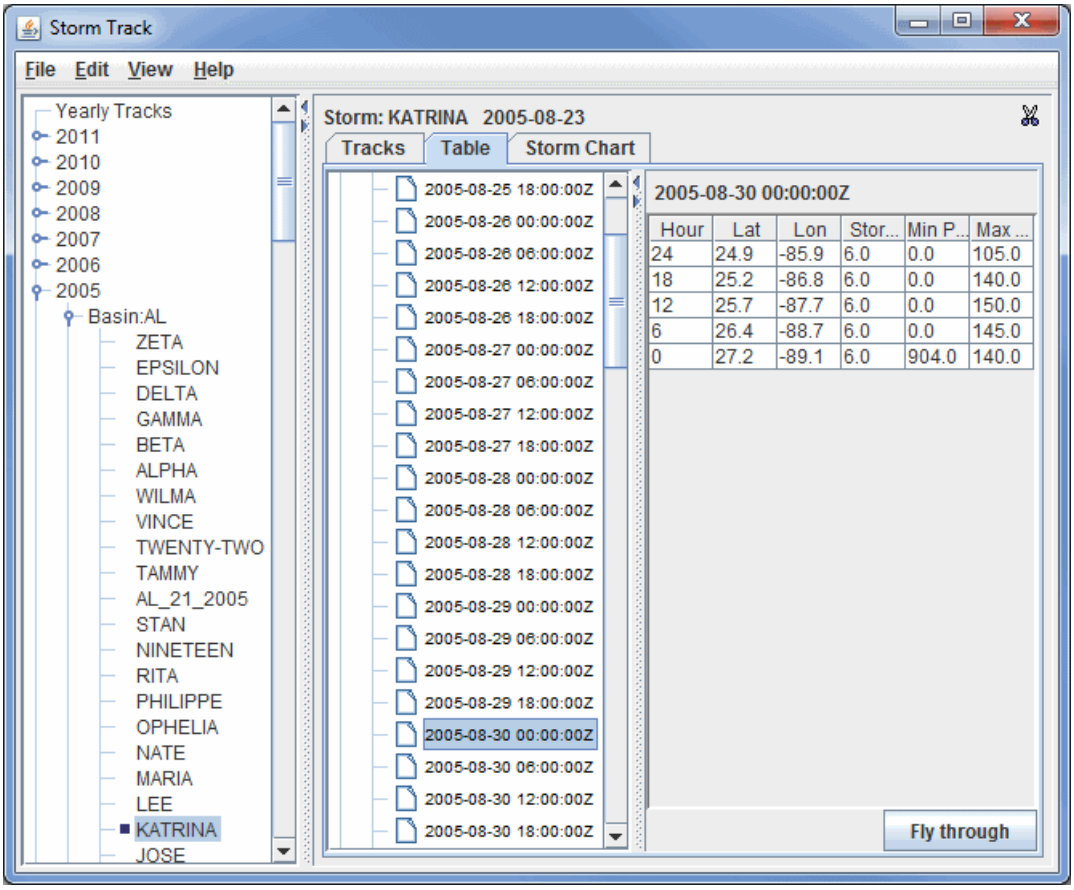


Image 4: Table Tab of the Storm Track Window

Properties

Fly through **-** Opens a Flythrough window that allows you to interactively explore the display in the Main Display window.

Storm Chart

The **Storm Chart** tab shows time series charts of selected tracks. Under the main **Edit** menu you can any number of new forecast time or forecast hour charts. The forecast time chart is based around the model run time of the selected forecasts. The forecast hour charts selects data across the different model run times, e.g., you can show the 12 hour forecast from each model run.

To do the charting of the storm track, one or more Techs need to be selected. Once selected the Forecast Hour/Forecast Time list is populated. One or more times can be selected (Ctrl+click). Each Parameter that is selected will result in a new chart shown on the right.

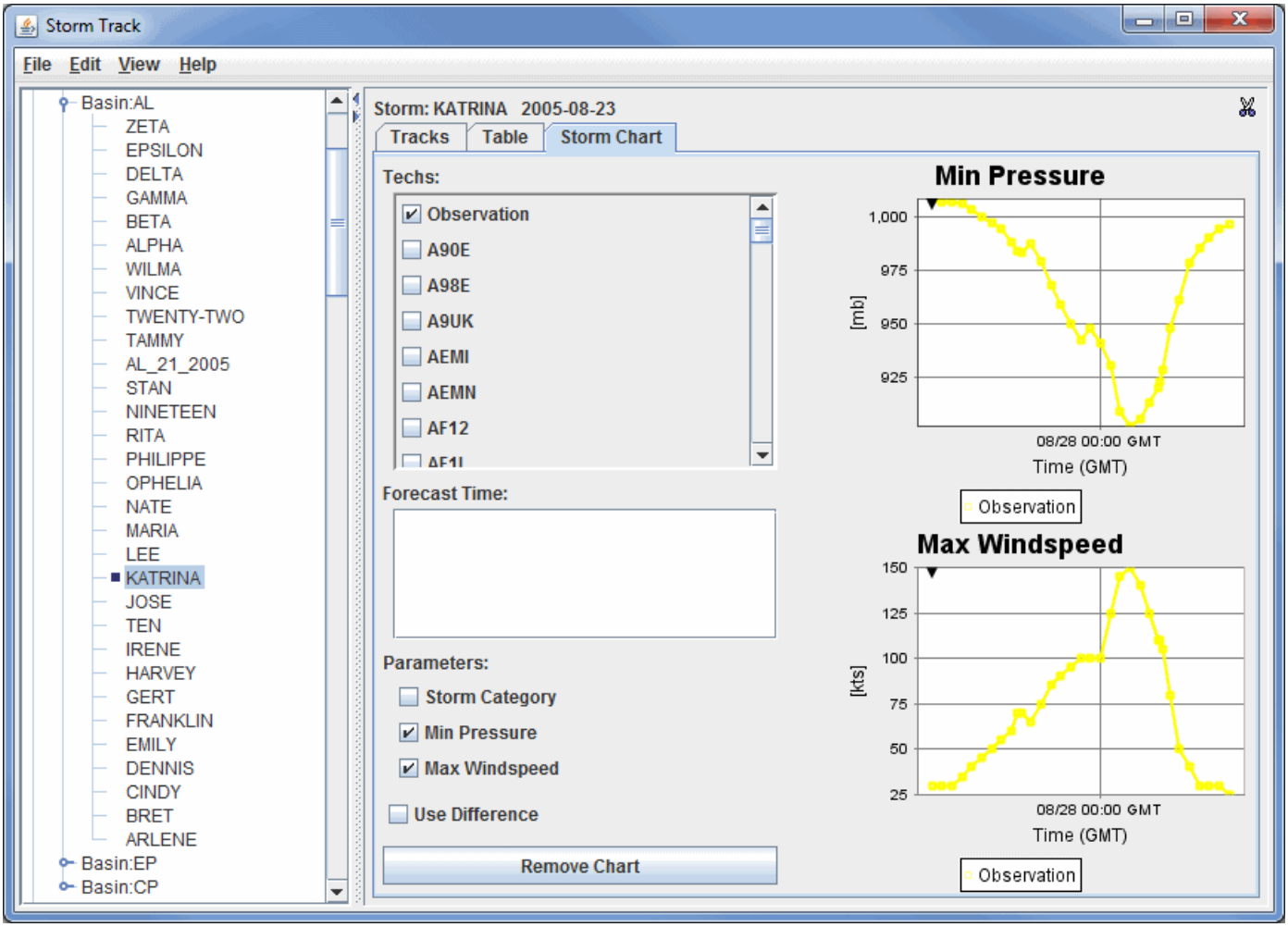


Image 5: Storm Chart Tab of the Storm Track Window

Properties

Techs - Selects the source of the data for the charts in the Storm Track window. This is either observation or model data.

Forecast Time - Allows you to select which forecast model runs to display in the charts.

Storm Category - Shows the ATCF storm category.

0 DB	Disturbance
1 TD	Tropical Depression
2 TS	Tropical Storm
3 TY	Typhoon
4 ST	Super Typhoon
5 TC	Tropical Cyclone
6 HU	Hurricane

Min Pressure - Plots the pressure level at the time of the observation/forecast.

Max Windspeed - Plots the wind speed at the time of the observation/forecast.

Use Difference - Plots the difference between the forecasted value and the observed value for the chosen parameter(s).

Remove Chart - Removes the **Storm Chart** tab from the Storm Track window.

Menus

Many of these menu items seen utilizing this tool are standard options that can be found in the Menus section of the Layer Controls page. However, there are some options that are unique to this display.

The **File** menu has these unique items:

Save->Export to Data File - Saves the file as a Microsoft Excel (.xls) file.

Save->Export to Google Earth - Saves the file as a Google Earth (.kml) file.

Close Window - Closes the Storm Track window.

The **Edit** menu has these unique items:

Edit Mode - Allows you to change the track of the storm in the Main Display window by clicking and dragging on the track, and allows you to edit values in the table.

Add Forecast Time Chart - Adds a new tab to the Storm Track window that is the same as the **Storm Chart** tab. Here, you can enter a new forecast time and create new charts.

Add Forecast Hour Chart - Adds a new tab to the Storm Track window that is the same as the **Storm Chart** tab. Here, you can enter a new forecast hour and create new charts.

The **View** menu has these unique items:

Storm Tracks - Allows you to select an archived or current storm to display.

Use Projection From Tracks - Re-centers the display and resets the zoom level back to the display's initial settings without changing any other preferences you may have modified.

Color Table Editor

- Introduction
- Starting the Color Table Editor
- Using the Color Legend
- Painting and Editing Colors
- Using Breakpoints
- Saving, Importing, and Exporting
- Using the Color Chooser
- Menus

Introduction

The Color Table Editor supports editing existing color tables and creating new ones. A color table is an ordered collection of colors that is used to color a display according to a range of data values.

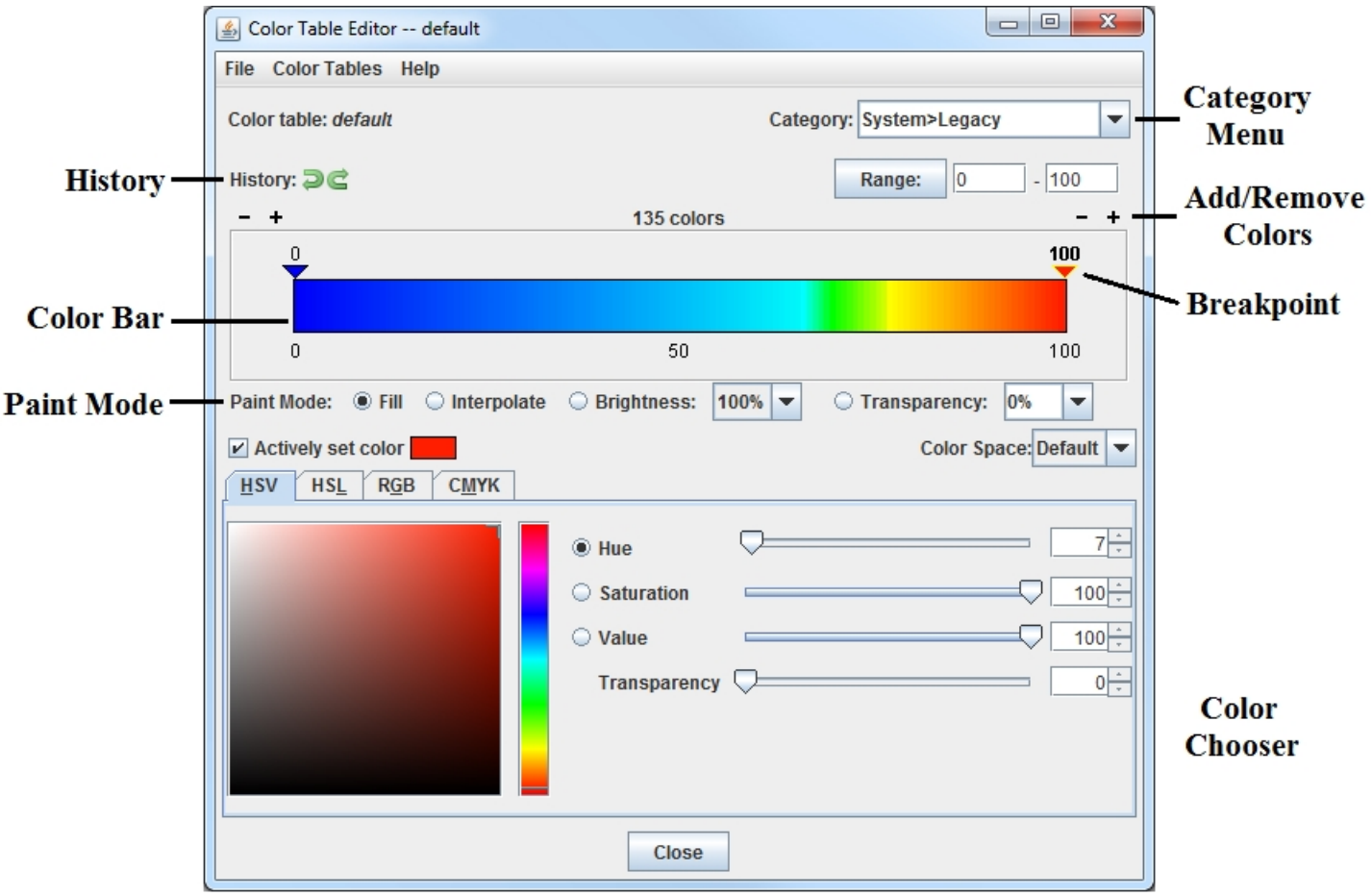


Image 1: The Color Table Editor

Starting the Color Table Editor

The Color Table Editor can be used stand-alone by selecting the **Tools->Color Tables** menu item in the Main Display window. It can also be used or in conjunction with a particular layer by right-clicking on the layer's color bar in the Legend and selecting **Edit Color Table**, or through the layer's Edit menu (**Edit->Color Table->Edit Color Table**). You can also click on the button that represents the name of the color bar in the **Layer Controls** tab and select **Edit Color Table**.

The Color Table Editor starts with a color table loaded in it. If you are working with a data display and you open the Color Table Editor through the **Layer Controls** tab of the Data Explorer, the color table in the editor is the same as in the display. If you want to use or edit a different color table, use the **Color Tables** menu to select from the categorized list of color tables:

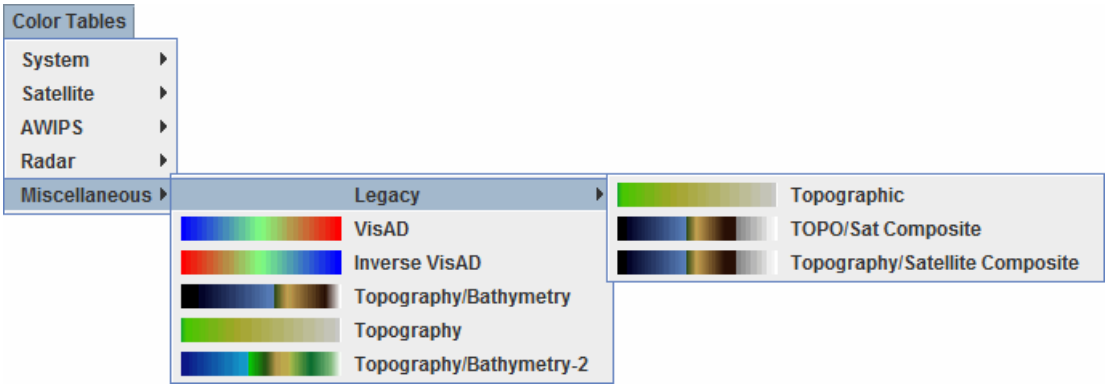


Image 2: The Color Tables Menu

Color tables are grouped into categories. Click on a color table to bring it into the Color Table Editor. To change to the newly selected color table for a display on the Main Display window, click **OK** or **Apply** at the bottom of the Color Table Editor. **Apply** will save changes to the color table, while keeping the Color Table Editor open, and **OK** will save any changes to the color table and close the Color Table Editor. Also, when editing a color table that is currently being used to display a layer in the Main Display window, there is an **Auto update** checkbox on the bottom right of the Color Table Editor. When this box is checked, any changes made to the color table will be applied directly to the display in the Main Display window. If you are making several changes to the color bar at once, and you have a lot of data displayed in the Main Display, it is recommended that you do not have this option turned on, as it will use up more memory. Once done making changes to the color bar, click **Apply** or **OK** to apply your changes to the displayed data.

Using the Color Legend

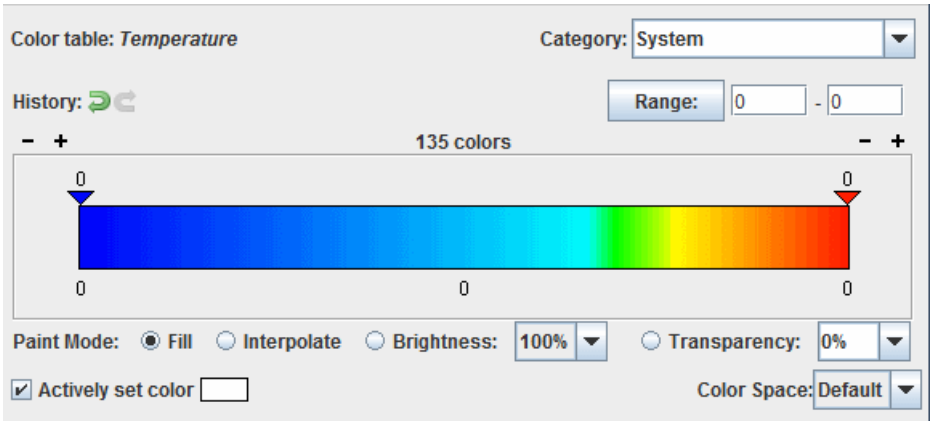


Image 3: The Color Legend

Properties

Color table - Lists the name of the color table currently being displayed in the Color Table Editor.

Category - Lists out the category that the color table currently being displayed in the Color Table Editor is under. The category is utilized to help organize the color bars in the **Color Tables** menu of the Color Table Editor. In the example above, the color table for Temperature can be found under the **Color Tables->System** menu item. You can enter your own values into this text field to organize your color bars in your desired fashion. If you wish to use multiple levels of menus, you can use the ">" symbol between different menu levels. For example, if you have a variety of color bars to be utilized in different weather conditions, and you are making a color bar for CAPE, you can specify a **Category** of "Weather > Severe". If you give your color bar a name of CAPE, once your color bar is saved, it can be found under the **Color Tables->Weather->Severe Weather->Cape** menu item of the Color Table Editor.

History - Allows you to step forward and backward through changes you have made. Using Shift+click on these buttons will step forward/back 10 changes.

Range: **-** Sets the minimum and maximum data values on the color bar, with minimum being the breakpoint at the left end of the color bar, and maximum being the breakpoint on the right end of the color bar. You can change these values by typing values into the fields and pressing Enter or by clicking Range:.

Colors - Shows the number of colors currently in the color bar. This is how many segments your color bar is broken up into. You can decrease or decrease the number of colors by clicking on the – + buttons above the left and right ends of the color bar. You can add/remove 10 colors at once by using Shift+click on these buttons. New colors are added or removed at each end of the legend with the same color as the end color. The minimum number of colors required in the color bar is five, and there is no upper limit. The more colors you have in your color bar, the smoother the transition of colors between break points will be if interpolating colors.

Color Bar - Displays the current color bar that you are working with. Any changes that you make in the Color Table Editor window will be applied to this color bar.

Paint Mode - Determines how the colors will be applied to the color bar. These controls are described in the section below.

Painting and Editing Colors

You can "paint" in the color table by left-clicking and dragging the mouse within it. When your mouse is over the color table the cursor will change to a paintbrush and a gray line is drawn to indicate the position of the cursor.

The type of painting is specified by the Paint Mode buttons.

Fill - Fills the color table with the currently selected color in the color chooser when the mouse is clicked and dragged on the color table. With this Paint Mode, the color you selected will be drawn in solidly over the distance you click and drag on the color table. There will be no interpolation.

Interpolate - Applies a linear interpolation with the currently selected color in the color chooser when the mouse is clicked and dragged in the color table. Over the distance you click and drag on the color table, the color will gradually transition from one end to the other.

Brightness - Applies the given brightness value (in the pull-down list) when the mouse is clicked and dragged on the color table. A higher value will make the colors appear lighter, and a lower value will make the colors appear darker.

Transparency - Applies the given transparency value (in the pull-down list) when the mouse is clicked and dragged on the color table. The transparency value is important because it will be utilized in the Main Display when you have a field using this color table. A transparency value of 0 will make it so you cannot see any features through a layer utilizing this color bar. A transparency value of 100 will make it so you do not see the layer utilizing this color bar. Transparency can be used so you can visualize multiple items in one display without worrying about the items overlapping each other.

Color Space - Allows you to add select color space that will be applied to the color bar. This helps to determine the color mixing when using the **Interpolate** Paint Mode.

Using Breakpoints

The editor uses "breakpoints" indicated along the top of the color legend with triangles and the numerical value. By default, the beginning and ending of the color bar will each be a breakpoint. You can add additional breakpoints to the color bar by right-clicking on the color bar and selecting **Add Breakpoint**, or by double-clicking on or above the color bar where you want a breakpoint.

Clicking on a breakpoint makes it active. The active breakpoint will have bold text for the label, and the colored triangle below it will have an outline of yellow. There is only one active breakpoint at a time. Breakpoints are used for a number of things: showing the data and transparency values at a point along the color table and changing the colors (fill, interpolation or transparency).

The values on the breakpoints are determined by the position of the breakpoint along the legend, proportional to the min and max of the Range. Changing the minimum and maximum of the Range changes the breakpoint values.

You can move the active breakpoint (assuming it isn't locked) in several ways:

- Left-click and drag it with the mouse pointer
- Move in small increments with the right or left arrow keys (If there is no response, first left-click on the breakpoint to make it active)
- Right-click on the breakpoint and use the menu item **Change Breakpoint**. Enter a new value into this field and click **OK**

If you have the **Actively set color** checkbox selected, when you change the color in the color chooser that color will be applied to the color slot under the selected breakpoint automatically.

You can also change colors and manipulate breakpoints by right-clicking on a breakpoint:

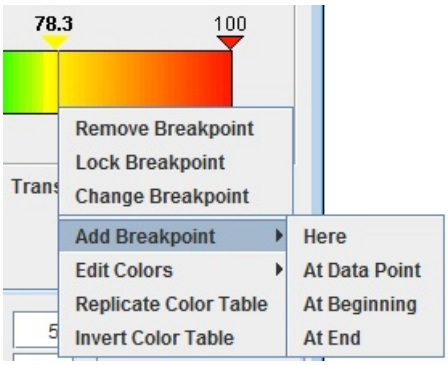


Image 4: Add a Breakpoint

The choices are:

Remove Breakpoint - Removes the active breakpoint.

Lock/Unlock Breakpoint - Locks or unlocks the active breakpoint. When locked, it cannot be moved.

Change Breakpoint - Sets the breakpoint to a new value.

Add Breakpoint - Adds a new breakpoint to the color bar.

Here - Adds a new breakpoint where you clicked on the color bar.

At Data Point - Opens a Breakpoint Value window, which allows you to enter a specific numerical value to place your breakpoint.

At Beginning - Adds a new breakpoint on the far left end of the color table.

At End - Adds a new breakpoint on the far right end of the color table.

Edit Colors - Allows you to change the colors between the breakpoints.

Interpolate - Interpolates colors on both sides, to the left or right, of the selected breakpoint up to the next breakpoint. Transparency and brightness values will not be interpolated between the colors.

Fill - Fills a single, solid color on both sides, to the left, or to the right of the selected breakpoint up to the next breakpoint.

Transparency - Sets the transparency value on both sides, to the left, or to the right of the selected breakpoint up to the next breakpoint. The current transparency value of the breakpoint will be listed next to Transparency. You can also select to interpolate transparency to the left, right, or on both sides of the breakpoint. For example, if your selected breakpoint has a transparency value of 100, and the next breakpoint on the right has a transparency value of 50, interpolating transparency to the right of this breakpoint will cause the transparency values between the two breakpoints to gradually shift from 100 to 50 (more to less transparent).

Brightness - Sets the brightness value on both sides, to the left, or to the right of the selected breakpoint up to the next breakpoint. The current brightness value of the breakpoint will be listed next to Brightness. You can also select to interpolate brightness to the left, right, or on both sides of the breakpoint. For example, if your selected breakpoint has a brightness value of 100, and the next breakpoint has a brightness value of 50, interpolating brightness to the right of this breakpoint will cause the brightness values between the two breakpoints to gradually shift from 100 to 50 (more to less bright).

Replicate Color Table - Replicates the current color table x number of times over the current color table. The overall range will not change.

Invert Color Table - Reverses the order of the color table. The range will not change, but the colors will be reversed.

Saving, Importing, and Exporting

You can modify an existing color table, or edit an existing color table and save it with a new name to make a new color table. Any new or modified color table can be saved for future use. To save a new or modified color table simply select the the **File->Save**. To save a modified color table as a new color table, select **File->Save As** and enter the new name in the dialog box that appears. This new color table will now be permanently saved in your local collection of color tables. You can control where your color bar will be saved by selecting a **Category** in the upper right of the Color Table Editor.

To save a color table as a file which can be shared with others in McIDAS-V, select the **File->Export** menu item. A file dialog will appear that will allow you to save the color table as an XML-format file. We suggest you use a file extension of **.xml**.

To use a color table as a file which has been supplied to you by another McIDAS-V user, select the **File->Import** menu item. A file dialog will appear that will allow you to find the color table as an XML-format file. The following types of color tables can be imported:

- McIDAS-V (IDV) color table (*.xml)
- GEMPAK color table (*.tbl)
- 3-column RGB color table (*.ascii)
- McIDAS-X color table (*.ET)
- AWIPS II color table (*.cmap)

Another way that you can save all of your color tables at once is to save them as a plugin. This can be done through the Plugin Manager, by including your colortables.xml file that is inside of your /User/McIDAS-V directory. You can then pass this on to any McIDAS-V user, and they can install this plugin and obtain all of your color bars without having to individually transfer them.

3-column RGB color table

The definitions of the 3-column **RGB** color table are divided over a range of values. Each line represents one of the equal sized blocks on the color bar, and the bar is saved in the *.ascii format. Ascii files are text files with three space-separated columns consisting of the RGB component counts. An example is shown below:

```
180 0 10 140 0 50 140 0 140 80 0 180 0 120 60 0 140 80
```

In the example above, there are six lines (definitions) that would be divided into the color table. The color table would be broken into six even segments, with the first line applying to the first segment, the second to the second segment, etc. Your file may be any number of lines long. The values in these columns must be between 0 and 255.

Using the Color Chooser

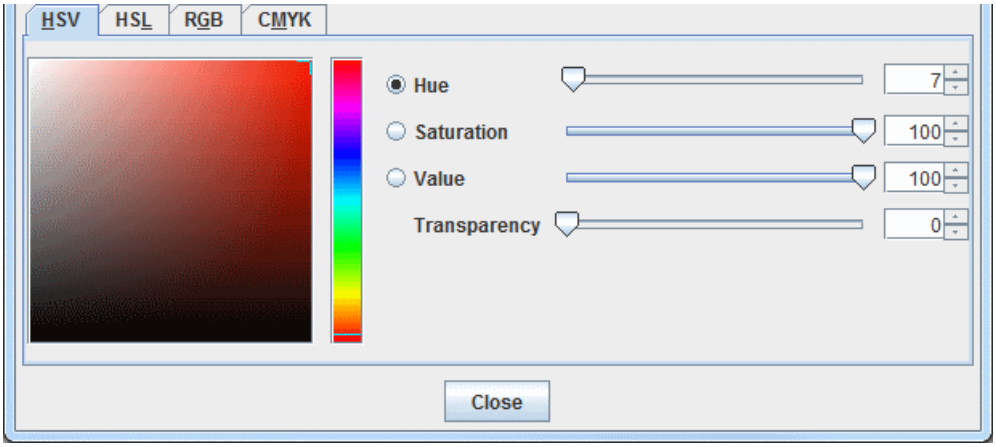


Image 5: The Color Chooser

The Color Chooser, in the lower half of the Color Table Editor window, allows you to select any possible color. The chooser contains four tabs, **HSV** (Hue, Saturation, Value), **HSL** (Hue, Saturation, Lightness), **RGB** (Red, Green, Blue), and **CMYK** (Cyan, Magenta, Yellow, Black, Alpha). In most cases, the **HSV** tab provides better control and better depiction of color changes because of its hue, saturation, and value controls. Thus, it is recommended that you use the **HSV** tab (rather than the other tabs) unless you have specific values to set in the other tabs.

The HSV Tab

The **HSB** tab allows you to control color by hue, saturation, and brightness, thereby making any color. With the **HSB** tab open, click on one of the radio buttons marked **H**, **S**, or **B** for the corresponding control for hue, saturation, or brightness. All controls in the **HSB** tab also show the **RGB** values for any color selected, in case you need to know the **RGB** values for another use.

Hue is the term indicating a pure color selection from the spectrum. Saturation is an indication of how much white is added to the hue. 100% saturation is pure hue with no white. Brightness is an indication of how much black is added to the hue. 100% brightness has no black and maximum brilliancy, but can be any saturation from the hue to pure white. 0% brightness is solid black. Some colors are not found in the spectrum, and are a mixture of a hue and black and/or white. You only need to use one of the controls for **H**, **S**, or **B** to make any color.

With the **Hue** (**H**) radio button selected, the slider bar chooses the pure hue. Once **Hue** has been selected, clicking or dragging the mouse on the color display chooses degrees of saturation and value for that hue.

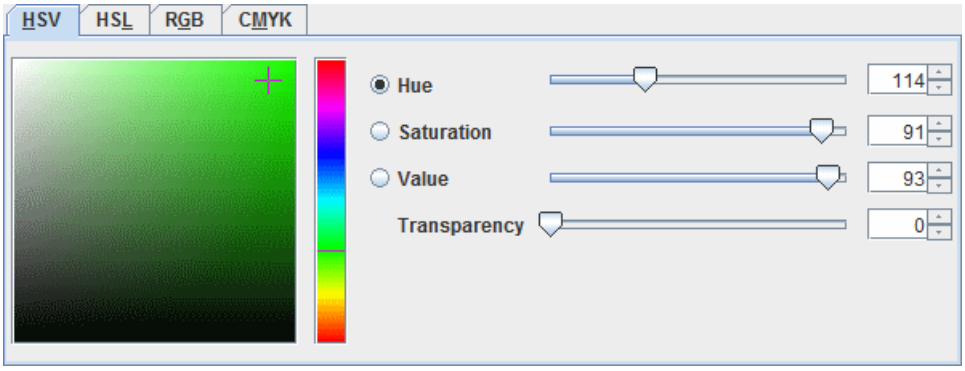


Image 6: The HSV Hue Tab, Set on Green With High S and High B

Saturation (**S**) has a slider bar with the full range of saturation. The bottom is always solid black. A saturation value of 100 is the pure hue, and more white is mixed in with the hue until it is solid white at a value of 0. The saturation value can be controlled by the slider to the right of the color square, or by entering a value into the field to the right of **Saturation** and pressing Enter. After selecting a saturation level, click and drag in the colored square to get your desired color.

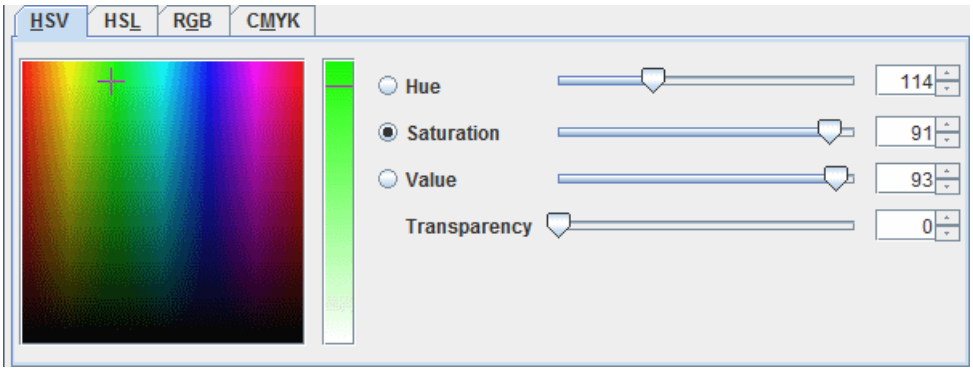


Image 7: The HSV Saturation Tab, Set on the Same Green

Value (**V**) has a slider bar with the full range of brightness. The bottom is always solid white. A brightness value of 100 is the pure hue, and more black is mixed in with the hue until it is solid black at a value of 0. The brightness value can be controlled by the slider to the right of the color square, or by entering a value into the field to the right of **Value** and pressing Enter. After selecting a brightness level, click and drag in the colored square to get your desired color.

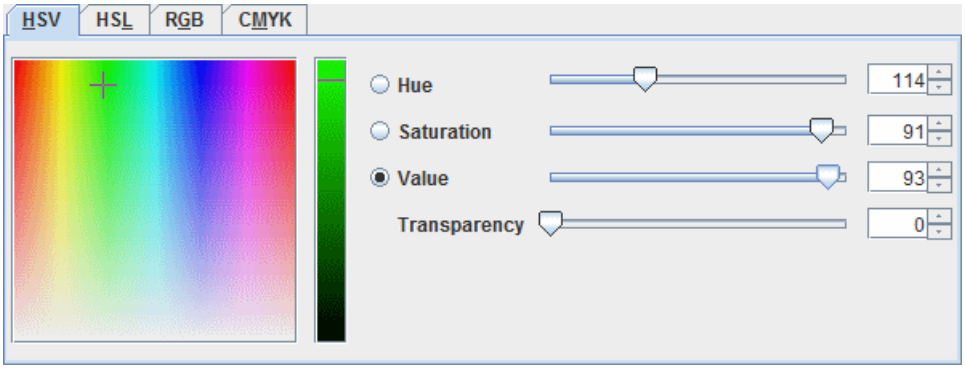


Image 8: The HSV Value Tab, Set on the Same Green

When a **HSV** color is selected, the numerical values in all of the other tabs are updated to reflect the color. There is also a **Transparency** slider at the bottom of this tab that sets the transparency associated with the **HSV** color. This transparency is applied to the color bar

The HSL, RGB, and CMYK Tabs

The other three tabs (**HSL**, **RGB**, and **CMYK**) all work in generally the same way as the **HSV** tab, with the color swatch, and different sliders to control aspects of the selected color. Below is a description of the components in each of these tabs.

HSL tab - Sets Hue, Saturation, Lightness, and Transparency values for the color.

Hue - Sets the base, true color.

Saturation - Sets the variation of the hue dependent on lightness. A value of 100 matches the hue.

Lightness - Sets the amount of white or black to mix in with the hue color. A value of 50 matches the hue. Values less than 50 become darker until a value of 0 which is black. Values greater than 50 become lighter until value of 100 which is white.

Transparency - Sets the transparency value of the color. A value of 0 is opaque, and as the number increases to 100 the color becomes more transparent.

RGB tab - Sets Red, Green, Blue, and Alpha values for the color.

Red - Sets the amount of red in the color. A value of 255 is the true color of red. As the number gets lower, black gets mixed in, until a value of 0 is solid black.

Green - Sets the amount of green in the color. A value of 255 is the true color of green. As the number gets lower, black gets mixed in, until a value of 0 is solid black.

Blue - Sets the amount of blue in the color. A value of 255 is the true color of blue. As the number gets lower, black gets mixed in, until a value of 0 is solid black.

Alpha - Sets the transparency of the color. A value of 255 is opaque, and a value of 0 is 100% transparent.

CMYK tab - Sets Cyan, Magenta, Yellow, Black, and Alpha values for the color.

Cyan - Sets the amount of cyan in the color, ranging from 0 to 255. A value of 255 is the true color of cyan, and as the value gets lower white gets mixed in, until 0 where no cyan is included in the color.

Magenta - Sets the amount of magenta in the color, ranging from 0 to 255. A value of 255 is the true color of magenta, and as the value gets lower white gets mixed in, until 0 where no magenta is included in the color.

Yellow - Sets the amount of yellow in the color, ranging from 0 to 255. A value of 255 is the true color of yellow, and as the value gets lower white gets mixed in, until 0 where no yellow is included in the color.

Black - Sets the amount of black in the color, ranging from 0 to 255. A value of 255 is the true color of black, and as the value gets lower white gets mixed in, until 0 where no magenta is included in the color.

Alpha - Sets the transparency of the color. A value of 255 is opaque, and a value of 0 is 100% transparent.

As modifications are made in any of these four tabs, the current color will be displayed above the tabs next to the **Actively set color** checkbox. If the **Actively set color** checkbox is selected, any changes made in the tabs will be applied directly to the color bar as changes are made, with the exception of the **Transparency** and **Alpha** fields.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there are several options unique to this display.

The **File** menu has these unique options:

New - Begins a new color table from scratch.

Save - Saves changes to a color table. This will overwrite the current color bar that you are editing.

Save As... - Saves a color table and allows you to name it. This allows you to save your updated color bar with a new name and keep your original color bar as well.

Remove - Removes an existing color table. Note that you cannot remove any system color bars (color bars that are included with McIDAS-V). If you have a system color bar open, this **Remove** option will be grayed out and not usable. You can only remove color bars you have created yourself.

Import... - Imports a color table in the IDV (*.xml), GEMPAK (*.tbl), 3-column RGB (*.ascii), McIDAS-X (*.et), and AWIPS II (*.cmap) color table formats.

Export... - Exports a color table in the IDV (*.xml) and GEMPAK (*.tbl) color table formats.

Close - Closes the Color Table Editor.

The **Color Tables** menu has these unique options:

Satellite/AWIPS/Radar/System/Miscellaneous - Contains pre-existing color tables as well as color tables that you have saved that you can edit.

Layout Model Editor

The Layout Model Editor composes the model and style used to plot data on a map from observations at discrete points (e.g., weather observations). This tool is used to edit existing models or to create new models. The Layout Model Editor is opened with the **Tools->Layout Model Template** menu item in the Main Display window.

- Creating a Layout Model
- Editing a Layout Model
- Properties Dialog - Display Tab
- Properties Dialog - Color By Tab
- Properties Dialog - Scale Size Tab
- Properties Dialog - Rotate Tab
- Alignment Toolbar
- Properties Dialog - Shapes
- Menus

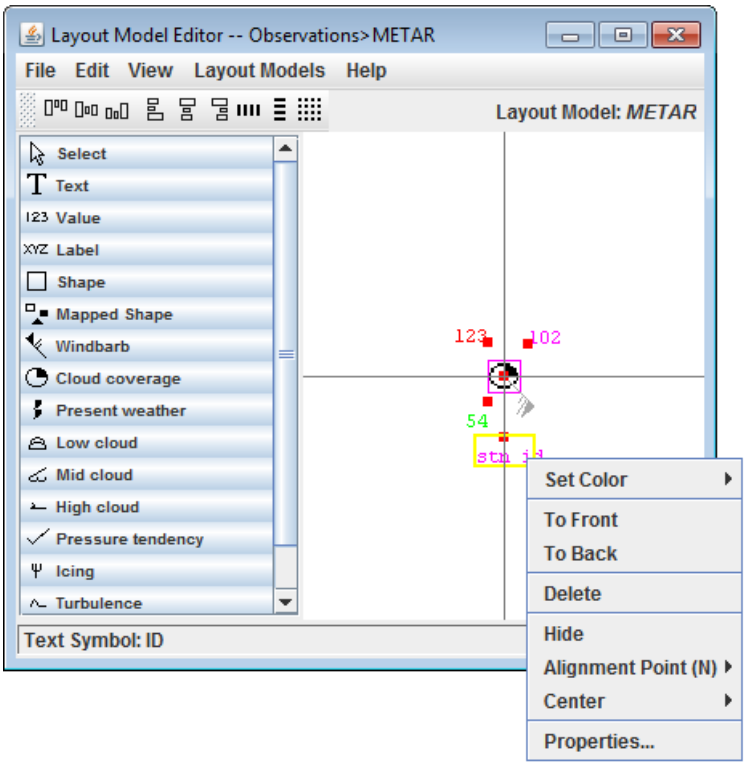


Image 1: Layout Model Editor

Creating a Layout Model

Layout models can be created from scratch by utilizing the **File->New** menu option, or an existing layout model can be edited with the **Layout Models** menu. The display includes a horizontal and vertical line, which acts as a reference point for the location of the layout model with respect to the physical location of the observation (at the origin). The different shapes and features that can be added to the layout model are in the left panel. The shapes and features can be added to the layout model by left-clicking the item and then left-clicking at the desired location in the panel. Once in the Layout Model, individual components can be moved by left-clicking and dragging them. When an item is placed into the layout model, the Properties dialog for the component will open. This Properties dialog can also be invoked by double-clicking on a shape.

Each component of the layout model can be resized by dragging the black squares along the outside of the item. Multiple items can be aligned at once by holding down Shift and left-clicking on the items to move. Clicking on an item makes it active, and active items have black squares around them. Each item in the layout model also includes a red "Alignment Point', which acts to locate the individual components of the model with respect to the center point of the observation. The location of the Alignment Point to the item can be changed via the Alignment Point option in the menu when an item is right-clicked on.

When the mouse is held over a component of the layout model, the name of the item will be listed in the bottom bar of the Layout Model Editor. This can be useful if multiple **Value** fields are included in the layout model (temperature, dew point, etc.).

To save a layout model, use the **File->Save** or **File->Save As...** menu items. When the layout model is saved, any point data displays or gridded value plot displays that are using it will be updated. To remove a model, use the **File->Remove** menu item. Layout models supplied with McIDAS-V cannot be removed, but user-created local models can be removed.

Editing a Layout Model

There are many options that can be controlled for each individual component of the layout model. This menu is seen by right-clicking on an item.

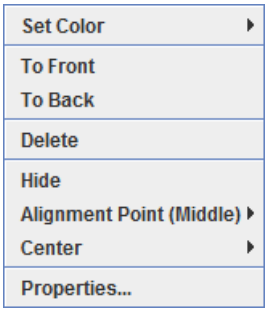


Image 2: Editing a Layout Model Menu

Set Color - Sets the color of the selected item.

To Front - Moves the selected item in front of others that may overlap it.

To Back - Moves the selected item behind others that may overlap it.

Delete - Removes the selected item from the layout model display. The Delete key will also remove the item.

Hide - Grays out the component in the layout model, still leaving the object in the model, but not displaying it in the Main Display window.

Alignment Point - Sets the location of the Alignment Point with respect to the item. For example, NW would place the Alignment Point to the northwest (upper left) of the item. This is not an option when working with windbarbs or vectors

Center - Centers the display in both the horizontal and vertical, just in the horizontal, or just in the vertical.

Properties... - Opens the Properties Dialog described below. The Properties Dialog can also be invoked by double-clicking on a component of the layout model.

The Properties window consists of four tabs: **Display**, **Color By**, **Scale Size**, and **Rotate**.

Properties Dialog - Display Tab

The **Display** tab allows for assigning which observation variable is associated with that item. Numerical values should appear in a "Value" item, text in a "Text" item, etc. Note that the items in this tab may differ depending on the item.

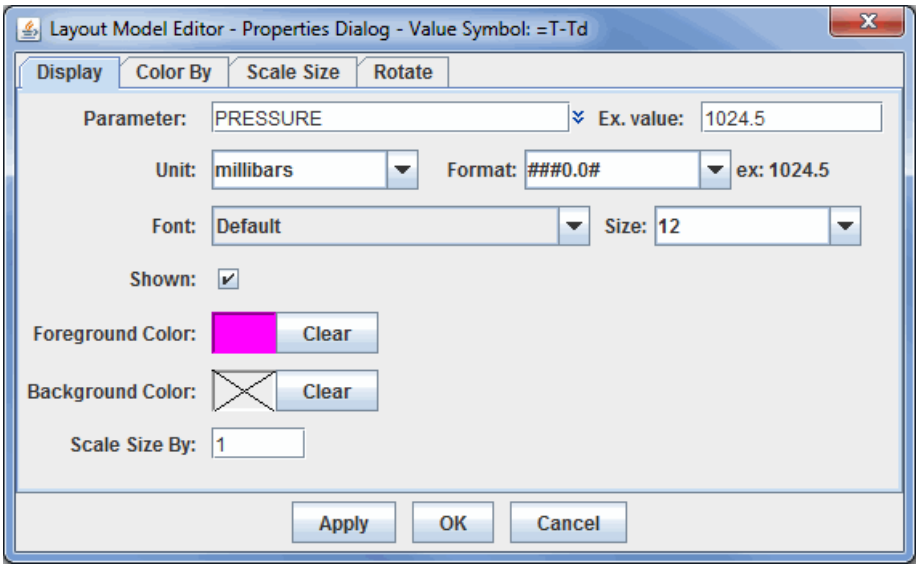


Image 3: Display Tab of the Properties Dialog

Properties

Parameter - Represents what parameter the layout model item is displaying. This can be a single parameter, such as pressure, or it can be an equation. This is possible because the parameter identifiers in the layout model can hold embedded Jython code, and any parameter that begins with "=" is treated as a Jython expression. For example, "=T-Td" can be entered for dew point depression. This can also be formatted this as "='Td:'+str(T-Td)". To format the result of the calculation using the format specifier from the properties dialog, then enter "='Td:'+format(T-Td).

Unit - Determines the unit that the parameter will use in its display.

Format - Represents how the numerical value will be displayed. This can affect rounding. An example of how each format will appear is written in the 'ex:' next to the Format field**.** The **0** value will plot the actual numerical value of the data at that place in the number if it exists, and if not a 0 will be plotted at that place. The **#** value will plot the actual numerical value of the data at that place in the number if it exists,

and if not it will leave it empty. For example, with a value of 998.5, different **Formats** would plot the value as:

###0.0# - plots as: 998.5

0000.00 - plots as: 0998.50

Font - Sets the font of the item's text when displayed in the Main Display window.

Size - Sets the size of the item's text when displayed in the Main Display window.

Shown - Determines if the item will be shown as part of the layout model.

Foreground Color - Represents the color of the text/symbol.

Background Color - Sets a background color for the text/symbol if desired. A through this field is representative of a transparent background.

Scale Size By - Scales the size of the item with respect to other items in the layout model. The default value for this field is 1, meaning that all parameters in the layout model are scaled the same.

Properties Dialog - Color By Tab

The **Color By** tab consists of two tabs within itself: **Map Value Into Color Table**, and **Color From Parameter**. This tab allows for specifying how to color the item in the layout model.

The **Map Value Into Color Table** tab allows for coloring the parameter based off of its numerical value in relation to the set data range and color table for the parameter.

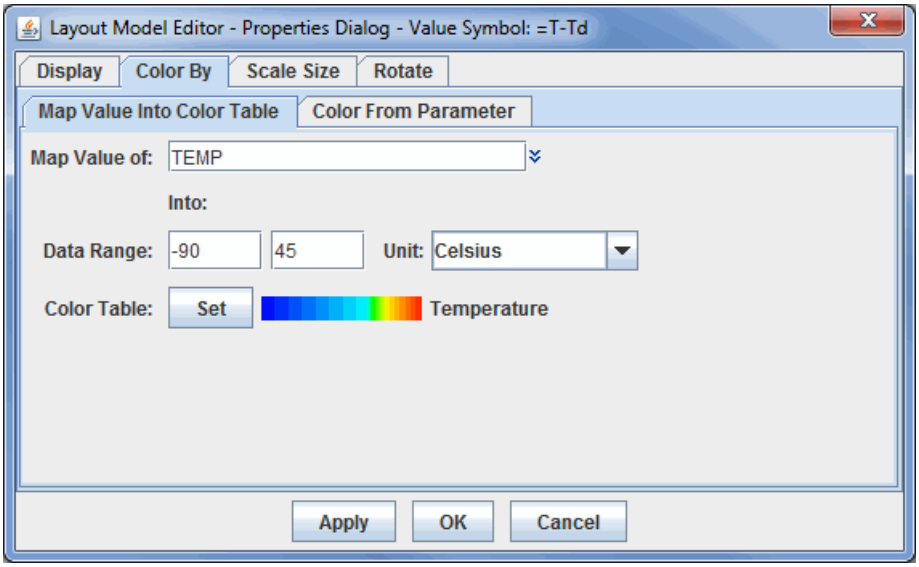


Image 4: Map Value Into Color Table Tab of the Color By Tab

Properties

Map Value of - Sets the parameter used for coloring the displayed item. The » to the right of this field allows for selecting a currently loaded field or an alias.

Data Range - Sets the numerical range of the parameter listed in the **Map Value of** field. This represents the end points for the color table.

Unit - Sets the unit of the parameter listed in the **Map Value of** field.

Color Table - Sets the color table of the parameter to be one of the already existing tables.

For example, in the above image the Temperature parameter has been specified with data range -90 to 45 Celsius. For each display, McIDAS-V will find the Temperature value (e.g., 15 Celsius), convert it to the specified unit (if necessary), find where it lays within the range, and use the corresponding color from the color table to display the data in the Main Display window.

The **Color From Parameter** tab allows for specifying a parameter, a set of (regular expression) patterns, and a corresponding color. If the text value of the parameter matches one of the patterns then the given color is used to color the shape.

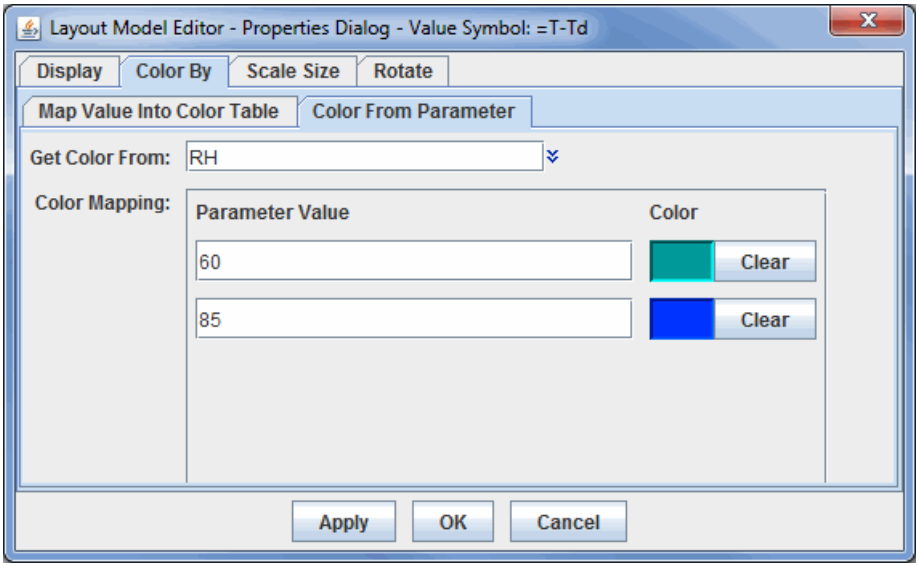


Image 5: Color From Parameter Tab of the Color By Tab

Properties

Get Color From - Selects a parameter or set of patterns that correspond to a color. The » to the right of this field allows for selecting a currently loaded field or an alias.

Parameter Value - Represents a numerical, fixed value that will be colored by the color selected for each value. If specifying a range of values, they should be entered by minimum value, maximum value (for example: 250,273). Clicking Clear will change any set color back to transparent. Pressing the Apply button will add two more Parameter Value fields once all other fields are filled.

Properties Dialog - Scale Size Tab

The **Scale Size** tab allows for specifying a parameter to scale the shape by. For each point display, McIDAS-V will find the value of the parameter, determine where that value lies within the data range, and find the corresponding scaling from the scale factor range.

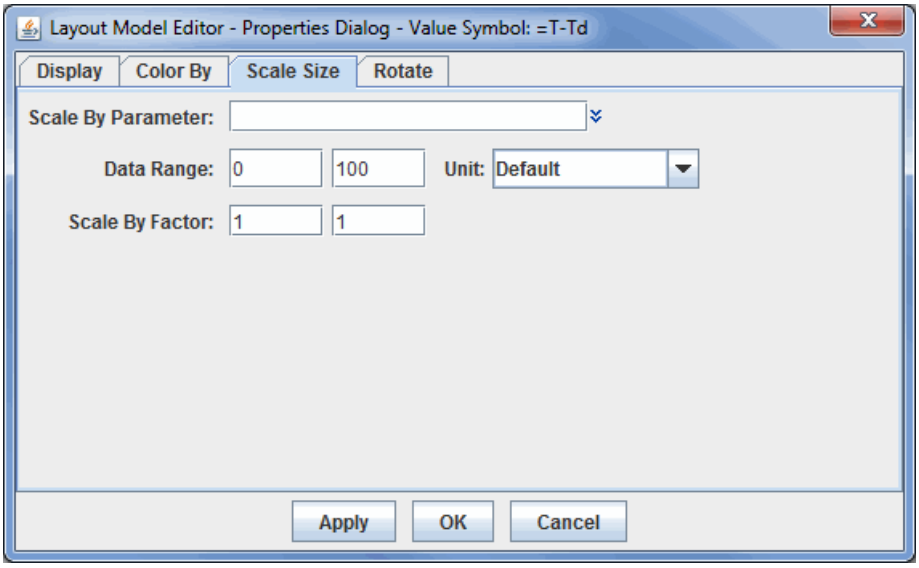


Image 6: Scale Size Tab of the Properties Dialog

Properties

Scale By Parameter - Sets the parameter used to scale the data in the Main Display window. The » to the right of this field allows for selecting a currently loaded field or an alias.

Data Range - Sets the numerical range of the parameter listed in the **Map Value of** field of the **Color By** tab.

Unit - Sets the unit of the parameter listed in the **Scale By Parameter** field.

Scale By Factor - Sets the range for which the scaling factor will be applied to the data.

Properties Dialog - Rotate Tab

The **Rotate About Axis** tab works like the scale and color by facilities. Note that the rotation is about the Z axis in X/Y/Z space. It is not a rotation in Lat/Lon space. All three tabs in the **Rotate** tab have the same fields.

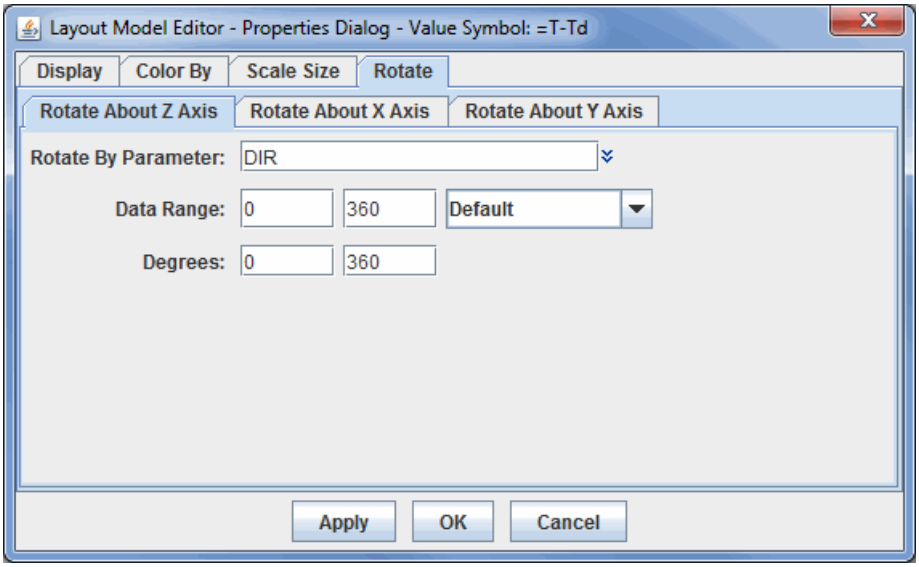


Image 7: Rotate About Tabs of the Rotate Tab

Properties

Rotate By Parameter - Sets the parameter used to rotate the data in the Main Display window. The » to the right of this field allows for selecting a currently loaded field or an alias.

Data Range - Sets the numerical range of the parameter listed in the **Map Value of** field of the **Color By** tab.

Unit - Sets the unit of the parameter listed in the **Scale By Parameter** field.

Degrees - Sets the range of degrees for which the data will rote about each respective axis.

Alignment Toolbar

At the top of the Layout Model Editor window, there is an alignment toolbar that allows for specifying the location of one item in a layout model model with respect to another. To align one item with respect to another, both items must be selected in the Layout Model Editor must be active. To activate multiple items, use Shift+left click on each item.

Image 8: Alignment Toolbar

- **-** Shifts the selected items up vertically to align the top of the items. There is no horizontal shift.
- **-** Shifts the selected items vertically to align the middle point of the items. There is no horizontal shift.
- **-** Shifts the selected items down vertically to align the bottom of the items. There is no horizontal shift.
- **-** Shifts the selected items left horizontally to align the left side of the two items. There is no vertical shift.
- **-** Shifts the selected items horizontally to align the middle point of the items. There is no vertical shift.
- **-** Shifts the selected items right horizontally to align the right side of the two items. There is no vertical shift.
- **-** Centers (horizontally) the item with respect to the shift made from a button on the left.
- **-** Centers (vertically) the item with respect to the shift made from a button on the left.
- **-** Snaps the items to the grid.

Properties Dialog - Shapes

Two items that can be added to the layout model whose Properties windows are significantly different than described above are **Shape** and **Mapped Shape**. These allow you to define numerical values of a parameter as a variety of different shapes.

The Properties window of the **Mapped Shape Symbol** is shown below. The only tab that differs between the Properties of **Mapped Shape Symbol** and **Shape** and the Properties above is the **Display** tab. The **Shape** item does not include the **Shape Mappings** panel in the window below, so using

Shape, all numerical values will be plotted with the same shape regardless of their value.

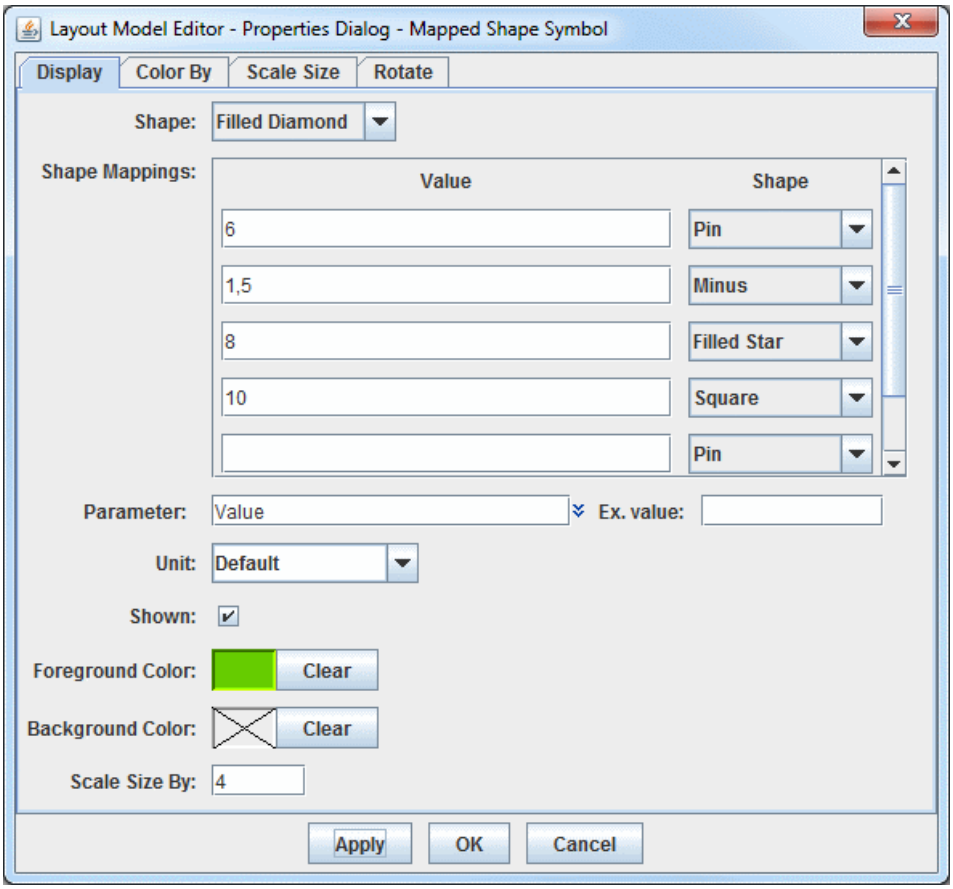


Image 9: Mapped Shape Properties

Properties

Shape - Sets the shape that numerical values will be plotted as. This will be the shape of all of the values not included in the **Shape Mappings** panel below.

Shape Mappings - Allows for defining specific shapes to individual numerical values included with the data. The **Value** field is for the numerical values included in the data. This can be either an individual value (e.g. 6) or a range of values, which is represented by minValue, maxValue (e.g. 1,5). The **Shape** field next to **Value** is the shape that the values will take in the display. Note that the **Values** and **Shapes** in the **Shape Mappings** panel override the **Shape** field above.

Parameter - Represents what parameter the layout model item is displaying. This can be a single parameter, such as pressure, or it can be an equation. This is possible because the parameter identifiers in the layout model can hold embedded Jython code, and any parameter that begins with "=" is treated as a Jython expression. For example, "=T-Td" can be entered for dew point depression. This can also be formatted this as "='Td:'+str(T-Td)". To format the result of the calculation using the format specifier from the properties dialog, then enter "='Td:'+format(T-Td).

Unit - Determines the unit that the parameter will use in its display.

Shown - Determines if the item will be shown as part of the layout model.

Foreground Color - Sets the color of the shape(s).

Background Color - Sets a background color for the shape(s) if desired. A through this field is representative of a transparent background.

Scale Size By - Scales the size of the item with respect to other items in the layout model. The default value for this field is 1, meaning that all parameters in the layout model are scaled the same.

For example, in the above image the Value parameter has been specified. From the **Shape Mappings** panel, values of 1-5 will display as a Minus, 6 will display as a Pin, 8 will display as a Filled Star, and 10 will display as a Square. All other values will display as a Filled Diamond, as set in the **Shape** field.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there are several options unique to this display.

The **File** menu has these unique options:

New - Allows for the creation of a new layout model.

Save - Saves the layout model so that it can be used in McIDAS-V.

Save As... - Saves the layout model so that it can be used in McIDAS-V and allows for the changing of the name of the layout model.

Rename... - Opens a Rename Layout Model window that prompts for the layout model's new name.

Remove - Removes the currently open layout model.

Import... - Allows for importing a layout model as an IDV station model file (*.ism).

Export... - Allows for exporting a layout model as an IDV station model file (*.ism).

Close... - Closes the Layout Model Editor.

The **Edit** menu has these unique options:

Symbols - Lists the different symbols included in the layout model. Clicking on the symbol will bring up the Properties Dialog window for that symbol, allowing for modifications to be made to it.

Set properties on selected - Opens a Properties Dialog window for the active symbols in the Layout Model Editor. Active symbols are those that have black squares around them. The only items in this Properties Dialog window are only properties that can apply to all symbols in the layout model, such as the **Data Range**, **Unit**, and **Color Table**. Changing a property in this window will apply the change to all active symbols.

Cut - Removes the selected symbols from the layout model.

Copy - Copies the selected symbols from the layout model.

Paste - Pastes a symbols into the layout model.

Select All - Activates each individual symbol in the layout model so that cut/copy/paste can be applied to all of the symbols at once. When active, each symbol will have black squares around them.

To Front - Moves the selected item to the front of others that may overlap it.

To Back - Moves the selected item to the back of others that may overlap it.

The **View** menu has these unique options:

Show Alignment Points - Displays a red square representing where the symbol will be centered.

Zoom in - Zooms in on the layout model.

Zoom out - Zooms out on the layout model.

Zoom rest - Reverts back to original zoom level.

Grid - Adds horizontal/vertical grids to the layout model. Increase makes the grid size larger (fewer grids), and Decrease makes the grid size smaller (more grids).

Black background - Makes the background in the Layout Model Editor black, with white grids and gray axes lines.

White Background - Makes the background in the Layout Model Editor white, with gray grids and black axes lines. This is the default for the Layout Model Editor

The **Layout Models** menu has these unique options:

This menu lists out all of the layout models included in McIDAS-V. Layout models that have been created by a user will include **<local>** after the name. When a layout model is selected, it will be brought into the Layout Model Editor where a user can modify the layout model.

Parameter Alias Editor

The Parameter Alias Editor is opened through the Tools menu in the Main Display window with **Tools->Parameters->Aliases** menu and allows for the association between "canonical" parameter names used by McIDAS-V for physical quantities, such as TEMP for temperature, and parameter names used in particular data sets for the same quantity, such as for example "jan_mean_temp."

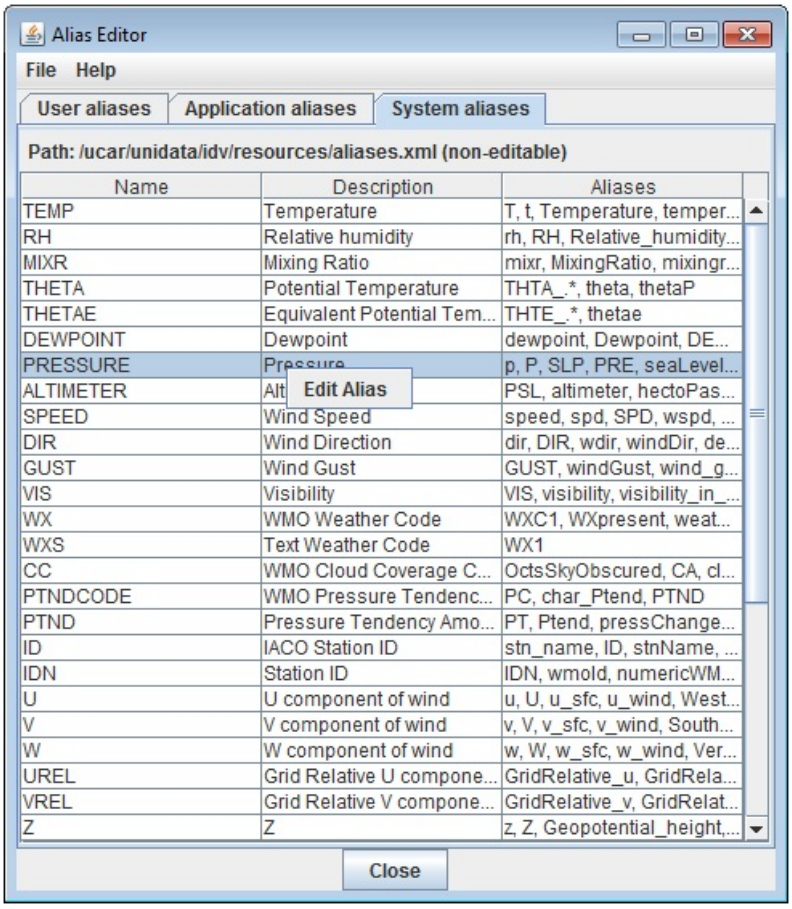


Image 1: Alias Editor

Different data sets often have different names for the same physical quantity, such as the quantities for temperature or easterly wind speed component. McIDAS-V can recognize any particular variable name as representing a standard quantity with the use of a parameter alias. The Alias Editor associates any particular variable name that may appear in a data set (right column) with a canonical or McIDAS-V name or alias (left column). These columns are sorted in alphabetical order by default, and this order can be reversed by clicking on the name of the columns (e.g. '**User aliases**').

The Alias Editor has a number of tabs that display the user editable aliases and the non-editable system aliases. To modify an alias in the **Application aliases** or the **System aliases** tabs, right-click on a row and select **Edit Alias**. This will copy the alias to the **User aliases** tab, where it can be modified by the user. While this alias will still exist in the **Application aliases** or **System aliases** tab, the alias in the **User aliases** tab will be used first by McIDAS-V. User aliases can be modified in the same way, by right-clicking on a row and selecting **Edit Entry**. User aliases can be deleted by right-clicking on a row and selecting **Delete Entry**.

When attempting to create a new alias or edit an existing one, a Data Alias dialog is shown:

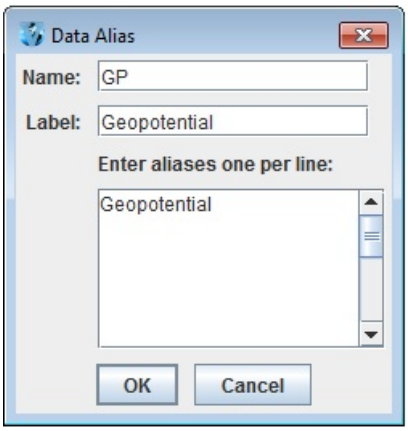


Image 2: Data Alias Properties Dialog

Name - Sets the name of the alias. This is what all of the parameter names in the bottom part of this Data Alias window will be mapped to. This name can then be mapped to a parameter default.

Label - Sets a description of the alias.

Enter aliases one per line - Shows a listing of all of the parameter names being mapped to the alias. Only one parameter name should be entered per line.

Menus

The **File** menu has these unique items:

New Alias - Opens a Data Alias dialog, where a new alias can be created.

Export to Plugin - Opens the Plugin Creator window with all of the aliases loaded in.

Export Selected to Plugin - Opens the Plugin Creator window with the selected aliases loaded in.

Close - Closes the Data Alias dialog.

Parameter Defaults Editor

The Parameter Defaults Editor is opened through the Tools menu in the Main Display window with **Tools->Parameters->Defaults** and allows for the specification of default color tables, ranges, units, and contouring values for different parameters:

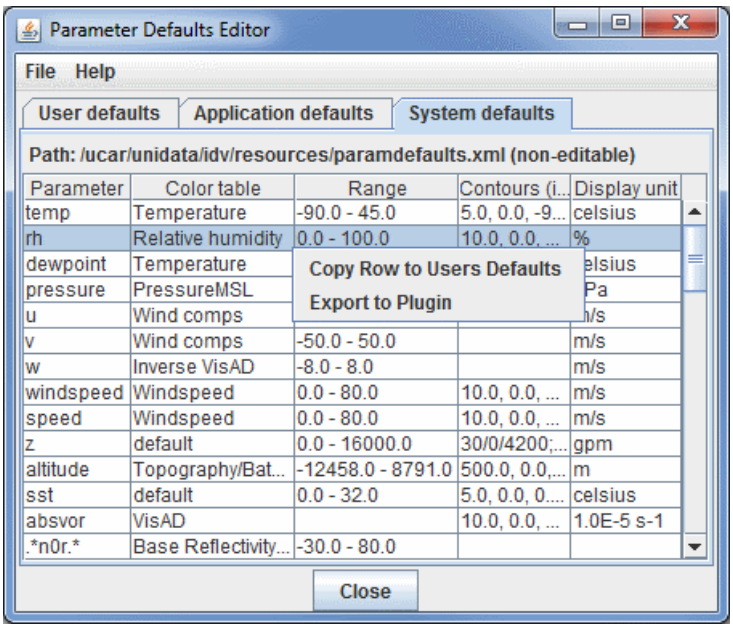


Image 1: Parameter Defaults Editor

Properties

Parameter - Lists the name of the parameter. The parameter name is included with data that is loaded into McIDAS-V. This field can also be the **Name** defined in the Formula Editor or a parameter alias.

Color Table - Lists the color table to be used to display the parameter.

Range - Lists the range that the color bar will cover.

Contours - Lists values related to the contours being displayed, including the interval, base, minimum, and maximum values.

Display Unit - Lists the unit used to display the parameter.

This feature allows for presetting conventional color and contouring choices, and allows for overriding system defaults.

There are three sets of defaults: User defaults, Application defaults, and System defaults. These columns are sorted in alphabetical order by default, and this order can be reversed by clicking on the name of the columns (e.g. '**Parameter**'). While the items in the **Application defaults** and **System defaults** tabs cannot be modified within the tab, a duplicate of the same parameter can be copied in the **User defaults** tab. This can be done by right-clicking on a row and selecting **Copy Row to Users Defaults**. If the same parameter is defined as a User default and an Application/System default, the User default will be used first. Once this is done, a user default can be edited by right-clicking on a row and selecting **Edit Settings**. This opens a Parameter Defaults window that allows for modifying and defining properties of the default:

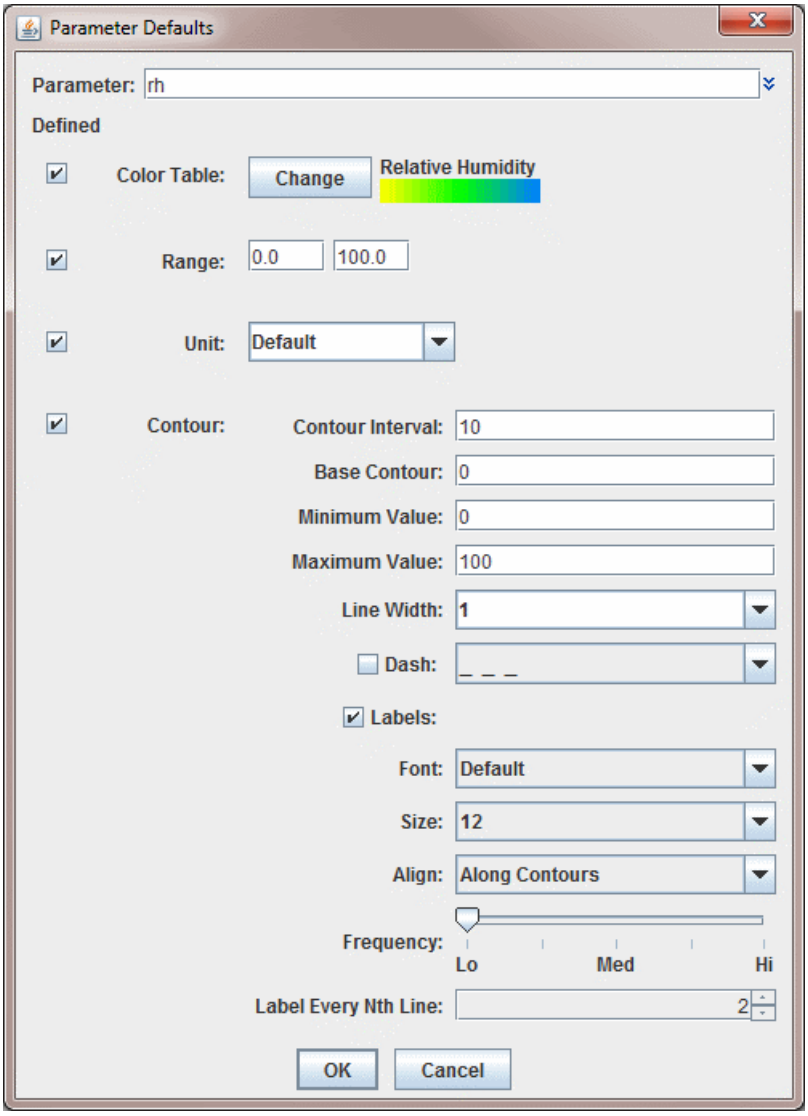


Image 2: Parameter Defaults Properties

In the example above, any time a parameter named "rh" is used to define a field, the data will display with the **Relative Humidity** color bar, a range of 0-100, and contour values as specified in the window. To define an individual item, such as **Range**, the **Defined** checkbox must be selected. If it is not checked, then any values stored in this window will not be saved as a default. From the **User defaults** tab, right-clicking on a row to adding a new row, editing the settings for the row, deleting the row, or exporting an individual row as a plugin.

The parameter names are given in regular expression syntax to help match with actual data names. Plain text is matched exactly. The string dot star, ".*", means "any text here." The ^ means "begin with the following text exactly".

Properties

Parameter - Represents the name of the parameter. The double down arrows allow you to change the parameter to one of a loaded data source, or a predefined alias.

Color Table - Sets the color table to use to display your parameter. You can change this by clicking the **Change** button, and selecting a pre-defined color bar.

Range - Sets the range that the color bar will cover, from low to high.

Unit - Sets the unit used to display the parameter.

Contour Interval - Sets the spacing (difference in value) between contours. There are four ways to specify the contour interval.

1. Specify a single value to denote a regular interval between contours.
2. Specify irregular contour intervals with a semi-colon separated list of values. For example:

   5400;5460;5800. This would only show contours at 5400, 5460, and 5800.
3. Specify different contour intervals for different ranges in the following format:

   cint1/min1/max1;cint2/min2/max2;...;cintn/minn/maxn

For example, with geopotential heights: 30/0/4200;60/4200/8600;120/8600/24000 would draw contours at 30gpm between 0 and 4200, 60gpm between 4200 and 8600, and 120gpm between 8600 and 24000

4. Specify one individual contour by setting the interval, min, and max as the same value. For example:

   5400/5400/5400. This would only show the 5400 line.

Base Contour - Sets the value on which all contours are based. All contours will be integer multiples of the contour interval from the base value. For example, with a base value of 0 and a contour interval of 3 contours would be created at ... -6, -3, 0, 3, 6... A base of 1 with that interval would create contours at ... -5, -2, 1, 4, 7... The base value does not have to be the lowest contour level on a plot, or inside the range of values plotted; it is only a computational reference point. The base contour value is also used for controlling which lines are dashed.

Minimum Value - Sets the limit below which no contour lines are shown. The minimum value may be larger than the base value, so that the base value may never appear on a plot.

Maximum Value - Sets the upper limit above which no contour lines are shown. The minimum and maximum values do not need to match contour line values; they are only limits.

Line Width - Sets the line width (in pixels) of the contour lines and labels.

Dash - Dashes contour values less than the base value. If the base is set higher than maximum value, then all lines are dashed. Use the pulldown menu to select the dash pattern to use.

Labels - Displays contour labels on the image.

Labels: Font - Sets the font style of the contour labels.

Labels: Size - Sets the font size of the contour labels.

Labels: Align - Sets the way contour labels will be written on the contours. **Along Contours** means the labels will be written along contours, and while they will not be written upside down, there is a chance they will be written at an angle depending on the layout of the contours. **Horizontal** means the contour labels will be written on the contour, but it will be written in the horizontal and not on an angle.

Frequency - Sets the frequency of labels along the contour lines. There will be more labels displayed as the slider is moved from left to right.

Label Every Nth Line - Determines how many contour lines will be labeled in the display. By default this is set to a value of 2, which means that every other contour line will be labeled. Decrease this value to increase the number of contours with labels, and increase this number to decrease the number of contours with labels.

Menus

The **File** menu has these unique items:

New Row - Opens a Parameter Defaults window, which allows you to select what properties you want to define.

Open - Allows you to open an eXtensible Markup Language (XML) file (*.xml). This will add a new tab to the Parameter Defaults Editor window specifically for the parameter(s) in the file.

Import - Allows you to import an eXtensible Markup Language (XML) file (*.xml). This will add a new row to the User Defaults tab for each default in the imported file.

Export to File - Allows you to save your Parameter as an eXtensible Markup Language (XML) file (*.xml).

Export to Plugin - Opens the Plugin Creator window with all of the aliases loaded in.

Export Selected to Plugin - Opens the Plugin Creator window with the selected aliases loaded in.

Close - Closes the Parameter Defaults Editor window.

Parameter Groups Editor

The Parameter Groups Editor is opened through the Tools menu in the Main Display window with **Tools->Parameters->Groups** and allows for the specification of "parameter groups", named groups of parameter names.

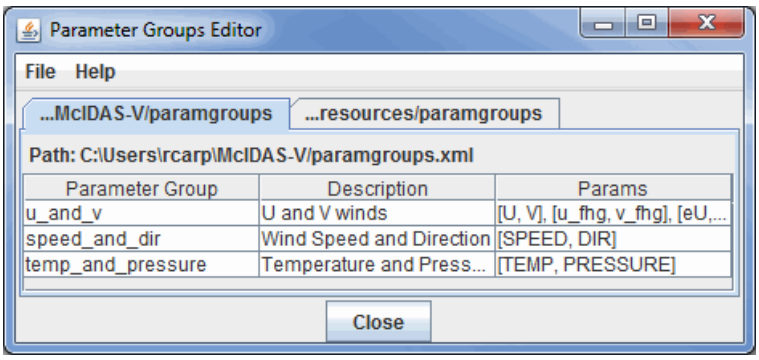


Image 1: Parameter Groups Editor

Properties

Parameter Group - Lists the names of the parameter group that the parameters in the Params column will be mapped to.

Description - Lists a description of the parameter group.

Params - Lists the parameters that are stored in the parameter group.

There are two sets of defaults: user defaults in the tab **User Groups**, and system groups supplied with McIDAS-V in the **System Groups** tab. Look at the system defaults for examples. These columns are sorted in alphabetical order by default, and this order can be reversed by clicking on the name of the columns (e.g. '**Parameter Group**').

The system settings cannot be edited by the user, but right clicking a row and selecting **Copy Row to Users Defaults** allows for copying a group to the "user defined" table where it can be modified. When this is done, the Parameter Group window allows for the sets of parameters that fall under this group. Parameters in each group should be separated by commas and only one group can be specified per line.

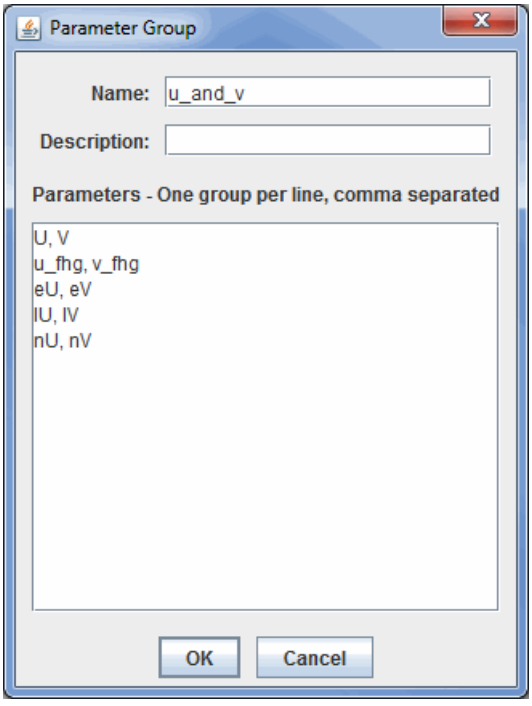


Image 2: Parameter Groups Properties

Properties

Name - Sets the group name for the selected parameters.

Description - Sets the description used to represent the parameter group names.

Parameters - Stores the parameter names to be included with the group. This is necessary so McIDAS-V can look up the selected parameters.

Menus

The **File** menu has these unique items:

New Row - Opens a Parameter Group window, which allows you to define the sets of parameters that fall under the group.

Open - Allows you to open an eXtensible Markup Language (XML) file (*.xml).

Import - Allows you to import an eXtensible Markup Language (XML) file (*.xml).

Export to File - Allows you to save your Parameter as an eXtensible Markup Language (XML) file (*.xml).

Export to Plugin - Opens the Plugin Creator window with all of your aliases loaded in.

Export Selected to Plugin - Opens the Plugin Creator window with your selected aliases loaded in.

Close - Closes the Parameter Defaults Editor window.

Projection Manager

The Projection Manager allows you to choose, edit, and save map projections for use in McIDAS-V.

A projection is a way of mapping the surface of the Earth (a curved 2D surface) onto a flat 2D surface (a plane). A projection transforms a point on the earth (specified by latitude, longitude) to a point on the projection plane.

In the Projection Manager, both the projection and the area of the Earth can be specified. For example, you can make a Lambert Conformal map of North America, and a Lambert Conformal map of Sedgwick County, Kansas. Same projection, different areas.

McIDAS-V provides several basic types of projections: **Lat/Lon**, **Lambert conformal conic**, **Transverse mercator**, **Stereographic**, **Mercator**, **Albers Equal Area**, **Lambert Azimuth Equal Area**, **Orthographic**, **VerticalPerspectiveView**. Each of these can be parameterized (e.g., tangent point, origin longitude) to create a specific projection area of that type. When you define a projection and area, you specify the type of projection and its parameters.

Projection Manager Window

You can bring up the Projection Manager with the **Projections-> New/Edit...** menu item in the Main Display window, or through the **Tools->Projections->Edit Map Projections** menu option in the Main Display window. Projections supplied with McIDAS-V are shown in the list. There may be additional projections you have created and named. In the figure, the US->CONUS projection is highlighted, and displayed on the left.

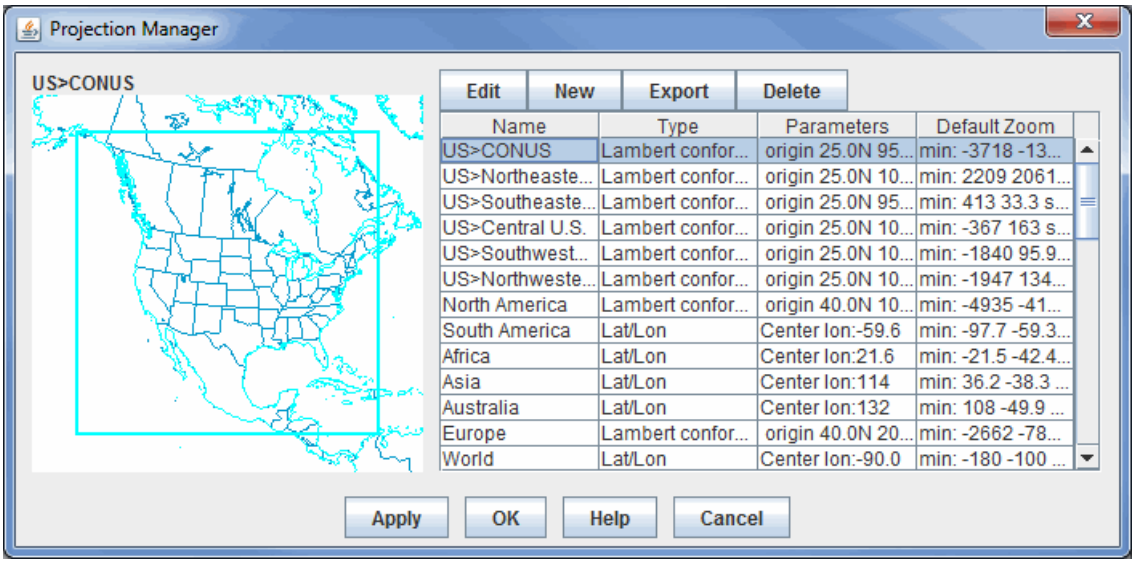


Image 1: Projection Manager

Properties

Edit - Opens a Define/Edit Projection window, where you can edit the map boundaries, type, and name of the existing map.

New - Opens a Define/Edit Projection window, where you start from scratch by naming the map, setting the boundaries, and selecting the map type.

Export - Allows you to export a map and save it to a file.

Delete - Deletes the selected map and removes it from the list.

Name - Lists the names of the user-saved and default maps.

Type - Lists the type of projection that is used to display the map.

Parameters - Lists the lat/lon origin of the display, as well as the parallels.

Default Zoom - Represents the zoom level and size of the map.

Apply - Changes the map projected in the Main Display window to the selected map

OK - Changes the map projected in the Main Display window to the selected map and closes the Projection Manager.

Help - Opens the McIDAS-V User's Guide to this page.

Cancel - Closes the Projection Manager window without making any changes to the Main Display window.

McIDAS-V starts with a default projection. Use the **Default** pulldown menu to select the projection that will be shown each time your McIDAS-V

starts. (The default projection may not be used if you are starting McIDAS-V with a Bundle of configuration information).

Define/Edit Projection Window

This allows you to define new projections and to modify existing ones. Remember that a projection not only consists of the mathematical projection, but also the area of the Earth that is seen.

Here is how to create a new or revised projection:

1. Choose Edit or New from Projection Manager window. You can also double click on an existing projection in the Projection Manager to open the Define/Edit Projection window.
2. Enter a new or revised name if necessary. See the Properties section below for more information about naming and creating hierarchies.
3. Choose a Projection Type from the pull-down menu.
4. Fill in the projection parameters.
5. Set the map area shown with this projection by zooming and panning the view on the left. To zoom, click and drag the left mouse button. Use the other buttons in the window to zoom in/out and translate the display.
6. Resize the map boundaries by clicking and dragging on the black boxes at the borders of the image. Pressing Delete or Ctrl+D will delete the box, and pressing Ctrl+R will resize the boundaries of the map to the current geographical boundaries of the map in the Define/Edit Projection window.

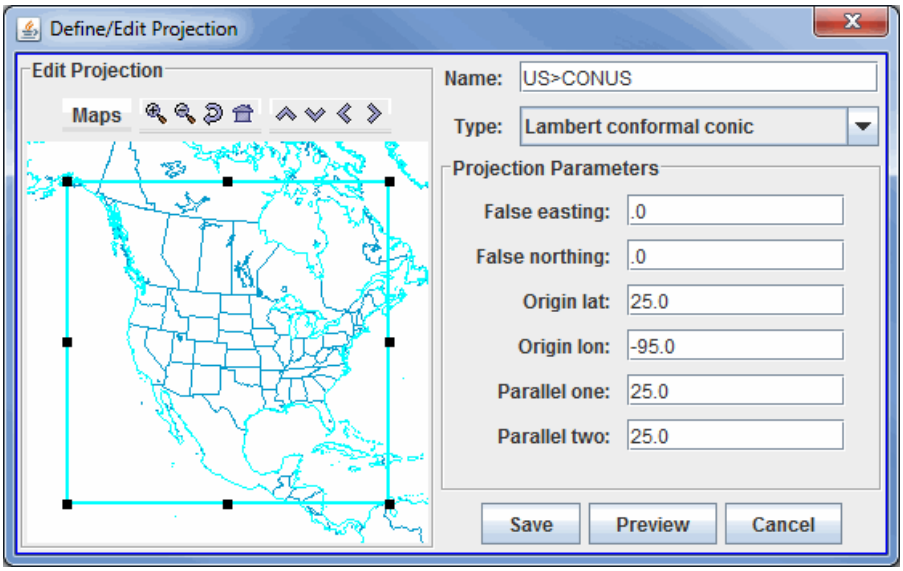


Image 2: Define/Edit Projection Dialog

Note that some fields in this window may be different depending on the map type you select. There are no Projection Parameters when using a Lat/Lon map type. In the example shown, a Lambert conformal conic projection is being defined with the projection parameters as shown in the figure.

Properties

Edit / New **Projection** - Edits an existing/Creates a new map area.

Maps **-** Turns on/off maps in the map area while defining a new projection.

Zoom In - Zooms in over the current map area.

Zoom Out - Zooms out over the current map area.

Previous Map Area - Returns to the previous map area.

Home Map Area - Returns to the default map area.

Move View Up - Moves the view up (map down).

Move View Down - Moves the view down (map up).

Move View Left - Moves the view left (map right).

Move View Right - Moves the view right (map left).

Name - Represents the name of the map. Enter in a new or revised name if necessary (projection names are unique). Use ">" between names to create a category hierarchy.

Type - Represents the projection type. Each projection type will have their own specific parameters to define.

Projection Parameters - Determines the positioning of the boundaries of the map. These parameters will differ depending on the map type that you select.

False easting - Moves the map boundaries east and west. A negative value in this field moves the boundaries of the map east, and a positive value moves the map's boundaries west.

False northing - Moves the map boundaries north and south. A negative value in this field moves the boundaries north, and a positive value moves the map's boundaries south.

Origin lat - Represents the center of the map's boundaries with respect to latitude.

Origin lon - Represents the center of the map's boundaries with respect to longitude.

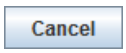
Height - Sets the zoom level of the display in the Define/Edit Projection window. The larger the value, the more zoomed in you will be. This is an option with the Lambert conformal conic map type.

Scale - Sets the scale of the map with respect to size. The larger the scale, the larger the map will appear. This is an option with the Transverse mercator map type.

Tangent lon - Sets the tangent longitude for the map. This is an option with the Transverse mercator map type.

- Changes the map in the Projection Manager to match the map in the Define/Edit Projection window.

- Displays what the projection looks like.



- Exits the Define/Edit Projection window.

Data Analysis

- Formulas
- Derived Data
- Native Formulas
    - Description of Formulas - Maps
    - Description of Formulas - Grids
    - Description of Formulas - Miscellaneous
    - Description of Formulas - Image Filters
    - Description of Formulas - Export
    - Description of Formulas - Imagery
- Jython Methods
- Jython Shell
- Jython Library

Formulas

McIDAS-V provides techniques to make computations with data sources and to display the results. The simplest technique is using McIDAS-V formulas, which are one-line mathematical expressions. The steps for computing and displaying the output of a McIDAS-V formula are:

- Defining a McIDAS-V formula by name, description, and mathematical formula.
- Saving the formula.
- Selecting the display type.
- Selecting which data to use in the formula.

You can make formulas more powerful by writing methods (subroutines) in the Jython computer language, which is described in Jython Methods.

Once you define a McIDAS-V formula, it is saved and will appear in future sessions of McIDAS-V.

To create a formula, select the **Tools->Formulas->Create Formula** menu item in the Main Display window. This opens the Formula Editor dialog window used to define a formula:

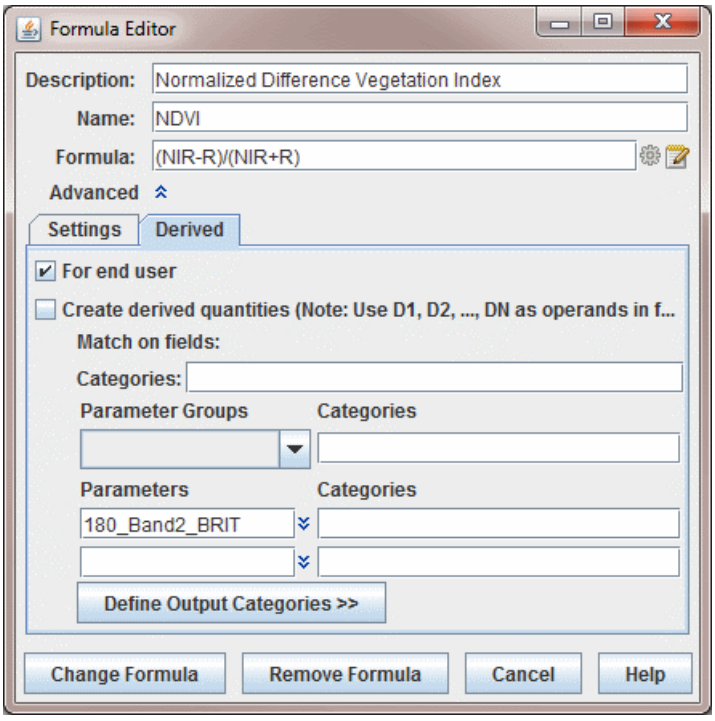


Image 1: Formula Editor Dialog

Properties

Description - Represents the name of the formula that will be written in the **Field Selector** tab of the Data Explorer.

Name - Sets the name of the formula to be used in the Parameter Defaults. This allows for settings such as color tables to be automatically assigned to the display when the formula is evaluated. For example, if **T** is entered as the **Name**, the displays created by this formula would use the Temperature color table.

Formula - Represents the formula that will be evaluated.

The formula itself can use common mathematical operators much as +, -, * for multiply, / for divide, and ** for power. Other Jython operations such as sqrt(a), max(b), pow(a,b), and sin(c) are available. The Jython Methods section of the User's Guide explains how to write complete multi-line functions or Jython methods that you can call in one-line formulas.

The variable names in the formula definition, such as "NIR" in the figure above, are operands and do *not* need to exactly match any particular parameter name in any data source; the association is made later, in the parameter selection step.

Do not use spaces in formula variable names, such as "wind speed." The formula is an expression in the Jython language. Each variable name must start with a letter.

It is best to use variable names that suggest the parameter data they represent, so that later you can easily remember what the variables mean. Use names like Temp500m, RelHum_surf, absvort, sst_jan, density, or whatever makes sense to you. If you use a variable names like V1 and V2, then later when the formula requests which real parameter name goes with which variable name you may be puzzled which is which.

Variable names can have extra "syntactic sugar" attached to them that McIDAS-V uses for a variety of purposes. The "sugar" consists of a set of name/value pairs contained in brackets ("[...]") after the variable name.

For example, normally variables are used to select and define data choices. You can also have variables that are simple text input from a user. For

example, evaluating the following expression:

```
someProcedure(someValue[isuser=true])
```

will result in a dialog box being shown to allow for the user to enter a text value (e.g., a number) for the variable *someValue*.

You can provide default values with:

```
someProcedure(someValue[isuser=true,default=some default])
```

An extension from the previous example, a formula can be created without using a pre-defined procedure from the Jython Library. For example, a formula can be created that will allow the user to divide the values of a field by a specific value. This can be done as follows, by specifying that the value is a float (the value could also be specified as an integer by specifying 'int' in place of 'float'):

```
field/float(value[isuser=true,default=some default])
```

You can specify the types of data that can be selected for a variable with the *categories* name. e.g.:

```
someProcedure(someDataValue[categories=param:ALTITUDE])
```

If you want multiple data categories, separate them with a ";":

```
someProcedure(someDataValue[categories=param:ALTITUDE;param:elevation])
```

If you only want to select 3D grids do:

```
someProcedure(someDataValue[categories=GRID-3D-*])
```

If you only want to select 3D or 2D grids do:

```
someProcedure(someDataValue[categories=GRID-3D-*;GRID-2D-*"])
```

You can also specify a regular expression pattern that is used to pre-select the first data choice whose description matches the pattern.

```
someProcedure(someValue[pattern=some_pattern])
```

A formula can be created that allows for multiple line text input by specifying rows= in the formula. For example:

```
someProcedure(someValue(isuser=true,rows=4))
```

A formula can prompt the user with a menu of choices with type=choice in the formula. For example:

```
someProcedure(someValue(isuser=true,type=choice,choices=lt;gt))
```

A formula can prompt the user with a Field Selector window that allows for selecting multiple fields at once with multiple=true in the formula. For example:

```
someProcedure(someValue(multiple=true))
```

In the advanced section you can enter a description of the formula, its group or category, and you can define what types of displays are applicable for the given formula (the default is to be able to use all displays).

The group is used to display the formula in the Field Selector window and can be any alphanumeric text including spaces, numbers, and punctuation characters. Hyphens ("-") define sub-categories.

To save the formula, click on Add Formula. A new entry appears in the selector panel. By right clicking on the formula entry in the Field Selector window you can edit the formula. If you edit a native formula and save it, the original formula will still be listed, but the modified formula will also be listed. To remove a formula, click on Remove Formula in the pull down menu. You can also right click on a formula and select Remove Formula.

For information about the **Derived** tab, see Derived Data.

Different data sources and automatic navigation

McIDAS-V hides much of the computational complexity. You can write a simple formula such as (CT*1.8 + 32.0) - dewptF, and McIDAS-V will automatically apply the calculation to every element in large 3D grids referred to as CT and dewptF. No loops over grid points are needed; and you don't need to know anything about how the grid is defined, mapped on the Earth, or the data format. You can even use different sources for the individual parameters. For example, CT can come from a NAM model output grid and dewptF from your own local weather model. The two grids don't need to have the same grid point locations nor the same areal coverage. The results are computed in the area of overlap on the grid points locations of the first grid. Interpolation is automatically applied where needed.

Creating a Display with a Formula

Using a formula as the data when creating a display is just like using any other data. You select the formula entry in the Field Selector window, and the list of applicable displays will be shown and you create the display.

When you create a display, McIDAS-V needs to know what actual data should be bound to the operands within your formula. A Field Selector window will appear that allows you to select the actual data for each operand. You can select parameters from more than one data source for use in a single formula, for example, you can pick the same parameter from data sources of different times to compute a time difference in the parameter.

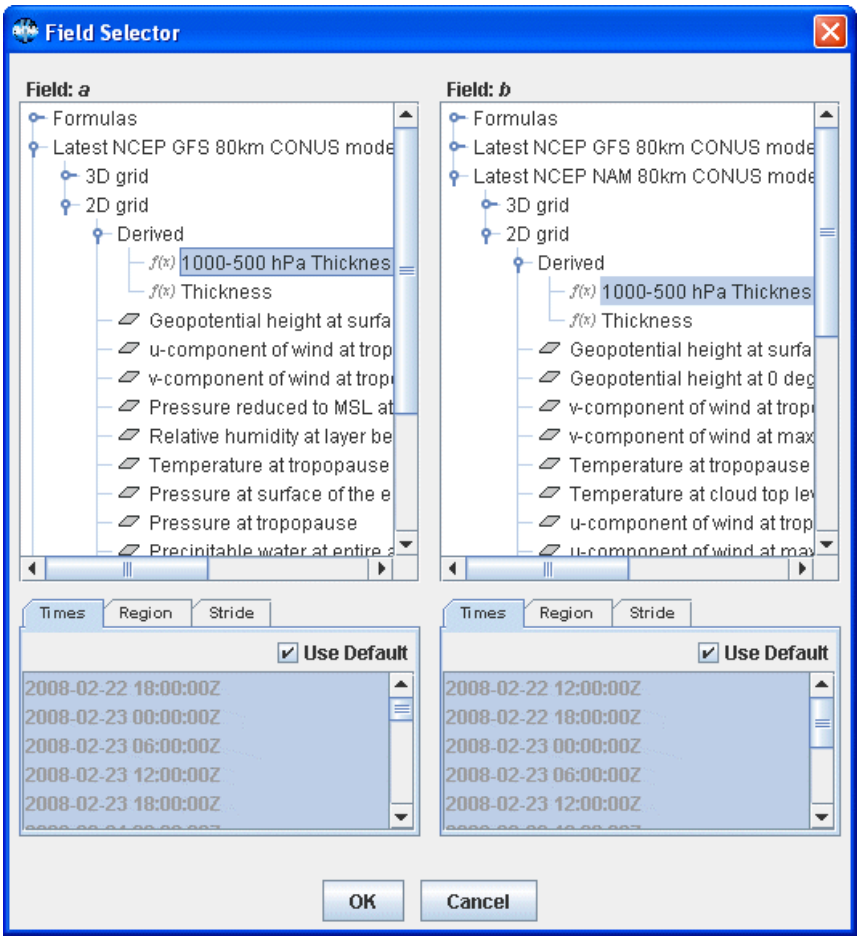


Image 2: Field Selector Window

Open the data source to see the names of parameters available. Click on the parameter needed for each variable. Then click OK. The result of the formula is computed for every data point in the source, and the result shown in the Main Display window.

Note that other windows may appear when evaluating a formula. For example, a Select Input window may be used if the formula prompts the user for a numerical value. This Select Input window may involve a combination of text fields or drop-down menus.

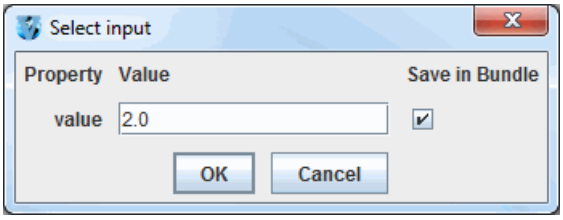


Image 3: Select Input Window

- Creating/Removing library files
- Calling procedures from formulas
- Create a formula from my procedure
- Why do I see "TypeError: object is not callable" messages when scripting?

FAQ

Q. What is Jython?

A. Jython is a Java implementation of the Python language. It is used within McIDAS-V for data analysis. Complex routines can be written in the McIDAS-V Jython editor and called from the McIDAS-V Formulas.

Q. How do I learn to write Jython?

A. There are a number of books available on the language as well as a number of web sites:

- http://www.python.org
- http://www.jython.org

Q. How does Jython work with my data in McIDAS-V?

A. McIDAS-V uses the VisAD package as as an underlying data model. There is a VisAD/Jython Tutorial available.

Q. Creating/Removing library files

A. To create a new file use the **File->New Jython Library...** menu. To remove the currently displayed library file use the **File->Remove Library** menu.

Q. Calling procedures from formulas

A. When creating a formula with the Formula Editor you can call any routines you have defined in the Jython Library. Simply enter the procedure name in the formula with appropriate arguments, if any. For example a formula might be "convertCToF(atemp)". When evaluating the formula for display, this will call the routine that you define in the Jython Library.

Q. Create a formula from my procedure

A. Right click on a procedure definition within the McIDAS-V editor window and choose **Make formula for ...**. This is a convenience that brings up the Formula creation dialog with a call to that procedure.

As another convenience you can also right-click on the **Formula:** field of the Formula Editor to show the **Insert Procedure Call** menu. This lists all of the currently defined procedures in the other Jython libraries.

Q. Why do I see "TypeError: object is not callable" messages when scripting?

A. This error occurs when a user gives a variable the same name as a reserved keyword or function. For a list of reserved Jython functions, please see Built-in Functions. Variable names should be unique.

Jython Shell

The Jython Shell is an interactive command line interface to the McIDAS-V Jython interpreter that allows the user to type in arbitrary Jython to evaluate. This feature is brought up with the **Tools->Formulas->Jython Shell** menu item in the Main Display window. Alternatively, the Jython Shell can be brought up with Ctrl+J.

The User Interface

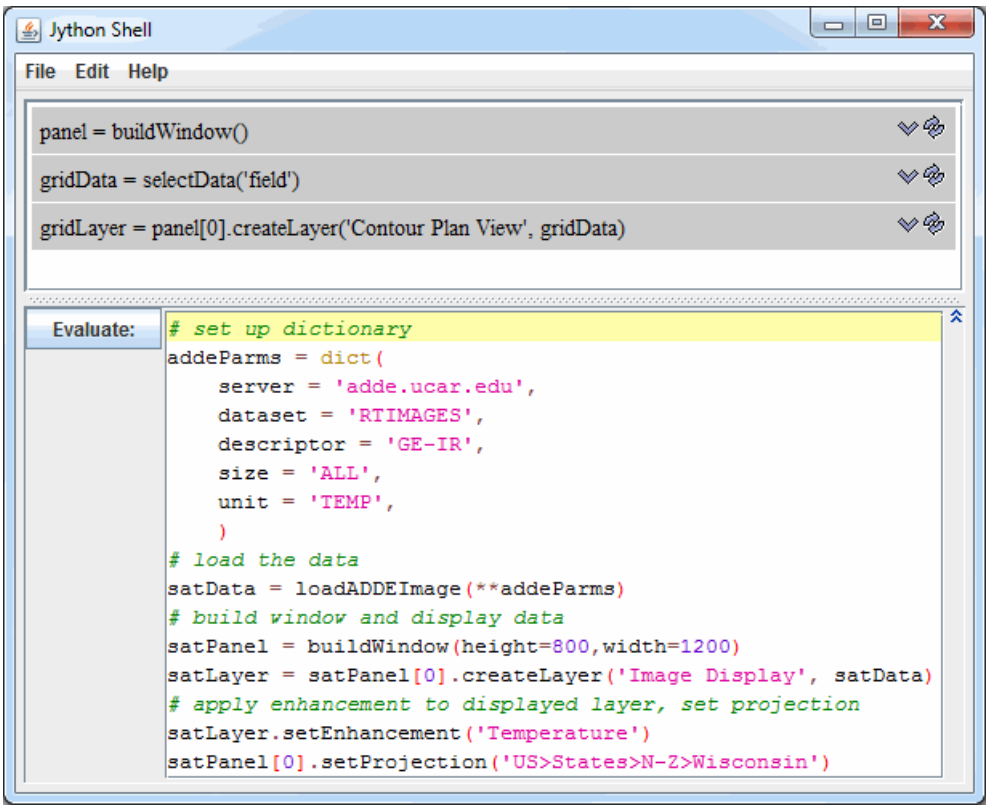


Image 1: Jython Shell Window

The Jython shell consists of an output window on the top and an input field on the bottom. The user enters Jython into the input field. When Enter or Evaluate: is pressed the Jython is evaluated and any output is shown in the output window. Note that Enter will only evaluate the field if the field has not been expanded. If your are using multi-line input for your commands, you can evaluate the commands with Shift+Enter.

The entry window can be expanded with the to the right of the command line. When the entry field is expanded, you can enter more than one line of code to be processed at once. When the entry field isn't expanded, you are limited to evaluating one line of code at a time. As an alternative to the button, you can use Ctrl+/ to change between single and multi-line command line structure.

Pressing the "Up" arrow and "Down" arrow in the entry field goes up and down through the history of commands when you are in single-line input. If you are using multi-line input, use Ctrl+P, Ctrl+N to cycle through previously-executed commands.

After a command has been evaluated, the command will be listed above the Evaluate field. To the right of the command, there are two buttons. The button enters the formula back into the Evaluate field without evaluating it. The button reevaluates the previously entered command without having to manually reenter it.

The Jython Shell window includes syntax highlighting, which colors different parts of the text in different colors. For example, strings will be pink and comments specified with a pound symbol (#) will be green. This syntax highlighting is only available in multi-line input mode. When in multi-line input mode, pressing enter will restore the indentation of the previously-entered line. For example, when setting up the addeParms dictionary in the image above, when Enter was pressed after line three, the indentation of four spaces was automatically applied for line four.

Print statements are not needed in the Jython Shell to output information when a single line of code is being evaluated. Below are a couple of examples:

Command: 2+6

Output: 8

Command: layer.getEnhancementTable()

Output: Inverse Gray shade

Right-clicking in the entry field brings up a menu that allows for:

Adding an entry from the history.

Inserting the identifier for a display control type when creating a display.

Inserting the text of a procedure call from any of the McIDAS-V Jython Library modules. Note: The *shell utilities* module has a number of useful Jython shell related commands.

Inserting any of the defined McIDAS-V actions (e.g., Edit color table, Show window, etc.)

Menus

All of the menu items in this tool are unique to the Jython Shell.

The **File** menu has these unique items:

Save Commands to Jython Library - Saves any entered commands (up to 100 by default) to the User's local Jython Library as a Procedure or as a block of commands if no Procedure name is provided.

List Saved History - Lists out previously entered commands.

List Current Variables - Lists all global Jython Variables currently in use.

The **Edit** menu has these unique items:

Reset Jython Shell - Removes any saved variables and commands, as well as clears the output window.

Clear Output Buffer - Removes any text in the output window, but does not remove any variables or commands from the history.

Auto-select Operands - Causes the Jython shell to analyze every command entered to see if there are references to variables that have not been set. It will bring up the Data Selection dialog to allow you to choose the fields to use.

Jython Library

Module: grid

This is the doc for the grid module. For more information, see Description of Formulas - Grids.

---

applyToRange(function, data):
Apply the function name to each timestep of the data

applyToRangeValues(function, data):
Apply the function name to each value in each timestep of the data

averageOverTime(field, makeTimes):
Average the values in each time step If makeTimes is true (1) then we return a field mapping all of the times to the average. Else we just return the average

combineFields():
combine several fields together

differenceFromBaseTime(field):
Set the value of each time step N: D(N)=D(N)-D(0)

exportGridToNetcdf(grid, filename):
Writes out the gridded data to a CF-compliant netCDF file

extractLatitudeFromNWPGrid(fieldimpl):
Get the latitude coordinate from a grid. Return a grid of the latitudes at each point

extractLongitudeFromNWPGrid(fieldimpl):
Get the longitude coordinate from a grid. Return a grid of the longitudes at each point

extractPressureFromNWPGrid(fieldimpl):
Get the pressure coordinate from a time series grid and return a grid of the pressure at all points. Input grid must have pressure or height (which is converted to pressure in the standard atmosphere). User must be sure input is a suitable FlatField

flowVector(field):
Make a vector from flow direction

getAltitude(z):
Change units from geopotential meters to meters

getNthTimeGrid(fieldimpl, Nth):
Get the Nth grid in time series of grids; User must be sure input is a suitable data field. returns a single time. Nth is an integer, >=0, <= max index of grid time series

getSliceAtAltitude(fieldimpl, alt, unit):
Extract a 2D horizontal slice from a 3D grid at the given altitude; level is a real number; if unit is supplied, it must be compatible with meters (ft, fathoms, etc) param fieldimpl is a grid which may have one or more time steps

getSliceAtLevel(fieldimpl, level):
Extract a 2D horizontal slice from a 3D grid at "Level." level is a real number; must be appropriate for the grid. param fieldimpl is a grid which may have one or more time steps

GP2Z(gp):
Convert Geopotential (GP) to Height (Z)

horizontalAdvection(param, u, v):
Horizontal advection

horizontalDivergence(param, u, v):
Horizontal flux divergence

layerAverage(grid, top, bottom):
Wrapper for calculating layer average

layerDiff(grid, top, bottom):
Wrapper for calculating layer difference

lonFlip(grid):
Flip the longitudes in a grid from -180-180 to 0-360 (or vice-versa). Only works for cyclic rectilinear grids

make2D(slice):
Make a 2D slice from a 3D slice at a single level

makeFlowField(a, b, c):

Make a vector from 3 components
makeVector(a,b) = [a,b,c]

makeTimeSequence(g):
Merge a set of single time grids/images into a time sequence

makeTopographyFromField(grid):
Make a topography field out of a grid

makeTrueVector(u, v):
True wind vectors

makeVector(a, b):
Make a vector from 2 components
makeVector(a,b) = [a,b]

maskGrid(grid, mask, value, resample):
Mask one grid by the values in the other. Value is the masking value

maxOverTime(field, makeTimes):
Take the max of the values in each time step if makeTimes is true (1) then return a field mapping of all times to the average. Else return the max

mergeTimeSequences(g):
Merge a set of time sequences of grids/images into a single time sequence. All grids/images must have the same parameter name

minOverTime(field, makeTimes):
Take the min of the values in each time step if makeTimes is true (1) then return a field mapping of all times to the average. Else return the min

newName(field, varname, copy):
Create a new field with a new parameter name

newUnit(field, varname, unitname):
Set the name and unit on a grid

noUnit(field):
Remove the units from a grid

resampleGrid(oldGrid, gridwithNewDomain):
Display gridded data on a new domain

runave(grid, nave, option):
Generate a running average. nave = number of steps to average over. option = option for unsmoothed end points (0: set to missing; 1: use symmetry; -1: assume cyclic)

substitute(data, low, high, newValue):
Change values in data between low/high to newValue

sumFromBaseTime(field):
Set the value of each time step N: D(N)=D(N)+D(0)

sumOverTime(field, makeTimes):
Take the sum of the values in each time step if makeTimes is true (1) then return a field mapping of all times to the average. Else return the sum

timeStepDifference(field, offset):
Set the value of each time step N: D(N)=D(N)-D(N+offset) where offset should be negative

timeStepSum(field, offset):
Set the value of each time step N: D(N)=D(N)+D(N+offset) where offset should be negative

uvFromWindDir(dir):
Create the vector field using the wind direction

wgt_runave(grid, wgts, option):
Generate a weighted running average. wgts = comma separated list of weights option = option for unsmoothed end points (0: set to missing; 1: use symmetry; -1: assume cyclic)

windShear(u, v, z, top, bottom):
Calculate the wind shear between discrete layers
shear = sqrt((u(top)-u(bottom))^2 + (v(top)-v(bottom))^2)/zdiff

windShearVector(u, v, top, bottom):
Calculate the u and v layer difference and return as vector

writeGridToXls(grid, filename):
Write out the grid data to an excel spreadsheet

Module: griddiag

This is the doc for the Grid Diagnostics module. These functions are based on the grid diagnostics from the GEneral Meteorological PAcKage (GEMPAK). Note that the names are case sensitive and some are named slightly different from GEMPAK functions to avoid conflicts with Jython built-ins (e.g. str).

In the following operators, scalar operands are named Si and vector operands are named Vi. Lowercase u and v refer to the grid relative components of a vector.

GRAVITY():
Gravity constant

add(S1, S2):
Addition
ADD (S1, S2) = S1 + S2

adv(S, V):
Horizontal Advection, negative by convention
ADV (S, V) = - (u * DDX (S) + v * DDY (S))

age(obs, geo):
Ageostrophic wind
AGE (S) = [u (OBS) - u (GEO(S)), v (OBS) - v (GEO(S))]

atn2(S1, S2):
Wrapper for atan2 built-in
ATN2 (S1, S2) = ATAN (S1 / S2)

avg(S1, S2):
Average of 2 scalars
AVG (S1, S2) = (S1 + S2) / 2

avor(V):
Absolute Vorticity
AVOR (V) = VOR (V) + CORL(V)

circs(S, D):
Apply a circular aperature smoothing to the grid points. The weighting function is the circular aperature diffraction function. D is the radius of influence in grid increments, increasing D increases the smoothing (default D=2)

corl(S):
Coriolis Parameter for all points in a grid
CORL = TWO_OMEGA*sin(latr)

cress(S, D):
Apply a Cressman smoothing to the grid points. The smoothed value is given by a weighted average of surrounding grid points. D is the radius of influence in grid increments, increasing D increases the smoothing (default D=2)

cros(V1, V2):
Vector cross product magnitude
CROS (V1, V2) = u1 * v2 - u2 * v1

ddx(S):
Take the derivative with respect to the domain's X coordinate

ddy(S):
Take the derivative with respect to the domain's Y coordinate

defr(V):
Total deformation
DEF (V) = (STRD (V) ** 2 + SHR (V) ** 2) ** .5

dirn(V):
North relative direction of a vector
DIRN (V) = DIRR (un(v), vn(v))

dirr(V):
Grid relative direction of a vector

div(V):
Horizontal Divergence
DIV (V) = DDX (u) + DDY (v)

dot(V1, V2):
Vector dot product
DOT (V1, V2) = u1 * u2 + v1 * v2

dvdx(V):

Partial x derivative of a vector
DVDX (V) = [DDX (u), DDX (v)]

dvdy(V):
Partial x derivative of a vector
DVDY (V) = [DDY (u), DDY (v)]

frnt(S, V):
Frontogenesis function from theta and the wind
FRNT (THTA, V) = 1/2 * MAG (GRAD (THTA)) * (DEF * COS (2 * BETA) - DIV) Where: BETA = ASIN ((-DDX (THTA) * COS (PSI) - DDY (THTA) * SIN (PSI))/ MAG (GRAD (THTA))) PSI = 1/2 ATAN2 (SHR / STR)

geo(z):
geostrophic wind from height
GEO (S) = [- DDY (S) * const / CORL, DDX (S) * const / CORL]

grad(S):
Gradient of a scalar
GRAD (S) = [DDX (S), DDY (S)]

gwfs(S, N):
Horizontal smoothing using normally distributed weights with theoretical response of 1/e for N * delta-x wave. Increasing N increases the smoothing (default N=6)

gwfv(V, N):
Horizontal smoothing using normally distributed weights with theoretical response of 1/e for N * delta-x wave. Increasing N increases the smoothing (default N=6)

inad(V1, V2):
Inertial advective wind
INAD (V1, V2) = [DOT (V1, GRAD (u2)), DOT (V1, GRAD (v2))]

jcbn(S1, S2):
Jacobian Determinant
JCBN (S1, S2) = DDX (S1) * DDY (S2) - DDY (S1) * DDX (S2)

lap(S):
Laplacian operator
LAP (S) = DIV (GRAD (S))

latr(S):
Latitude all points in a grid

lav(S, level1, level2):
Layer Average
LAV (S) = (S (level1) + S (level2)) / 2.

ldf(S, level1, level2):
Layer Average
LDF (S) = S (level1) - S (level2)

mag():
Magnitude of a vector

mixr(temp, rh):
Mixing Ratio from Temperature, RH (requires pressure domain)

mul(S1, S2):
Multiply
MUL (S1, S2) = S1 * S2

pvor(S, V):
Potential vorticity (usually from theta and wind)

quo(S1, S2):
Divide
QUO (S1, S2) = S1 / S2

qvcl(THTA, V):
Q-vector (K / m / s)
QVCL (THTA, V) = (1/(D (THTA) / DP)) * [(DOT (DVDX (V), GRAD (THTA))), (DOT (DVDY (V), GRAD (THTA)))]

qvec(S, V):
Q-vector at a level (K / m / s)
QVEC (S, V) = [- (DOT (DVDX (V), GRAD (S))), - (DOT (DVDY (V), GRAD (S)))] where S can be any thermal parameter, usually THTA.

rects(S, D):
Apply a rectangular aperature smoothing to the grid points. The weighting function is the product of the rectangular aperature diffraction function in the x and y directions. D is the radius of influence in grid increments, increasing D increases the smoothing (default D=2)

rehl(temp, mixr):
Create relative humidity from temperature and mixing ratio (requires pressure domain)

savg(S):
Average over whole grid
SAVG (S) = average of all non-missing grid point values

savs(S):
Average over grid subset
SAVS (S) = average of all non-missing grid point values in the subset area

sdiv(S, V):
Horizontal Flux Divergence
SDIV (S, V) = S * DIV (V) + DOT (V, GRAD (S))

shr(V):
Shear Deformation
SHR (V) = DDX (v) + DDY (u)

sm5s(S):
Smooth a scalar grid using a 5-point smoother
SM5S (S) = .5 * S (i,j) + .125 * (S (i+1,j) + S (i,j+1) + S (i-1,j) + S (i,j-1))

sm9s(S):
Smooth a scalar grid using a 9-point smoother
SM9S (S) = .25 * S (i,j) + .125 * (S (i+1,j) + S (i,j+1) + S (i-1,j) + S (i,j-1)) + .0625 * (S (i+1,j+1) + S (i+1,j-1) + S (i-1,j+1) + S (i-1,j-1))

sm5v(V):
Smooth a scalar grid using a 5-point smoother (see sm5s)

sm9v(V):
Smooth a scalar grid using a 9-point smoother (see sm9s)

strd(V):
Stretching Deformation
STRD (V) = DDX (u) - DDY (v)

sub(S1, S2):
Subtract
SUB (S1, S2) = S1 - S2

thrm(S, level1, level2):
Thermal wind
THRM (S) = [u (GEO(S)) (level1) - u (GEO(S)) (level2), v (GEO(S)) (level1) - v (GEO(S)) (level2)]

thta(temp):
Potential Temperature from Temperature (requires pressure domain)

thte(temp, rh):
Equivalent Potential Temperature from Temperature and Relative humidity (requires pressure domain)

un(V):
North relative u component

ur(V):
Grid relative u component

vadd(V1, V2):
add the components of 2 vectors
VADD (V1, V2) = [u1+u2, v1+v2]

vecn(S1, S2):
Make a true north vector from two components
VECR (S1, S2) = [S1, S2]

vecr(S1, S2):
Make a vector from two components
VECR (S1, S2) = [S1, S2]

vlav(V, level1, level2):
calculate the vector layer average
VLDF(V) = [(u(level1) - u(level2))/2, (v(level1) - v(level2))/2]

vldf(V, level1, level2):
calculate the vector layer difference
VLDF(V) = [u(level1) - u(level2), v(level1) - v(level2)]

vmul(V1, V2):
Multiply the components of 2 vectors
VMUL (V1, V2) = [u1*u2, v1*v2]

vn(V):
North relative v component

vor(V):
Relative Vorticity
VOR (V) = DDX (v) - DDY (u)

vquo(V1, V2):
Divide the components of 2 vectors
VQUO (V1, V2) = [u1/u2, v1/v2]

vr(V):
Grid relative v component

vsub(V1, V2):
subtract the components of 2 vectors
VSUB (V1, V2) = [u1-u2, v1-v2]

wshr(V, Z, top, bottom):
Magnitude of the vertical wind shear in a layer
WSHR (V) = MAG [VLDF (V)] / LDF (Z)

xav(S):
Average along a grid row. KXD = number of points in row; KNT = number of non-missing points in row; XAV for a row is stored at every point in that row
XAV (S) = (S (X1) + S (X2) + ... + S (KXD)) / KNT

xsum(S):
Sum along a grid row. KXD = number of points in row; XSUM for a row is stored at every point in that row
XSUM (S) = (S (X1) + S (X2) + ... + S (KXD))

yav(S):
Average along a grid column. KYD = number of points in column; KNT = number of non-missing points in column
YAV (S) = (S (Y1) + S (Y2) + ... + S (KYD)) / KNT

ysum(S):
Sum along a grid column. KYD = number of points in row; YSUM for a column is stored at every point in that column
YSUM (S) = (S (Y1) + S (Y2) + ... + S (KYD))

zav(S):
Average across the levels of a grid at all points. KZD = number of levels; KNT = number of non-missing points in column
ZAV (S) = (S (Z1) + S (Z2) + ... + S (KZD)) / KNT

zsum(S):
Sum across the levels of a grid at all points. KZD = number of levels ZSUM for a vertical column is stored at every point
ZSUM (S) = (S (Z1) + S (Z2) + ... + S (KZD))

Module: ensemble

This is the doc for the grid ensemble module. For more information, see Description of Formulas - Grids.

---

ens_mode(grid):
Mode value

ens_prcntl(grid, percent):
Percentile value

ens_savg(grid):
Basic ensemble average

ens_smax(grid):
Max value of all members

ens_smin(grid):
Minimum value of all members

ens_srng(grid):
Max - min grid values

ens_ssprd(grid):
Standard deviation of all members

ens_uprob(grid, logicalOp1, pValue1, and_or, logicalOp2, pValue2, exptdLoBound, exptdUpBound):
Ensemble univariate probability calculation

Module: image

---

combineRGB(red, green, blue):
combine 3 images as an RGB image

makeNavigatedImage(d, ulLat, ulLon, lrLat, lrLon):
This takes a image data object and a lat/lon bounding box and adds a lat/lon domain to the data. Use it in conjunction with a formula:

Module: maps

A set of utilities to apply to a map field. For more information, see Description of Formulas - Maps.

---

applyFunctionToValuesInField(function, field, min, max, inside):

applyFunctionToValuesInRange(function, range, timeStep, min, max, inside):

applyToIndices(function, range, timeStep, indices):

averageFromMap(field, mapSets):
mapSets defines a set of polygons. This procedure fills the areas in the field are enclosed by each polygon with the average value within that area

averageFromMapAndClip(field, mapSets):

averageRangeFromMap(range, timeStep, mapSets):
mapSets defines a set of polygons. This procedure fills the areas in the field are enclosed by each polygon with the average value within that area

filterMaps(mapSets, propName, operator, value):
Return a new set of maps whose property propName satisfies the given operator/value. The operators can be ==,!=, <,>,<=,>=, match, !match

getMapProperty(polygon, propName):
Get the named property from the given mapData

getMapsWithProperty(mapSets, propName, value):
Return a new set of maps that have the given property value

make3DMap(map, topo):
Make a 3d map. map - map line data - topo - topography dataset

makeFieldFromMapBounds(mapSets, length1, length2, fill, unit):
Make a field whose lat/lon area is the bounds of the given mapSet. It has length1 points in the x and length2 in the y. Fill it with the fill value and the given unit

mapsAbasoluteValue(originalValues, newValues, indexArray):

mapsApplyToField(function, field, mapSets, inside):
Fills the areas in the field are enclosed by each polygon with the average value within that area. mapSets defines a set of polygons

mapsApplyToRange(function, range, timeStep, mapSets, inside):

mapsAverage(originalValues, newValues, indexArray):

mapsMax(originalValues, newValues, indexArray, value):

mapsMin(originalValues, newValues, indexArray, value):

mapsSet(originalValues, newValues, indexArray, value):

subsetFromMap(field, mapSets, fillValue, inverse):
mapSets defines a set of polygons. This procedure fills the areas in the field that are not enclosed by the polygons with the fill value. If inverse is 1 then it fills the areas that are enclosed

subsetRangeFromMap(range, timeStep, mapSets, fillValue, inverse):
mapSets defines a set of polygons. This procedure fills the areas in the field that are not enclosed by the polygons with the fill value. If inverse is 1 then it fills the areas that are enclosed

subsetRangeWithProperty(range, mapSets):

test code

subsetWithProperty(field, mapSets):
test code

Module: shell

A set of utilities for selecting data and creating displays. For use from the Jython shell.

---

clear():
Clear the shell

createDisplay(displayType, data, dataName):
create a display of type displayType. Right click in input field to select particular displayType. The data is can be a data object, a datachoice or a list of data or datachoices The dataName is used to name the data, i.e., its the parameter name

findDataSource(name):
Find the data source object with the given name. If no name is given then this will return the first (non-formula) data source

getData(dataSourceName, dataChoiceName):
Find the data source with the given name and the data choice on that data source with the given name. If no dataSourceName is given then use the first one in the list If no dataChoiceName is given then use the first one held by the data source Return the data for the data choice. If no data source or data choice is found then return null

getDataChoice(dataSourceName, dataChoiceName):
Find the data source with the given name and the data choice on that data source with the given name. If no dataSourceName is given then use the first one in the list If no dataChoiceName is given then use the first one held by the data source Return the data choice If no data source or data choice is found then return null

listVars():
List all of the variables defined in the shell's interpreter

makeDataSource(path, type):
Create a datasource from the given file name or url. The optional type parameter is used to specify the type of data

printType(data):
Print out the math type of the given data

selectData(name1, name2, name3, name4, name5):
Select up to 5 data fields. This returns a List of the actual Data objects

selectDataChoice(name1, name2, name3, name4, name5):
Select up to 5 data choices. This returns a List of the data choices, not the actual Data To get the data do:
dataList.get(0).getData(None)

setDataChoices(dataSource):
The given dataSource can be an actual data source or the name of a data source. This procedure will define a set of jython variables that correspond to the data choices held by the given data source

setDataSources():
This procedure will define a set of jython variables, 'dataSource0, dataSource1, ...' that correspond to loaded data sources

showLib():
Bring up the jython library dialog

Module: misc

A set of miscellaneous utilities.

---

cloneArray(array):
Make a 2 dimensional float array filled with the given value

idveval(formula):
Evaluate a formula

makeFloatArray(rows, cols, value):
A utility to make a 2 dimensional float array filled with the given value

printSounding(sounding):
Print out the values of the sounding data

printSoundings(data):
Print out the values of the set of sounding data

Module: sandwich

---

sandwich(imgIR, imgVIS, minIR, maxIR, colorTable, useNaN):
Creates a 3-color RGB sandwich product image from infrared and visible data

---

Display Settings

The Display Settings facility allows you to select a set of properties from a display control (e.g., color table, contouring info, isosurface value, label template, etc.) and apply them to other display controls and/or save them as preferences to be used when creating new display controls.

The Display Settings dialog can be opened with the **Edit->Display Settings...** menu in the **Layer Controls** tab of the Data Explorer.

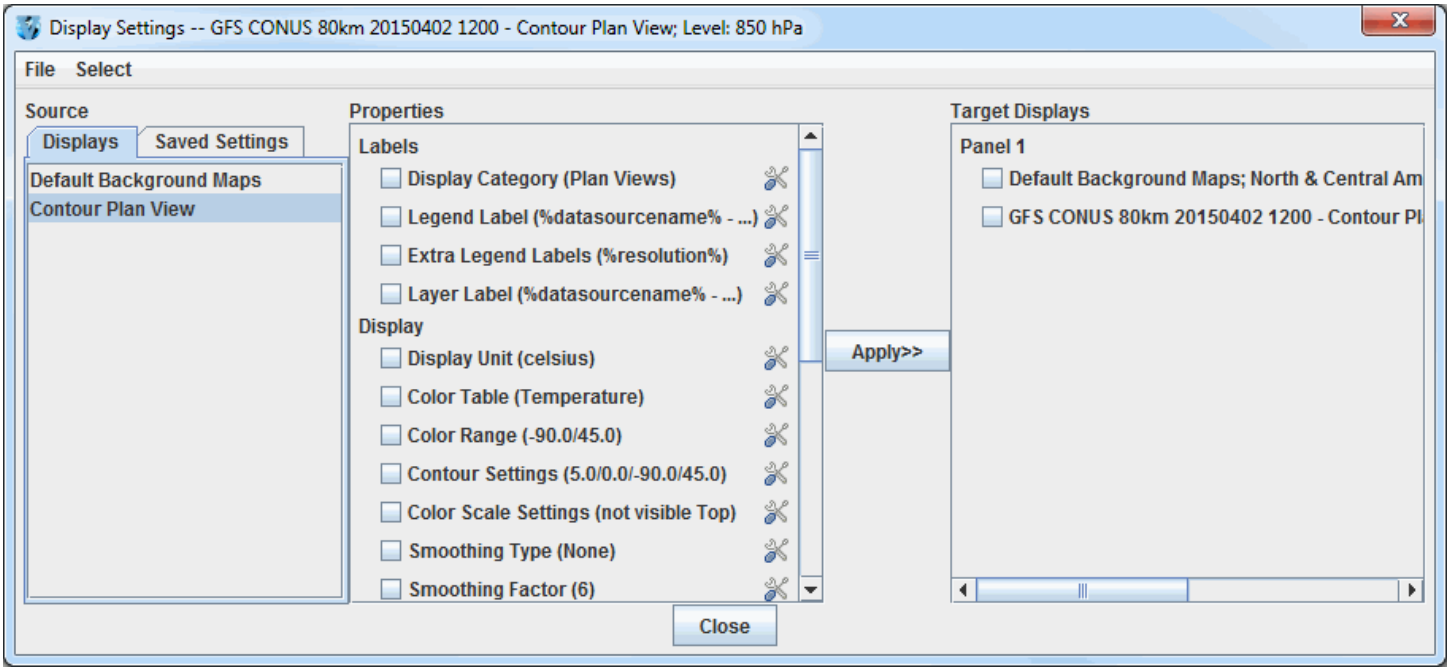


Image 1: Display Settings Dialog

The left panel in this window is titled **Source** and includes two tabs, **Displays** and **Saved Settings**. The **Displays** tab includes all of the display types currently loaded into McIDAS-V. This tab is useful to make display settings changes within a session. If you wish, you can save these settings to be used in future sessions by using the **File->Save Selected Properties** menu item. The **Saved Settings** tab includes a list of any saved display settings you have made in previous sessions. You can store several different saved settings at once by grouping them into different categories.

The center panel of the window is titled **Properties**. These are the properties of the currently selected display control, which is shown highlighted in blue in the **Source** panel. On the right is also a list of target display controls.

The purpose of this is that you can select properties in the **Properties** panel that you want to apply to the selected target display controls (via the checkboxes) on the right. Many of the properties can be changed by clicking on the buttons.

The **Select** menu is useful for selecting different groups of target display controls. For example, you can select all displays, displays of certain types, displays that have the same data source, etc.

Display Settings Examples

If you have two different data sources loaded with several displays created from each, normally the legend will list all of the displays based on some display category (e.g., Plan Views). However, you can change their display category so that each group of displays that are from one data source have the same category (e.g., "Data source 1", "Data source 2"). You can do this by changing the "Display Category" property under "Labels" to "Data Source 1".

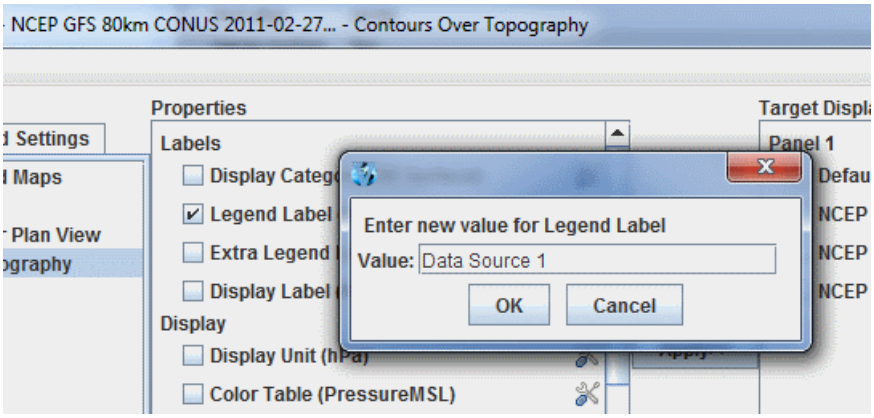


Image 2: Enter New Value for Legend Label Dialog

Then, you could manually select the displays you want to change, or use the **Select** menu and choose "Displays with data source: ...":

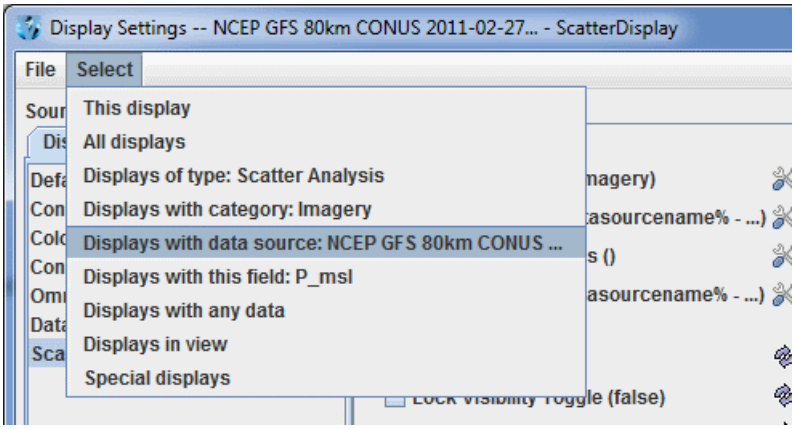


Image 3: Select Menu of the Display Settings Dialog

This selects the displays with the data source of the currently selected display.

Once selected, you then hit

, and the "Display Category" will be set on the selected display controls.

To do the next set of displays, select a new Source display control in the list on the left. This will select this display and reset the properties list in the middle. Then, when you click **Select->Displays with data source**, the displays that share the data source from this new display will be selected.

Saving Display Settings

You can save the set of selected settings with the **File->Save Selected Properties** option. The Save Display Settings dialog will be shown:

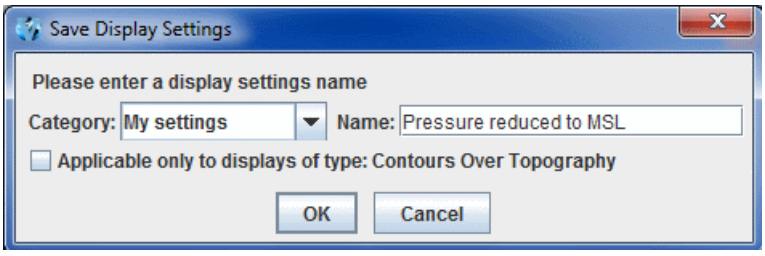


Image 4: Save Display Settings Dialog

You can enter a category and a name. The saved settings will be shown under the **Saved Settings** tab. When selected they will be applied to the list of properties on the left. If you select the checkbox for **Applicable only to displays of type**, only the display listed will be an option in the **Displays** panel of the **Field Selector**.

Using Display Settings in the Field Selector

The set of saved display settings are also shown in the **Field Selector**:

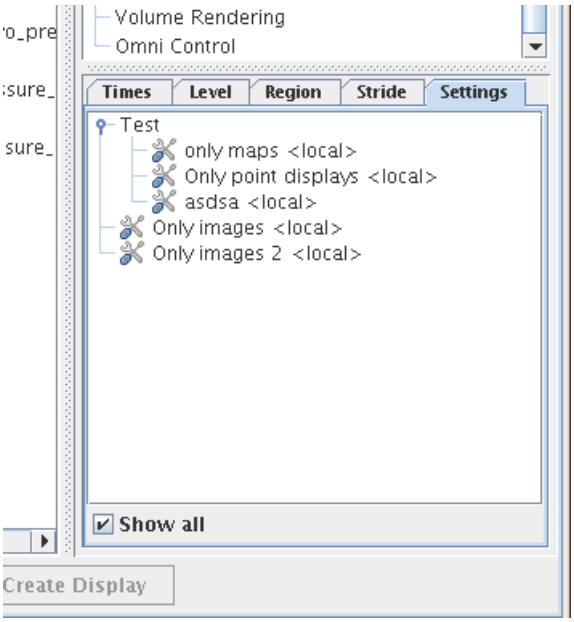


Image 5: Display Settings in the Field Selector

You can select any number of these, and when a new display control is created, these settings will be applied to the new display. The **Show All**

checkbox allows you to list all of the settings, regardless if they were saved for a particular type of display.

Menus

Many of the menu items seen utilizing this display are standard options that can be found in the Menus section of the Layer Controls page. However, there are several options unique to this display.

The **File** menu has this unique option:

> **Save Selected Properties -** Saves any settings you create. These saved properties can be found under the **Saved Settings** tab in the **Source** panel.

The **Select** menu has these unique options:

> **This display -** Modifies only the selected layer in the **Displays** tab of Source.
>
> **All displays -** Modifies all of the layers listed in the **Displays** tab of Source.
>
> **Displays of the type -** Modifies all of the layers of a specific Display type as chosen in the **Field Selector** tab of the Data Explorer (Ex. Contour Plan View).
>
> **Displays with the category -** Modifies all of the layers of a specific Display as chosen in the **Field Selector** tab of the Data Explorer (Ex. Plan Views).
>
> **Displays with data source -** Modifies all of the layers that come from the same Data Source.
>
> **Displays with the field -** Modifies all of the layers that display the same field (Ex. Pressure_reduced_to_MSL).
>
> **Displays with any data -** Modifies all of the layers that contain data.
>
> **Displays in view -** Modifies all of the layers that are in the same panel of the Main Display as the display selected in the **Displays** panel of the Display Settings window.
>
> **Special displays -** Modifies the layers that don't contain any data (Ex. Default Background Maps, Range Rings).

Plugin Creator

The Plugin Creator, accessed through the **Tools->Plugins->Create...** menu item in the Main Display window, allows you to create new plugins. The Plugin Creator is broken up into three tabs: **Resources**, **Excludes**, and **Properties**.

A plugin is a Java JAR file that contains a set of resource files. These resource files can include things like the color tables you have created, projections, layout models, formulas, etc. The plugin manager supports both adding in a whole file (e.g., all of the color tables you have created) as well as adding in individual resource objects (e.g., a specific color table you have created).

- Adding Resources
- Resources List
- Excludes
- Properties
- Writing the Plugin
- Menus

Adding Resources

To add in a file, use the **File->Add File** menu item. The file dialog will come up listing the contents of your local McIDAS-V directory. This is where all of the various resources that are created are stored. For example, if to include all of the color tables, add the colortables.xml file. Use the **File->Add Preferences** menu item to add your User Preferences to a resource, such as a bundle you are creating or editing. Individual resources can be added through the **File->Add Resource** menu item. Resources can also be added through the various resource editors (e.g., Jython Editor, Parameter Defaults, Parameter Aliases). Typically this facility is available through the editor's **File** menu.

Resources List

Each file, preference, and resource that is added into the Plugin Creator is listed under the **Resources** tab:

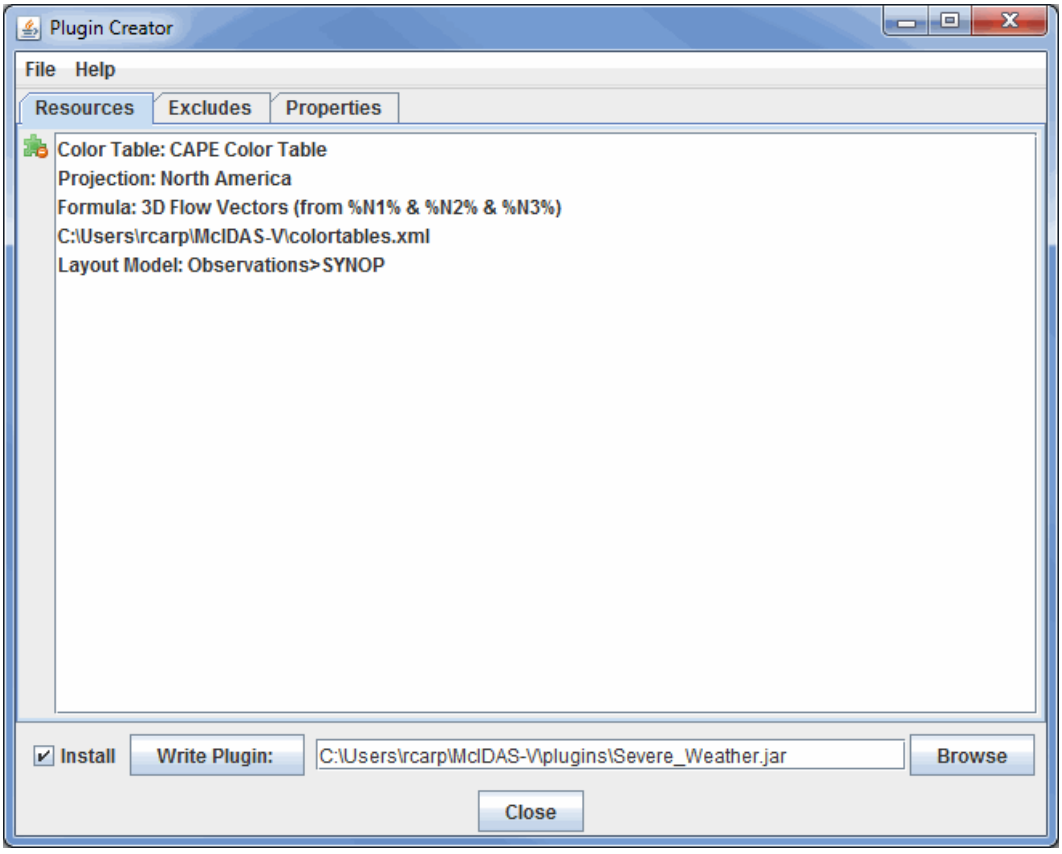


Image 1: Resources Tab of the Plugin Creator

Resources can be deleted by clicking the button or by pressing the delete key when a resource is selected.

Excludes

The **Excludes** tab allows for the exclusion of system default resources. For example, in the below image, Color tables and Map projections are excluded. When the plugin that is defined here is loaded into McIDAS-V, the excludes will result in only the Color tables and Map projections that are defined in this plugin to be used.

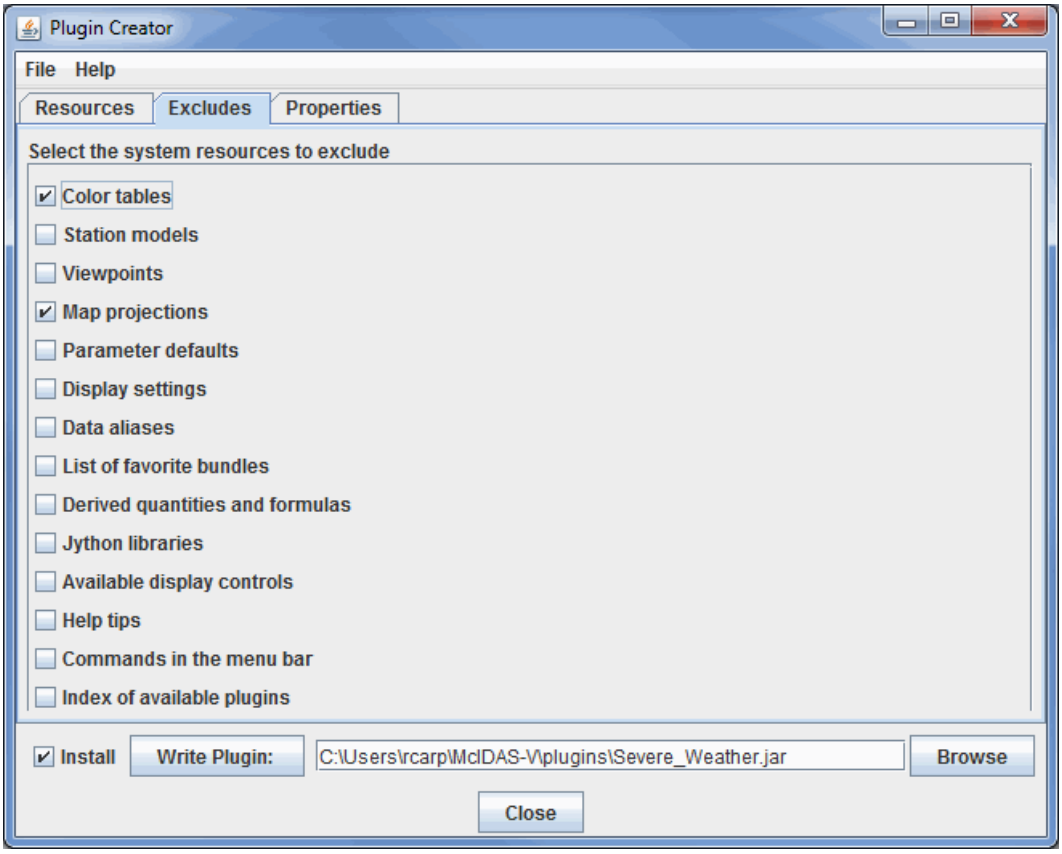


Image 2: Excludes Tab of the Plugin Creator

Properties

The **Properties** tab allows the user to overwrite different properties McIDAS-V uses. This listing is broken up into three categories: **User Interface**, **Data**, and **Miscellaneous**.

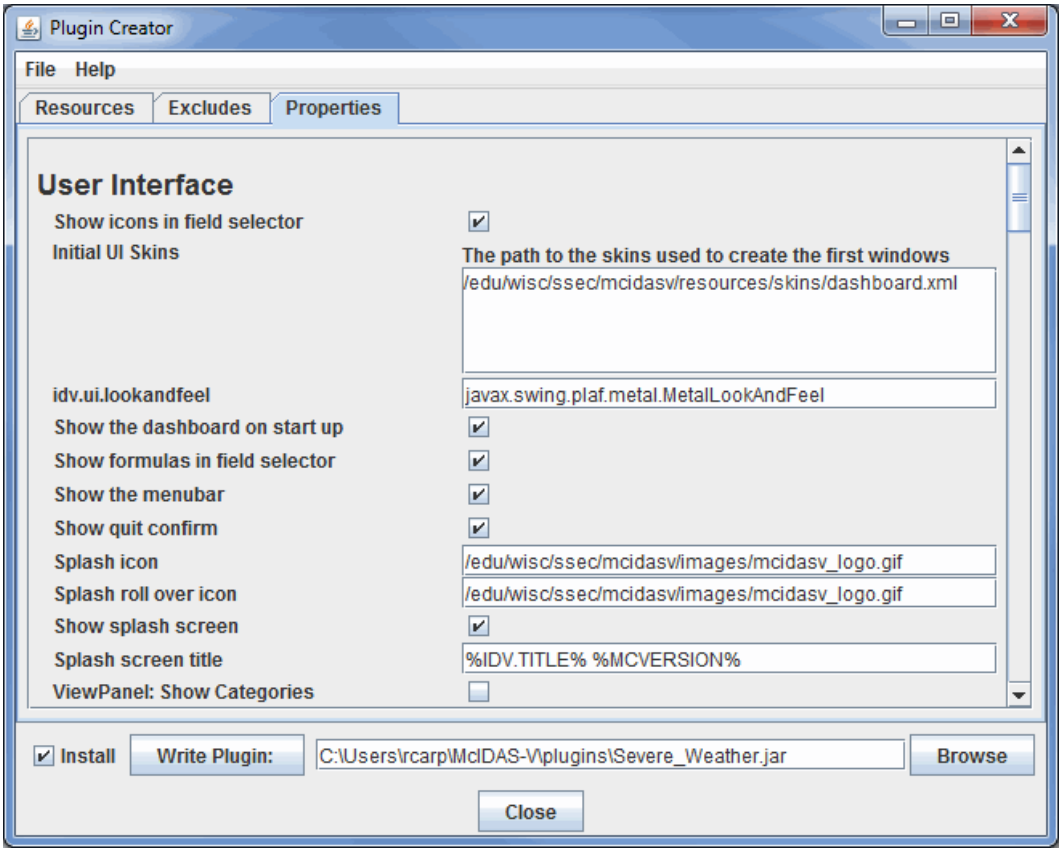


Image 3: Properties Tab of the Plugin Creator

The **User Interface** category primarily affects the aesthetic appearance and basic usability in McIDAS-V. These options allow you to decide if you want to do the following:

Display icons in the **Field Selector**.

Display formulas in the **Field Selector**.

Display the menu bar.

Display the splash icon.

Show the Data Explorer on startup.

Use the full screen view.

Change the height and width of the Main Display window.

The **Data** category affects what sources of data you will have available when selecting data in the **Data Sources** tab of the Data Explorer. These options allow you to decide the following:

Which Image Descriptors will be listed when selecting data in the **Data Sources** tab.

Which ADDE Point Datasets will be available to choose from.

Which Level III Datasets will be available.

Which different Servers will be available in the **Data Sources** tab.

Which Catalogs will be included in the **General->Catalogs** chooser.

Which Level II Remote Radar Catalogs will be included.

Whether to merge Catalogs and Servers together.

The **Miscellaneous** category affects many features of McIDAS-V. While these options affect many things that go on 'under the hood' of McIDAS-V, there is a great deal that can be changed with these options. These options allow you to decide the following:

If you are going to use 3D or not in your displays.

How globe and map projections are plotted in the Main Display window.

What distance units you want to use.

Many aspects of the JNLP code.

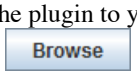
Many aspects of the User Preferences.

If and how information will be shown as quicklinks.

The vertical range for Globe, Map, and Transect displays.

Writing the Plugin

To write the plugin, click the

button. If you have not specified a plugin file name, (i.e., a .jar file) you will be prompted. If you also want to install the plugin to your local McIDAS-V plugins area, select the Install checkbox. You can choose a specific location to save the plugin to by selecting the 

button, or by typing the file path into the field. Note: You will need to restart McIDAS-V for any installed plugins to take effect.

Menus

Many of the menu items seen utilizing the Plugin Creator tool are unique to this menu item.

The **File** menu has these unique options:

Add File - Allows you to add a local file to the list under the **Resources** tab of the Plugin Creator window.

Add Preferences - Adds in the main.xml file for your user to the list under the **Resources** tab. This includes all of your User Preferences.

Add Resource - Allows you to add favorites, bundles from disk, individual color tables, layout models, projections, formulas, and parameter defaults to the list under the **Resources** tab of the Plugin Creator window.

Import Plugin - Allows you to import an existing plugin. All of the Resources in the plugin you import will be added to your list under the **Resources** tab in the plugin you are making.

Close - Closes the Plugin Creator window.

Plugin Manager

McIDAS-V plugins are a way to add to or modify the functionality of McIDAS-V. Plugins can range from adding new resources (e.g., color tables, layout models, maps) to changing the entire application. Plugins are typically Java JAR archive files that can contain a set of McIDAS-V resources and Java code. They are kept in a special directory on disk and are loaded at run time.

Plugin Command Line Arguments

You can load a plugin (one time only) with the:

```
-plugin <plugin file or URL>
```

command line argument.

You can install a plugin with the:

```
-installplugin <plugin file or URL>
```

command line argument.

You can start McIDAS-V without any plugins with the:

```
-noplugins
```

command line argument.

Plugin Manager

The Plugin Manager, accessed through the **Tools->Plugins->Manage...** menu item in the Main Display window, allows you to list, install, and manage plugins.

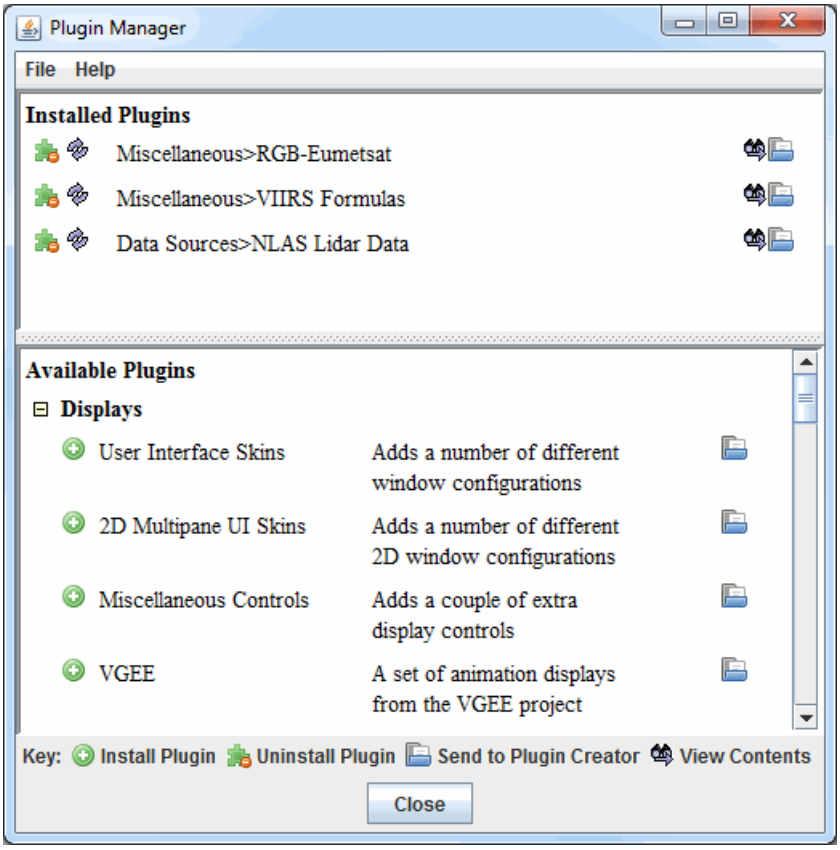


Image 1: Plugin Manager

A list of the installed plugins is shown at the top of the Plugin Manager, and a list of available plugins is shown below that. Click on an icon to perform an action in the Plugin Manager:

Install Plugin - Installs the selected plugin in the Available Plugins section. You can install plugins that are not in this list through the **File->Install Plugin from File** and **File->Install Plugin from URL** menu items in the Plugin Manager window. When you install a plugin you will need to restart McIDAS-V for the plugin to take effect.

Uninstall Plugin - Uninstalls the selected plugin. When a plugin is removed, McIDAS-V must be restarted for it to take effect through the session. Once McIDAS-V is restarted, the plugin will still be listed in the Available Plugins list and can be reinstalled at any time.

Send to Plugin Creator - Directs you to the Plugin Creator, where modifications to the plugin can be made.

View Contents - Opens the Plugin List dialog, which allows you to list the files that the plugin contains. You can view the contents of a file and/or export a file through this dialog.

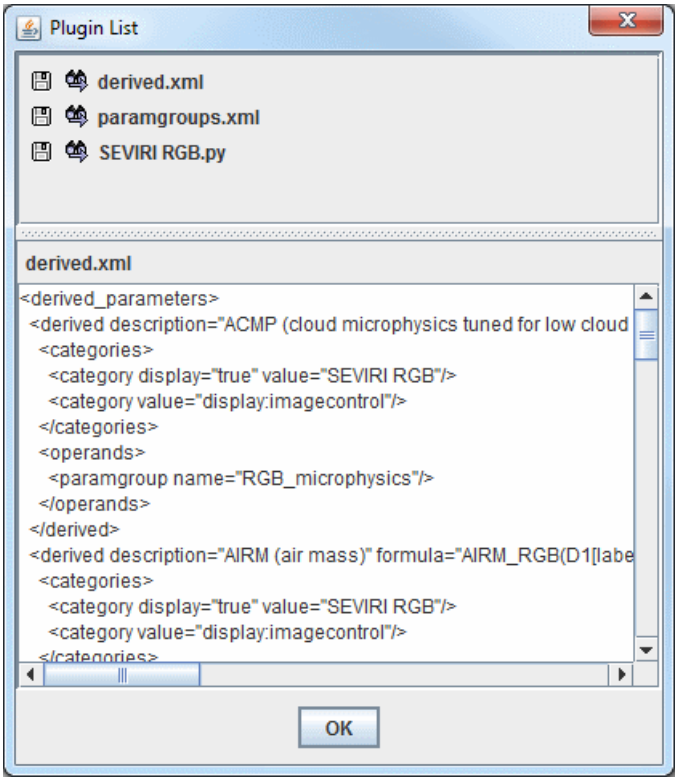


Image 2: Plugin List Dialog

Menus

There are a few menu items that are unique to this tool.

The **File** menu has these unique options:

Install Plugin from File - Opens a window that allows you to load a local *.jar plugin into McIDAS-V.

Install Plugin from URL - Opens a window that allows you to enter a URL that points to a plugin that will be brought into McIDAS-V.

The **Help** menu has this unique option:

Plugin Manager - Opens the Plugin Manager help page in the User's Guide.

Miscellaneous

- Bundles
- Time Matching
- Adaptive Resolution
- Scripting
- Sharing
- Site Configuration
- Plugin Jar Files
- Configuring Image Defaults
- Adding in New GRIB Tables
- McIDAS-V Special Data Formats
- Actions
- Command Line Arguments
- Data Source Types
- Performance Tuning
- Building McIDAS-V from Source

Bundles

Bundles let you save a quick "snapshot" of McIDAS-V, including data sources, maps, and data displays. Bundles are small information files that specify the state of McIDAS-V. They are a kind of configuration file. They include information about what data sources are in use, and which parameters from the data sources are displayed, and how they are displayed.

The purpose of bundles is for you to save a particular McIDAS-V setup and display. A bundle can be used for your own reference at a later time, or others using McIDAS-V can use bundles you made to see data the same way you did.

Saving a Bundle

To make a new bundle file, select the **File->Save Bundle** menu item in the Main Display window. A pop-up window will let you set a new file location and name:

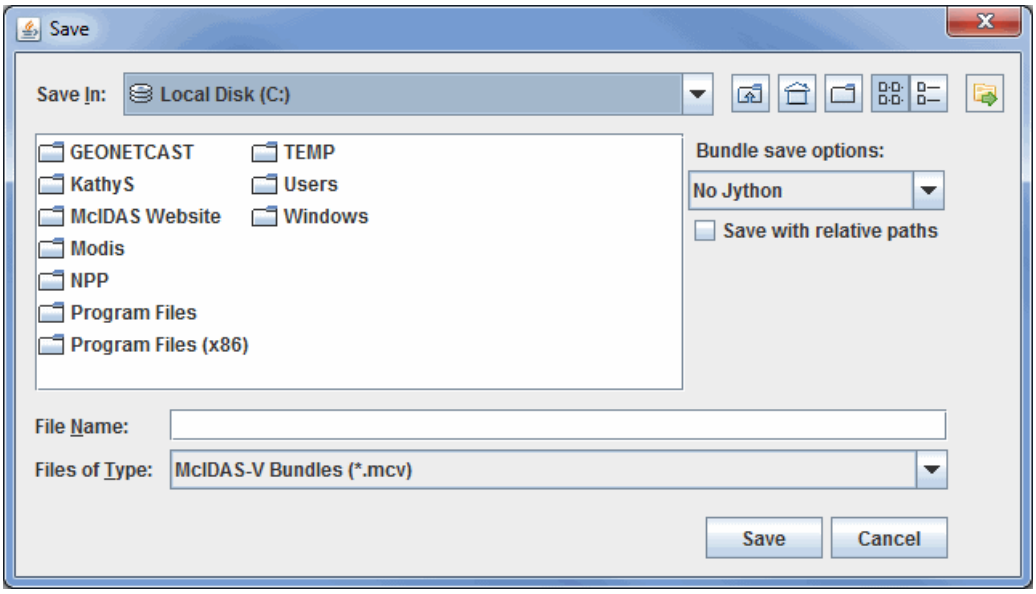


Image 1: Save Bundle Dialog

The customary McIDAS-V bundle filename extension is **.mcv**; if you do not enter a file extension, .mcv will be appended. When saving a .mcv file, no data is saved with the bundle, only references to the remote or local Data Sources are saved.

McIDAS-V does support a zipped data bundle format: **.mcvz**. This is a zip file that contains a regular bundle (.mcv) and a set of data files. When the user does a "Save Bundle" or "Save Favorite " and specifies a .mcvz file extension, McIDAS-V prompts the user to select the data sources that should be written into the zip file. When opening a .mcvz file, McIDAS-V needs to unzip the data files, so it prompts the user as to where to place the files - a temporary directory or a user selected directory (this is a preference as well).

> Note: In order for bundle files to work, the data must be available in exactly the same way you made connection to it when you made the bundle file. Others who use your bundles must have access to the same file system or to the same remote or local data servers you use, so that file paths or URLs to the data are exactly the same.

The file dialog has a set of buttons to define how parts of your bundle is saved.

- The **Jython** menu allows you to save the Jython code you may have in your library in different ways. For example, you may have written some custom Jython code that implements a Formula. You have a display that uses the results of that computation. To include your local Jython code just select **All Jython** or **Selected Jython**. When loading in a bundle that has had Jython code saved with it, the user will be prompted for what to do with the Jython.
- One can save a bundle with data paths that are relative to where the bundle is loaded from by checking the **Save with relative paths** checkbox. McIDAS-V will change the file based data sources to point to the directory where the bundle is loaded from. For example, you can use this to save a bundle that references model files on disk. Copy the bundle and the model files over to a thumb drive or CD. Then when you load the bundle the files are relative to the bundle path.

Saving a Bundle as a Favorite

Favorite bundles are just normal bundles that are categorized and saved off in a particular location on disk and serve as a convenience to the user. This allows the user to organize their favorites by category and readily load them in. Favorite bundles are easily available through the Bundles menu and can also be displayed on the toolbar of the Main Display window.

A favorite bundle can be created through the **File->Save Favorite...** menu item in the Main Display window:

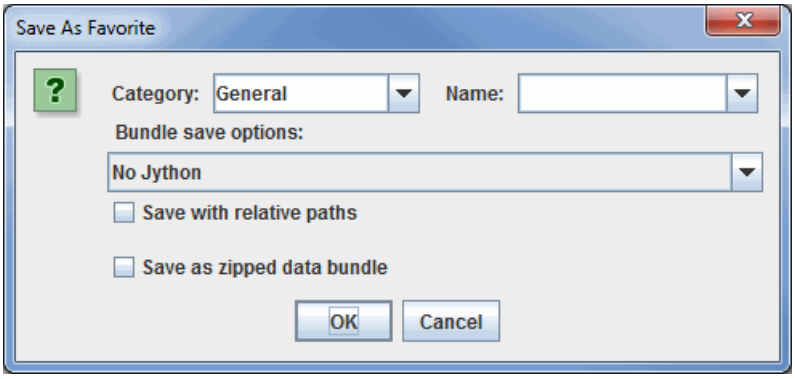


Image 2: Save As Favorite Dialog

Define your favorite bundle by specifying a category in the **Category** field and a name in the **Name** field. Categories can be hierarchical; by using a ">" as a separator (e.g. *Toolbar>sounding*) the categories will appear as a tree structure in the Local Favorites Bundles Manager. The "Toolbar" category is a special category in the Favorite Bundles Manager. The bundles in the Toolbar category will also appear as links in the toolbar of your Main Display window.

The Local Favorite Bundles Manager, accessed through the **Bundles->Manage...** menu item in the Main Display window, allows you to reorganize the categories and favorites by drag-and-drop, or right click on a favorite or a category to delete it, export it, etc.:

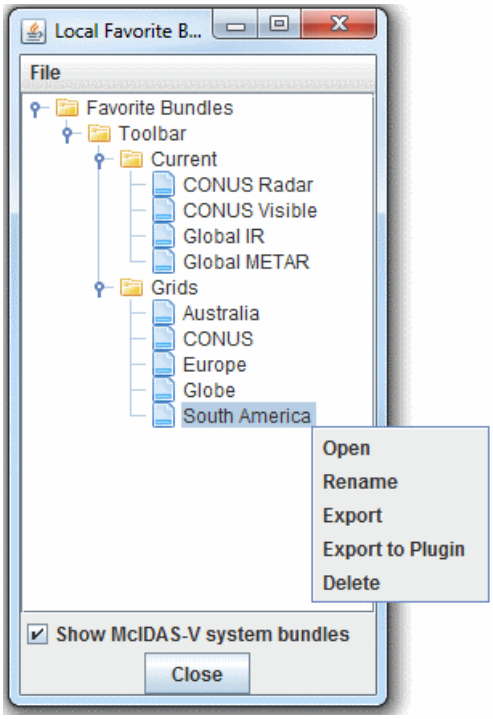


Image 3: Local Favorite Bundles Manager

Once a bundle has been saved as a favorite, it can be set as your default bundle that will load automatically when you start McIDAS-V. You can set a default bundle in the **Advanced** tab of the User Preferences window. Note that after saving a favorite bundle, you must restart McIDAS-V before the bundle will be visible in the User Preferences window.

The **Show McIDAS-V system bundles** checkbox at the bottom of the window sets the visibility of the **Current WX** bundles on the Main Toolbar. This option is turned on by default. The visibility of the system bundles can also be set in the **General** tab of the User Preferences window.

Opening a Bundle

Use the **File->Open File** menu item in the Main Display window to open a bundle. When loading in a new bundle you will be prompted whether the current displays and data should be removed. You can also start up McIDAS-V with a bundle file or URL in the command line.

There is also an option in the Open File window for **Change data paths**. If option is not selected, then the bundle will load exactly as it was saved, using the same data source. If this option is selected, then the user will be given the option of changing the data source to use when loading the bundle. This allows the bundle to load with a new data source, but display the data as it was saved in the bundle, essentially treating the bundle as a display template for the new data. An example of when this could be used would be if a bundle was created to display mean sea level pressure (MSLP) from GFS CONUS data. Once this bundle is loaded, if the **Change data paths** option was selected, the user could change the data source to NAM CONUS data, and the MSLP from NAM would display instead of GFS.

Copying Data Locally

For most remote data types, data can be copied from the server to the local disk using the "Make Remote Data Local" facility. The following ADDE types are supported: satellite, radar, point, sounding and forecast fronts. There is also preliminary support for grids on remote servers* (see below).

This is used in two ways. First, the user can right-click on a data source in the **Field Selector** and select "Make Data Local" for remote data sources. McIDAS-V prompts for a file directory and a file prefix (the default is to use the name of the data source) and the remote data is copied over. For multiple files the format used is: <directory><prefix><file count>.<suffix>. The data source object within McIDAS-V is then changed to point to the new file paths.

The second way this is used is when a .mcvz file is saved. The user is prompted for both the local data sources to be saved off as well as for the remote data sources. For the remote ones, McIDAS-V automatically copies the files over and zips them.

***Grids:** There is preliminary support for grids. This support relies on some extra service information in the catalogs which, right at this moment, is not included in the regular IDV gridded data catalog but is included for model data under the "File_Access" dataset in the main thredds catalog: http://www.ssec.wisc.edu/mcidas/software/v/threddsRTModels.xml When saving gridded data the user is prompted for the fields to save and the geo-spatial subset is used to subset the grids. As of right now, there is not yet support for sub-setting on times and grid stride/decimation.

IDV Bundles

McIDAS-V has the ability to load IDV bundles (.xidv and .zidv), but all of the features between the two software packages may not be compatible, and therefore the bundles may not load properly in the other software package.

Time Matching

Time matching is a feature designed to create loops that accommodate data with differing temporal frequencies. An example where time matching would be useful is if a user wants to create a loop of satellite data overlaid with radar data but they have different frequencies (e.g., the satellite data comes in twice an hour while the radar data comes in eight times an hour). In the past, a user would have to use the Absolute Times tab of the radar data and individually select the times closest to those of the satellite data. With time matching, this is no longer necessary. See the example image below:

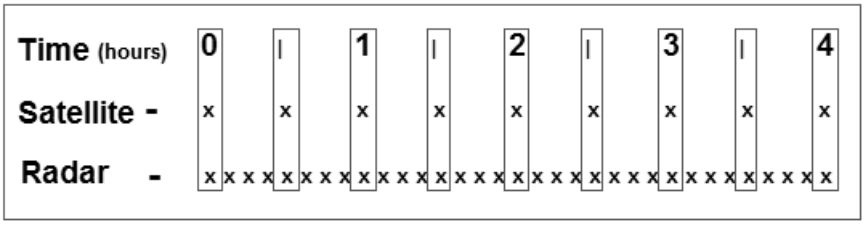


Image 1: Time Matching Example

The example above shows the temporal frequency that satellite and radar images come in (each image is marked by an 'x'). In this example, the satellite data is set as the driver, and radar data is set to match the driver. When using time matching, McIDAS-V will look at the time of each satellite image and pick out the radar image with a time closest to that of the satellite image. This radar time may be earlier or later than the satellite time. In this example, only the satellite and radar times contained in the rectangles are used in the display. Therefore, every satellite image is displayed, but only every fourth radar image is displayed.

Time matching can be used with a variety of types of data, including satellite, radar, grid, and point data. In general, the item with the lowest temporal frequency will be set as the "time driver", while other items will be set to match the times of the driver.

The time driver can also be set in the Time Animation Widget. There is an option in the **Define Animation Times** tab called **Set as Time Driver**. This feature allows a user to set a block of times to be a driver before loading any data. For example, a time animation over the last 5 hours in 30 minute increments can be set as the driver, and layers chosen to match time driver times will match the Time Animation Widget times.

Multiple time drivers can be used in the same session, and each time driver is only the driver for the panel that the layer is displayed in. Therefore, with a multi-panel display, if a time driver is set in panel 1, only layers displayed in panel 1 will be able to match the time driver. If a layer is displayed in panel 2 using the **Match Time Driver** in the **Times** tab of the **Field Selector**, then there will be an error since no time driver is set in that panel. However, each panel is capable of having a time driver set for it.

Terminology

Time Driver - Sets the times that will be used in the display. This is generally the item with the lowest temporal frequency. The time driver must be set in order to use time matching. A layer can be set to be a time driver in the **Field Selector** tab or in the **Layer Controls** tab of the Data Explorer.

Match Time Driver - Follows the times set by the time driver. This is generally an item with a higher temporal frequency than the time driver. McIDAS-V will select the times of these items to use in the loop based on the time steps of the time driver. In general, a layer can be set to match the time driver in the **Data Sources**, **Field Selector**, or **Layer Controls** tab of the Data Explorer.

Methods of Setting the Time Driver

Field Selector - In the **Times** tab of the **Field Selector**, use the dropdown menu to choose **Set As Time Driver**. Once Create Display is clicked, the data will display, and this field will now be set as the time driver.

Layer Controls - If the **Field Selector** method above wasn't used, after creating the display, use the **View->Times->Drive Times with this Display** menu item in the **Layer Controls**. After this option is chosen, the layer will be set as the time driver. If setting a CSV file as the time driver, the **Layer Controls** menu item is the only way to do so.

Time Animation Widget - The previous two methods set an individual layer to be the time driver. As an alternative, a block of times can be set as the time driver in the Time Animation Widget using the **Set as Time Driver** option.

Methods of Matching the Time Driver

Note that it is only possible to match time driver times if a time driver has already been set in the session. Most data sources that support time matching have the options listed below. However, not all data sources have the option of matching the time driver in all three tabs. For example, with the Gridded Data data source, there is no option to match time driver times in the **Data Sources** tab of the Data Explorer.

Data Sources - In the **Data Sources** tab of the Data Explorer, at the bottom of the **Times** panel, choose the **Match Time Driver** checkbox. This will gray-out the **Times** panel, and clicking **Add Source** will add times for the layer that are closest to the time driver times.

Field Selector - If the **Data Sources** method above wasn't used, in the **Times** tab of the **Field Selector**, use the dropdown menu to choose **Match Time Driver**. Once Create Display is clicked, the only times of data that will display are those that match closest to the time driver times.

Layer Controls - If the **Data Sources** or **Field Selector** methods above weren't used, after creating the display use the **View->Times->Uses Time Driver Times** menu item in the **Layer Controls**. After this option is chosen, the data must be reloaded. To do this, use the **File->Reload Data** menu item in the **Layer Controls**. Once this is done, the data will reload, and only use the times that match closest to the time driver times. If setting a CSV file to match the time driver, the **Layer Controls** menu item is the only way to do so.

Adaptive Resolution

*** For this McIDAS-V 1.7 release adaptive resolution is still under development so there may be bugs and there could implementation changes in the future. Adaptive resolution is currently available in the Gridded Data, Point Observations, General Files/Directories, and the Under Development > Imagery - Satellite choosers. Because it's still under development, adaptive resolution is disabled by default. In order to use adaptive resolution, it must be enabled through the Display Window tab of the User Preferences.***

Adaptive resolution is a feature designed to load high resolution data efficiently by obtaining and loading only the minimum amount of data needed to display all of the observable features in the given display size and geographic domain. If the domain is subsequently changed by using either Shift+left-click+drag or the Projections menu, adaptive resolution automatically reloads the data at a higher resolution (if available) if the user zoomed in to a more detailed view, or reloads the data at a lower resolution (sampled) if the user zoomed out to a wider view.

If the data is sampled, it is indicated in the Legend of the Main Display, where a line similar to '*Data Sampling: every 3rd pixel*' or '*Data Sampling: every 4th by 5th grid point*' appears below the layer label. If the data is displayed at full resolution, then no data sampling text will be written. In the example below, the data is sampled is every 3rd grid point in the x direction by every 2nd grid point in the y direction. The sampling text is controlled by the resolution macro in the Extra Legend Labels field of the Properties Dialog for the layer.

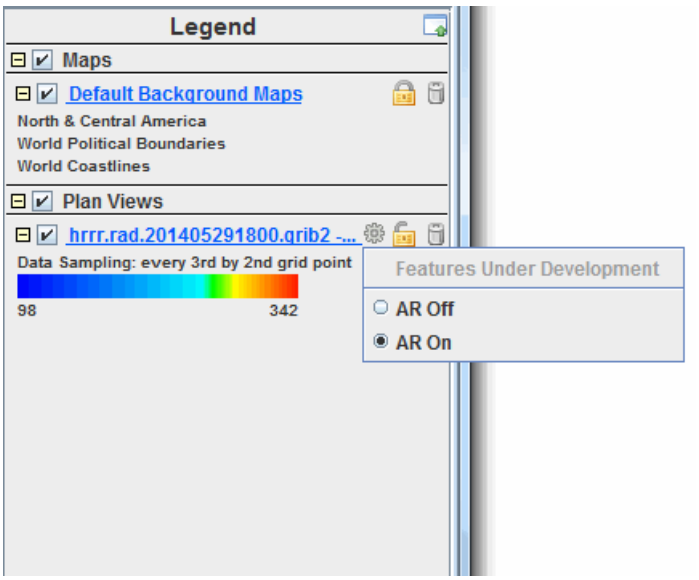


Image 1: Legend of Main Display Window

The AR Off/On popup appears when the **Resolution Control** button is clicked. This button has two options:

AR Off - Turns adaptive resolution off for the layer. Once adaptive resolution is turned off, changing the domain by using either Shift+left-click+drag or the Projections menu will not reload the data. Any data sampling that was done before adaptive resolution was turned off will remain displayed at the same resolution. Additionally, the geographical domain of the data will not change.

AR On - Turns adaptive resolution on for the layer. Once adaptive resolution is on, changing the domain by using either Shift+left-click+drag or the Projections menu will automatically reload the data at a higher resolution (if available) if you zoom in to a more detailed view, or reload the data at a lower resolution if you zoom out to a wider view.

There are four ways of setting adaptive resolution on or off:

User Preferences - Sets the default for adaptive resolution through the session as a whole. This is done with the **Enable Adaptive Resolution** option in the **Display Window** tab of the User Preferences. If adaptive resolution is not enabled in the User Preferences, then the **Resolution Control** button, along with the menu items associated with adaptive resolution will not be available.

Projections Menu - Sets the default for adaptive resolution for every layer added to the panel in the Main Display. This is done with the **Projections->Enable Adaptive Resolution (Under Development)** menu item of a panel in the Main Display.

Resolution Control button - Sets adaptive resolution on or off for an individual layer.

Layer Controls - Sets adaptive resolution on or off for an individual layer via the **View->Enable Adaptive Resolution (Under Development)** menu item.

Currently, these are the data sources that are capable of using adaptive resolution:

Point Observations - Data added through the **Point Observations->Plot/Contour** chooser. When plotting gridded point data using a Plan View display, adaptive resolution impacts both the geographic domain of the display as well as the data sampling to control the resolution. When plotting using a Point Data Plot display, adaptive resolution only controls the geographic domain of the display. The data sampling used in the display is controlled by the **Declutter** option in the **Layer Controls** for the layer.

Gridded Data - Remote data added through the **Gridded Data->Remote** chooser or local data added through the **Gridded Data->Local** or **General->Files/Directories** chooser. When plotting gridded data using a Plan View or another 2D display, adaptive resolution impacts both the geographical domain of the display as well as the data sampling to control the resolution. Note that adaptive resolution is currently limited to 2D display types.

Satellite Data - Data added through the **Under Development->Imagery - Satellite** chooser. Note that this chooser is under development and adaptive resolution only works well with geostationary satellite data.

Scripting

McIDAS-V can be scripted to create and manipulate images and movies. The scripting is accomplished using Jython. Jython is an implementation of the Python language in Java and follows Python syntax.

McIDAS-V scripting can be done from the Jython shell, or a Jython script can be invoked as a command line argument.

In Unix, from the McIDAS-V-System directory:

```
runMcV -script /home/user/example.py
```

In Windows, from the McIDAS-V System directory (if running under a Windows machine, it is necessary to use "\\" instead of "\" in scripts when specifying directory paths to avoid Windows interpreting it as an escape sequence.):

```
runMcV.bat -script C:\\home\\user\\example.py
```

When invoked as a command line argument, the user interface will not be shown. However, McIDAS-V still needs to be run with an active window system (e.g., X, MS Windows) for it to run. If running under a Linux/Unix machine with no X server running, McIDAS-V must be run under the X virtual frame buffer, xvfb.

McIDAS-V supports a number of functions and methods to load and display data, manipulate the display, and to save images. Download the example script to see how to use each one (example15.py). This page contains a list of functions that are supported in McIDAS-V. You can find more information about each function, including parameters, keywords, and example commands, by clicking on a function or a function category.

Create an Object:

- buildWindow
- openBundle
- createLayer
- findWindow

Create an Object - Imagery:

- makeLocalADDEEntry
- getLocalADDEEntry
- loadADDEImage
- listADDEImages
- listADDEImageTimes

Create an Object - Grids:

- loadGrid
- listGridFieldsInFile
- listGridLevelsInField
- listGridTimesInField

Modify the Display Object:

- annotate
- setCenter
- setProjection
- setViewpoint
- setWireframe
- setMapVisibilityByDescription

Modify the Layer Object:

- setColorScale
- setEnhancement
- setLayerLabel
- setLegendLabel
- setExtraLegendLabel
- setLayerVisible
- setVerticalPosition
- getData
- getLayer
- getDisplayUnit
- setDisplayUnit

Modify the Layer Object - Point:

- setLayoutModel
- setDeclutter
- setDeclutterFilter
- setUseAltitudeForVerticalPosition

Data Analysis:

- describe
- sparkline
- findUnits

Save the Display:

- captureImage
- writeMovie

Environment:

- getJythonShellMaxHistoryLength
- setJythonShellMaxHistoryLength
- collectGarbage
- removeAllLayers
- removeAllData
- expandpath
- editFile
- getLogLevel
- setLogLevel
- importEnhancement
- see

For users looking for more functionality from McIDAS-V scripting, additional functions can be found in the Java docs for visAD, netCDF, IDV, and McIDAS-V. Please send any questions or requests for functionality to the McIDAS-V Support Forum on scripting.

Create an Object

buildWindow - Creates a window and returns an array of panels (single panel currently supported)

Usage: *panel=buildWindow(keywords)*

Keywords - optional:

- height= height of the window
- width= width of the window
- panelTypes= type of display to create
  - MAP (default)
  - GLOBE
- widgets= include toolbar buttons in the window
  - True (default)
  - False

Example:

panel=buildWindow(height=600,width=800,panelTypes=GLOBE)
panel=buildWindow(height=600,width=800,panelTypes=MAP)

Remarks:

When widgets=False is passed through buildWindow(), there will be no toolbar buttons, including the top toolbar that allows for closing the window. There are two ways of closing this window within McIDAS-V. To do this, the findWindow() function (defined below) can be used, or a "with statement" can be used. When working in a foreground session, it is possible to build a window that will close itself once it has completed the process assigned to it using Python's "with statement" functionality. For example, a user can build a window, display a loop of satellite data, write a movie, then have the window close automatically when the movie capture is complete. Here is an example of how to use this functionality with buildWindow.

```
with buildWindow(height=1000,width=1200) as panel:
    layer = panel[0].createLayer('Image Sequence Display',myLoop)
    writeMovie('C:\\Users\\myUser\\myMovie.gif')
```

openBundle - Creates a new window and displays contents of a bundle

Usage: *openBundle(keywords)*

Keywords - required:

- bundle file= file name of bundle

Keywords - optional:

- height= height of display; default= height of the display window when the bundle was saved
- width= width of display; default= width of the display window when the bundle was saved
- dataDirectory= a dictionary where the keys are datasource names, and the values are either a string or list of strings representing the full path name/names of the data that will be used in place of the data in the bundle
- mode= specifies the method that will be used to open the bundle
  - REPLACE - Removes any previously-loaded layers and data sources and replaces the current session with the bundle's data (default)
  - NEWWINDOW - Loads the bundle's data and displays into a new window, without removing any previously-loaded layers and data sources
  - MERGE - Loads the bundle's data and displays into the current tab of the active display window without removing any previously-loaded layers and data sources
  - NEWTAB - Loads the bundle's data and displays into a new tab of the active display window without removing any previously-loaded layers and data sources

Example:

openBundle('C:\\Users\\myuser\\bundle.mcv',mode='NEWTAB')

createLayer - Creates a new data layer in a panel

Usage: *myDataLayer = panel[0].createLayer(keywords)*

Keywords - required:

- display type= display type for layer; valid options shown in Field Selector (e.g. 'Image Display', 'Image Sequence Display')
- myData= data object to display (from loadADDEImage)

Example:

layer=panel[0].createLayer('Image Display', data)

findWindow - Finds and creates a reference to the window containing a display

Usage: *window = findWindow(display=panel[0])*

Keywords - required:

- display= display name defined from buildWindow

Remarks:

The buildWindow function returns a reference to a specific panel in a window, and therefore any functions run on this panel will only impact that one panel, not the window as a whole. This findWindow function returns a reference to the actual window containing the buildWindow panel. This allows for performing actions on the window itself, such as adding new tabs and closing the window.

Example:

```
panel = buildWindow()
window = findWindow(display=panel[0])
see(window) # return which functions/methods can be applied to 'window'
```

window.createTab()
window.close()

Create an Object - Imagery

makeLocalADDEEntry - Creates a local ADDE entry in the server table

Usage: *localDataset=makeLocalADDEEntry(keywords)*

Keywords - required:

dataset= name of dataset - limit of 8 characters

mask= directory containing the files used by the dataset

format= data format of files used within the dataset. Either Full Name or Short Name can be used as valid options

Full Name	Short Name
"AMSR-E L 1b"	"AMSR"
"AMSR-E L 2a"	"AMSE"
"AMSR-E Rain Product"	"AMRR"
"LRIT GOES-9"	"FSDX_G9"
"LRIT GOES-10"	"FSDX_G10"
"LRIT GOES-11"	"FSDX_G11"
"LRIT GOES-12"	"FSDX_G12"
"LRIT MET-5"	"FSDX_M5"
"LRIT MET-7"	"FSDX_M7"
"LRIT MTSAT-1R"	"FSDX_MT"
"McIDAS Area"	"AREA"
"Meteosat OpenMTP"	"OMTP"
"Metop AVHRR L 1b"	"LV1B_METOP"
"MODIS MOD 02 - Level 1B Calibrated Geolocated Radiances"	"MODS"
"MODIS MOD 04 - Aerosol Product"	"MOD4"
"MODIS MOD 06 - Cloud Product"	"MODX_06"
"MODIS MOD 07 - Atmospheric Profiles"	"MODX_07"
"MODIS MOD 28 - Sea Surface Temperature"	"MOD8"
"MODIS MOD 35 - Cloud Mask"	"MODX_35"
"MODIS MOD R - Corrected Reflectance"	"MODR"
"MSG HRIT FD"	"MSGT_FD"
"MSG HRIT HRV"	"MSGT_HRV"
"MTSAT HRIT"	"MTST"
"NOAA AVHRR L 1b"	"LV1B_NOAA"
"SSMI"	"SMIN"
"TRMM"	"TMIN"
"GINI"	"GINI"
"Himawari-8"*	"Himawari-8"*
"INSAT-3D Imager"*	"INSAT3D_IMAGER"*
"INSAT-3D Sounder"*	"INSAT3D_SOUNDER"*
"GOES-16 ABI"*	"GOES-16 ABI"*

* The Himawari-8, INSAT-3D, and ABI local servers are currently supported on Linux and OS X platforms

Keywords - optional:

imageType= text description of the data used for the local server entry (default=*format_dataset*)

save= determines if the dataset will be retained from session to session (default = False)
True = retains the dataset between sessions
False = does not retain the dataset between sessions

Example:

```
dataPath = 'C:\\Users\\myuser\\Data\\AREA'
areaDataset=makeLocalADDEEntry(dataset='AREA', imageType='Area files', save=True, mask=dataPath, format='McIDAS Area')
```

getLocalADDEEntry - Gets the descriptor for a local ADDE entry

Usage: *localDescriptor=getLocalADDEEntry(keywords)*

Keywords - required:

dataset= local ADDE entry dataset name

imageType= image type of local ADDE entry

Example:

```
desc = getLocalADDEEntry(dataset='AREA',imageType='Area files')
```

loadADDEImage - Requests data from an ADDE Image server - returns one object containing both data and metadata

Usage: Local: *dataLocal=loadADDEImage(keywords)*

Keywords - required (local):

localEntry= local dataset defined by **makeLocalADDEEntry** or the descriptor returned from **getLocalADDEEntry**

Keywords - required (remote):

server= ADDE server

dataset= ADDE dataset group name

descriptor= ADDE dataset descriptor

Keywords - optional:

day= single day ('date 1') or as a day range ('begin date','end date'); default=most recent day included in data

time= ('begin time','end time'); default=most recent time included in data

coordinateSystem= coordinate system to use for retrieving data; default=server dependent
AREA = AREA file coordinates - zero based
LATLON = latitude and longitude coordinates
IMAGE = image coordinates - one based

location= (x,y); default=coordinateSystem dependent
x = AREA line, latitude, or IMAGE line
y = AREA element, longitude, or IMAGE element

place= CENTER places specified location (x,y) at center of panel (default)
ULEFT places specified location (x,y) at upper-left coordinate of panel

band= McIDAS band number; must be specified if requesting data from multi-banded image; default=band in image

unit= calibration unit to request; default = 'BRIT'

position= time relative (negative values) or absolute (positive values) position in the dataset; default=0 (most recent image)

size= number of lines and elements to request. Use "ALL" to obtain the full size of the image; default=(480,640).

mag= magnification of data (line,element), negative number used for sampling data; default=(1,1)

accounting= ('user', 'project number') user and project number required by servers using McIDAS accounting; default = ('idv','0'). If no accounting is defined for a server/dataset requiring it, McIDAS-V will first check the ADDE Data Manager to see if any accounting is defined for the server/dataset before erroring

debug= send debug information to file; default=False

track= True = with real-time data, will wait until the most recent image is complete before pulling it in
False = with real-time data, will not wait until the most recent image is complete before pulling it in. Dependent on when the loadADDEImage command is run, this may result in an incomplete image.
default=False

showUrls= True = Prints the ADDE URL returned from the server to the Jython Shell once the command has completed
False = Does not print the ADDE URL returned from the server to the Jython Shell once the command has completed
default=True

Examples:

dataLocal = loadADDEImage(localEntry=desc, size='ALL', mag=(1,1), unit='BRIT',debug=True)

dataRemote = loadADDEImage(server='adde.ssec.wisc.edu',dataset='RTIMAGES',descriptor='GE-IR',band=4,unit='TEMP')

The data object returned from **loadADDEImage** contains a variety of key:value pairings with information about the data. The list of keys may vary dependent on the server or type of data, but here is a general list of keys that may be included in the data object returned from **loadADDEImage** as well as example values:

Key	**Example Value**
accounting	('idv', '0')
debug	False
server	adde.ssec.wisc.edu
calibration-scale-factor	1
bands	[4]
nominal-time	2016-03-08 15:15:00Z
datetime	2016-03-08 15:15:18Z
directory-block	list of the first 64 words of the AREA
source-type	'GVAR'
band-count	1
lines	480
day	'2016068'
sensor-id	180
satband-band-label	10.7 um IR Surface/Cloud-top Temp
calibration-type	'BRIT'
start-time	2016-03-08 15:15:18Z
bandNumber	4
url	URL that prints to Jython Shell when data retrieved
memo-field	any memos included with data (e.g. the calibration-type)

elements	640
bandList	[4]
sensor-type	'GOES 13 imager'

These keys and values can be printed as follows:

print dataRemote['satband-band-label']

A practical use for this satband-band-label key would be to apply it to a layer label. This example adds the key to the layer label along with the %timestamp% macro:

layer.setLayerLabel(dataRemote['satband-band-label']+' %timestamp%')

listADDEImages - Lists data from an ADDE Image server that matches the keywords in the request - returns metadata objects which can be passed into loadADDEImage

Usage: *directoryList = listADDEImages(keywords)*

Keywords - required (local):

localEntry= local dataset defined by makeLocalADDEEntry or the descriptor returned from getLocalADDEEntry

Keywords - required (remote):

server= ADDE server

dataset= ADDE dataset group name

descriptor= ADDE dataset descriptor

Keywords - optional:

day= single day ('date 1') or as a day range ('begin date','end date'); default=most recent day included in data

time= ('begin time','end time'); default=most recent time included in data

band= McIDAS band number; must be specified if requesting data from multi-banded image; default=band in image

unit= calibration unit to request; default = 'BRIT'

position= time relative (negative values) or absolute (positive values) position in the dataset. Use "ALL" to obtain all positions. Multiple positions are obtained when a negative value is used. For example, if *position=-4* is used, then the five most recent images will be obtained (positions -4, -3, -2, -1, and 0 (most recent)); default=0 (most recent image).

accounting= ('user', 'project number') user and project number required by servers using McIDAS accounting; default = ('idv','0'). If no accounting is defined for a server/dataset requiring it, McIDAS-V will first check the ADDE Data Manager to see if any accounting is defined for the server/dataset before erroring

debug= send debug information to file; default=False

showUrls= True = Prints the ADDE URL returned from the server to the Jython Shell once the command has completed
False = Does not print the ADDE URL returned from the server to the Jython Shell once the command has completed
default=True

Examples:

directoryListLocal = listADDEImages(localEntry=desc, band=4, unit='TEMP')

directoryListRemote = listADDEImages(server='adde.ssec.wisc.edu',dataset='RTIMAGES',descriptor='GE-IR',unit='TEMP')

The data object returned from **listADDEImages** contains a variety of key:value pairings with information about the data. The list of keys may vary dependent on the server or type of data, but here is a general list of keys that may be included in the data object returned from **listADDEImages** as well as example values:

Key	**Example Value**
server	'adde.ssec.wisc.edu'
calibration-unit-name	None
unitList	['RAW', 'TEMP', 'BRIT']
calibration-scale-factor	1
descriptor	'GE-IR'
accounting	('idv', '0')
bands	[4]
resolution	(4.03157, 4.58618)
calinfo	['RAW', 'RAW', 'TEMP', 'TEMPERATURE', 'BRIT', 'BRIGHTNESS'
unitType	'BRIT'
nominal-time	2016-03-08 15:15:00Z
datetime	2016-03-08 15:15:18Z
directory-block	list of the first 64 words of the AREA
source-type	'GVAR'
band-count	1
imageSize	(2726, 1732)
center-longitude	-71.9527
lines	2726
day	'2016068'
center-latitude-resolution	4.03157

sensor-id	180
debug	'false'
centerLocation	(-0.0459699, -71.9527)
calibration-type	'BRIT'
start-time	2016-03-08 15:15:18Z
bandNumber	4
center-latitude	-0.0459699
url	URL that prints to Jython Shell when data retrieved
center-longitude-resolution	4.58618
memo-field	any memos included with data (e.g. the calibration-type)
elements	1732
bandList	[4]
time	'15:15:00'
sensor-type	'GOES 13 imager'
dataset	RTIMAGES

These keys and values can be accessed the same way as defined in **loadADDEImage**.

listADDEImageTimes - Returns a list of available dates and times of data that match the keywords in the request

Usage: *directoryList = listADDEImageTimes(keywords)*

Keywords - required (local):

localEntry= local dataset defined by makeLocalADDEEntry or the descriptor returned from getLocalADDEEntry

Keywords - required (remote):

server= ADDE server

dataset= ADDE dataset group name

descriptor= ADDE dataset descriptor

Keywords - optional:

day= single day ('date 1') or as a day range ('begin date','end date'); default=most recent day included in data

time= ('begin time','end time'); default=most recent time included in data

band= McIDAS band number; must be specified if requesting data from multi-banded image; default=band in image

unit= calibration unit to request; default = 'BRIT'

position= time relative (negative values) or absolute (positive values) position in the dataset. Use "ALL" to obtain all positions. Multiple positions are obtained when a negative value is used. For example, if *position=-4* is used, then the five most recent images will be obtained (positions -4, -3, -2, -1, and 0 (most recent)); default=0 (most recent image)

accounting= ('user', 'project number') user and project number required by servers using McIDAS accounting; default = ('idv','0'). If no accounting is defined for a server/dataset requiring it, McIDAS-V will first check the ADDE Data Manager to see if any accounting is defined for the server/dataset before erroring

debug= send debug information to file; default=False

showUrls= True = Prints the ADDE URL returned from the server to the Jython Shell once the command has completed
False = Does not print the ADDE URL returned from the server to the Jython Shell once the command has completed
default=True

Examples:

print listADDEImageTimes(localEntry=desc, position=-5)

print listADDEImageTimes(server='adde.ssec.wisc.edu',dataset='RTIMAGES',descriptor='GE-IR',time=('02:00','04:00'),position='ALL')

The data object returned from **listADDEImageTimes** contains a variety of key:value pairings with information about the data. The list of keys may vary dependent on the server or type of data, but here is a general list of keys that may be included in the data object returned from **listADDEImageTimes** as well as example values:

Key	**Example Value**
datetime	'2016-03-08 15:00:18Z'
time	'15:15:00'
day	'2016068'

These keys and values can be accessed the same way as defined in **loadADDEImage** assuming that a data object returned from **listADDEImageTimes** was defined (e.g. *timeList = listADDEImageTimes(...)*).

Create an Object - Grids

loadGrid - Loads local netCDF, hdf, and grib files.

Usage: *myData = loadGrid(keywords)*

Keywords - required:

filename= directory path to local gridded file

field= the short name of the field to load. A listing of field short names included in a file can be printed using **listGridFieldsInFile**.

Keywords - optional:

level= the vertical level and units to load. Default="All". A listing of vertical levels included with a field can be printed using **listGridLevelsInField**. Example: *level="1000 hPa"*

time= the time to load. This can be an integer representing the index of time to be loaded (Default=0 for earliest time). A listing of times included with a field can be printed using **listGridTimesInField**. This can also be set as a date/time text string. Example: *time="2014-01-16 18:00:00 UTC"*

xStride= integer value to reduce the resolution of display in the x-direction. Default=1 for full resolution. Higher values reduce the resolution.

yStride= integer value to reduce the resolution of display in the y-direction. Default=1 for full resolution. Higher values reduce the resolution.

stride= integer value to reduce the resolution of the display in the x and y-directions. Default=1 for full resolution. Higher values reduce the resolution.

xRange= integer for geographically subsetting by grid indices in the x-direction. By default, no geographical subsetting is done. Example: *xRange=(0,80)*

yRange= integer for geographically subsetting by grid indices in the y-direction. By default, no geographical subsetting is done. Example: *yRange=(0,80)*

latLonBounds= geographically subset by lat/lon bounds. By default, no subsetting is done. The expected format is (upper left lat, upper left, lon, lower right lat, lower right lon). Example: *latLonBounds=(50,-130,20,-65)*

Example:

t850 = loadGrid(filename='C:\\Users\\myUser\\gfs.grb',field='Temperature_Isobaric',level='850 hPa')

The data object returned from **loadGrid** contains a variety of key:value pairings with information about the data. The list of keys may vary dependent on the type of data, but here is a general list of keys that may be included in the data object returned from **loadGrid** as well as example values:

Key	**Example Value**
globalAttributes	dictionary of all global attributes included with data
level	850.0
description	'Temperature @ Isobaric surface'
units	'K'
dataSourceName	file path or URL of data source
times	[2016-03-08T06:00:00Z]
filename	name of file or URL of data source
field	Temperature_isobaric
datatype	float
metadataVariables	dictionary of all metadata variables included with data
attributes	lists all of the attributes of the field/variable loaded
projection	projection information about the data
levels	[850]
info	'Temperature_isobaric K false Temperature @ Isobaric surface'
variableAttributes	lists all of the attributes of the field/variable loaded

These keys and values can be printed as follows:

t850['description']

The keys and values within one of the dictionary keys (globalAttributes or metadataVariables) can be printed as follows:

t850['globalAttributes']

An individual value of one of the keys in globalAttributes or metadataVariables can be printed as follows

t850['globalAttributes']['file_format']

A practical use for these key:value parings would be to apply it to a layer label. This example adds the description key to the layer label along with the %timestamp% macro:

layer.setLayerLabel(t850['description']+' %timestamp%')

listGridFieldsInFile - Lists the fields in a file brought in with **loadGrid**. The output is *shortname ; longname*

Usage: *myData = listGridFieldsInFile(keywords)*

Keywords - required:

filename= directory path to local gridded file

Example:

listGridFieldsInFile(filename='C:\\Users\\myUser\\gfs.grb')

listGridLevelsInField - Lists the vertical levels included in a field of a **loadGrid** file

Usage: *myData = listGridLevelsInField(keywords)*

Keywords - required:

filename= directory path to local gridded file

field= the short name of the field to list levels of. A listing of field short names included in a file can be printed using **listGridFieldsInFile**

Example:

listGridLevelsInField(filename='C:\\Users\\myUser\\gfs.grb',field='Temperature_Isobaric')

listGridTimesInField - Lists the times included in a field of a **loadGrid** file

Usage: *myData = listGridTimesInField(keywords)*

Keywords - required:

filename= directory path to local gridded file

field= the short name of the field to list times of. A listing of field short names included in a file can be printed using **listGridFieldsInFile**

Example:

listGridTimesInField(filename='C:\\Users\\myUser\\gfs.grb',field='Temperature_Isobaric')

Modify the Display Object

annotate - Writes text to a panel

Usage: *panel[0].annotate(keywords)*

Keywords - required:

- text= annotation string. This string can contain HTML tags such as paragraph <p>, line break <br>, emphasize/italicize , and bold <b>
- lat=, lon= center text string at specified latitude and longitude (must be used together) -or-
- line=, element= center text string at specified panel line and element (must be used together)

Keywords - optional:

- font= name of font; default is system dependent, this uses the default defined in User Preferences
- size= size of font; default = size of font defined in user preferences
- style= style of font; default = style of font defined in user preferences
  'BOLD'
  'ITALIC'
  'NONE'
- color= sets the color of the text. There are two ways this can be set:
  'color name'; default = 'red'
  -or-
  [R,G,B] fractional scaling factor for each red, green and blue value (0 to 255). For example, [255,0,0]
- alignment= sets the location of the text with respect to the latitude/longitude or line/element combination entered. The format is alignment=(horizontal,vertical). For horizontal, values of "left", "right", and "center" can be used. For vertical, values of "top", "bottom" and "center" can be used. The default is alignment=("center","center") which means the text will be centered at the location of the latitude/longitude or line/element values.
- bgColor= sets the background color of the text. default=None
  There are two ways this can be set:
  'color name'. For example, 'green' -or-
  [R,G,B] fractional scaling factor for each red, green and blue value (0 to 255). For example, [0,255,0]

Example:

panel[0].annotate('EQUATOR',size=20, font='SansSerif.bold', lat=0, lon=-90, color='Green',alignment=("left","top"))

setCenter - Centers the display on a specified latitude/longitude and sets a scaling factor

Usage: *panel[0].setCenter(keywords)*

Keywords - required:

- lat= centers the display at the specified latitude (no default, required parameter)
- lon= centers the display at the specified longitude (no default, required parameter)

Keywords - optional:

- scale= scale factor for map; default = current scale factor

Remarks:

Scale factors between 0 and 1 zoom out centered on the specified latitude/longitude and scale factors greater than 1 zoom in.

Example:

panel[0].setCenter(45, -75, scale=20)

setProjection - Sets the projection of a panel

Usage: *panel[0].setProjection(keywords)*

Keywords - required:

- projection= string specifying the projection; e.g., 'US>Southeastern U.S.' or the name of the layer returned from createLayer, which uses the default projection of that data. Alternatively, a layer object can be passed through this keyword. For example, if a layer was defined as myLayer when running createLayer, passing 'myLayer' through the projection keyword would set the projection to the native projection of the myLayer layer.

Example:

panel[0].setProjection(projection='US>States>N-Z>Pennsylvania')

setViewpoint - Sets the viewpoint of a panel

Usage: *panel[0].setViewpoint(keywords)*

Keywords - required:

- viewpointName= string specifying the viewpoint; e.g., 'Viewpoint1'. This works in conjunction with the **Projections->Viewpoints** menu item in the Main Display window.

Example:

panel[0].setViewpoint(viewpointName='Viewpoint1')

setWireframe - Turns wire frame box on or off

Usage: *panel[0].setWireframe(keywords)*

Keywords - required:

- visible= sets the visibility of the wireframe box
  True - displays the wireframe box
  False - does not display the wireframe box

Examples:

panel[0].setWireframe(False)
panel[0].setWireframe(True)

setMapVisibilityByDescription - Sets the visibility of individual maps in the display

Usage: *panel[0].setMapVisibilityByDescription(keywords)*

Keywords - required:

description= the map to be added or removed from the display. The description matches the names of the maps in the Layer Controls.

visibility= sets the visibility of the map defined in the description keyword
True - displays the map
False - does not display the map

Examples:

panel[0].setMapVisibilityByDescription(description='World Coastlines', visibility=False)
panel[0].setMapVisibilityByDescription(description='U.S. County Outlines', visibility=True)

Modify the Layer Object

setColorScale - Displays color scale on a panel and specifies its attributes

Usage: *myDataLayer.setColorScale(keywords)*

Keywords - optional:

- visible= True - displays color scale (default)
- placement= location of color scale
  - 'Top' (default)
  - 'Bottom'
  - 'Left'
  - 'Right'
- font= name of font; default = font defined in User Preferences
- style= font style; default=font defined in user preferences
  - 'BOLD' - bolded font
  - 'ITALIC' - italicized font
  - 'NONE'
- size= size of font; default = size of font defined in User Preferences
- color= 'color name'; default = color defined in User Preferences
  - -or-
  - [R,G,B] fractional scaling factor for each red, green and blue value (0.0 to 1.0)
- showUnit= toggles the visibility of the display unit on the color scale (default = False)

Example:

layer.setColorScale(placement='Left',font='SansSerif',size=18.0,color='green',showUnit=True)

setEnhancement - Applies a color table and defines data range of data in a layer

Usage: *myDataLayer.setEnhancement(keywords)*

Keywords - required:

- color table = color table name e.g., 'Longwave Infrared Deep Convection'

Keywords - optional:

- range= (min,max) enhancement range; default = (min,max) of data
- transparency= transparency to apply to entire enhancement. The valid range is 0 - 100, with 0 being opaque and 100 being 100% transparent; default=0

Example:

layer.setEnhancement('Longwave Infrared Deep Convection',range=(20,250),transparency=20)

setLayerLabel - Toggles a layer label on/off and defines its attributes

Usage: *myDataLayer.setLayerLabel(keywords)*

Keywords - required:

- label = layer label string. This can include macros

Keywords - optional:

- visible= True - displays layer label(default)
- font= name of font; default = font defined in User Preferences.
- style= font style; default = font defined in user preferences
  - 'BOLD' - bolded font
  - 'ITALIC' - italicized font
  - 'NONE'
- size= size of font; default = size of font defined in User Preferences
- color= 'color name'; default = color defined in User Preferences
  - -or-
  - [R,G,B] fractional scaling factor for each red, green and blue value (0.0 to 1.0)

Example:

layer.setLayerLabel('%displayname% %timestamp%', size=15, color='blue', style='BOLD')
layer.setLayerLabel('%timestamp% - GOES East image', size=15, color='blue', style='BOLD')

Remarks:

There are a variety of macros that can be passed into the label keyword. Note that these macros must be contained within the label= string so they must be surrounded by quotes. These macros may differ between data sources and can include:

- %displayname% The name of the display
- %shortname% Shot name of parameter being displayed
- %longname% Long name of parameter being displayed
- %displayunit% Unit of parameter being displayed
- %timestamp% Lists the timestep of parameter currently being displayed. This defaults to the time format in the User Preferences. The time format can be changed by using the macro in the form of:
  %time:<time pattern>%
  For example:
  %time:HHz EEE dd MMM yyyy% would show something like 20UTC Wed 02 Dec 2015
- %fhour% Forecast hour of grid being displayed followed by an 'H' for hour
- %fhour2% Forecast hour of grid being displayed without being followed by an 'H' for hour

%level% Lists the vertical level of the parameter being displayed

setLegendLabel - Sets the Legend Label of the displayed layer. The Legend Label is the blue text of the layer seen in the Legend of the Main Display window

Usage: *myDataLayer.setLegendLabel(keywords)*

Keywords - required:

text= legend label string. This can include the macros included in the Remarks of setLayerLabel

Example:

layer.setLayerLabel(text='Layer 1')

setExtraLegendLabel - Sets the Extra Legend Label of the displayed layer. The Extra Legend Label is the text that lists below the blue Legend Label in the Legend of the Main Display window

Usage: *myDataLayer.setExtraLegendLabel(keywords)*

Keywords - required:

text= extra legend label string. This can include the macros included in the Remarks of setLayerLabel. Multiple lines can be created by using the HTML new line character: \n

Example:

layer.setExtraLegendLabel(text='%level%\n%shortname%')

setLayerVisible - Toggles layer visibility on/off, this includes any color scale or layer labels for the layer

Usage: *myDataLayer.setLayerVisible(keywords)*

Keywords - required:

visible= sets the visibility of the layer

True - displays the layer

False - does not display the layer

Example:

layer.setLayerVisible(visible=False)

setVerticalPosition - Sets the vertical positioning of the layer in the Main Display. The acceptable values range from -1 (bottom) to 1 (top)

Usage: *myDataLayer.setLayerVisible(keywords)*

Keywords - required:

verticalPosition= Sets the vertical positioning of the layer in the Main Display.

Example:

layer.setVerticalPosition(1)

getData - Returns a data object associated with the layer

Usage: *myDataLayer.getData()*

Example:

layerData = layer.getData()

Remarks:

The data object returned from the getData function (*layerData* from the above example) can now be passed through various formulas

getLayer - Returns a reference to a displayed layer

Usage: *layer = panel[0].getLayer(index)*

Example:

satLayer = panel[0].getLayer[1]

Remarks:

This function returns a reference to a displayed error, which allows for passing this layer through other functions such as *setLayerVisible()*, *setEnhancement()*, and *setLayerLabel()*. The numerical value in the square brackets after *getLayer* in the example is the layer's index in the display. The index of displays in the displays begins with 0, which is the first layer displayed in the panel (normally the map layer). The second layer displayed would be index 1, the third layer display would be index 2, and so on.

getDisplayUnit - Returns the unit of a displayed layer

Usage: *myDataLayer.getDisplayUnit()*

Example:

layer.getDisplayUnit()

setDisplayUnit - Sets the unit of a displayed layer

Usage: *myDataLayer.getDisplayUnit()*

Keywords - required:

unitname= Sets the unit to be applied to the displayed layer.

Example:

layer.setDisplayUnit('hPa')

Modify the Layer Object - Point

setLayoutModel - Sets the layout model used in the display

Usage: *myDataLayer.setLayoutModel(keywords)*

Keywords - required:

model= name of layout model to use in the display. The full directory structure to the layout model must be specified.

Example:

layer.setLayoutModel(model='Observations>Temperature')

setDeclutter - Enables or disables decluttering of the layer in the display

Usage: *myDataLayer.setDeclutter(keywords)*

Keywords - required:

value = sets if decluttering is enabled or disabled for the layer

True - declutters the layer (default)

False - plots every point of data without decluttering

Example:

layer.setDeclutter(value=True)

setDeclutterFilter - Sets the level of decluttering used for the layer if setDeclutter is set to True

Usage: *myDataLayer.setDeclutterFilter(keywords)*

Keywords - required:

filterFactor = numerical value for level of decluttering to use in the display. This is a value between 0 and 1, where 0 is the maximum level of decluttering and 1 is the maximum level of decluttering. default=0

Example:

layer.setDeclutterFilter(filterFactor=0.5)

setUseAltitudeForVerticalPosition - Toggles between displaying the data at the data's altitude (if available) or at a constant vertical position

Usage: *myDataLayer.setUseAltitudeForVerticalPosition(keywords)*

Keywords - required:

useAltitude= sets if the display plots at the altitude of the data or at a constant vertical position

True - displays the layer at the altitude of the data (if available) (default)

False - displays the layer at a constant vertical position, defined by setVerticalPosition()

Example:

layer.setUseAltitudeForVerticalPosition(useAltitude=False)

Data Analysis

describe - Returns a variety of statistical parameters about an imagery or gridded data object

Usage: *describe(myData)*

Example:

describe(imageryData)

Remarks:

This function returns the following statistical parameters of data objects returned from loadADDEImage and loadGrid:

- Histogram
- Length
- Min
- Max
- Range
- Q1
- Q2
- Q3
- IQR
- Mean
- Mode
- Kurtosis
- Skewness
- Std Dev
- Variance
- # Good Pts

Multiple data objects can be passed through describe() at once, separated by commas (example: *describe(imageryIR,imageryVIS)*).

sparkline - Returns a histogram of data values in a data object returned from loadADDEImage and loadGrid

Usage: *sparkline(myData)*

Example:

sparkline(imageryData)

Remarks:

Multiple data objects can be passed through sparkline() at once, separated by commas (example: *sparkline(imageryIR,imageryVIS)*).

findUnits - Returns the units of a data object

Usage: *findUnits(myData)*

Keywords - optional:

rangeOnly= True - returns only the range unit (default)
False - returns all units associated with the data object

Example:

findUnits(imageryData)

Save the Display

captureImage - Writes panel display to a file

Usage: *panel[0].captureImage(keywords)*

Keywords - required:

file= name of file, file format determined by file extension; valid options: .jpg, .gif, .png, .ps, .pdf, .svg, .kml, and .kmz

Keywords - optional:

height=	height of image (default - see Remarks)
width=	width of image (default - see Remarks)
quality=	quality of jpg file (0.0 to 1.0); default=1.0; not used with other formats
bgtransparent=	captures image with transparent background; default=False
formatting=	various formatting options to apply to the output image
createDirectories=	creates the directory specified in the file keyword if it does not already exist when set to True; default=False
index=	specifies the frame (index) in the display to capture when multiple frames are displayed in a loop. This is a 0-based list, where the first frame is index 0, the second frame is index 1, and so on; default=0

There are a variety of keywords that can be passed through the keyword parameter of captureImage. Below is a list of these formatting keywords and options for each of them. See the second example below for an example of passing various formatting options through captureImage with a dictionary.

Clip - Clips the output image at a specific latitude/longitude location or at specific spacing into the image. By default, no clipping is done.

north - Sets the north latitude to clip the image at.

south - Sets the south latitude to clip the image at.

east - Sets the east longitude to clip the image at.

west - Sets the west longitude to clip the image at.

space - Sets a pixel spacing in each direction to clip into the image.
Example: *space=-50*
Clips 50 pixels into the image in all four directions.

hSpace - Sets a pixel spacing in the vertical to clip into the image.
Example: *hSpace=50*
Clips 50 pixels into the image in both vertical directions (top and bottom).

vSpace - Sets a pixel spacing in the horizontal to clip into the image.
Example: *vSpace=20*
Clips 20 pixels into the image in both horizontal directions (left and right).

Colorbar - Adds a colorbar to the output image. By default, no colorbar is added to the image.

display - Sets the layer to add the colorbar for. This is the name given to the layer at createLayer.

width - Sets the horizontal width of the colorbar in pixels.

height - Sets the vertical height of the colorbar in pixels.

orientation - Sets the location of the tickmarks and labels with respect to the colorbar. Valid options for this keyword are "top", "bottom", "left", and "right". Default="bottom".

tickMarks - Sets the number of tickmarks and labels to add to the colorbar. By default, no tickmarks or labels are added to the colorbar.

interval - Sets the numerical interval to use between tickmarks and labels on the colorbar. By default, no tickmarks or labels are added to the colorbar.

values - Sets specific numerical values to use for tickmarks and labels on the colorbar. By default, no tickmarks or labels are added to the colorbar.

fontSize - Sets the size of the labels of the colorbar.

fontFace - Sets the font to use for the labels of the colorbar.

place - Sets the location the colorbar on the image along with x and y pixel offsets. Valid options are:

UL - Upper Left	**UM -** Upper Middle	**UR -** Upper Right
ML - Middle Left	**MM -** Middle Middle	**MR -** Middle Right
LL - Lower Left	**LM -** Lower Middle	**LR -** Lower Right

Example: *place="LM,0,-30"*
Places the colorbar in the lower middle and raises it 30 pixels from the bottom of the image.
Example: *place="ML,50,0"*
Places the colorbar in the middle left and indents it 50 pixels from the left of the image.

anchor - Sets the location on the colorbar to center at the **place**. Valid options are:
UL - Upper Left **UM -** Upper Middle **UR -** Upper Right
ML - Middle Left **MM -** Middle Middle **MR -** Middle Right
LL - Lower Left **LM -** Lower Middle **LR -** Lower Right
Example: *anchor="UM"*
Sets the upper middle of the colorbar to be centered at the **place** specified.

showLines - Includes lines on the colorbar at the tickmark and label locations. Valid options are "true" and "false". Default="false".

showUnit - Includes a unit with the numerical labels on the colorbar. Valid options are "true" and "false". Default="false".

suffix - Sets a label for the numerical labels on the colorbar. Note that this cannot be used in conjunction with **showUnit**.
Example: *suffix="H"*
Sets the labels on the colorbar to be "H".

suffixFrequency - Sets which labels on the colorbar will show the unit or suffix. Valid options are "first", "last", and "all". Default="last".

color - Sets the colors of the labels and lines. Default="black".

lineColor - Sets the color of the lines on the colorbar, assuming **showLines** is set to true. Default=**color** or "black" if **color** has not been set.

transparency - Includes any transparency used with the enhancement of the layer in the output image. Default="true".

ImageOverlay - Adds an image, such as a logo, to the output image.

image - Specifies the image to add to the output image. The full path to the image file must be specified. If this keyword isn't specified, then a McIDAS-V logo ( ) will be used.

place - Sets the location of the image along with x and y pixel offsets. Valid options are:
UL - Upper Left **UM -** Upper Middle **UR -** Upper Right
ML - Middle Left **MM -** Middle Middle **MR -** Middle Right
LL - Lower Left **LM -** Lower Middle **LR -** Lower Right
Example: *place="UL,40,20"*
Adds the image to the upper left brought in 40 pixels from the left and brought down 20 pixels from the top.

anchor - Sets the location on the image to center at the **place**. Valid options are:
UL - Upper Left **UM -** Upper Middle **UR -** Upper Right
ML - Middle Left **MM -** Middle Middle **MR -** Middle Right
LL - Lower Left **LM -** Lower Middle **LR -** Lower Right
Example: *anchor="UM"*
Sets the upper middle of the image to be centered at the **place** specified.

transparency - Sets the transparency of the image. The valid values range from 0 to 1, 0 being completely opaque and 1 being 100% transparent. Default=0.

Matte - Adds a matte to the output image. By default, no matte is added to the image.

Background - Sets the background color of the matte. Default="white"

top - Sets the size of the matte on the top of the image. Default=0.
Example: *top=20*
Adds a 20 pixel matte to the top of the image.

bottom - Sets the size of the matte on the bottom of the image. Default=0.
Example: *bottom=20*
Adds a 20 pixel matte to the bottom of the image.

left - Sets the size of the matte on the left of the image. Default=0.
Example: *left=50*
Adds a 50 pixel matte to the left of the image.

right - Sets the size of the matte on the right of the image. Default=0.
Example: *right=50*
Adds a 50 pixel matte to the right of the image.

space - Sets the size of the matte on all sides of the image. Default=0.
Example: *space=25*
Adds a 25 pixel matte to all sides of the image.

hSpace - Sets the size of the matte on the left and right sides of the image. Default=0.
Example: *hspace=10*
Adds a 10 pixel matte to the left and right sides of the image.

vSpace - Sets the size of the matte on the top and bottom of the image.
Example: *vspace=20*
Adds a 20 pixel matte to the top and bottom of the image.

Resize - Resizes the output image. By default, no resize is done to the output image, and the image will be the same size as the display window.

dimensions - Sets the size of the output image in either a pixel count or a percentage of the display window.
Example: *dimensions=("400","300")*
Creates a 400x300 pixel image.
Example: *dimensions=("60%","80%")*
Creates an image that is 60% in the x of the original display, and 80% in the y of the original display.

TextOverlay - Adds text to the output image. By default, no text is added to the output image.

text - Sets the text string to add to the output image.
Example: *text="GOES East Image"*
Adds the text of "GOES East Image" to the output image.

place - Sets the location of the text along with x and y pixel offsets. Valid options are:

UL - Upper Left	**UM -** Upper Middle	**UR -** Upper Right
ML - Middle Left	**MM -** Middle Middle	**MR -** Middle Right
LL - Lower Left	**LM -** Lower Middle	**LR -** Lower Right

Example: *place="UL,20,20"*
Adds the text to the upper left brought down 20 pixels from the top and brought in 20 pixels from the left.

anchor - Sets the location on the text to center at the **place**. Valid options are:

UL - Upper Left	**UM -** Upper Middle	**UR -** Upper Right
ML - Middle Left	**MM -** Middle Middle	**MR -** Middle Right
LL - Lower Left	**LM -** Lower Middle	**LR -** Lower Right

Example: *anchor="UM"*
Sets the upper middle of the text string to be centered at the **place** specified.

fontSize - Sets the size of the text.

fontFace - Sets the font to use for the text.

color - Sets the color of the text.

background - Sets the background color for the text string. By default, this is not defined and there is no background for the text.

transparency - Sets the transparency of the text. The valid values range from 0 to 1, 0 being completely opaque and 1 being 100% transparent. Default=0.

TransparentBackground - Sets the background of the image to be transparent in the output image. By default, the background is not transparent. To capture an image with a transparent background, specify *TransparentBackground()* in the **formatting** keyword of captureImage.

Remarks:

If captureImage is used to save a panel that was created with openBundle, the sizes default to size of the display window when the bundle was saved. If data was loaded using createLayer, the sizes default to those defined in buildWindow.
If running in a foreground session, the image capture is created from the display on the monitor. Therefore, the user is limited to a window size that fits within the bounds of the monitor. Any windows created with buildWindow must also include the Main Toolbar and Viewpoint Toolbar buttons in the window. Therefore, there is also a minimum size the display window can be. If a user wishes to capture larger or smaller images in a foreground session, they must use **setFullScreenWidth()**, **setFullScreenHeight()**, and **toggleFullScreen()**. The setFullScreen functions accept numerical pixel values. From the background, buildWindow can be used for any size display.

Example of capturing a large image in a foreground session:

```
panel=buildWindow()
panel[0].setFullScreenWidth(1500)
panel[0].setFullScreenHeight(1350)
panel[0].toggleFullScreen()
panel[0].captureImage('C:\\Users\\myuser\\Image.gif')
```

Example without formatting:

```
panel[0].captureImage('C:\\Users\\myuser\\Image.png')
```

Example with formatting:

```
myFormatting = [
    Matte(
        bottom="80",
        top="80",
        space="100",
    ),
```

```
        Colorbar(
            display=imLayer,
            place="ML,50,0",
            anchor="ML",
            orientation="left",
            interval="10",
            width="25",
            height="400",
        ),
        ImageOverlay(
            image='C:\\Users\\myuser\\logo3.png',
            place="UR,-20,10",
            anchor="UR",
        ),
        TextOverlay(
            text="GOES East Image",
            place="LM,0,-40",
            anchor="LM",
            fontSize="30",
            color="black",
        ),
    ]
    panel[0].captureImage('C:\\Users\\myuser\\formattingExample.gif',formatting=myFormatting)
```

writeMovie - Writes an image sequence to a movie file (ISL function)

Usage: *writeMovie(keywords)*

Keywords - required:

file= name of file, file format determined by file extension; valid options: .gif, .mov

Keywords - optional:

resize width= height=	size of image (default = height of window)
globalPalette=	sets if the animated GIF will use the color palette of each individual image or if the same colors will be used in each frame. Setting this to true helps to mitigate the flickering effect that can sometimes be seen in the color scale attached to the image. One circumstance where disabling this option may be ideal is if the movie starts with a low-light scene (not many colors) and there is no color scale in the display; default=True
createDirectories=	creates the directory specified in the file keyword if it does not already exist when set to True; default=False
framesPerSecond=	defines the number of frames to show each second in an animated GIF. The higher the number, the faster the GIF will play; default=2
endFramePause=	defines the number of seconds to show the last frame in an animated GIF. The higher the number, the longer the last frame will be displayed before the animation returns to the beginning; default=2

Example:

```
writeMovie('C:\\Users\\myuser\\movie.gif',params='resize width=600 height=800')
```

Environment

getJythonShellMaxHistoryLength( ) - Returns the current number of commands that are saved.
Usage: *print getJythonShellMaxHistoryLength()*

setJythonShellMaxHistoryLength( ) - Sets the number of commands that will be saved.
Usage: *setJythonShellMaxHistoryLength(number)*
Remarks:
This is the number of commands that will be listed out with the **File>List Saved History** menu item in the Jython Shell, as well as the number that will be added to the Local Jython Library from the **File>Save Commands to Jython Library** menu item. The default number of commands saved to the history is 100.
Example:
setJythonShellMaxHistoryLength(25)

collectGarbage( ) - Performs a garbage collection to free up memory.
Usage: *collectGarbage()*

removeAllData( ) - Removes all data sources added during the current session, without removing any displays.
Usage: *removeAllData()*

removeAllLayers( ) - Removes all layers that have been displayed.
Usage: *removeAllLayers()*

expandpath( ) - Expands the path entered.
Usage: *expandpath(path)*
Remarks:
Understands environmental variables such as "~" and "..".
Example:
print expandpath('$HOMEPATH')

editFile( ) - Pastes the content of a text file into the text input field of the Jython Shell.
Usage: *editFile(path)*
path - Directory path to the file to be added to the Jython Shell.
Remarks:
Pastes the text of an existing file into the text input field of the Jython Shell. This makes it easy to evaluate and edit scripts.
Example:
editFile('C:\\Users\\myuser\\myscript.py')

getLogLevel( ) - Sets the logging level to be used by McIDAS-V.
Usage: *print getLogLevel()*
Remarks:
Returns the current logging level being used by McIDAS-V. This is composed of two items, level and effectiveLevel.
level- The logging level of the directory path used in the command. If a directory path is not specified, this is the logging level for the session as a whole.
effectiveLevel- The logging level for the specific module specified in the command
Example:
print getLogLevel( )
This returns the logging level for everything as long as a logging level for another directory hasn't already been set.

setLogLevel( ) - Sets the logging level to be used by McIDAS-V.
Usage: *setLogLevel(level,keywords)*
level- Logging level to be used. This can be set to *TRACE*, *DEBUG*, *INFO*, *WARN*, *ERROR*, or *OFF*. Information about each of these logging levels can be found in the Advanced Preferences page.
Keywords:
temporary= determines if the logging level will be saved from session to session (default = True)
Remarks:
This command can be used to set the logging level for the session as a whole, and it can also be used to set logging levels for specific directories to control what type of logging output goes to mcidasv.log.
Examples:
setLogLevel('TRACE')
Sets the logging level for everything to *Trace* as long as a logging level for another directory hasn't already been set.
print getLogLevel()
Returns the global logging level in McIDAS-V. Both *level* and *effectiveLevel* are set to *TRACE*.

importEnhancement( ) - Imports a local enhancement file. This enhancement will then be available for use in a script as well as through the Color Table Editor in the current and future McIDAS-V sessions.
Usage: *importEnhancement(filename,keywords)*
Keywords - required:
filename= full path and file name of the local enhancement file
Keywords - optional:
name= name of the enhancement; default = the base filename without the extension (e.g. 'cape.xml' will become 'cape')

category= the category that the enhancement will be saved under. This name is used in the Color Table Editor under the Color Tables menu and allows for organization of enhancements; default= 'Basic'.

overwrite= sets if the command will overwrite any previously-existing enhancements with the same name. When set to False, an additional enhancement will be added to the list of color tables, and the name will be appended with '_#'. For example, if an enhancement named 'cape' already exists and an importEnhancement() command is run with the name specified as 'cape' and overwrite set to False, then the new enhancement will be saved with a name of 'cape_1'. If set to True, then the existing enhancement will be overwritten with the new one; default= False

Remarks:

The list of supported enhancement formats with importEnhancement() is the same as what can be imported through the Color Table Editor:

- IDV color table (*.xml)
- GEMPAK color table (*.tbl)
- 3-column RGB color table (*.ascii)
- McIDAS-X color table (*.et)
- AWIPS II color table (*.cmap)

If the enhancement specified in the filename keyword of importEnhancement() was originally exported from McIDAS-V, then the name and category keywords will be set from the values that already exist in the enhancement file.

Example:

importEnhancement(filename='C:\\Users\\myuser\\cape.xml', name='CAPE', category='Severe')

see( ) - Inspects an object passed through the function and prints out a list of different functions that can be used on the object.

Usage: *setLogLevel(keywords)*

Keywords:

obj= data or layer object passed through the function. The returned functions can be applied on the obj object.

pattern= filters the list of commands returned from the function. Wildcards (*) can be used.

Remarks:

If the obj keyword is omitted, the command will list all of the functions and packages that can be used in the current session.

Examples:

see(obj=data,pattern='.get')*

Returns a list of functions beginning with ".get" that can be applied on the data object.

Sharing

Sharing is a mechanism to share control operations between two or more displays. For example, you can have one animation control control animation in two windows at once.

For **sharing animation** in two windows, such as in the main McIDAS-V view window and a vertical cross section control, open the animation properties dialog in each animation control by clicking on the icon. Toggle on the **Shared** box and click on **Ok**. Then using either animation control will effect animation in both windows.

You can share other kinds of layer controls, such as sharing one selector line in vertical cross sections. This is toggled on by clicking on the **Share** checkbox under the **View** menu in the control window.

Site Configuration

McIDAS-V can be customized for yourself and your site in a variety of ways. McIDAS-V is configured through a set of resource files. These are typically e**X**tensible **M**arkup **L**anguage (XML) files that define things such as:

- Color tables
- The data chooser user interface
- The derived quantities and formulas
- Jython libraries
- Display defaults for parameters
- Parameter aliases
- Help tips
- Projections
- Available data sources
- Available displays
- Where the favorite bundles are
- Maps
- Layout models

Most of these resource files (with the exception of the chooser UI, help tips, data sources, displays and favorite bundle locations) are created through facilities provided by McIDAS-V (e.g., color table editor, formula editor, etc.).

By default McIDAS-V looks in four places for the resources it uses to configure itself. A user can enter the full path to the resource file, or use one of the four macros below which McIDAS-V will replace with the appropriate path:

- ***%USERPATH%* -** This is the ~user/McIDAS-V directory that gets created for each user. While this path may be defined by the -userpath or -tempuserpath command line arguments, the default location varies by platform:
  - Windows - C:\Users*username*\McIDAS-V
  - Linux - /home/*username*/McIDAS-V
  - OS X - /Users/*username*/Documents/McIDAS-V
- ***%SITEPATH%* -** This is the file directory or URL directory that can be defined as a command line argument -sitepath. This path is used to allow administrators to specify site-specific configurations.
- ***%IDVPATH%* -** This is the file directory containing configuration files that McIDAS-V inherits from Unidata's IDV. Note that these files are primarily located within idv.jar, but in some situations may also be found in local-idv.jar. The path to the resources in both of the JAR files is /ucar/unidata/idv/resources.
- ***%APPPATH%* -** This is the path used for McIDAS-V configuration files. These files will be in the /edu/wisc/ssec/mcidasv/resources path contained in mcidasv.jar. This path is specified by the idv.resourcepath property found in /edu/wisc/ssec/mcidasv/resources/mcidasv.properties file.

When McIDAS-V first starts up it reads the system properties file: mcidasv.properties. This defines some basic information (e.g., title, splash icon, ADDE servers, etc.) as well as defining where to find other properties files. By default it looks for mcidasv.properties files under the app, site, and the user paths:

```
idv.properties =
%APPPATH%/mcidasv.properties;%SITEPATH%/mcidasv.properties;%USERPATH%/mcidasv.properties;
```

You can also specify one or more properties files as command line arguments:

```
-properties your_properties_file
```

McIDAS-V processes these properties files in order, with properties defined in later files overriding those defined previously.

Once the properties have been processed McIDAS-V initializes its resources by reading in one or more resource definition files. These are called "RBI" files - (Resource Bundle for the IDV). These are XML files, the locations of which are defined by the *idv.resourcefiles* property:

```
idv.resourcefiles =
%USERPATH%/mcidasv.rbi;%SITEPATH%/mcidasv.rbi;%APPPATH%/mcidasv.rbi;%IDVPATH%/mcidasv.rbi
```

When McIDAS-V is started for the first time, the application writes out an example RBI file to the ~user/McIDAS-V directory. This file defines the location of different collections of resources. When originally created, this mcidasv.rbi file doesn't define any paths to the different resources used by McIDAS-V, but it can be used as a template to do so. To show how this can be done, there is a commented out entry to define where McIDAS-V can find the XML files that define the color tables:

```
<resources name="idv.resource.colortables" loadmore="true"> <resource
location="%USERPATH%/colortables.xml"/> <resource location="%SITEPATH%/colortables.xml"/>
<resource location="http://www.somewebsite.edu/somepath/colortables.xml"/> </resources>
```

The example above tells McIDAS-V to look for color tables in the user path, sitepath, and an online URL. McIDAS-V uses the first entry in this list as the file path to write out color tables that are created using the color table editor.

The loadmore tag for the colortable resource is set to "true" by default. When this is set to true, then the colortables resource contained in all of the directories in the idv.resourcefiles property will be used, meaning the user will have access to system color tables (in the %APPPATH% directory) as well. If this loadmore tag were set to "false", then only the mcidasv.rbi contained in the %USERPATH% directory (the first path contained in the idv.resourcefiles property) would be used for the colortables resource, system resource.

This gives the flexibility to customize McIDAS-V to us only resources set by the user and not those used by McIDAS-V by default. This mcidasv.rbi file does not contain all of the resource files available for use by McIDAS-V, but instead contains a subset of commonly-used resources. Additional resources can be added to this file by the user.

An example use case of this mcidasv.rbi file is if your site needs to use a set of special color tables that you have created. Once the color tables have been created in McIDAS-V, they are saved to ~user/McIDAS-V/colortables.xml (as defined by the resource paths defined in the app path's mcidasv.rbi). This file can then be copied to a web site or on a shared file system that is pointed to by the McIDAS-V -sitepath flag. Now, your users simply need to define the -sitepath at startup and they will naturally pick up the color tables saved in colortables.xml.

Resource

Here is the list of the resource identifiers, description and file pattern (for use with plugins) of the different resources McIDAS-V uses.

Resource Identifier	Description	File Pattern
idv.resource.actions	Actions	actions.xml$
idv.resource.addeservers	ADDE servers and datasets	addeservers.xml$
idv.resource.aliases	Data aliases	aliases.xml$
idv.resource.autodisplays	Automatic display creation	autodisplays.xml$
idv.resource.backgroundwms	Background WMS images	backgroundwms.xml$
idv.resource.bundles	Default bundles that are evaluated at start up	no pattern
idv.resource.bundlexml	Bundle xml	no pattern
idv.resource.categories	Display categories	categories.xml$
idv.resource.choosers	The definition of the user interface for data choosers	choosers.xml$
idv.resource.colorpairs	Color pairs	no pattern
idv.resource.colortables	Color tables used in the application	colortables.xml$
idv.resource.controls	Display controls	controls.xml$
idv.resource.datasource	Specification of the data sources	datasource.xml$
idv.resource.derived	Derived quantities	derived.xml$
idv.resource.enduserformulas	Native formulas	enduserformulas.xml$
idv.resource.grib1lookuptables	Grib 1 Lookup tables	grib1lookuptable.lst$
idv.resource.grib2lookuptables	Grib 2 Lookup tables	grib2lookuptable.lst$
idv.resource.helptips	Help tips shown in the help tips dialog	helptips.xml$
idv.resource.imagedefaults	ADDE Image Defaults	imagedefaults.xml$
idv.resource.imagesets	Image Sets	imagesets.xml$
idv.resource.jython	Jython libraries	.py$
idv.resource.locations	Fixed station locations	locations.xml$
idv.resource.maps	Maps for the displays	maps.xml$
idv.resource.menubar	Commands in the menu bar	(defaultmenu.xml$\|menubar.xml$)
idv.resource.messages	Message catalog	messages.properties$
idv.resource.misccontrols	Controls for different display types	misccontrols.xml$
idv.resource.njConfig	Configuration files	njConfig.xml$
idv.resource.paramdefaults	Display defaults for data	paramdefaults.xml$
idv.resource.paramgroups	Parameter groups	paramgroups.xml$
idv.resource.plugins	Plugins	no pattern
idv.resource.preferences	User preferences	no pattern
idv.resource.projections	Map projections	projections.xml$
idv.resource.prototypes	Prototypes	no pattern
idv.resource.skin	UI Skin	skin.xml$
idv.resource.staeprojections	Projections for USA states	stateprojections.xml$
idv.resource.stationmodels	Layout models	stationmodels.xml$
idv.resource.stationsymbols	Layout model symbols	stationsymbols.xml$
idv.resource.toolbar	Tool bar	toolbar.xml$
idv.resource.transects	Map transects	transects.xml$
idv.resource.translations	Hydrometeor classification value mapping	translations.xml$
idv.resource.urlmaps	Maps calls from old thredds server to another	urlmaps.xml$
idv.resource.userchooser	End user constructed data choosers	no pattern
idv.resource.varrenamer	Maps one field name to another	varrenamer.xml$
idv.resource.viewpoints	Viewpoints	viewpoints.xml$

Plugin Jar Files

Note: This page is intended for someone who wants to create a McIDAS-V plugin. A description of installing and managing plugins is here.

McIDAS-V supports a plugin architecture that allows for the easy extension and addition of functionality. A plugin is most commonly a Java Jar file that contains a set of resource files (e.g., color tables) and/or Java class files. The plugins are stored on a local directory or could be loaded form a web site. McIDAS-V processes the plugin Jar file at run time loading in the contained resources and code.

Basic Plugin

Lets suppose you have created a set of color tables and some Jython code that you want to make a plugin with. As described in the Site Configuration docs McIDAS-V stores these user created files in <user home>/.metappps/DefaultIdv as colortables.xml and default.py.

To make these into a plugin, e.g., myplugin.jar, simply jar the the files (you need to get a Java SDK for this):

```
jar -cvf myplugin.jar colortables.xml default.py
```

Now this plugin can be distributed to others and loaded into their McIDAS-V environment.

So, you might ask how does McIDAS-V recognize these files in the plugin and treat them appropriately? McIDAS-V loads in a set of resources (e.g., color tables, Python libraries). Each resource type is identified by a regular expression as shown in the resource list. In our example above the file name *colortables.xml* matches the pattern for color table xml resources.

Now, what happens if you have some file whose name does not match a pattern? Say, you have a color table xml file called *myspecialtables.xml* that you want to include in a bundle. In that case you can add a *.rbi* file, as described here, that defines this file as a resource:

```
<?xml version="1.0" encoding="ISO-8859-1"?> <resourcebundle> <resources
name="TARGET_PluginJarFiles__idv.resource.colortables"> <resource
location="/myspecialtables.xml"/> </resources> </resourcebundle>
```

This acts as a table of contents for the plugin. Make sure that the location is not relative. Note: Jar files can contain directory trees. e.g., /tables/myspecialtables.xml. In this case just have the location point to:

```
... <resource location="/tables/myspecialtables.xml"/> ...
```

Including Code

You can also include code that implements certain functionality by just including the Java .class files in the Jar. When you do this you need to include them like a normal class containing Jar file, i.e., the package structure of your code (e.g., edu.ucar.app.Test) needs to be reflected in the directory structure of the Plugin Jar file:

```
/edu/ucar/app/Test.class
```

For a single class file this is not necessarily required but if there are multiple class files that have interdependency among themselves then you will get into trouble if you don't follow this structure.

Now, what this code does can be anything and is best left up to the developer's guide.

Configuring Image Defaults

The defaults for the advanced settings of the Image Chooser is set for particular images through a configuration file. You can override the system defaults by creating your own configuration file and placing it in the user directory or sitepath See the section on Site Configuration for more information on the location of these directories. The configuration file (imagedefaults.xml) has the following format:

```
<?xml version="1.0" encoding="ISO-8859-1"?> <imagedefaults> <default pattern="" key="" place=""
loc="" unit="" user="" band="" proj=""/> </imagedefaults>
```

The attributes that can be overridden are:

pattern dataset identifier (format: **host:group/desc**)
key type of location (LINELE or LATLON)
place placement (ULEFT or CENTER)
loc location of placement (line ele or lat lon)
size resulting image size (lines eles)
mag magnification factor (lmag emag)
unit default calibration unit
band band number
proj project number
user user id (case sensitive)
debug (true to print lots of debug information)

Except for pattern, key and debug, McIDAS-V uses the same keywords/syntax as McIDAS (longitudes are entered as degrees east, however). The entries are hierarchical, so if you specify some defaults for the server, they apply to all datasets on that server unless overridden for specific datasets.

Here are a few examples:

```
<imagedefaults> <default pattern="*" debug="true"/> <default
pattern="adde.ssec.wisc.edu:RTIMAGES/GE-IR" key="LATLON" place="CENTER" loc="40 -90" unit="BRIT"
user="foo" proj="9999"/> <default pattern="EUM_AD/M8" loc="46 10" band="9" unit="TEMP" size="512
512"/> <default pattern="CIMSS/CTP" key="LATLON" loc="35 -100" mag="1 1" unit="CTOP"/> <default
pattern="GINICOMP/GSN8KVIS" key="LINELE" place="CENTER" loc="504 768" size="504 768" mag="-2 -2"/>
<default pattern="CCS039/G81KVIS" key="LINELE" place="ULEFT" loc="0 0" size="ALL"/>
</imagedefaults>
```

Adding in New GRIB Tables

McIDAS-V can read Gridded Binary (GRIB) files in both GRIB-1 and GRIB-2 formats. Decoding GRIB files requires a set of lookup tables for parameters, issuing centers, etc. McIDAS-V comes pre-configured to support commonly used tables, but regional models and modeling centers may use tables that are not in the distribution.

You can add in specialized tables for both GRIB-1 and GRIB-2 using the steps below. Documentation on the format of the files can be found here.

- GRIB-1 tables
- GRIB-2 tables

GRIB-1 tables

To add in new GRIB 1 tables, you will need to create a file listing the special tables and the special table files themselves.

To add in a new parameter file, McIDAS-V would need to have access to a file called **grib1lookuptable.lst** which would list the parameter table (e.g.: gwctab_2.tab) and the parameter table itself.

The format of grib1lookuptable.lst is:

```
<center>:<subcenter>:<version>: <table location>
```

so it would look like:

```
57: 1: 2: gwctab_2.tab
```

gwctab_2.tab can be a relative or absolute path. The tables are in ncep format:

```
-1:57:-1:2 0:var0:undefined 1:PRES:Pressure [Pa] 2:PRMSL:Pressure reduced to MSL [Pa]
3:PTEND:Pressure tendency [Pa/s] 4:PVORT:Pot. vorticity [km^2/kg/s] 5:ICAHT:ICAO Standard
Atmosphere Reference Height [m] :GP:Geopotential [m^2/s^2] ...
```

(You can read more information about the format of this file and the parameter table here)

Once you've created this file, you would access it by putting the grib1lookuptable.lst in your <home>/McIDAS-V directory and put the corresponding table files where they are pointed to in the file. This can be a relative path or a web server. Alternatively, you could place the grib1lookuptable.lst and associated parameter tables on a local web server and use McIDAS-V's sitepath parameter (startup option or user preference) to point to the location where the files are.

GRIB-2 tables

To add in new GRIB 2 parameter, you would create a file named **grib2lookuptable.lst** which lists the parameters.

The format of grib2lookuptable.lst is:

```
<Discipline> <Category> <Parm #> <Name> <Units> <Desc>
```

Parameters are listed by row, fields are separated by tabs, so it would look like:

```
#Dis Cat Parm # Name Units Desc 0 0 0 Temperature K Temperature
```

(This is a sample table, the lines starting with # are not include in table.) (You can read more information about the format of this file and the parameter table here)

Once you've created this file, you would access it by putting the grib2lookuptable.lst in your <home>/McIDAS-V directory. Alternatively, you could place the grib2lookuptable.lst on a local web server and use McIDAS-V's sitepath parameter (startup option or user preference) to point to the location of the file.

McIDAS-V Special Data Formats

- Text (ASCII) Point Data Format
- Location XML Files
- Image XML Files
- Image Movie Files
- XGRF Symbols

Text (ASCII) Point Data Format

If your point (in situ) data is not available in one of the file formats that McIDAS-V can handle, but it can output into a column-oriented ASCII text file, it may still be able to read into McIDAS-V. McIDAS-V supports reading in point observation data in a text comma separated value (CSV) file format.

The metadata of this point data must be specified. This can be done in two ways. First, the file can have two extra header lines that defines for McIDAS-V the fields that are within the file and the types of the fields. The only other requirement is that there must be a latitude, longitude and time field in the data. See below.

Secondly, if there are no metadata header lines defined, the Text Point Data Source will show the Metadata GUI described below.

More information about the format of Time and Lat/Lon symbols can be found in the User Preferences' Formats and Data Preferences page.

Examples:

Comma separated numeric values

In the simplest form, each line line is an observation at one time and one location:

```
(index) -> (Time,Latitude,Longitude,Altitude,PSL,GUS,SPD,DIR,TD,T) Time[fmt="yyyy-MM-dd
HH:mm:ss"],Latitude[unit="deg"],Longitude[unit="degrees
west"],Altitude[unit="m"],PSL[unit="hPa"],GUS[unit="m.s-1"],SPD[unit="m/s"],DIR[unit="deg"],
TD[unit="celsius"],T[unit="celsius"] 2007-01-07
16:00:00Z,32.9,117.1,145.0,1026.1,NaN,0.0,0.0,-2.8,12.8 2007-01-07
16:00:00Z,48.3,92.5,341.0,1003.7,NaN,1.5,170.0,-2.0,-0.99 2007-01-07
16:00:00Z,36.8,98.7,449.0,1024.0,12.4,9.8,330.0,-3.0,3.0 2007-01-07
16:00:00Z,44.3,121.2,938.0,1030.1,NaN,2.1,110.0,-3.3,-1.7
```

Note also that the first line's structure is quite rigid -- there must be a variable (e.g., **index**, **recNum**) that is the domain parameter; this should map to the range values. The second line defines the formatting and units of the parameters. Unit names should be standard international unit specifications (udunits compatible). A list of valid names can be found here. (A complete description of this format is contained in the VisAD README.text file.)

Also note that "Time", as well as the locations as "Latitude", "Longitude" and "Altitude" must be specified (if needed).

Text fields

If there are text fields (i.e., non-numeric data) in the observation, just do this:

```
(index) -> (Time,Latitude,Longitude,Altitude,ST(Text),T) Time[fmt="yyyy-MM-dd HH:mm:ss
z"],Latitude[unit="deg"],Longitude[unit="degrees
west"],Altitude[unit="m"],ST(Text),T[unit="celsius"] 2007-02-16 11:00:00 MST,32.9,117.1,145.0,CA
,20.6
```

Here we have a ST field (State from metars). Its field name is defined as "ST(Text)" and its entry in the second line is the same.

Time in multiple columns

If there are time fields that span multiple columns, the **colspan** keyword should be used:

```
(index) -> (IDN, Latitude, Longitude, Time, WDIR, WSPD, GST) IDN, Latitude[unit="deg"],
Longitude[unit="deg"], Time[fmt="yyyy MM dd HH mm" colspan="5"], WDIR[unit="deg" miss="MM"],
WSPD[unit="m/s" miss="MM"], GST[unit="m/s" miss="MM"] 41001 34.68 -72.66 2007 07 17 20 50 210 4.0
6.0 41004 32.5 -79.09 2007 07 17 20 50 210 6.0 MM 41008 31.4 -80.87 2007 07 17 21 50 170 7.0 8.0
```

If using the Point Data window to define a colspan value, the numerical value must be in quotes. For example: colspan="2". This colspan value goes into the **Extra** field in the Point Data window.

Skipping columns

The "skip" parameter should be used to ignore (not read) values in the text file that shouldn't be used:

```
(recNum)->(Latitude, Longitude, Altitude, type(Text), time, turb_intensity) time[fmt=yyyyMMddHH],
obtime, skip, type(Text), skip, skip, Latitude, Longitude[scale=-1], Altitude[unit=ft],
Altitude2[unit=ft], turb_intensity, skip 2004050100 0005 34 C210 1 T 38.82 92.22 7000 7000 0 -9
2004050100 0004 35 PA32 0 T 35.40 98.62 4000 4000 0 -9 2004050100 0008 58 A36 0 T 29.18 81.05 5000
5000 2 -9
```

Fixed values for several observations

If there are values (like time or location) that are fixed for several observations then this construct may be used:

```
(index) -> (Longitude,Latitude,Time,ST(Text),SPD,DIR,TD,T) Longitude[unit="degrees
west"],Latitude[unit="deg"],Time[fmt="yyyy-MM-dd HH:mm:ss
z"],ST(Text),SPD[unit="m/s"],DIR[unit="deg"],TD[unit="celsius"],T[unit="celsius"] Longitude=-117.1
Latitude=32.9 ST=MSN 2007-02-20 11:00:00 ST ,0.0,0.0,8.9,13.3 2007-02-20 12:00:00 ST
,0.0,0.0,11.9,15.0 Longitude=-89.4 Latitude=43.1 ST=DEN 2007-02-20 11:00:00 ST
,1.5,160.0,-7.0,-2.0 2007-02-20 12:00:00 ST ,1.5,160.0,-7.0,-2.0 Longitude=-121.2 Latitude=44.3
ST=ORD 2007-02-20 11:00:00 ST ,10.8,230.0,-1.1,6.7
```

Loading into McIDAS-V

Finally, after the file has been created, McIDAS-V displays can be tailored in two ways:

1. Create a layout model for those variables using the McIDAS-V's "**Tools->Layout Model Editor**" menu item.

Then, here is the process to read in and display the data:

1. Use Data Source Type as "Text Point Data files"
2. Use the "Point Data Plot" for the Display
3. Select the newly created layout model

Using the Text Point Metadata Gui

If the text data does not have the metadata header lines the Text Point Data Source will show the following dialog which allows for specifying the metadata.

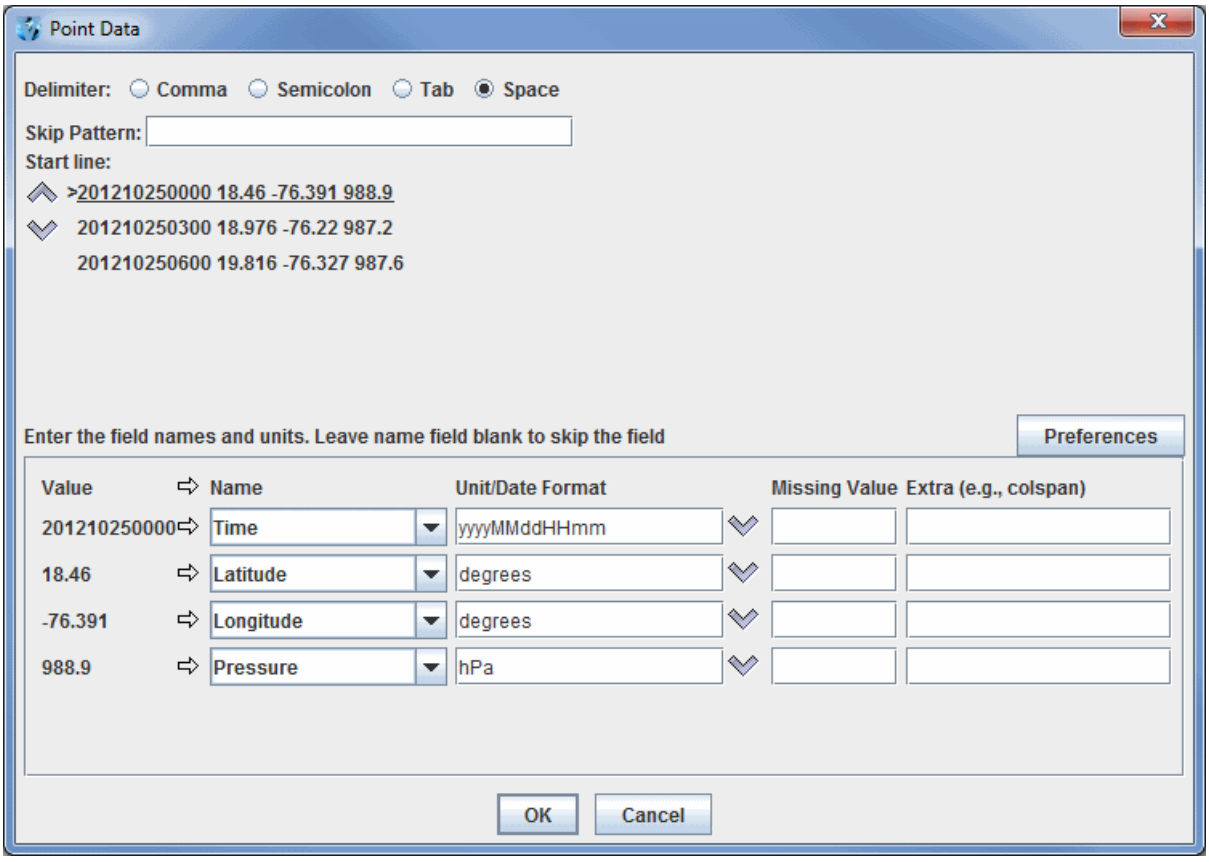


Image 1: Point Data Dialog Window

Delimiter

This field specifies how the different data values are separated within the text file. The options are Comma, Semicolon, Tab, and Space. Selecting this option allows McIDAS-V to separate out different text fields to allow for defining them at the bottom of this Point Data window.

Skipping lines

At the top, a number of the initial lines from the text data are shown. The arrow keys allow for specifying the start line. For example, if there were header lines in the file, these lines can be skipped over.

Specifying metadata
For each column of text data there is a row shown in the bottom of the dialog. This shows the sampled value and allows for entering a name, unit, date format, missing value and extra information. There are some names that McIDAS-V treats special: "Latitude", "Longitude", "Altitude", and "Time". At least Latitude, Longitude and Time must be specified in the file.

The Unit/Date Format field allows for specifying the Unit for data fields and the date format. For text fields choose **Misc->Text** as the unit.

The Extra fields must be of the form:

```
name="value"
```

Don't forget the quotes!

Skipping columns
Certain columns can be skipped by entering the Name: "skip"

Saving this as a preference
To keep from having to enter in this data again next time new text point data of the same form is loaded, simply press the "Preferences" button and select **Save Current**. This allows for saving these metadata settings and reapply them later using the "Preferences" button.

Location XML Files

McIDAS-V supports a variety of location text file formats. All of these formats can be loaded through the File Chooser. Select the "Location" data type.

- Locations XML
- CSV Format
- GeoRSS Format
- KML/KMZ Format

Locations XML

The main format McIDAS-V uses is a custom locations XML format. This format still has some nomenclature from when it was atmospheric science related (e.g. "stations"). A simple example:

```
<?xml version="1.0" encoding="ISO-8859-1"?> <stationtable
name="TARGET_LocationXml__Example"> <station name="TARGET_LocationXml__station 1"
lat="65:02:06" lon="-147:30:06" elev="790"/> <station name="TARGET_LocationXml__station 2"
lat="40.3" lon="-107.5" elev="10"/> ... </stationtable>
```

The *lat* and *lon* attributes can be of the form:

```
+/- ddd:mm, ddd:mm:, ddd:mm:ss, ddd::ss, ddd.fffff ===> [+/-] ddd.fffff +/- ddd, ddd:, ddd:: ===>
[+/-] ddd +/- :mm, :mm:, :mm:ss, ::ss, .fffff ===> [+/-] .fffff +/- :, :: ===> 0.0 Any of the
above with N,S,E,W appended
```

The *elev* attribute is optional. By default it is in meters. The default can be overridden with an *elevunit* in the stationtable tag. e.g.:

```
<?xml version="1.0" encoding="ISO-8859-1"?> <stationtable
name="TARGET_LocationXml__Example" elevunit="feet"> <station
name="TARGET_LocationXml__station 1" lat="65:02:06" lon="-147:30:06" elev="5340"/> ...
```

The *station* tags can have an *id* attribute as well:

```
<station id="APD" name="TARGET_LocationXml__Fairbanks/Pedro Dome" lat="65:02:06"
lon="-147:30:06" elev="790"/>
```

The *station* tags can also have any other attributes:

```
<station id="APD" name="TARGET_LocationXml__Fairbanks/Pedro Dome" st="AK" co="US"
lat="65:02:06" lon="-147:30:06" elev="790"/> <station id="FTG"
name="TARGET_LocationXml__Denver/Boulder" st="CO" co="US" lat="39:47:12" lon="-104:32:45"
elev="1675"/>
```

These can be displayed by the layout model used in the Location Display Control.

To create a permanent list of stations that show up in the **Display->Locations** menu in the Main Display window, create a file called userstations.xml in the McIDAS-V directory under your user's home directory. The format would look like:

```
<?xml version="1.0" encoding="ISO-8859-1"?> <stationtables> <stationtable name="SubsetA"
category="My Custom Stations"> (list of stations for SubsetA) </stationtable>
<stationtable name="SubsetB" category="My Custom Stations"> (list of stations for SubsetB)
</stationtable> </stationtables>
```

This will show up in the **Display->Locations** menu as a top menu called **My Custom Stations** and sub menus **SubsetA** and **SubsetB**. After adding this XML file in through the Files/Directories chooser, McIDAS-V must be restarted before the stations will be listed.

CSV Format

Location data can be defined in a CSV (Comma Separated Value) format. The first line is a comma separated list of column names. There must be columns that are latitude and longitude. These are denoted with (case insensitive):

```
latitude lat longitude lon long
```

Altitude is given by the column names:

```
alt altitude
```

The altitude value, if defined, is by default in meters. Optionally, specify a unit with the suffix: "[unit name]" (see example).

The first column that is found that is not one of the location columns is taken to be the name of the location.

Example:

```
Name,Latitude,Longitude,Altitude,State Boulder,40,-107,5430[feet],CO Miami,30,-95,0[feet],FL ...
```

GeoRSS Format

McIDAS-V can also read GeoRSS formats. This is a geocoded RSS feed.

KML/KMZ Format

McIDAS-V can also read KML/KMZ formats. This type of file can be read in through the General>Files/Directories Chooser of the **Data Sources** tab of the Data Explorer with the *Google Earth Files KML/KMZ* **Data Type**. An example file from the USGS can be found here:

https://waterwatch.usgs.gov/index.php?m=real&w=kml&r=us&regions=all

---

Image XML Files

The Image Xml file format (.ximg) allows one to define collections of geolocated images (and also shapefiles). The simplest file can define one geolocated image:

```
<image url="sboulder.jpeg" name="South Boulder-aerial photo" ullat="39.98890"
ullon="-105.22782" lrlat="39.98755" lrlon="-105.22548"/>
```

The *url* attribute can be an absolute or relative url or file path. The *ullat*, *ullon*, *lrlat* and *lrlon* attributes are the upper left and lower right lat/lon of the image. It is assumed that the image is in a geographic (i.e., rectilinear, lat/lon) projection.

Collections

You can also define a collection of images:

```
<collection name="TARGET_ImageXml__Boulder Images"> <image url="sboulder.jpeg" name="South
Boulder-aerial photo" ullat="39.98890" ullon="-105.22782" lrlat="39.98755"
lrlon="-105.22548"/> <image url="bouldertopo.jpeg" ullat="40.06654" ullon="-105.34710"
lrlat="39.98040" lrlon="-105.19676" name="Boulder topo"/> <image url="bigtopo.jpeg"
ullat="40.22807" ullon="-106.66437" lrlat="39.54718" lrlon="-105.45623" name="Mountains
topo"/> </collection>
```

Collections can contain other collections:

```
<collection name="TARGET_ImageXml__My Images"> <collection name="TARGET_ImageXml__Madison
Images"> <image url="madison_aerial.jpeg" ullat="43.09444" ullon="-89.52626"
lrlat="43.01143" lrlon="-89.36579" name="Madison aerial"/> <image url="madison_topo.jpeg"
ullat="43.09444" ullon="-89.52626" lrlat="43.01143" lrlon="-89.36579" name="Madison
topo"/> </collection> <collection name="TARGET_ImageXml__Boulder Images"> <image
url="sboulder.jpeg" name="South Boulder-aerial photo" ullat="39.98890" ullon="-105.22782"
lrlat="39.98755" lrlon="-105.22548"/> </collection> </collection>
```

There is also a *shape* tag for defining shape files:

```
<collection name="TARGET_ImageXml__Shapes"> <shape url="boulder_roads.zip"
name="TARGET_ImageXml__Boulder roads"/> <shape url="boulder_rivers.zip"
name="TARGET_ImageXml__Boulder rivers"/> </collection>
```

Grouping

The *group* tag allows you to group a set of images in time or space:

```
<group name="TARGET_ImageXml__group of images" format="yyyyMMddhhmm" ullat="39.991856"
ullon="-105.226944" lrlat="39.989426" lrlon="-105.222656"> <image date="200610011000"
url="sketch.jpg"/> <image url="map.jpg" date="200610011100"/> </group>
```

The *format* attribute defines the date/time format of the *date* attributes. The location attributes (ullat,ullon, etc.) can be defined both in the *group* tag as well as in each individual *image* tag.

If there are no *date* attributes then the group of images are aggregated together, each potentially covering a different area.

Images in 3D Space

One is not limited to just specifying the positions of the upper left and lower right corners of the image. There is support for defining the latitude and longitude for any of the four corners of the image:

```
<image url="image.jpeg" name="Image" ullat="40" ullon="-100" lllat="30" lllon="-100"
urlat="50" urlon="-90" lrlat="30" lrlon="-90" />
```

One can also specify the altitude of any of the points. The unit specification is not required and will default to meters.

```
<image url="image.jpeg" name="Image" ullat="40" ullon="-100" ulalt="20000[feet]"
lllat="30" lllon="-100" llalt="0[feet]" urlat="50" urlon="-90" uralt="5000[feet]"
lrlat="30" lrlon="-90" lralt="0[feet]" />
```

McIDAS-V will try to fill in defaults. So, for example, if you wanted to have an image be a vertical cross section you could do:

```
<image url="topo.jpg" name="Image" ullat="40" ullon="-100" urlat="50" urlon="-90"
ulalt="20000[feet]" llalt="0[feet]"/>
```

Here, we define the lat/lon of the upper left and upper right of the image. We define the altitude of the upper left and lower left corners of the image.

The altitude of the upper right corner defaults to that of the upper left and the altitude of the lower right defaults to the lower left altitude.

Image Movie Files

McIDAS-V can display a sequence of time-stamped images as an animation.

One can write their own xml file and display the images within McIDAS-V using this xml format.

There are really two xml formats used. The first defines a set of *imagesets*:

```
<imagesets base="http://www.unidata.ucar.edu/georesources/webcams/images"
name="TARGET_ImageMovie__McIDAS-V Webcams"> <group name="TARGET_ImageMovie__Rockies">
<imageset name="TARGET_ImageMovie__Boulder, CO" index="boulder_co/index.xml" lat="40.0"
lon="-105.27"/> <imageset name="TARGET_ImageMovie__Denver, CO" index="denver_co/index.xml"
lat="39.75" lon="-105"/> </group> <group name="TARGET_ImageMovie__National Parks">
<imageset name="TARGET_ImageMovie__Theodore Roosevelt National Park, ND"
index="theodorerooseveltnationalpark_nd/index.xml" lat="46.94889" lon="-103.43306"/>
<imageset name="TARGET_ImageMovie__Big Bend National Park,TX"
index="bigbendnationalpark_tx/index.xml" lat="29.25" lon="-103.25"/> <imageset
name="TARGET_ImageMovie__Olympic National Park" index="olympicnationalpark/index.xml"
lat="48.26667" lon="-124.675"/> </group> ... </imagesets>
```

This is a "table of contents". The *base* attribute, if defined, is used as a url base to prepend to the urls defined by the *index* attributes. The *lat* and *lon* attributes are optional and are used to locate the source of the movie on a map for the user to select.

Each of the *index* attributes refers to an *images* xml file of the form:

```
<images base="http://www.unidata.ucar.edu/georesources/webcams/images/boulder_co"
name="Boulder, CO" group="Rockies" format="yyyyMMddHHmmz" desc="From: http://9news.com">
<image time="200607251446GMT" file="image_200607251446GMT.jpeg"/> <image
time="200607251430GMT" file="image_200607251430GMT.jpeg"/> <image time="200607251414GMT"
file="image_200607251414GMT.jpeg"/> <image time="200607251357GMT"
file="image_200607251357GMT.jpeg"/> <image time="200607251344GMT"
file="image_200607251344GMT.jpeg"/> ... </images>
```

The *images* tag defines a *base* attribute (optional, used to prepend to any image urls), a *name*, a (optional) *group* and a date *format* and a description (*desc*). Each *image* tag has a *time* in the format specified in the *images* tag and a *file* attribute which refers to some image. This may be an absolute or relative url or file path.

XGRF Symbols

The drawing control can export and import its drawings in an xgrf format. In this format you can specify a symbol type. The symbol tag in the xgrf has a symbol attribute, the value of which can be any of the below symbols.

- General Symbols
  - **PIN** - Pin
  - **PLUS** - Plus
  - **MINUS** - Minus
  - **CROSS** - Cross
  - **SQUARE** - Square
  - **FILLED_SQUARE** - Filled Square
  - **TRIANGLE** - Triangle
  - **FILLED_TRIANGLE** - Filled Triangle
  - **CIRCLE** - Circle
  - **FILLED_CIRCLE** - Filled Circle
  - **DIAMOND** - Diamond
  - **FILLED_DIAMOND** - Filled Diamond
  - **STAR** - Star
  - **FILLED_STAR** - Filled Star
  - **HORLINE** - Hor. Line
  - **VERTLINE** - Vert. Line
  - **LEFTARROW** - Left Arrow
  - **RIGHTARROW** - Right Arrow
  - **UPARROW** - Up Arrow
  - **DOWNARROW** - Down Arrow
  - **CUBE** - Cube
  - **DOWNLINE** - Down Line
  - **PYRAMID_4FACE** - 4 Face Pyramid
  - **PYRAMID_5FACE** - 5 Face Pyramid
  - **FILLED_SPHERE** - Sphere
  - **AIRPLANE** - 2-D Airplane
  - **AIRPLANE3D** - 3-D Airplane
  - **NONE** - None
- Present Weather
  - **WX_PRESENTWX_0** - Cloud development not observed or not observable
  - **WX_PRESENTWX_1** - Clouds generally dissolving or becoming less developed
  - **WX_PRESENTWX_2** - State of sky on the whole unchanged
  - **WX_PRESENTWX_3** - Clouds generally forming or developing
  - **WX_PRESENTWX_4** - Visibility reduced by smoke
  - **WX_PRESENTWX_5** - Haze
  - **WX_PRESENTWX_6** - Widespread dust in suspension in the air, not raised by wind
  - **WX_PRESENTWX_7** - Dust or sand (or spray) raised by wind
  - **WX_PRESENTWX_8** - Well developed dust or sand whirl(s)
  - **WX_PRESENTWX_9** - Duststorm or sandstorm within sight or during preceding hour
  - **WX_PRESENTWX_10** - Mist
  - **WX_PRESENTWX_11** - Patches of shallow fog or ice fog (less than 2m land, 10m sea)
  - **WX_PRESENTWX_12** - Continuous shallow fog or ice fog (less than 2m land, 10m sea)
  - **WX_PRESENTWX_13** - Lightning visible, no thunder heard
  - **WX_PRESENTWX_14** - Precipitation in sight, not reaching the ground
  - **WX_PRESENTWX_15** - Precipitation in sight, reaching the ground, more than 5km away
  - **WX_PRESENTWX_16** - Precipitation in sight, reaching the ground nearby
  - **WX_PRESENTWX_17** - Thunderstorm, but no precipitation at time of observation
  - **WX_PRESENTWX_18** - Squalls within sight during the preceding hour
  - **WX_PRESENTWX_19** - Funnel cloud(s) within sight during the preceding hour
  - **WX_PRESENTWX_20** - Recent drizzle or snow grains
  - **WX_PRESENTWX_21** - Recent rain
  - **WX_PRESENTWX_22** - Recent snow
  - **WX_PRESENTWX_23** - Recent rain and snow or ice pellets
  - **WX_PRESENTWX_24** - Recent freezing drizzle or freezing rain
  - **WX_PRESENTWX_25** - Recent rain showers
  - **WX_PRESENTWX_26** - Recent showers of snow, or of rain and snow
  - **WX_PRESENTWX_27** - Recent showers of hail, or of rain and hail
  - **WX_PRESENTWX_28** - Recent fog
  - **WX_PRESENTWX_29** - Recent thunderstorm
  - **WX_PRESENTWX_30** - Slight or moderate duststorm or sandstorm, has decreased in last hour
  - **WX_PRESENTWX_31** - Slight or moderate duststorm or sandstorm, no change in last hour

- **WX_PRESENTWX_32** - Slight or moderate duststorm or sandstorm, has increased in last hour
- **WX_PRESENTWX_33** - Severe duststorm or sandstorm, has decreased in last hour
- **WX_PRESENTWX_34** - Severe duststorm or sandstorm, no change in last hour
- **WX_PRESENTWX_35** - Severe duststorm or sandstorm, has increased in last hour
- **WX_PRESENTWX_36** - Slight or moderate drifting snow (below eye level)
- **WX_PRESENTWX_37** - Heavy drifting snow (below eye level)
- **WX_PRESENTWX_38** - Slight or moderate blowing snow (above eye level)
- **WX_PRESENTWX_39** - Heavy blowing snow (above eye level)
- **WX_PRESENTWX_40** - Fog extending above observer in distance
- **WX_PRESENTWX_41** - Fog in patches
- **WX_PRESENTWX_42** - Fog has become thinner in last hour, sky visible
- **WX_PRESENTWX_43** - Fog has become thinner in last hour, sky invisible
- **WX_PRESENTWX_44** - Fog, no change in last hour, sky visible
- **WX_PRESENTWX_45** - Fog, no change in last hour, sky invisible
- **WX_PRESENTWX_46** - Fog has become thicker in last hour, sky visible
- **WX_PRESENTWX_47** - Fog has become thicker in last hour, sky invisible
- **WX_PRESENTWX_48** - Fog depositing rime, sky visible
- **WX_PRESENTWX_49** - Fog depositing rime, sky invisible
- **WX_PRESENTWX_50** - Slight intermittent drizzle
- **WX_PRESENTWX_51** - Slight continuous drizzle
- **WX_PRESENTWX_52** - Moderate intermittent drizzle
- **WX_PRESENTWX_53** - Moderate continuous drizzle
- **WX_PRESENTWX_54** - Heavy intermittent drizzle
- **WX_PRESENTWX_55** - Heavy continuous drizzle
- **WX_PRESENTWX_56** - Slight freezing drizzle
- **WX_PRESENTWX_57** - Moderate or heavy freezing drizzle
- **WX_PRESENTWX_58** - Slight rain and drizzle
- **WX_PRESENTWX_59** - Moderate or heavy rain and drizzle
- **WX_PRESENTWX_60** - Slight intermittent rain
- **WX_PRESENTWX_61** - Slight continuous rain
- **WX_PRESENTWX_62** - Moderate intermittent rain
- **WX_PRESENTWX_63** - Moderate continuous rain
- **WX_PRESENTWX_64** - Heavy intermittent rain
- **WX_PRESENTWX_65** - Heavy continuous rain
- **WX_PRESENTWX_66** - Slight freezing rain
- **WX_PRESENTWX_67** - Moderate or heavy freezing rain
- **WX_PRESENTWX_68** - Slight rain or drizzle and snow
- **WX_PRESENTWX_69** - Moderate or heavy rain or drizzle and snow
- **WX_PRESENTWX_70** - Slight intermittent fall of snow flakes
- **WX_PRESENTWX_71** - Slight continuous fall of snow flakes
- **WX_PRESENTWX_72** - Moderate intermittent fall of snow flakes
- **WX_PRESENTWX_73** - Moderate continuous fall of snow flakes
- **WX_PRESENTWX_74** - Heavy intermittent fall of snow flakes
- **WX_PRESENTWX_75** - Heavy continuous fall of snow flakes
- **WX_PRESENTWX_76** - Ice prisms
- **WX_PRESENTWX_77** - Snow grains
- **WX_PRESENTWX_78** - Isolated starlike snow crystals
- **WX_PRESENTWX_79** - Ice pellets
- **WX_PRESENTWX_80** - Slight rain showers
- **WX_PRESENTWX_81** - Moderate or heavy rain showers
- **WX_PRESENTWX_82** - Violent rain showers
- **WX_PRESENTWX_83** - Slight showers of rain and snow mixed
- **WX_PRESENTWX_84** - Moderate or heavy showers of rain and snow mixed
- **WX_PRESENTWX_85** - Slight snow showers
- **WX_PRESENTWX_86** - Moderate or heavy snow showers
- **WX_PRESENTWX_87** - Slight showers of ice or snow pellets
- **WX_PRESENTWX_88** - Moderate or heavy showers of ice or snow pellets
- **WX_PRESENTWX_89** - Slight hail showers
- **WX_PRESENTWX_90** - Moderate or heavy hail showers
- **WX_PRESENTWX_91** - Slight rain, thunderstorm in last hour
- **WX_PRESENTWX_92** - Moderate or heavy rain, thunderstorm in last hour
- **WX_PRESENTWX_93** - Slight rain and/or snow or hail, thunderstorm in last hour
- **WX_PRESENTWX_94** - Moderate or heavy rain and/or snow or hail, thunderstorm in last hour
- **WX_PRESENTWX_95** - Slight or moderate thunderstorm with rain and/or snow
- **WX_PRESENTWX_96** - Slight or moderate thunderstorm with hail
- **WX_PRESENTWX_97** - Heavy thunderstorm with rain and/or snow
- **WX_PRESENTWX_98** - Thunderstorm combined with duststorm or sandstorm

    - **WX_PRESENTWX_99** - Heavy thunderstorm with hail
- Low Cloud
    - **WX_LOCLD_1** - Cu of fair weather, little vertical development, seemingly flattened
    - **WX_LOCLD_2** - Cu of considerable development, generally towering, with or without other Cu or Sc bases all at same level
    - **WX_LOCLD_3** - Cb with tops lacking clear cut outlines, but distinctly no cirriform or anvil-shaped; with or without Cu, Sc, or St
    - **WX_LOCLD_4** - Sc formed by spreading out of Cu; Cu often present also
    - **WX_LOCLD_5** - Sc not formed by spreading out of Cu
    - **WX_LOCLD_6** - St or Fs or both, but no Fs of bad weather
    - **WX_LOCLD_7** - Fs and/or Fc of bad weather (scud)
    - **WX_LOCLD_8** - Cu and Sc (not formed by spreading out of Cu) with bases at different levels
    - **WX_LOCLD_9** - Cb having a clearly fibrous (cirriform) top, often anvil-shaped, with or without Cu, Sc, St, or scud
- Cloud Coverage
    - **WX_SKY_0** - No clouds
    - **WX_SKY_1** - Less than one-tenth or one-tenth
    - **WX_SKY_2** - two-tenths or three-tenths
    - **WX_SKY_3** - four-tenths
    - **WX_SKY_4** - five-tenths
    - **WX_SKY_5** - six-tenths
    - **WX_SKY_6** - seven-tenths or eight-tenths
    - **WX_SKY_7** - nine-tenths or overcast with openings
    - **WX_SKY_8** - completely overcast
    - **WX_SKY_9** - sky obscured
    - **WX_SKY_10** - missing
- Mid Clouds
    - **WX_MIDCLD_1** - Thin As (most of cloud layer semi-transparent)
    - **WX_MIDCLD_2** - Thick As, greater part sufficiently dense to hide sun (or moon), or Ns
    - **WX_MIDCLD_3** - Thin Ac, mostly semi-transparent; cloud elements not changing much and at a single level
    - **WX_MIDCLD_4** - Thin Ac in patches; cloud elements continually changing and/or occurring at more than one level
    - **WX_MIDCLD_5** - Thin Ac in bands or in a layer gradually spreading over sky and usually thickening as a whole
    - **WX_MIDCLD_6** - Ac formed by spreading out of Cu
    - **WX_MIDCLD_7** - Double-layered Ac, or a thick layer of Ac, not increasing; or Ac with As and/or Ns
    - **WX_MIDCLD_8** - Ac in the form of Cu-shaped tufts or Ac with turrets
    - **WX_MIDCLD_9** - Ac of a chaotic sky, usually at different levels; patches of dense Ci are usually present also
- High Clouds
    - **WX_HICLD_1** - Filaments of Ci, or "mares tails", scattered and not increasing
    - **WX_HICLD_2** - Dense Ci in patches or twisted sheaves, usually not increasing, sometimes like remains of Cb; or towers or tufts
    - **WX_HICLD_3** - Dense Ci, often anvil shaped derived from or associated with Cb
    - **WX_HICLD_4** - Ci, often hook shaped, spreading over the sky and usually thickening as a whole
    - **WX_HICLD_5** - Ci and Cs, often in converging bands, or Cs alone; generally overspreading and growing denser; the continuous layer not reaching 45 degrees altitude
    - **WX_HICLD_6** - Ci and Cs, often in converging bands, or Cs alone; generally overspreading and growing denser; the continuous layer exceeding 45 degrees altitude
    - **WX_HICLD_7** - Veil of Cs covering the entire sky
    - **WX_HICLD_8** - Cs not increasing and not covering the entire sky
    - **WX_HICLD_9** - Cc alone or Cc with some Ci or Cs, but the Cc being the main cirriform cloud
- Pressure Tendency
    - **WX_TNDCY_0** - rising then falling
    - **WX_TNDCY_1** - rising then steady; or rising, then rising more slowly
    - **WX_TNDCY_2** - rising steadily or unsteadily
    - **WX_TNDCY_3** - falling or steady, then rising; or rising, then rising more quickly
    - **WX_TNDCY_4** - steady, same as 3 hours ago
    - **WX_TNDCY_5** - falling then rising, same or lower than 3 hours ago
    - **WX_TNDCY_6** - falling then steady; or falling, then falling more slowly
    - **WX_TNDCY_7** - falling steadily, or unsteadily
    - **WX_TNDCY_8** - steady or rising, then falling; or falling, then falling more quickly
- Icing
    - **WX_ICING_0** - No icing
    - **WX_ICING_1** - Trace icing
    - **WX_ICING_2** - Trace to light icing
    - **WX_ICING_3** - Light icing
    - **WX_ICING_4** - Light to moderate icing
    - **WX_ICING_5** - Moderate icing
    - **WX_ICING_6** - Moderate to heavy icing
    - **WX_ICING_7** - Heavy or moderate to severe icing
    - **WX_ICING_8** - Severe icing
    - **WX_ICING_9** - Light superstructure icing
    - **WX_ICING_10** - Heavy superstructure icing

- Turbulence
  - **WX_TURBULENCE_0** - No turbulence
  - **WX_TURBULENCE_1** - Light turbulence
  - **WX_TURBULENCE_2** - Light turbulence
  - **WX_TURBULENCE_3** - Light to moderate turbulence
  - **WX_TURBULENCE_4** - Moderate turbulence
  - **WX_TURBULENCE_5** - Moderate to severe turbulence
  - **WX_TURBULENCE_6** - Severe turbulence
  - **WX_TURBULENCE_7** - Extreme turbulence
  - **WX_TURBULENCE_8** - Extreme turbulence
- Miscellaneous
  - **WX_MISC_0** - Square (outline)
  - **WX_MISC_1** - Square (filled)
  - **WX_MISC_2** - Circle (outline)
  - **WX_MISC_3** - Circle (filled)
  - **WX_MISC_4** - Triangle (outline)
  - **WX_MISC_5** - Triangle (filled)
  - **WX_MISC_6** - Diamond (outline)
  - **WX_MISC_7** - Diamond (filled)
  - **WX_MISC_8** - Star (outline)
  - **WX_MISC_9** - Star (filled)
  - **WX_MISC_10** - High Pressure (outline)
  - **WX_MISC_11** - Low Pressure (outline)
  - **WX_MISC_12** - High Pressure (filled)
  - **WX_MISC_13** - Low Pressure (filled)
  - **WX_MISC_14** - Plus sign
  - **WX_MISC_15** - Minus sign
  - **WX_MISC_16** - Tropical Storm (NH)
  - **WX_MISC_17** - Hurricane (NH)
  - **WX_MISC_18** - Tropical Storm (SH)
  - **WX_MISC_19** - Hurricane (SH)
  - **WX_MISC_20** - Triangle with antenna
  - **WX_MISC_21** - Mountain obscuration
  - **WX_MISC_22** - Slash
  - **WX_MISC_23** - Storm Center
  - **WX_MISC_24** - Tropical Depression
  - **WX_MISC_25** - Tropical Cyclone
  - **WX_MISC_26** - Flame
  - **WX_MISC_27** - X Cross
  - **WX_MISC_28** - Low pressure with X (outline)
  - **WX_MISC_29** - Low pressure with X (filled)
  - **WX_MISC_30** - Tropical Storm (NH)
  - **WX_MISC_31** - Tropical Storm (SH)
  - **WX_MISC_32** - Volcanic activity
  - **WX_MISC_33** - Blowing spray

Actions

Below is a list of the actions that can be used in menubars, skins and in the html or qhtml pages.

To use these in an html or qhtml file simply specify a link with the href:

```
action:the_action_id
```

e.g.:

```
action:bundle.open
```

- **new.datachooser**
  Show data sources window
- **show.dataselector**
  Show field selector window
- **show.dashboard**
  Show Data Explorer
- **ui.closewindow**
  Close Window
- **new.displaywindow**
  New view window
- **bundle.open**
  Open a bundle
- **bundle.save**
  Save bundle
- **bundle.default.save**
  Save as default
- **bundle.default.open**
  Reload default bundle
- **bundle.default.remove**
  Delete default bundle
- **bundle.favorite.save**
  Save as favorite bundle
- **bundle.favorite.manage**
  Manage favorites
- **plugins.install.file**
  Install a plugin from a file
- **plugins.install.url**
  Install a plugin from a url
- **plugins.manage**
  List plugins
- **plugins.create**
  Create plugin
- **edit.preferences**
  Edit user preferences
- **edit.formula.create**
  Create formula
- **edit.formula.import**
  Import formula

- **edit.formula.export**
  Export formula
- **edit.jython**
  Edit Jython library
- **edit.colortables**
  Edit color tables
- **edit.stationmodels**
  Edit layout models
- **edit.paramaliases**
  Edit parameter aliases
- **edit.projections**
  Edit projections
- **edit.paramdefaults**
  Edit parameter defaults
- **edit.paramgroups**
  Edit parameter groups
- **edit.autodisplays**
  Auto-create displays
- **edit.views.delete**
  Delete Saved Views
- **edit.removedisplays**
  Remove all displays
- **edit.removedisplaysanddata**
  Remove all displays and data
- **view.reloadalldata**
  Reload all data sources
- **edit.removedata**
  Remove all data sources
- **exit**
  Exit
- **idv.stopload**
  Stop current loads
- **capture.all**
  Capture All Images
- **collab.showcapture**
  Event Capture
- **collab.showwindow**
  Show Window
- **collab.shareall**
  Share All State
- **help.introduction**
  Show help
- **help.showconsole**
  Show Console

- **help.showhelptips**
  Show Help Tips
- **help.showsupportform**
  Submit support request
- **help.showabout**
  About...
- **display.curvedrawer**
  Create Drawing Control
- **display.locationindicator**
  Create Location Indicator
- **display.backgroundimage**
  Create Background Image
- **display.rangeandbearing**
  Create Range and Bearing
- **display.imagemovie**
  Create Image Movie Display

Command Line Arguments

There are a number of command line arguments for McIDAS-V. These command line arguments can be applied when starting McIDAS-V using a terminal or command prompt (e.g., from the McIDAS-V-System directory, type: **runMcV -noplugins**). To view them provide the argument: -help:

```
mcv -help
     -help (prints this message)
     -properties <property file>
     -installplugin <plugin jar file to install>
     -plugin <plugin jar file, directory, url for this run>
     -noplugins (do not load any plugins)
     -bundle <bundle file or url>
     -oneinstanceport <port number>
       (check if another version of McIDAS-V is running, and if so, pass command line arguments to it and shut down)
     -userpath <user directory to use>
     -sitepath <url path to find site resources>
     -nogui (do not show the main window GUI)
     -data <data source> (load the data source)
     -script <Jython script file name> (run the McIDAS-V script in the background)
     -image <image file name> (create a jpeg image and then exit)
     -imageserver <port number or .properties file>
       (run McIDAS-V in image generation server mode, and support http requests on the given port)
     -Dpropertyname=value (define the property value)
     -catalog <url to a chooser catalog>
     -connect <collaboration hostname to connect to>
     -server (run in collaboration server mode)
     -port <port number collaboration server should listen on>
     -chooser (show the data chooser on start up)
     -printjnlp (print out any embedded bundles from jnlp files)
     -setfiles <datasource pattern> <semi-colon delimited list of files>
       (use the list of files for the bundled datasource)
     -currenttime <dttm> (override current time for ISL processing)
     -listresources (list out the resource types)
     -debug (turn on debug printing)
     -debugmessages (turn on language pack debug)
     -recordmessages <language pack file to write missing entries>
     -trace (print out trace messages)
     -traceonly <trace pattern> (print out trace messages that match the pattern)
     -logpath <path to log file>
     -tempuserpath (sets up a temporary directory to act as the McIDAS-V directory, allowing for a clean, pristine
     session)
     -noerrorsingui (don't show error windows when running McIDAS-V in the foreground. Errors still go to mcidasv.log)
     -scriptargs (all arguments after this flag will be considered Jython arguments)
     -doaction <action id> (Run given action automatically after startup. For a list of actions, see Actions.)
     -nooneinstanceport (don't do the one instance port)
```

Specifying data source type

If you load in a data source from the command line using the -data argument, McIDAS-V tries to figure out what type of data it is by looking for patterns in the file or url you specify. If it cannot determine the type, McIDAS-V will prompt the user for the type.

You can add in a "type:" prefix to the argument that will specify the type with:

```
mcv -data type:somedatatype:the_file_or_url_to_the_data
```

For the different values for the "somedatatype", see Data Source Types.

Data Source Types

dods.grid	Grids from an OPeNDAP server
opendap.grid	Grids from an OPeNDAP server
dods	Data from an OPeNDAP server
opendap	Data from an OPeNDAP server
adde.image	Images from an ADDE server
raob	
adde.point	Point data from an ADDE server
file.track	Track files
opendap.track	Track files
opendap.trajectory	Track files
db.point	Point data database
db.trajectory	Trajectory database
eol.trackdb	Eol Track Database
file.sonde	Upsonde/Dropsonde files
file.bfr; file.bufr	netCDF/GEMPAK Point Data files
netcdf.point	netCDF Point Data files
netcdf.grid	Grid files (netCDF/GRIB/OPeNDAP/GEMPAK)
httpserver.grid	Grid files (netCDF/GRIB/OPeNDAP/GEMPAK)
file.grid	Grid files (netCDF/GRIB/OPeNDAP/GEMPAK)
aggregated.netcdf.grid	Aggregate Grids by Time
file.netcdf	netCDF files
file.radar	NEXRAD Radar files
opendap.radial	OPeNDAP Radar files
file.doraderadar	DORADE Radar files
wms	WMS image data
kml	Google Earth Files KML/KMZ
iser	IDV Serialized Data
file.vis5d	Vis5D files
file.areafile	McIDAS AREA files
file.shapefile	Map files
file.mapfile	Map files
file.image	Image files (gif, jpg, png)
file.dem	DEM files
product.adde	Weather Text Products (from server)
product.gempak	Weather Text Products (from NWX files)
storm.atcf	ATCF Tropical Storm Data
file.text	Text or HTML files
file.pointtext	Text Point Data files
file.pointtracktext	Text Point and Trajectory Data files
file.location	Locations
file.imagemovie	Image Movie Index
file.drawing	Drawing files
file.imagexml	Image XML files
movie	Movies
file.tiff	TIFF files
cached	Cached data source
file.audio	Audio File
file.chatlog	Chat Log file
file.addetext	Adde Text
text.front	Front Bulletins
netcdf.sweep	netCDF Radar Sweep files
netcdf.metar	netCDF METAR/Synoptic files
file.profiler	EOL netCDF Profiler files
file.any	I'm Still Feeling Lucky

Performance Tuning

If you are running into issues with memory consumption or slow response of McIDAS-V, there are several things you can do.

The amount of memory used by McIDAS-V will depend on the size of the datasets you use and the types of displays. Datasets rendered as 2D depictions (plan views - contours or color shaded displays) use much less memory than 3D displays (isosurfaces, cross sections). Large datasets (images, dense grids) will use much more memory.

There are several features in McIDAS-V that allow you to more efficiently view large datasets:

- Temporal/Spatial Subset of Data
  Subsetting the data before display reduces the memory and display time
- Memory Allocation
  Changing the amount of memory allocated to McIDAS-V
- Data Caching
  Caching of data uses more memory
- Maximum Grid/Image Size
  Reducing the maximum size of a display can reduce the memory used
- Fast Rendering
  Fast Rendering reduces memory and time at the expense of accuracy
- Parallel Rendering and Data Reading
  Parallel Rendering and Data Reading can reduce data reading and rendering time

Temporal/Spatial Subset of Data

Some data sources allow you to subset the data temporally and spatially. You can set these properties for all fields in a dataset through the **Properties** menu of the data source (double click on the Data Source in the **Field Selector**) or you can set these for individual field using the tabs in the lower right corner of the **Field Selector**. For more information, see Data Sources.

Memory Allocation

By default, McIDAS-V allocates 512 megabytes of maximum memory for Java. This is usually the optimum amount for a Windows system with 1 gigabyte of physical memory (RAM). Windows takes up half of that anyway and once Windows has to start swapping, performance severely degrades. On a Linux system, you can probably get away with 700m for 1 GB of memory as it does a much better job of swapping. All this also depends on what else you are running on the machine and how much memory those applications use.

If your system has more than 1 GB of memory, increasing the amount available to McIDAS-V can improve performance for displaying large datasets. You change the amount of memory used by McIDAS-V by editing the **Maximum Heap Size** in the **Advanced** tab of the User Preferences by selected **Edit->Preferences** from the Main Display window. The new amount of memory will be saved and used in subsequent sessions. Do not use the maximum amount of memory on your machine as some is needed for the operating system itself. If the system has to use swap memory, performance will degrade as well. For 32 bit operating systems, it is recommended to set this to no more than 1250 MB (*i.e. -Xmx1250m*). The maximum value for 32 bit operating systems is 1536 MB, while 64 bit operating systems can use all of the RAM available. For more information see Running McIDAS-V.

Data Caching

By default, McIDAS-V caches the data used for a display in memory. If a field is used more than once for several displays, caching the data prevents an additional reading from of the data from disk or a remote server. If you are only displaying/using a field (i.e. not using it for multiple displays or calculations), you can keep McIDAS-V from caching it in memory. You can turn off data caching by unchecking the **Cache Data in Memory** checkbox on the **Formats & Data** tab of the User Preferences window (accessible from the **Edit->Preferences** menu).

Maximum Grid/Image Size

You can also set the maximum size of a grid or image that will be displayed. This will allow you to download a large image or grid, but it will be re-sampled before displaying if it is larger than the maximum size you have asked for. You can set the maximum image/grid size under the **Formats & Data** tab of the User Preferences window (accessible from the **Edit->Preferences** menu).

Fast Rendering

By default, McIDAS-V will try to adjust the data layer (images, contours, etc.) renderings to account for projection seams. This is computationally intensive in some cases and slows down the display of data. If you change your User Preferences setting to **Use fast rendering**, McIDAS-V will not try to account for the projection seams. If you are displaying a layer of data in its native projection, this will result in faster rendering of the data depiction. However, if you have several layers of data, each from a different data source and on a different projection, you may see anomalies in one or more layers (spurious lines, portions of images). If that occurs, you can turn off fast rendering for the layer(s) by unchecking the **Use Fast Rendering** checkbox in its Properties dialog, or set your system preference back to not use fast rendering.

A separate fast rendering option for map layers is available in the Map Controls. Some maps display better when fast rendering is turned on, others display better when it's turned off. If a map displays poorly (e.g., has missing line segments), try switching its fast rendering settings to see if it fixes the problem.

Parallel Rendering and Data Reading

If you are running McIDAS-V on a multi-core machine you can configure it to render individual time steps in parallel. You can also do remote data reads in parallel. This typically results in a 50% reduction in overall data reading and rendering time.

The number of Rendering and Reading java threads can be set on the command line when starting McIDAS-V. To set these values, run the following when starting McIDAS-V (substitute in a numerical value in place of **#** in the commands to set the rendering and reading thread values):

- **Linux and Mac -** ./runMcV -Didv.threads.render.max=# -Didv.threads.render.data=#
- **Windows -** runMcV.bat -Didv.threads.render.max=# -Didv.threads.render.data=#

- **Didv.threads.render.max -** Sets the number of Java threads to use for rendering. This number defaults to the number of processors on the machine running McIDAS-V.
- **Didv.threads.render.data -** Sets the number of Java threads to use for reading. This number is dependent on the configuration of the server machine. This defaults to 4. This is used when reading individual time steps of data from remote ADDE and OpenDAP servers.

For rendering McIDAS-V will render each time step in parallel. Note: Since the rendering processes can allocate temporary memory, it is possible to exhaust the available memory if too many threads are running concurrently. Linear speedup with the number of cores available for rendering (probably due to memory contention issues) is not seen, however a 40%-50% performance improvement is seen for complex rendering tasks (e.g., contouring).

The second preference is used when reading individual time steps of data from remote ADDE and OpenDAP servers. This parallelization takes advantage of the multiple cores available on the remote server and somewhat the available bandwidth on the network. A linear speed up in accessing remote data based on the number of cores on the remote server (ADDE or OpenDAP) has been seen. However, if you load the server too much your performance

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Building McIDAS-V from Source

Developers can download the source files for McIDAS-V and build it from scratch.

Before building McIDAS-V you need to first install Java and Java 3D on your system. You need to use the Java SDK, because the Java RunTime Environment (JRE) does not contain the Java compiler (javac). You need to use a version of Java 1.6 or above. You can use either the Java 3D SDK or JRE, version 1.3.x.

You will also need to install **Ant** 1.7 (http://ant.apache.org/) on your machine. Ant is similar to make - instead of a `Makefile`, Ant uses a `build.xml` file. Be sure to follow the instructions for installing Ant, especially those for setting up environment variables.

Build steps:

1. Download the compressed source files from the McIDAS-V Download Page.
2. Uncompress the .zip file. This will create a new directory containing the McIDAS-V source and Unidata IDV .jar files.

   The resulting directory structure will be:

   ```
   mc-v/ mc-v/build.xml mc-v/... <-- McIDAS-V source directories idv/ idv/lib <-- Unidata IDV
   .jar files
   ```

   The Ant build script "mc-v/build.xml" is be used to build and run McIDAS-V.
3. Change to the **mc-v** directory and run:
   - "ant jar" to create the McIDAS-V .jar files in **mc-v/dist**.
   - "ant run" to run McIDAS-V with a small java heap size for testing.

Message Console

Clicking on the main menu bar choice **Help->Show Console** in the Main Display window shows a Console window which has error messages and other text output from McIDAS-V. Error messages created before you open the console are shown, as well as later ones.

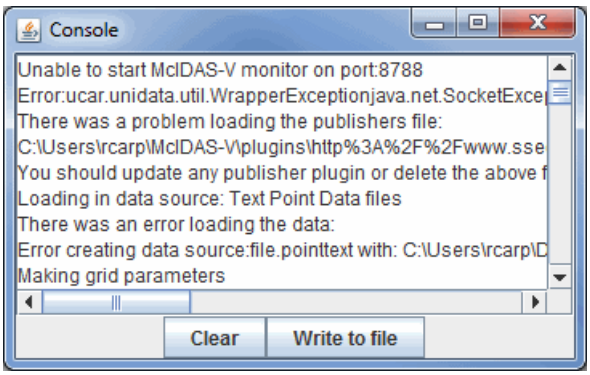


Image 1: Message Console Window

Properties

Clear - Clears the Console of all messages.

Write to file - Allows you to save your Console messages in the Log files (*.log) format.

The console is useful if you encounter an error as you can save the console message to a file and include it in email to McIDAS-V Support at SSEC or attach it in the Support Request Form.

Support Request Form

Clicking on the main menu bar choice **Help->Show Support Request Form** in the Main Display window opens a Request McIDAS-V Support window to post a support request to the McIDAS Help Desk. This form can also be brought up from the **Support Form** button of an Error dialog.

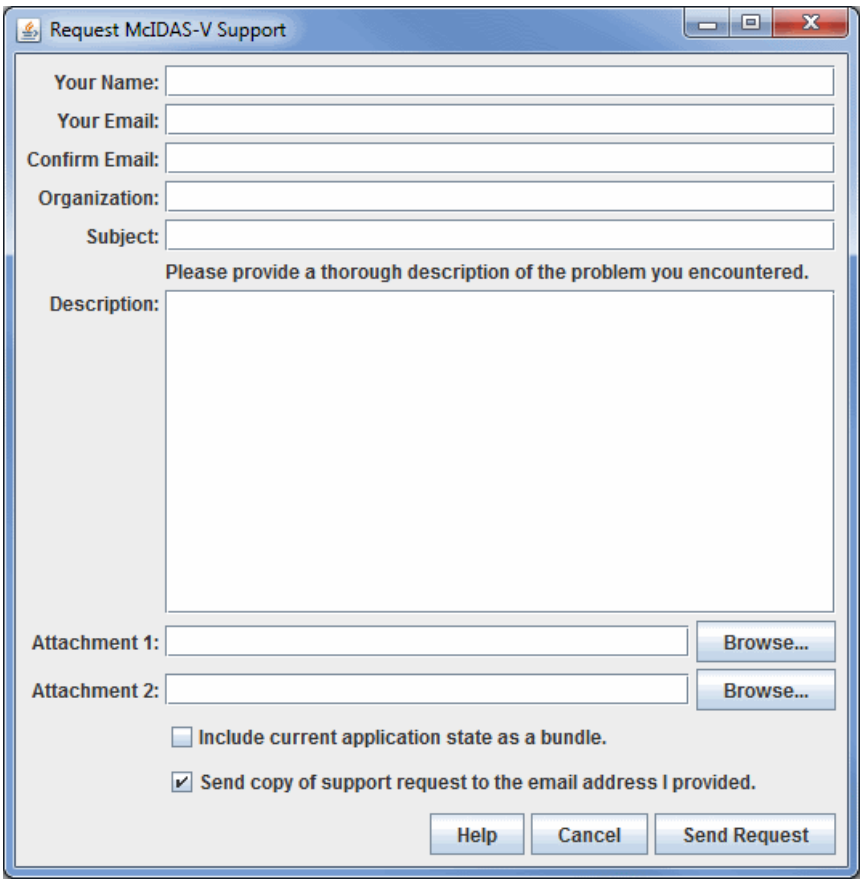


Image 1: Support Request Form

Properties

Name - Represents your name.

Your Email - Represents your email.

Confirm Email - Confirms your email address was entered correctly the first time

Organization - Represents your organization.

Subject - Represents the subject of the problem or request.

Description - Represents a thorough description of the problem or request. Please provide a thorough description of the problem you encountered, as well as the steps you took to produce the problem.

Attachment - Allows for any attachments to be sent along with the request. Hit Browse... to find your file.

Include current state as a bundle - Includes a bundle of your current session along with your support request to the McIDAS-V Support Team. This helps to determine what the problem may be.

Send copy of support request to me - Sends a copy of the email you are sending to McIDAS-V Support to the email address provided under **Your Email**.

Help **-** Opens the McIDAS-V User's Guide to this page.

Cancel **-** Cancels the request and closes the Request McIDAS-V Support window without sending a request.

Send Request **-** Sends your request to the McIDAS-V Support Team.

Appendices

- Examples of Display Types
- FAQ - Frequently Asked Questions
- McIDAS-X Commands in McIDAS-V

Examples of Display Types

- Plan Views
- 3D Surface
- Cross Sections
- Probes
- Hovmoller Display
- Imagery
- Radar - Level II WSR-88D Data Displays
- Soundings
- Flow Displays
- Observations
- Miscellaneous Display Types

Plan Views

A plan view is a flat, horizontal display of 2D data, or a horizontal cross section of 3D data. More simply, a plan view is a view from the top. These plan views are represented by contour lines used to display a parameter overlaying a base map. McIDAS-V offers the ability to shade or fill the spaces between the contour lines of the plan view display for further customization.

- Contour Plan View
- Color-Filled Contour Plan View
- Color-Shaded Contour Plan View
- Value Plots
- Contour Plan View for Ensembles

Contour Plan View

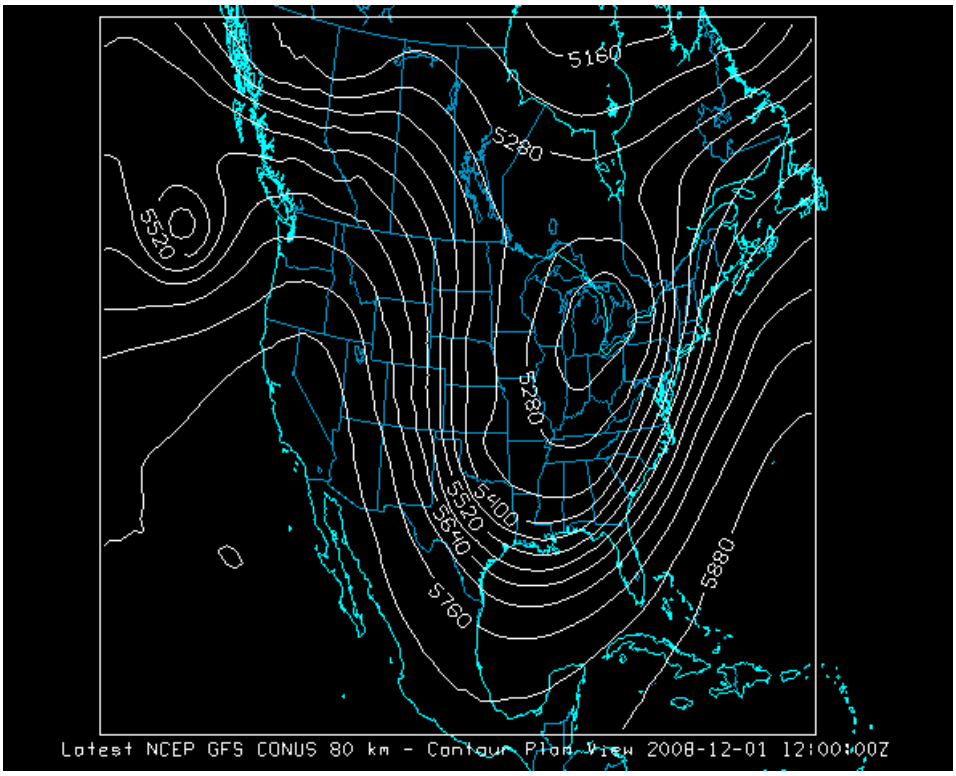


Image 1: Contour Plan View Display

Color-Filled Contour Plan View

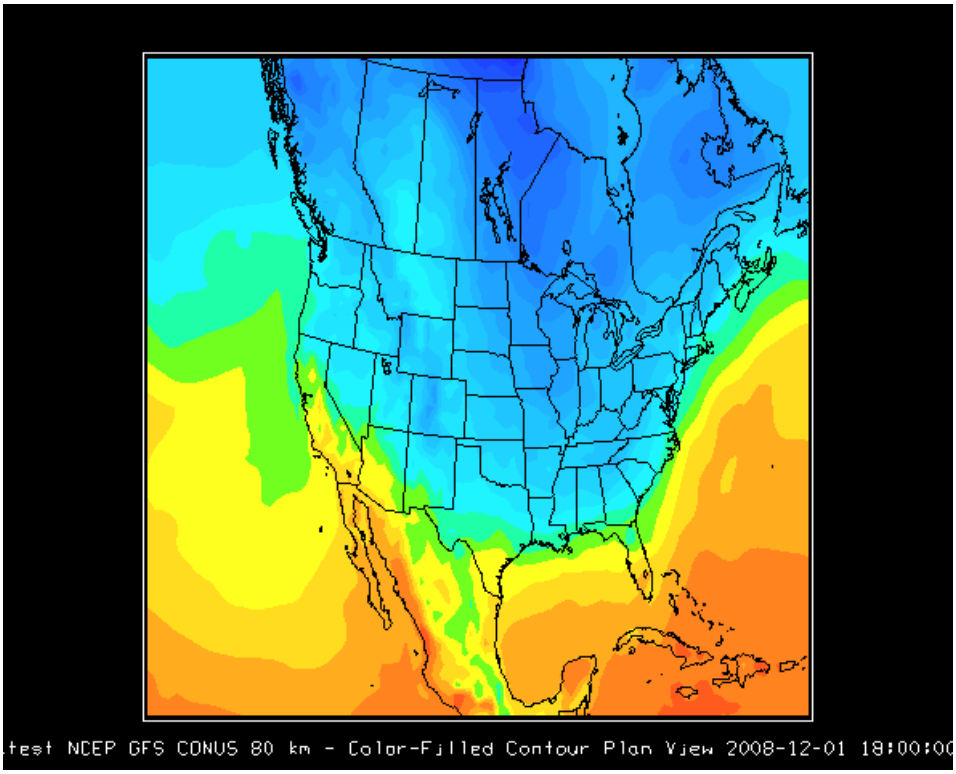


Image 2: Color-Filled Contour Plan View Display

Color-Shaded Contour Plan View

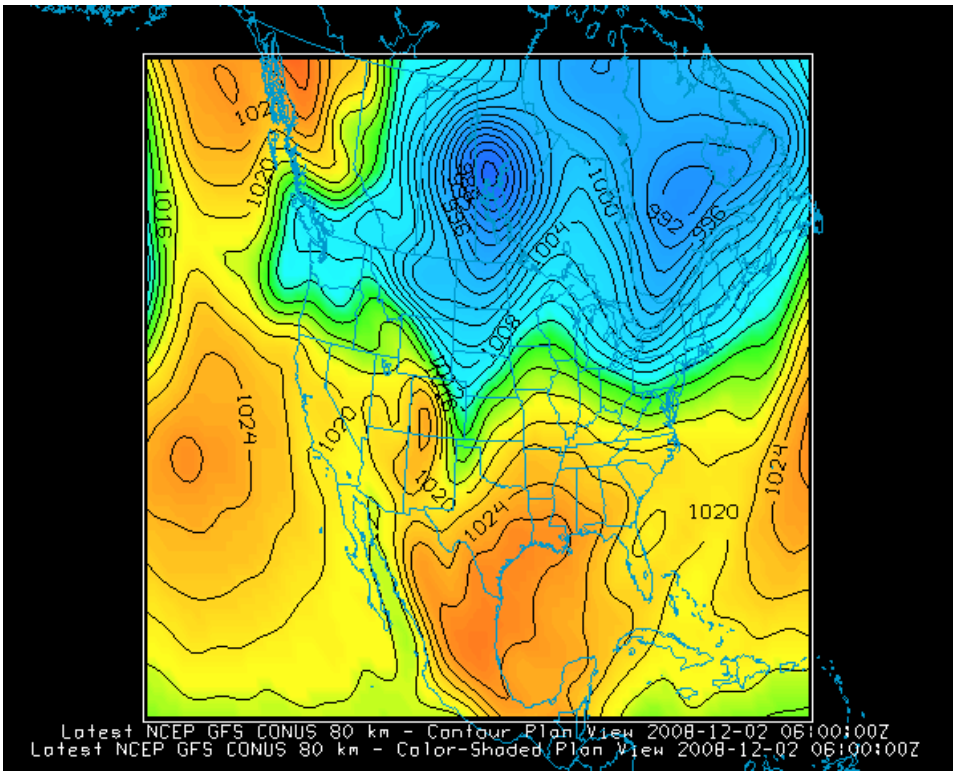


Image 3: Color-Shaded Contour Plan View Display Overlaid with a Contour Plan View Display

Value Plots

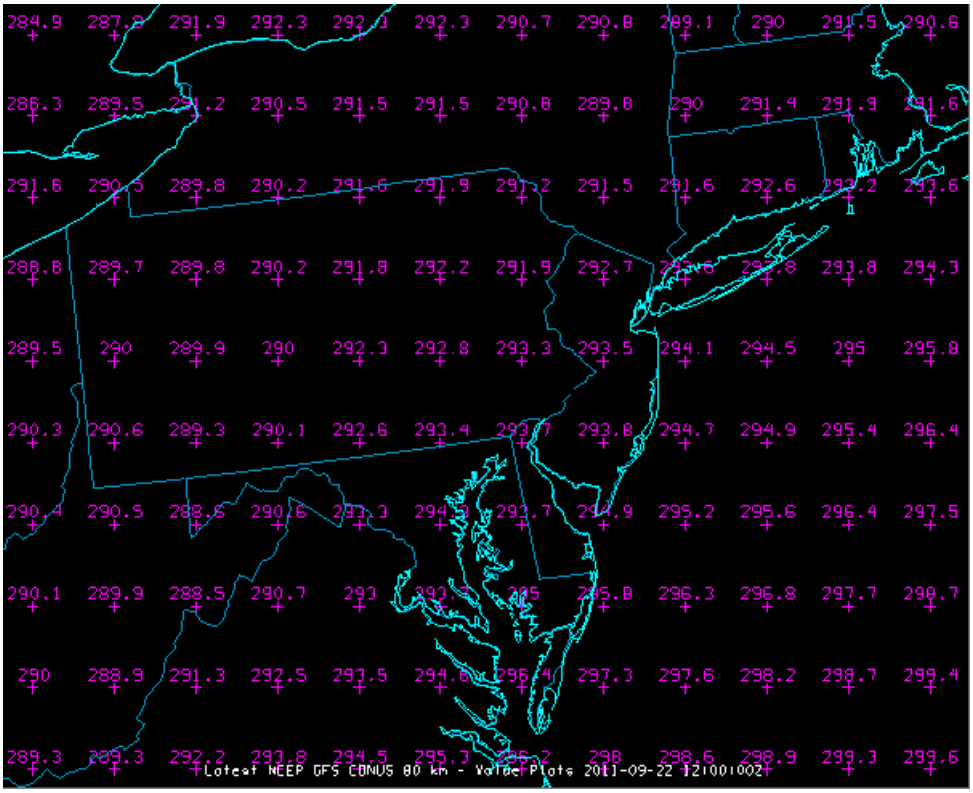


Image 4: Value Plots Display

Contour Plan View for Ensembles

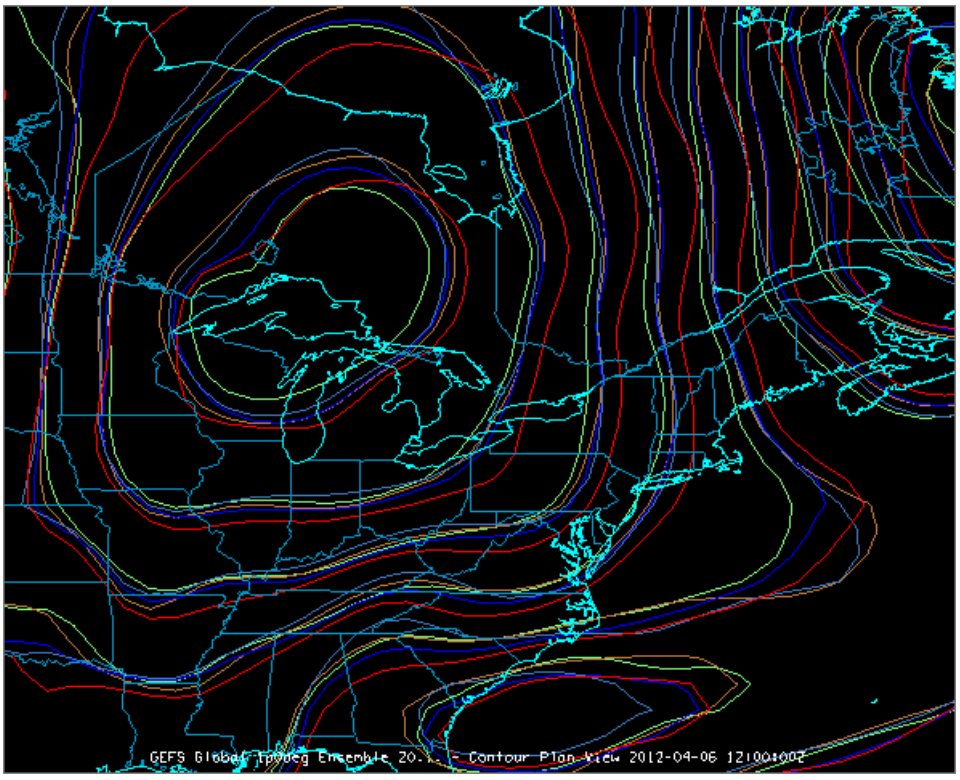


Image 5: Contour Plan View Display for Ensembles

Plan views can be displayed in several ways:

- with solid or dashed contour lines
- with contour lines colored by value
- with color-filled contours
- with "color-shaded" images (all data grid cells colored by value, which may be smoothed)

with value plots

Colors help distinguish values and subtle features, and if used carefully can be an intuitive indication of value and trend, such as using "hot" colors for higher or important values.

All of these displays display in the Main Display window, with their controls in the Layer Controls tab of the Data Explorer. For more information about the controls for the Plan Views, see Plan View Controls. For more information about the Value Plot display, see Value Plot Controls. For more information about the Ensemble Contour Plan View display, see Ensemble Grid Controls.

A McIDAS-V 3D Plan View can be set to any of the data levels in the data source, or between data levels, in which case interpolation is used to estimate the data values in the plan view. A colored square selector point in the left corner of the 3D plan view can be moved up and down by dragging the mouse button to re-position the level. You can make several 3D plan views at the same time for one or more parameters in 3D data. To learn how to make a display, see Displaying Gridded Data.

3D Surface

- Isosurface
- Topography
- 2D Data Draped Over Topography

Isosurface

An isosurface is a surface of a single value in a 3D parameter field. Isosurfaces are the 3D analog of a single-valued contour line in a 2D plot. The intersection of an isosurface and a plane is a contour line of the same value. Isosurfaces may form closed surfaces enclosing regions of higher or lower value, but not always.

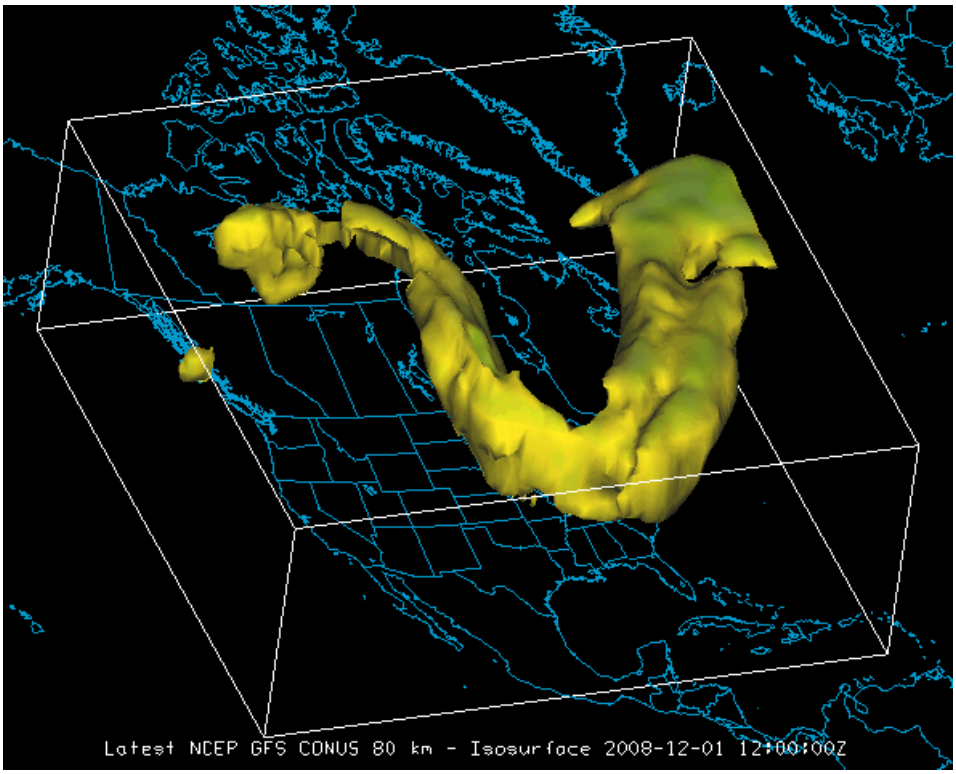


Image 1: 3D Surface Isosurface Display

McIDAS-V also supports isosurface displays that are colored from another parameter, not the parameter used to make the shape of the surface. The example here shows an isosurface of 89% relative humidity over North America colored by air temperature. A useful plot is to color isosurfaces by height (geopotential height) to show height of features by color.

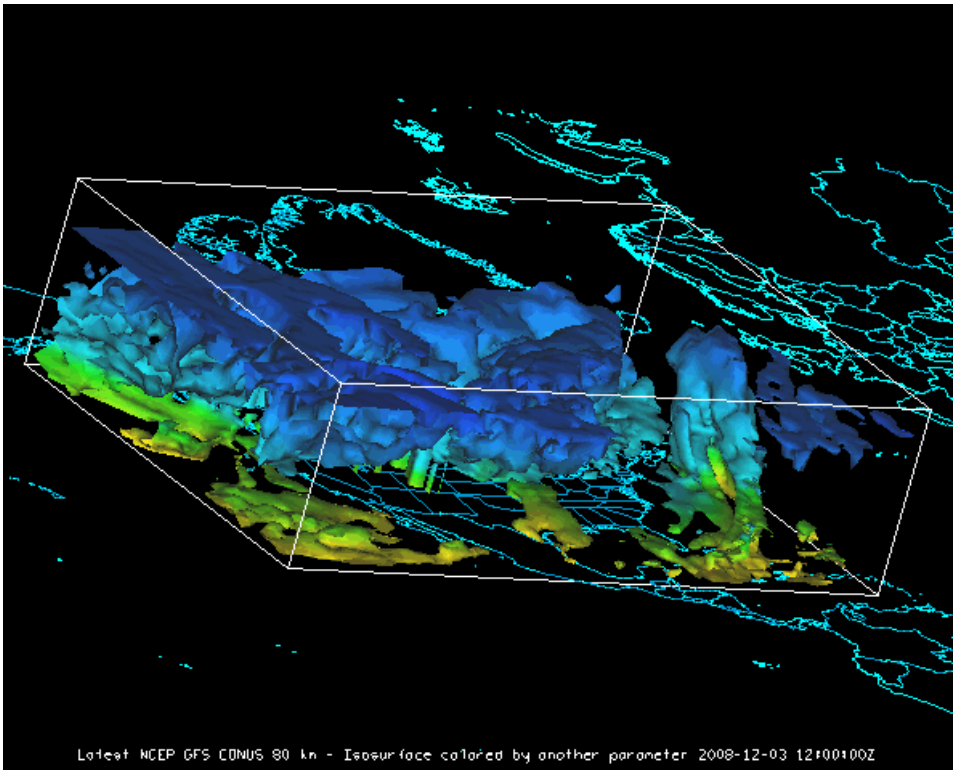


Image 2: 3D Surface Isosurface Display Colored by Another Parameter.

All Isosurface displays display in the Main Display window, and their controls are in the **Layer Controls** tab of the Data Explorer. For more information about isosurface controls, see 3D Surface Controls.

Topography

For data sources that include topography or terrain data, such as the "terrain" parameter in NAM and RUC model output or DEM data, McIDAS-V can display a 3D relief map. Select "Topography" for the display type.

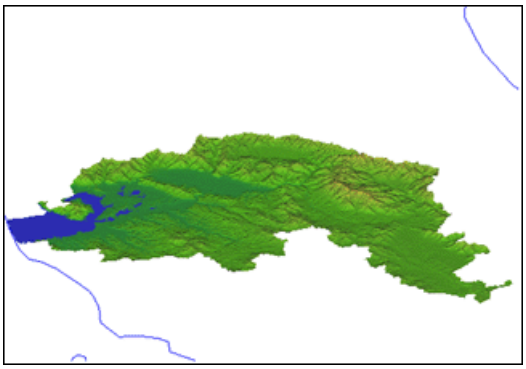


Image 3: 3D Topography Display of DEM Data

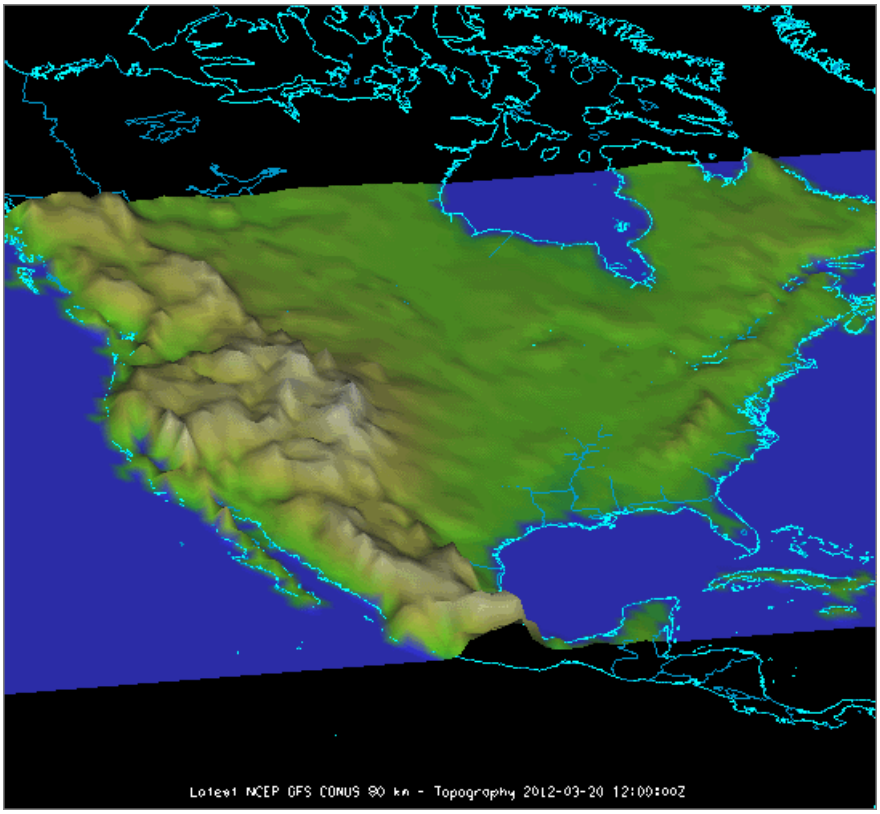


Image 4: 3D Topography Display of GFS Model Terrain Data

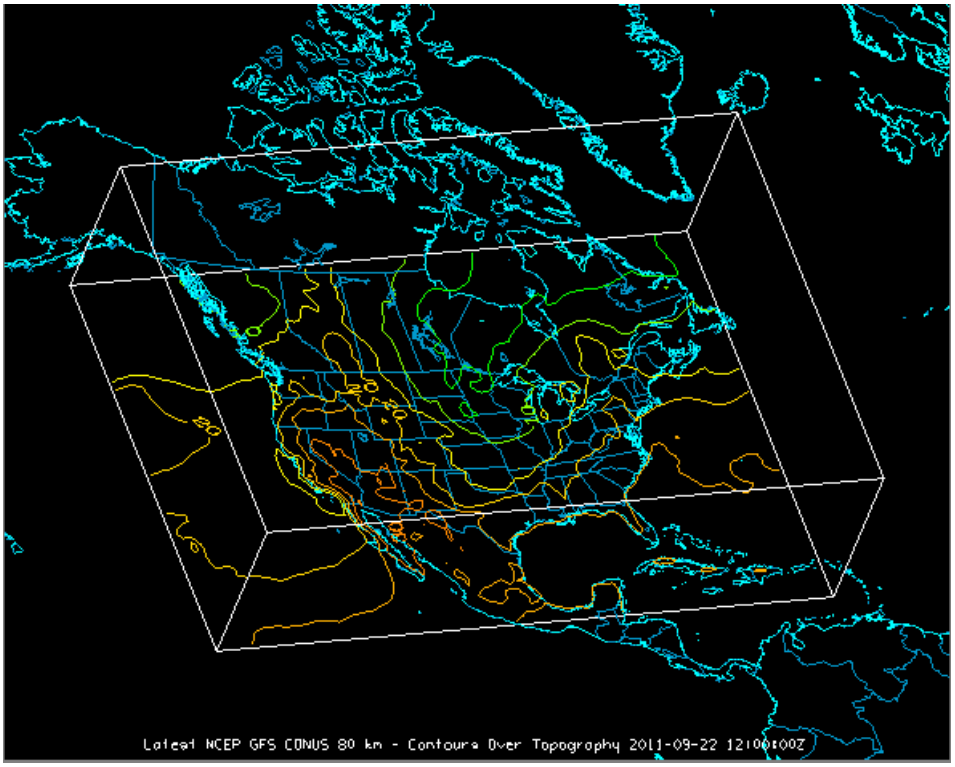


Image 5: 3D Surface Contours Over Topography Display

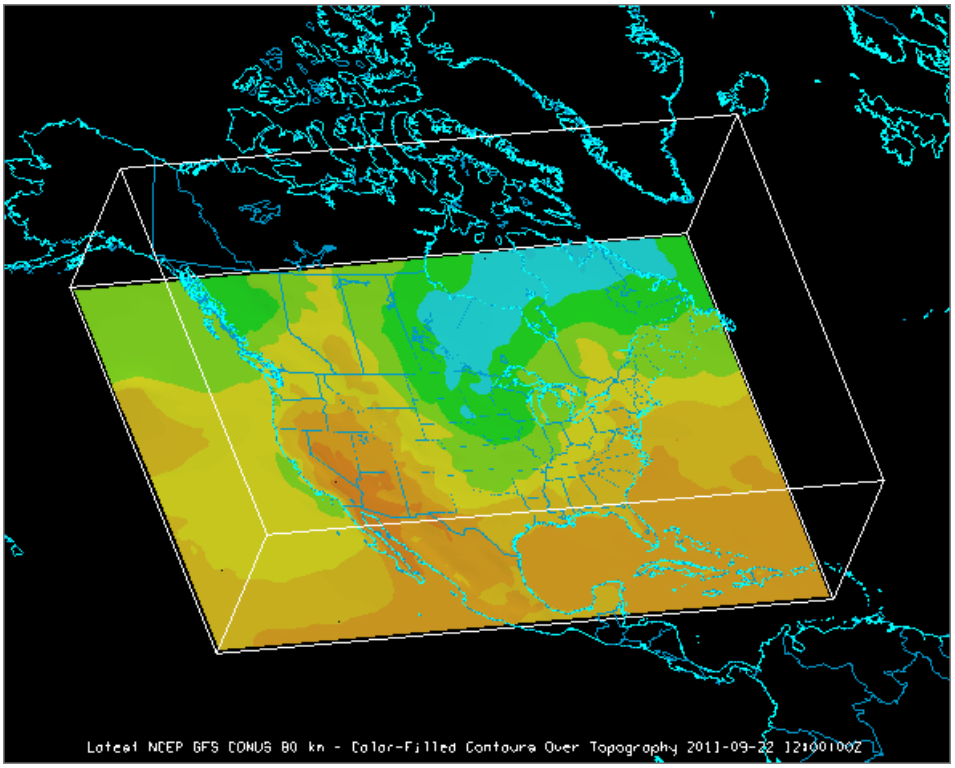


Image 6: 3D Surface Color-Filled Contours Over Topography Display

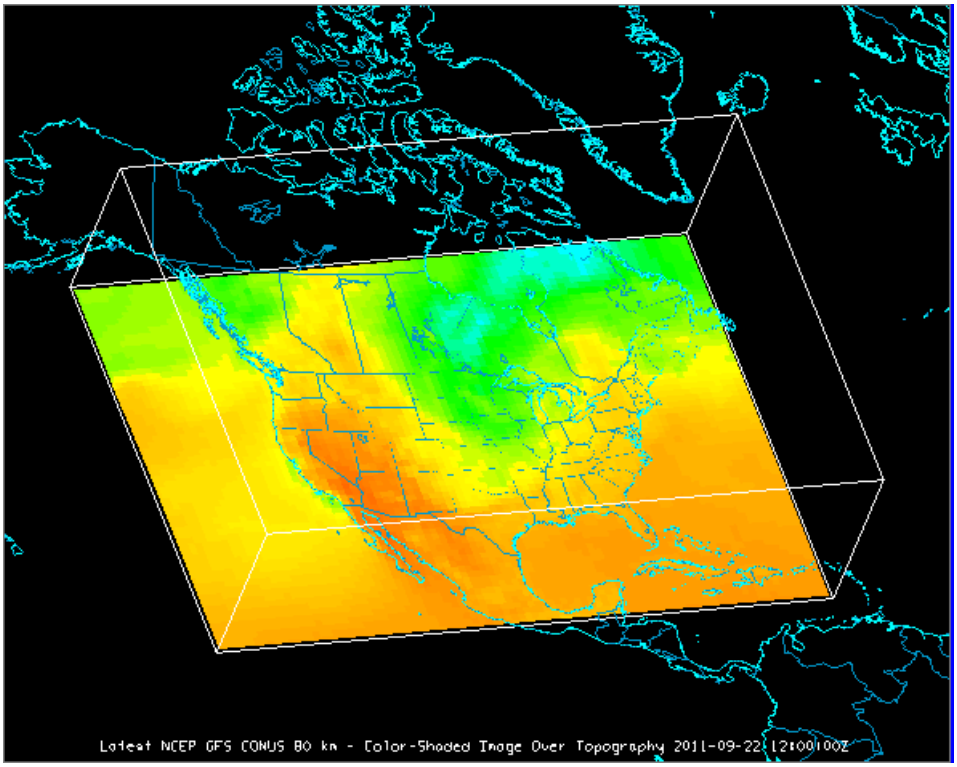


Image 7: 3D Surface Color-Shaded Contours Over Topography Display

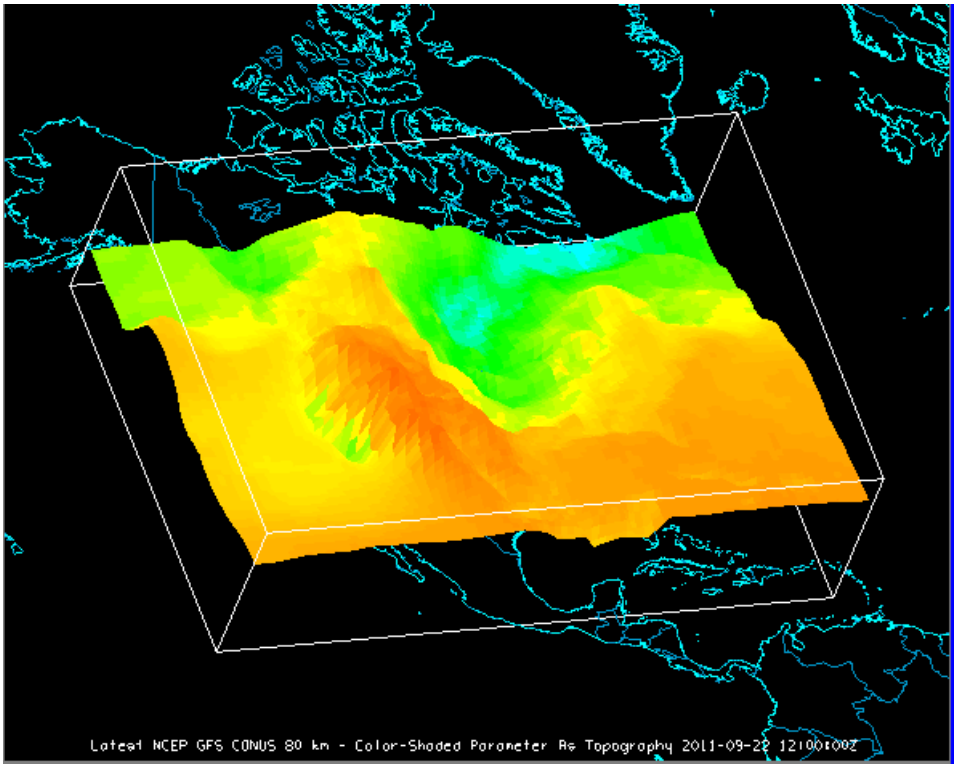


Image 8: 3D Surface Color-Shaded Parameter As Topography Display

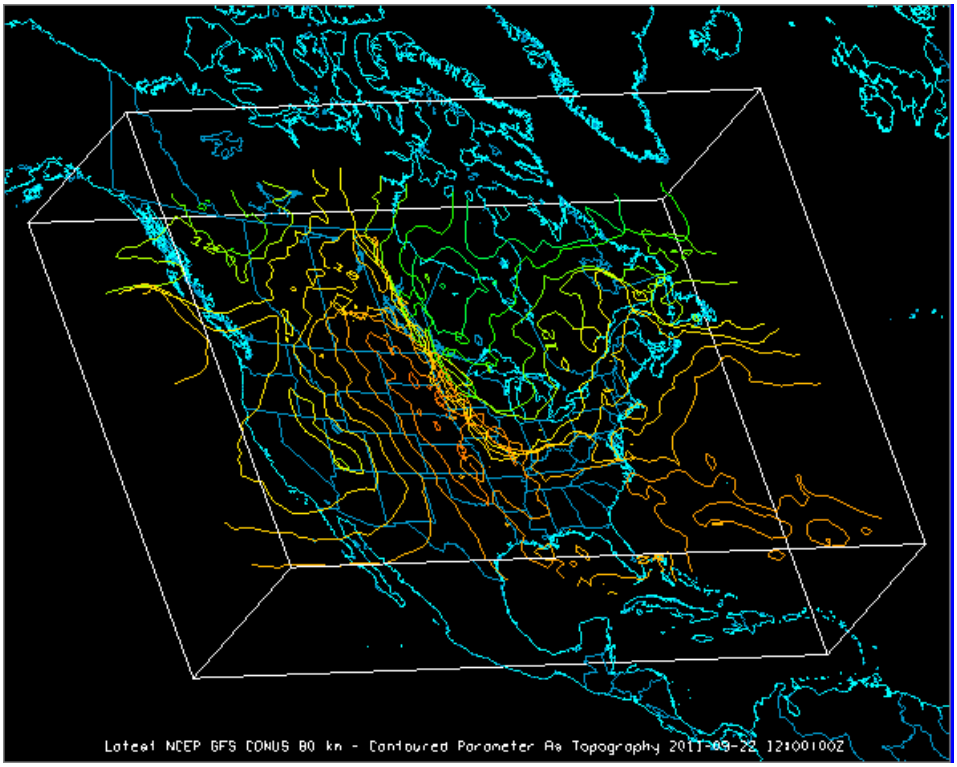


Image 9: 3D Surface Contoured Parameter as Topography Display

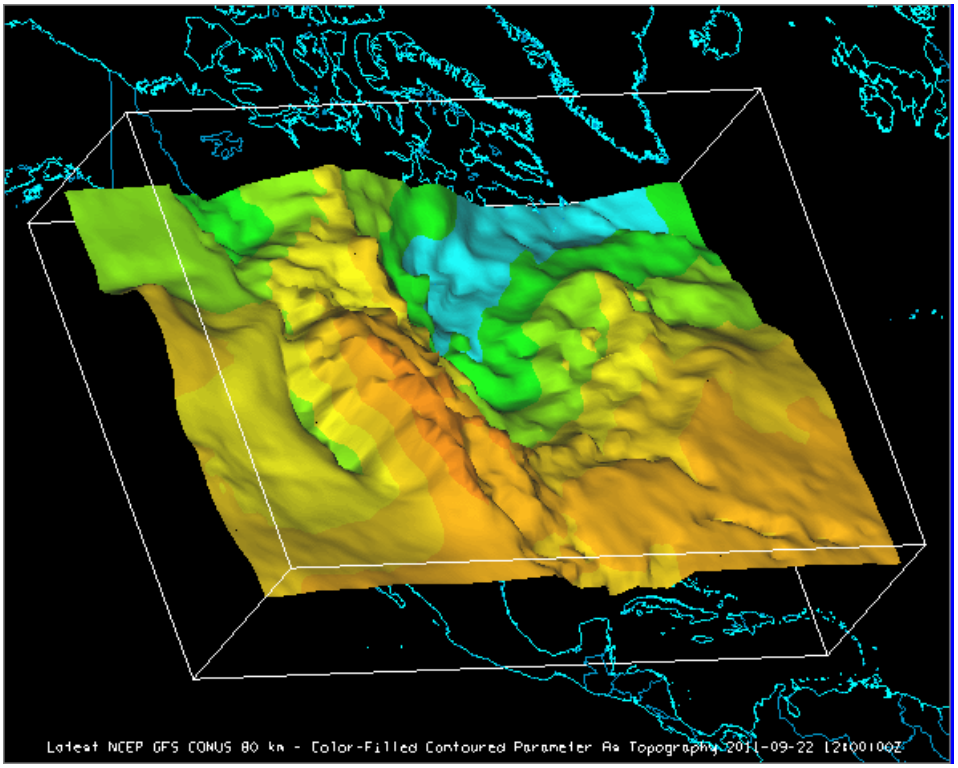


Image 10: 3D Surface Color-Filled Contoured Parameter as Topography Display

2D Data Draped Over Topography

Two dimensional grid data can be draped over a topography field to provide a terrain following representation of the data.

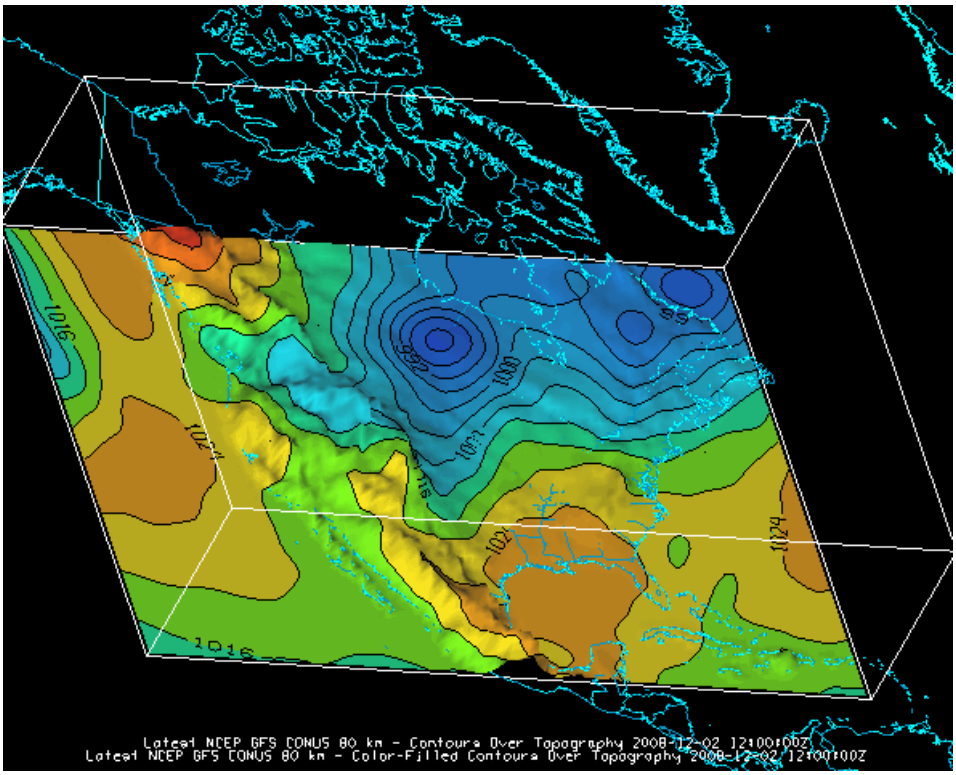


Image 11: Color-Filled Contours Over Topography Display Overlaid with the Contours Over Topography Display

All topography displays display in the Main Display window, and their controls are in the **Layer Controls** tab of the Data Explorer. For more information about the the controls for these displays see 3D Surface Controls and Topography Controls.

For more information see Displaying Gridded Data.

Cross Sections

A cross section is a horizontal or vertical slice through a 3D space. This type of display can be useful to determine the vertical profile of a parameter over a specific region, or the profile of a parameter at a constant elevation level throughout the entire area. The Cross Sections display is available for 3D fields. The 3D derived parameter 'Relative Humidity (from Temperature & mixingratio)' was used to create the below examples.

- Contour Cross Section
- Color-Filled Contour Cross Section
- Color-Shaded Contour Cross Section

Contour Cross Section

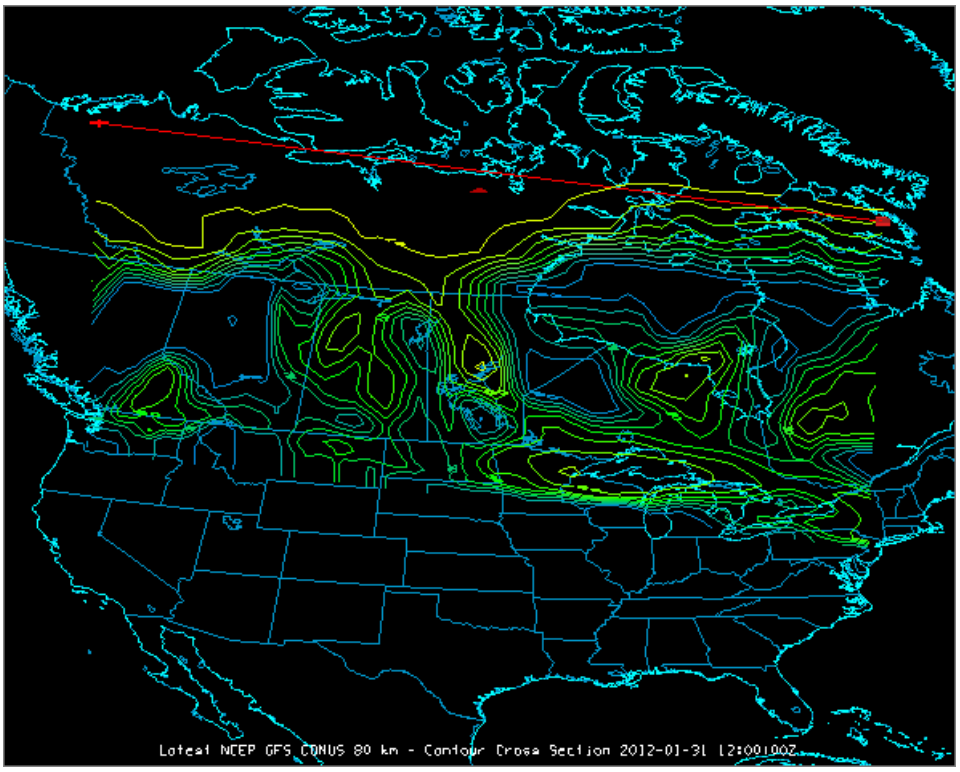


Image 1: Contour Cross Section Display

Color-Filled Contour Cross Section

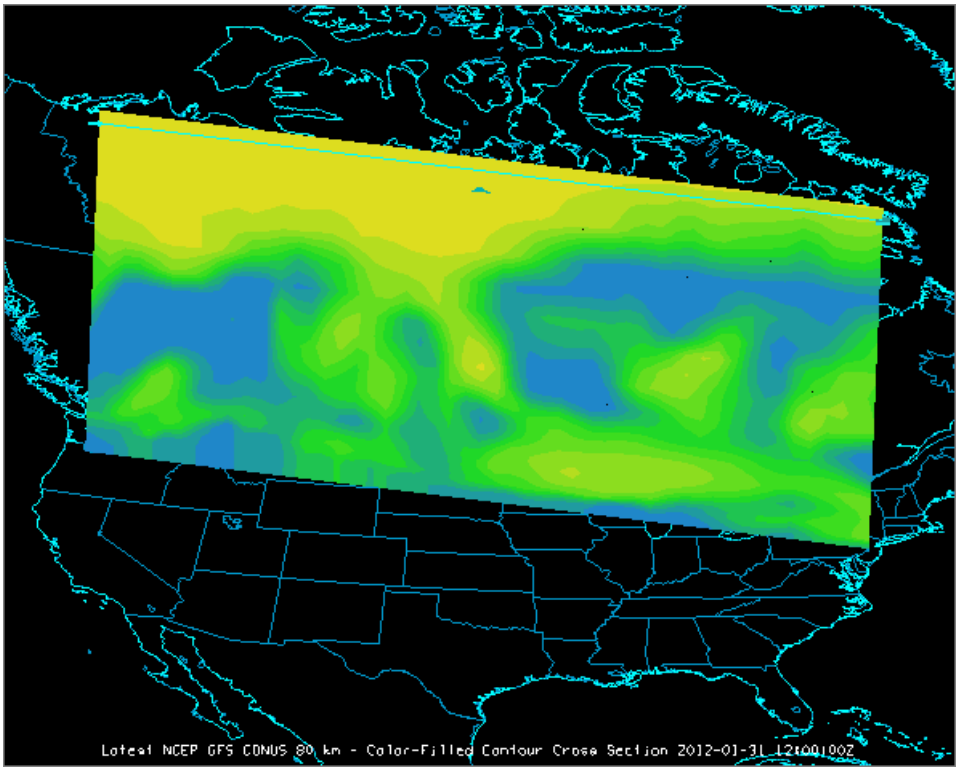


Image 2: Color-Filled Contour Cross Section Display

Color-Shaded Contour Cross Section

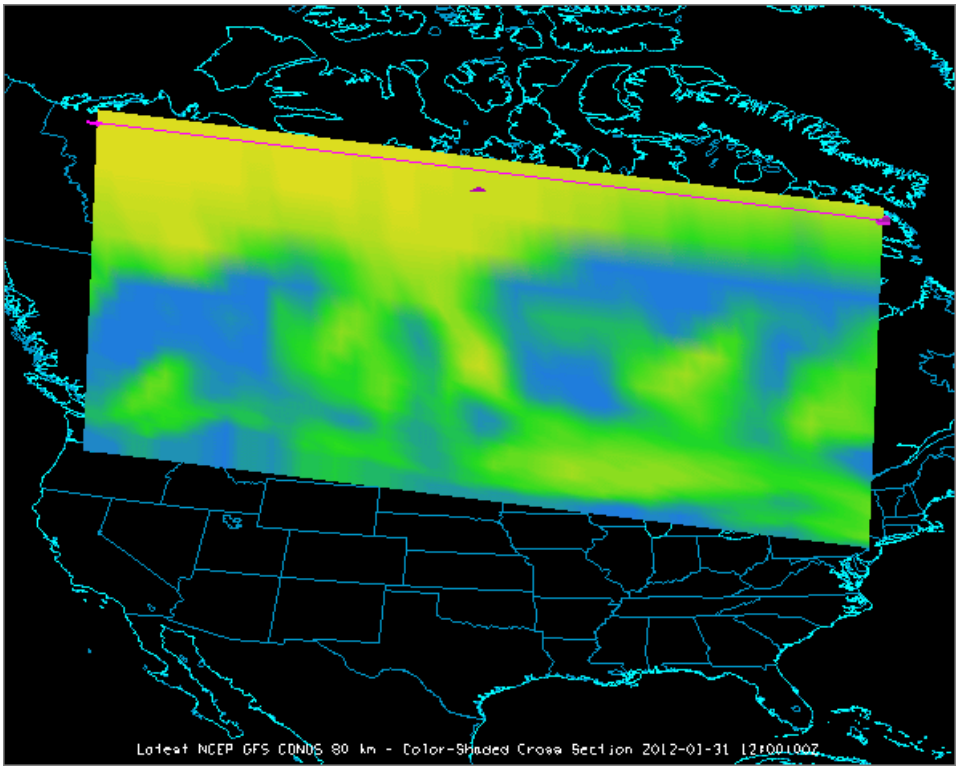


Image 3: Color-Shaded Cross Section Display

You can adjust the end points of the cross section by left-clicking and dragging them in the Main Display window. A duplicate of the displays made in the Main Display window will be drawn in the **Layer Controls** tab of the Data Explorer, where you can also modify different characteristics of the display. For more information about cross section controls, see Vertical Cross Section Controls.

Probes

- Vertical Profile Display
- Data Probe/Time Series Display
- Time/Height Display

Vertical Profile Display

The Vertical Profile display is an available display type for 3D model data that plots the value of any number of fields versus altitude. For more information on this display type, see Vertical Profile Controls.

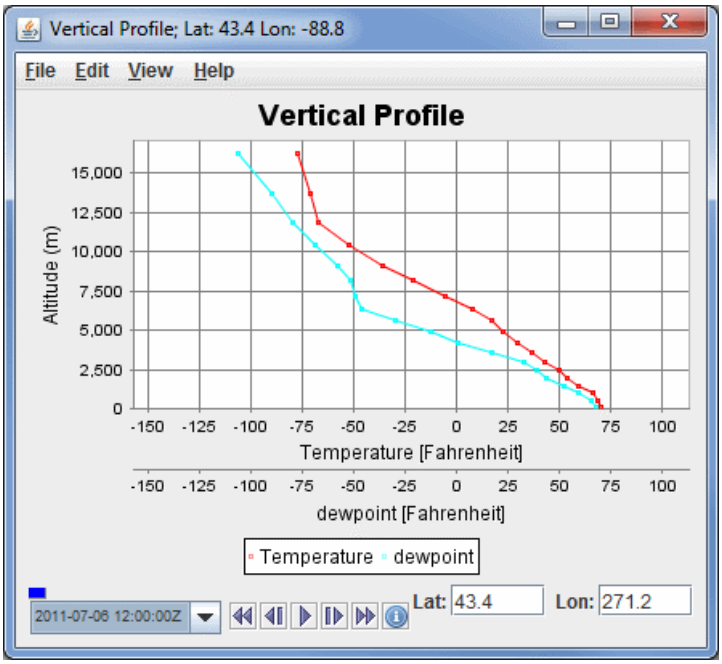


Image 1: Vertical Profile Display

Data Probe/Time Series Display

The Data Probe/Time Series display plots in the **Layer Controls** tab of the Data Explorer, and plots a line that represents the numerical value of the parameter (Y-axis) at a given time (X-axis). You can change the location of the probe in the Main Display window by left-clicking and dragging it. See Data Probe/Time Series for more information on this display.

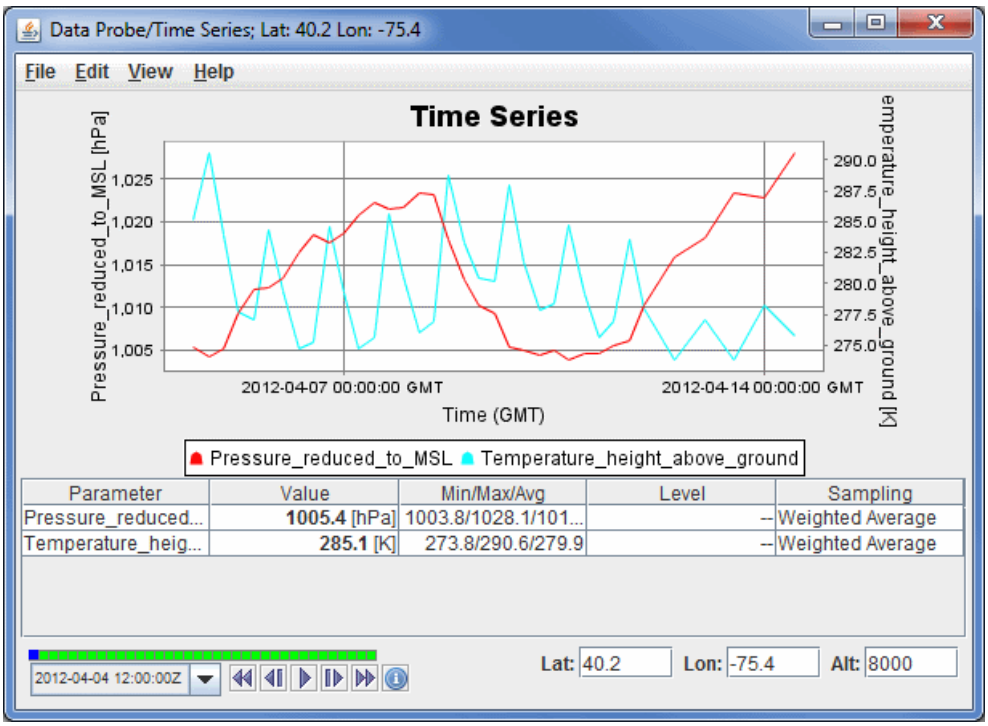


Image 2: Data Probe/Time Series Display

Time/Height Display

A Time/Height display plots a field's value in the vertical through the progression of time, with altitude on the Y-axis, and time along the X-axis. This can be a Contour or Color-Shaded display. For more information on this display type, see Time/Height Controls.

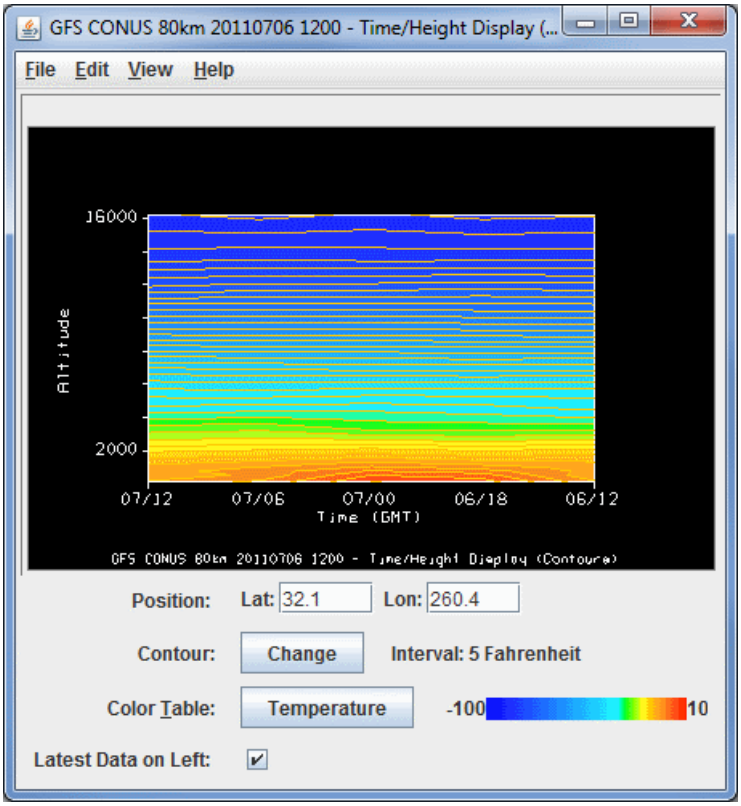


Image 3: Time/Height Display

Hovmoller Display

The Hovmoller display plots grid and gridded point data in a diagram with the Latitude/Longitude component on the X-axis, and the time component on the Y-axis. You can display the data with respect to either Latitude or Longitude, and as a Color Shaded or Contour view.

- Color Shaded Display
- Contour Display

Color Shaded Display

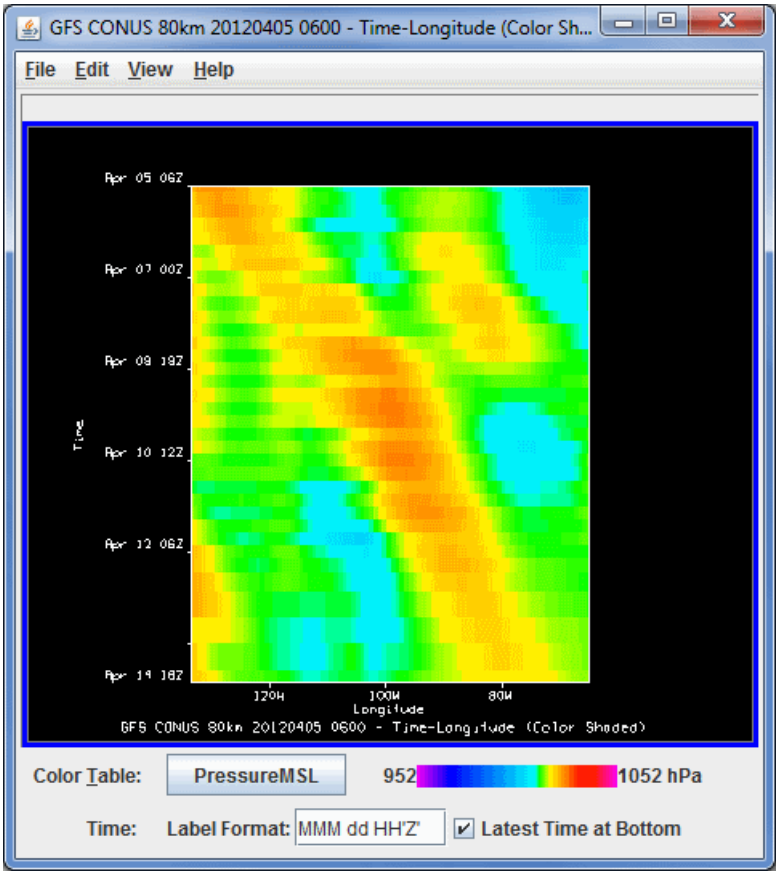


Image 1: Color Shaded Display

Contour Display

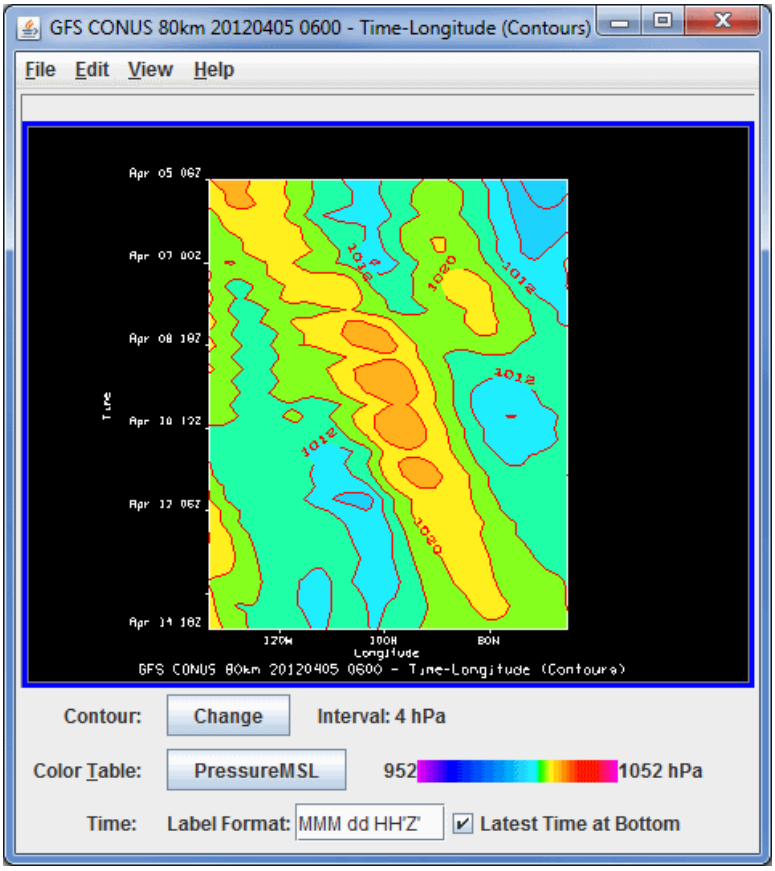


Image 2: Contour Display

For more information about the Hovmoller Display, see Hovmoller Controls.

Imagery

- Satellite Imagery Display
- Level III Radar Display

Satellite Imagery Display

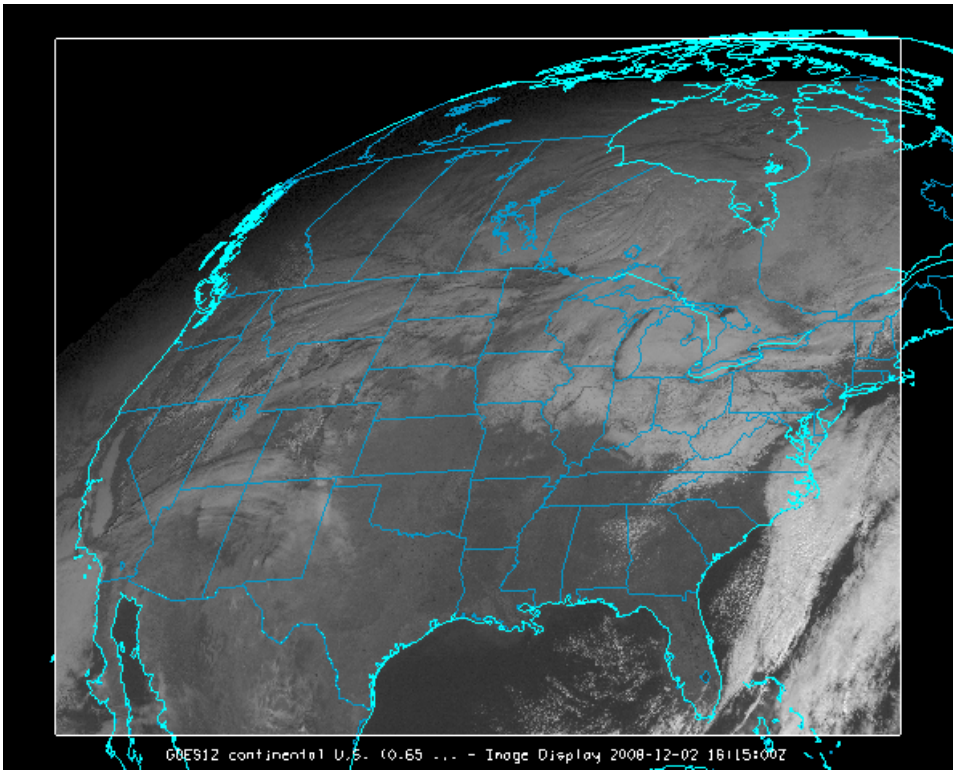


Image 1: Image Display of a GOES Visible Satellite Image

Extensive satellite image data are available from both local files and remote ADDE servers. For more information see Displaying Satellite Imagery.

Level III Radar Display

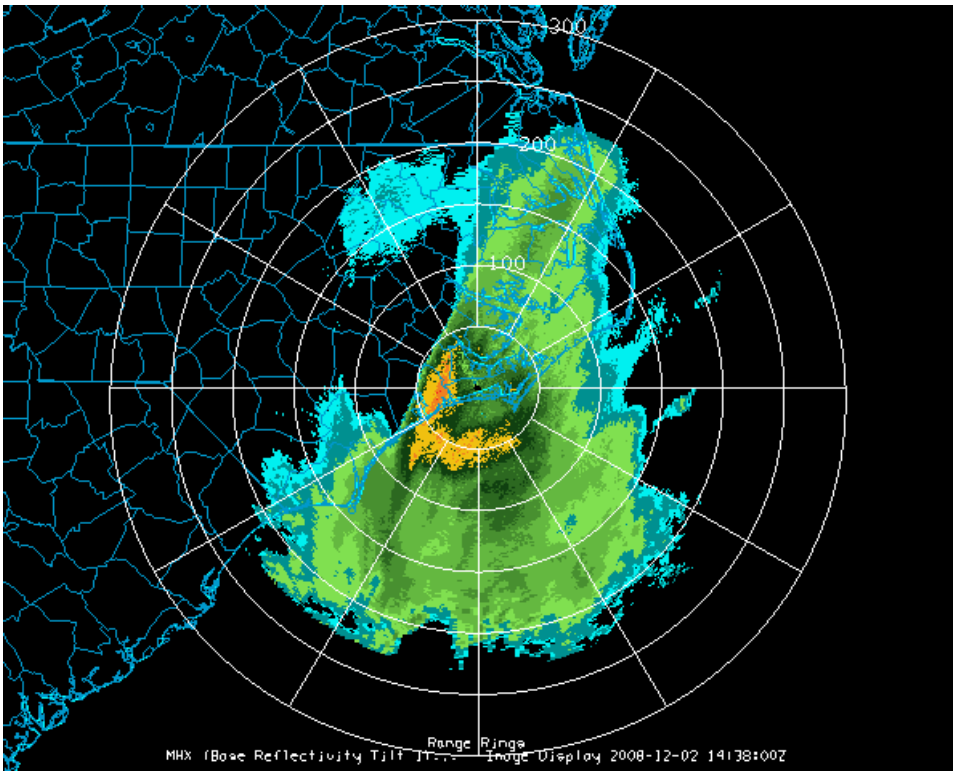


Image 2: Image Display of a Level III Base Reflectivity Radar Image

For more information see Displaying Level III Radar Imagery.

Radar - Level II WSR-88D Data Displays

McIDAS-V can read and use WSR-88D Level II data, including reflectivity, radial velocity, and spectrum width, and display it in several ways.

- Radar Sweep View
- RHI
- Radar Cross Section
- CAPPI
- Volume Scan
- Radar Isosurface

Radar Sweep View

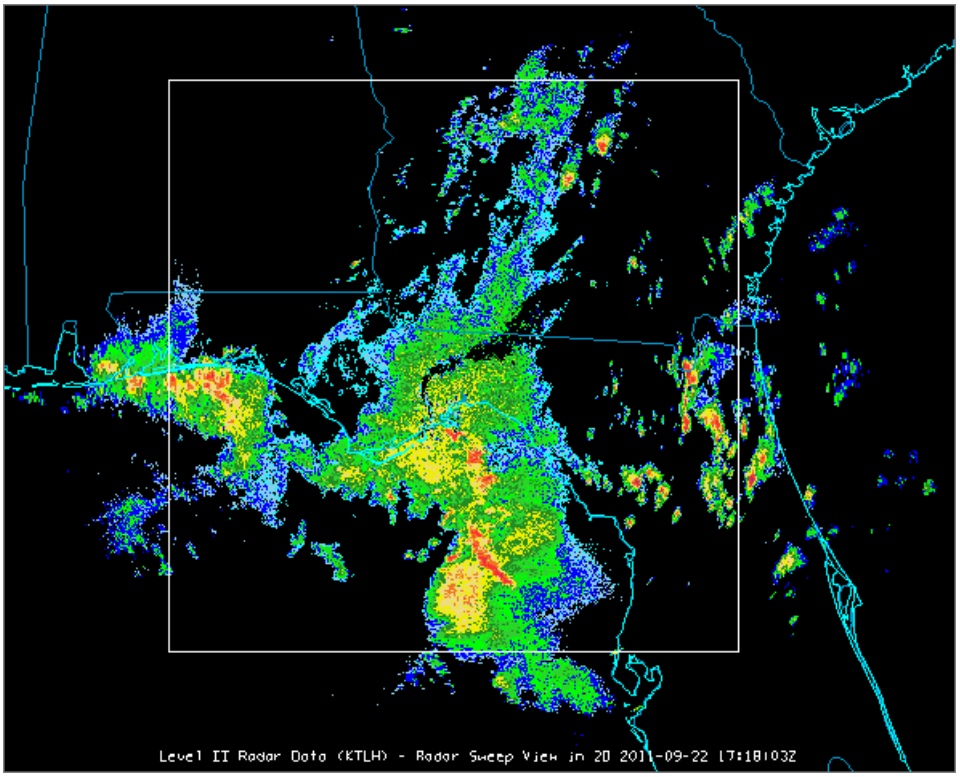


Image 1: Radar Sweep View in 2D Display

The Radar Sweep View in 2D display appears in the Main Display window. The display depicts radar data at a variety of different elevation angles. For more information, see Radar Sweep View Controls.

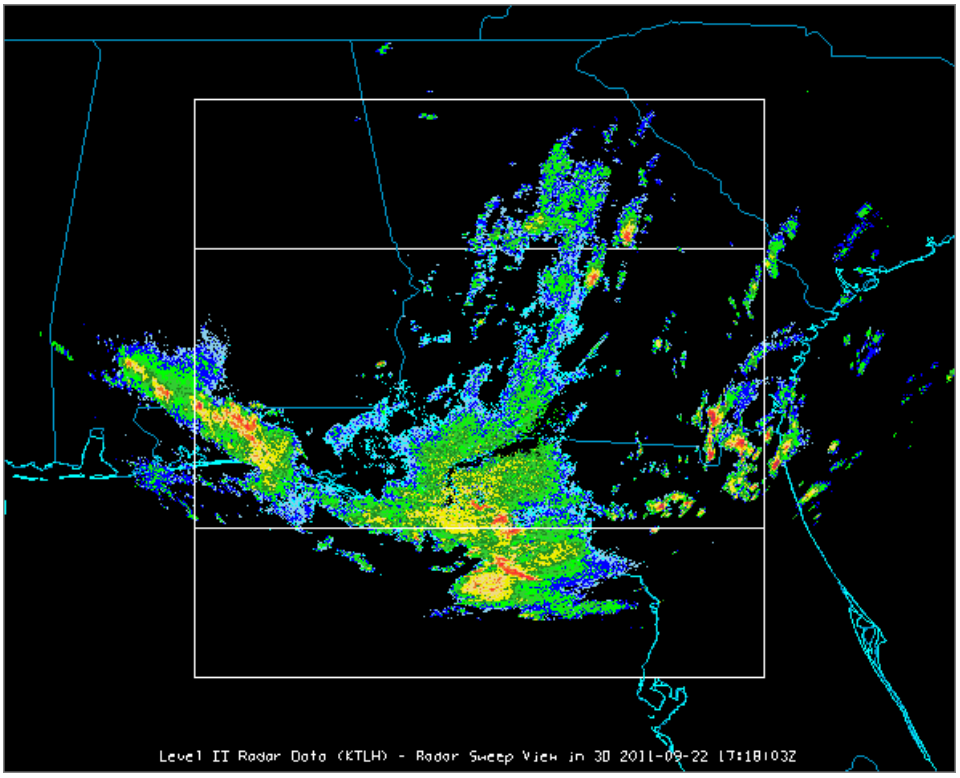


Image 2: Radar Sweep View in 3D Display

The Radar Sweep View in 3D display appears in the Main Display window. The display depicts 3D radar data at a variety of different elevation angles. For more information, see Radar Sweep View Controls.

RHI

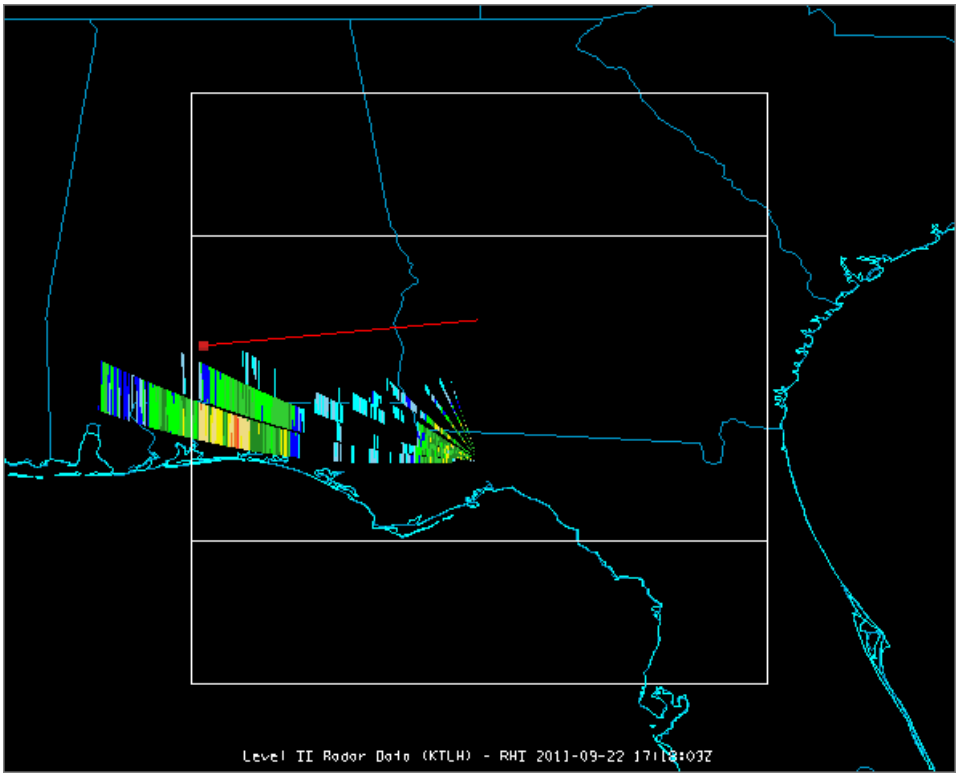


Image 3: RHI Display in the Main Display window

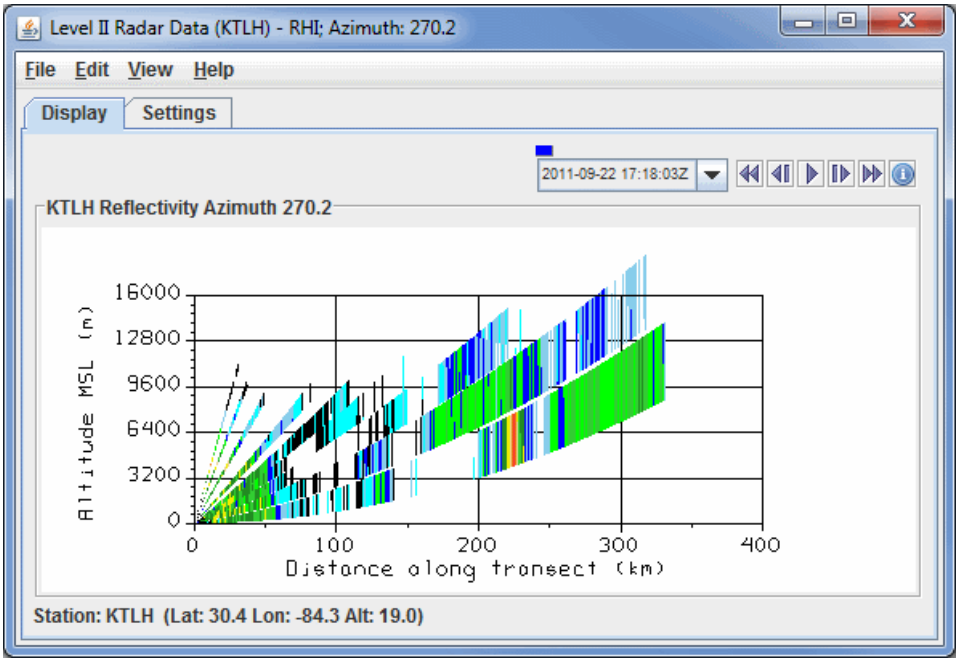


Image 4: RHI Display in the Layer Controls Tab

The RHI (Range-Height Indicator) display appears in the Main Display window and as a 2D plot in the **Layer Controls** tab. The display is a cross section of radar data, with one end point at the location of the radar and the other set by the user. In the chart, distance along transect is on the X-axis, and altitude is on the Y-axis. For more information, see Radar RHI Display Controls.

Radar Cross Section

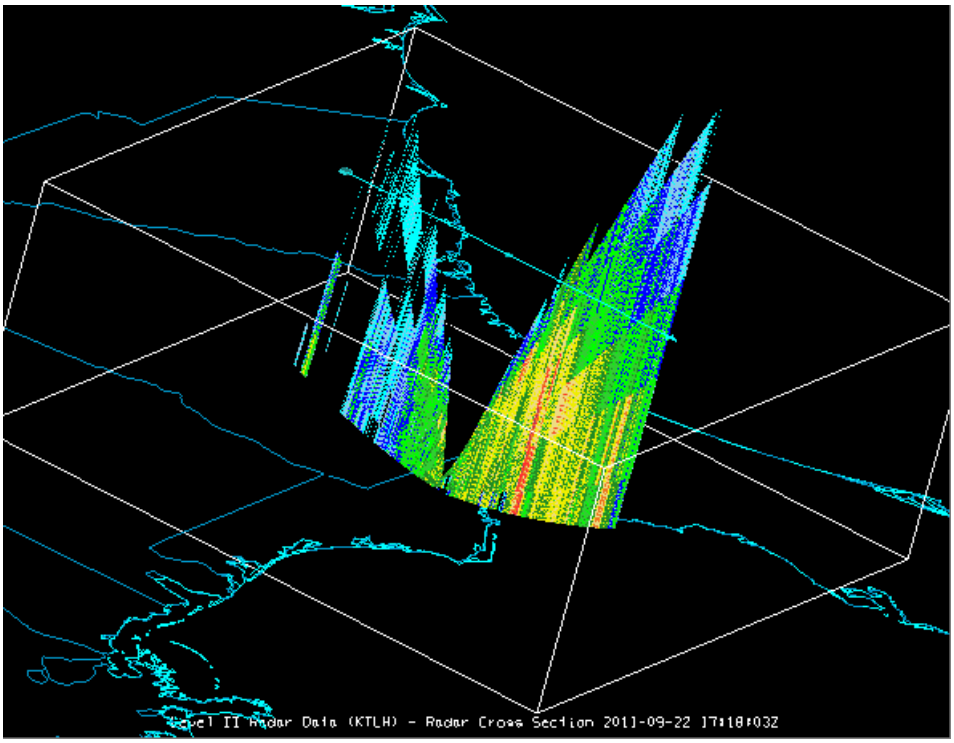


Image 5: Radar Cross Section Display in the Main Display Window

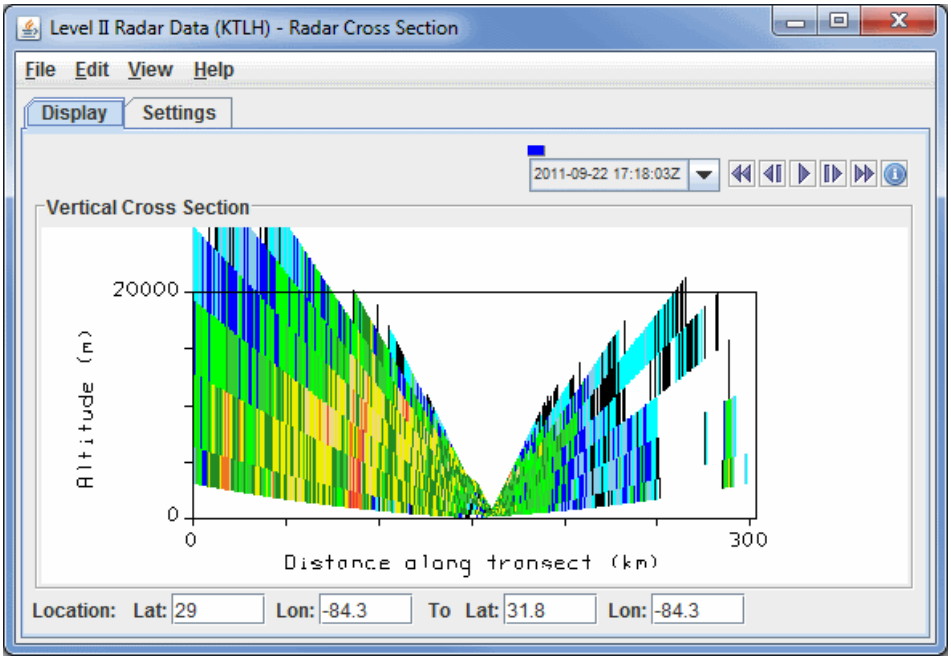


Image 6: Radar Cross Section Display in the Layer Controls Tab

The Radar Cross Section display appears in the Main Display window and as a 2D plot in the **Layer Controls** tab. The display is a cross section of radar data, with distance along transect on the X-axis, and altitude in the Y-axis. For this display, you have the ability to change the position both end points of the transect line. For more information, see Radar Cross Section Controls.

CAPPI

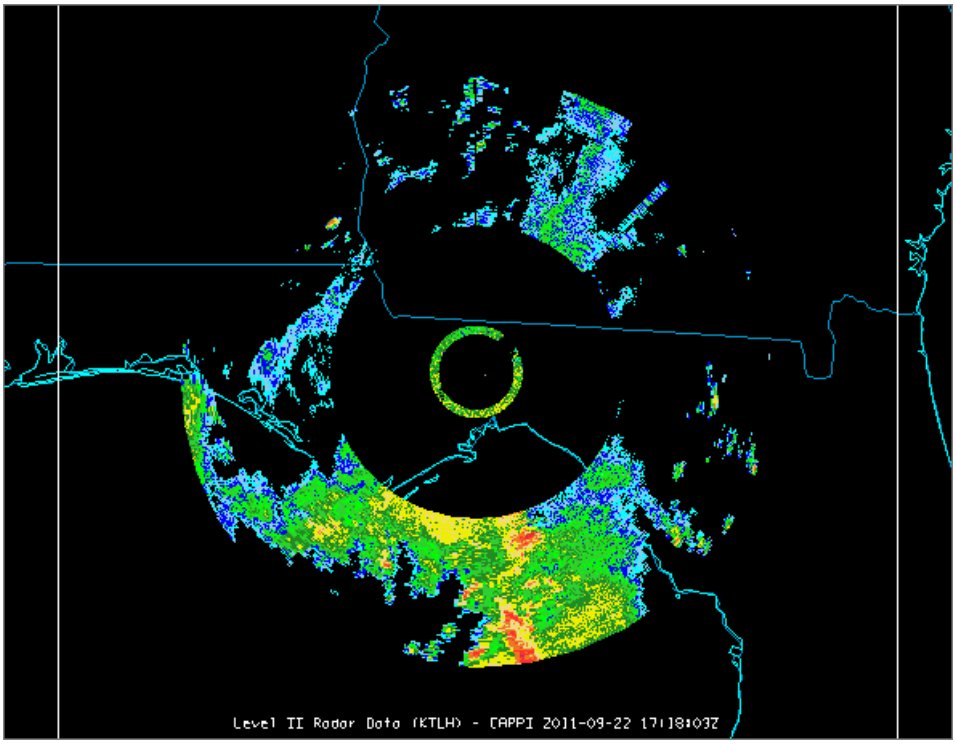


Image 7: CAPPI Display

The CAPPI (Constant Altitude Plan Position Indicator) display appears in the Main Display window. The display depicts radar data at a constant altitude around the Radar site. For more information, see Radar CAPPI Display Controls.

Volume Scan

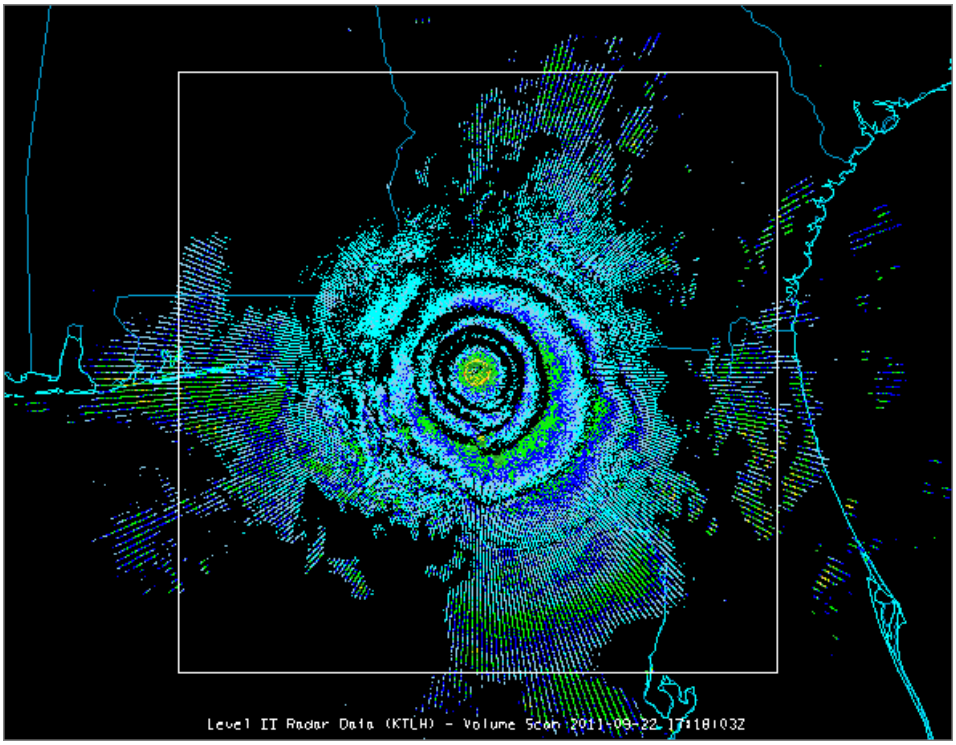


Image 8: Volume Scan Display

The Volume Scan Display appears in the Main Display window. This display depicts various elevation angles at once. For more information, see Radar Volume Scan Controls.

Radar Isosurface

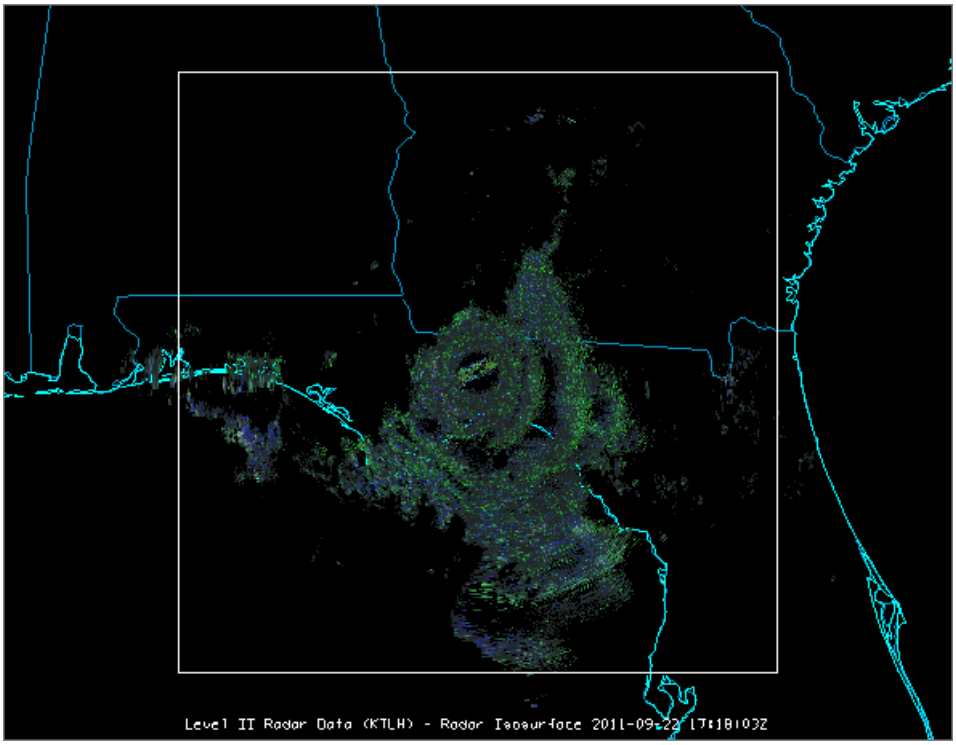


Image 9: Radar Isosurface Display

The Radar Isosurface display displays radar data at the user-specified reflectivity value. For more information, please see Radar Isosurface Controls.

For more information see Displaying Level II Radar Imagery.

Soundings

The meteorological sounding display is available with a choice of thermodynamic diagrams (Skew-T, Stuve and Emagram), with a table of related aerological parameters.

- Skew-T
- Stuve
- Emagram

Skew-T

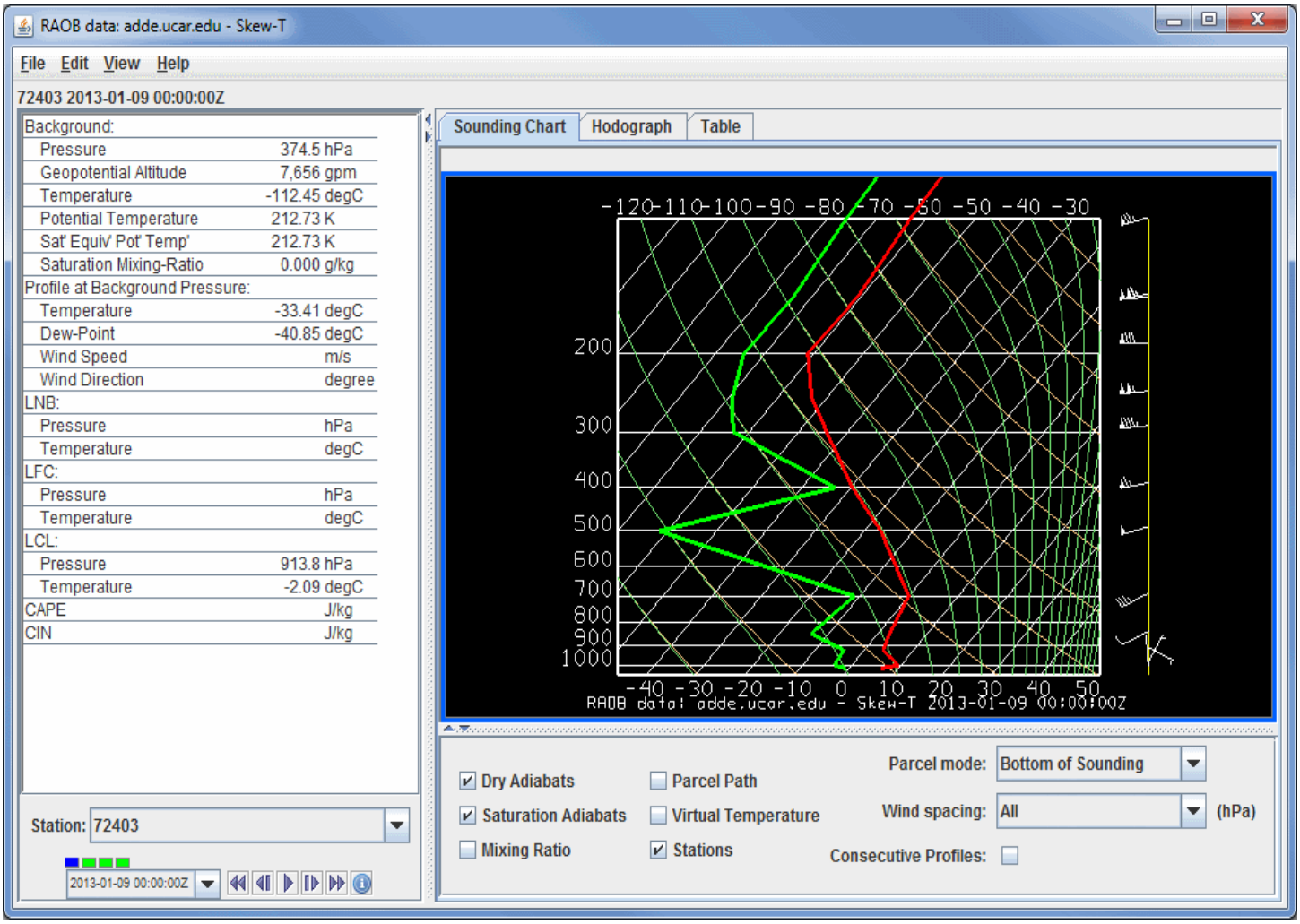


Image 1: Skew-T Display

Stuve

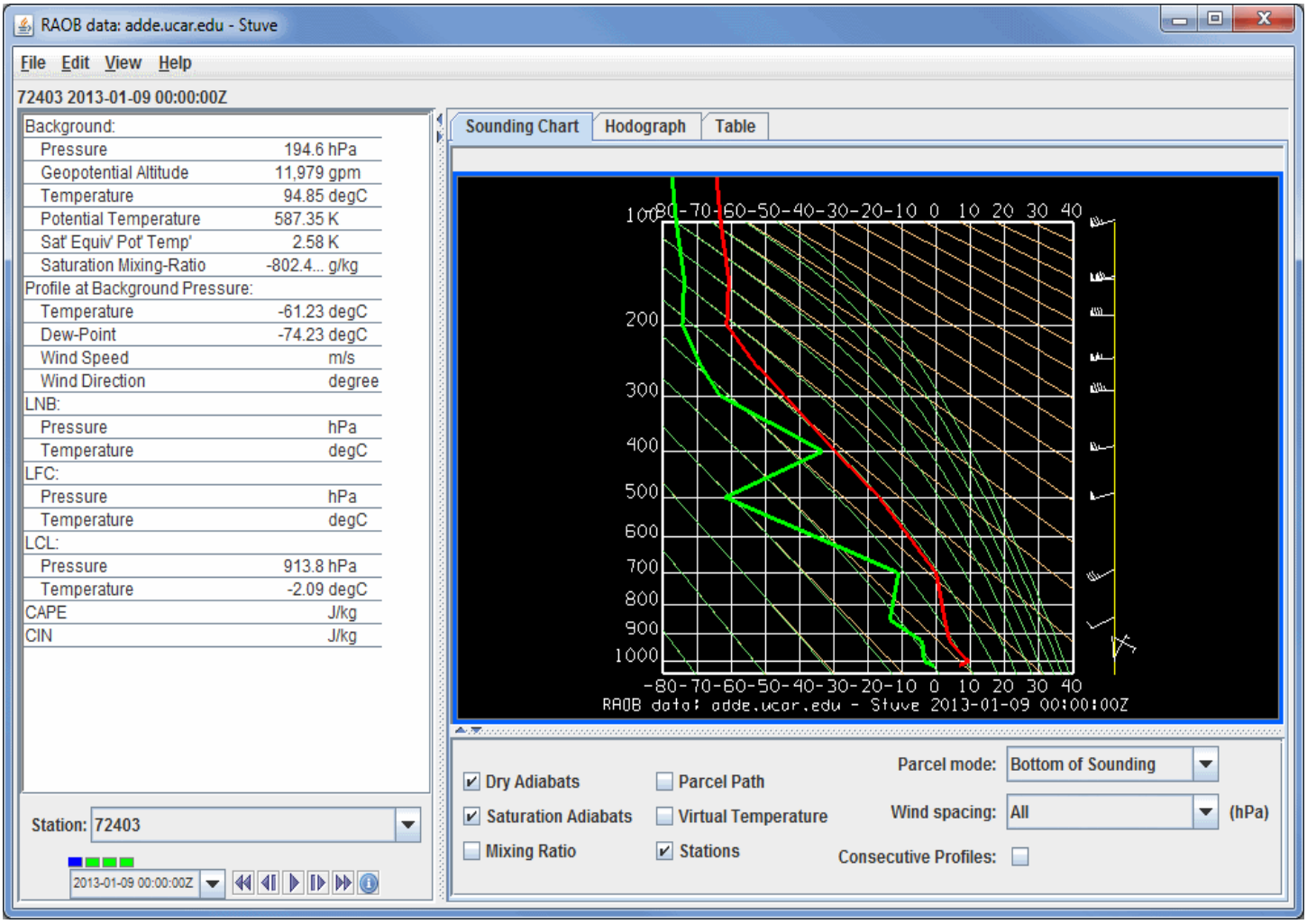


Image 2: Stuve Display

Emagram

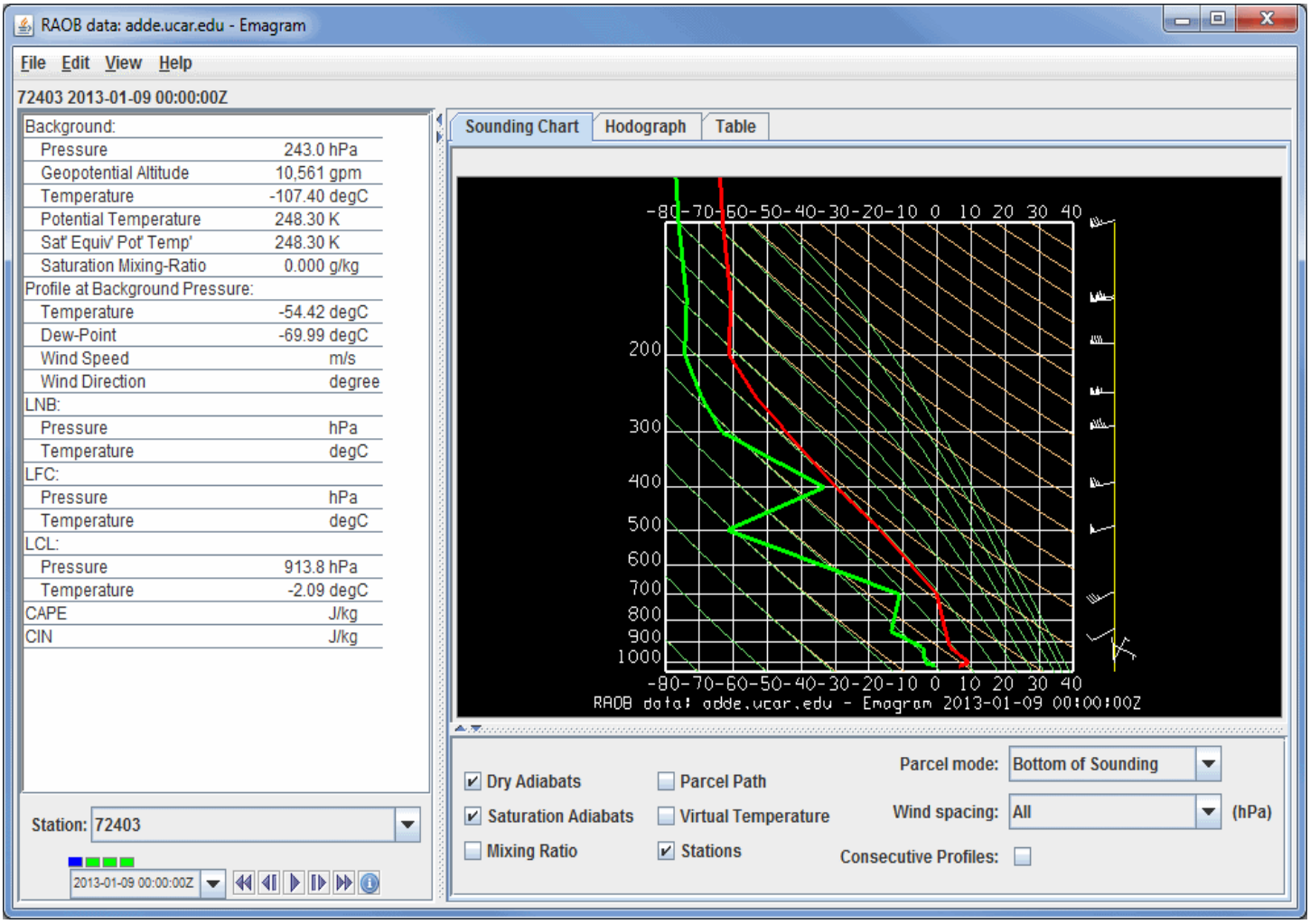


Image 3: Emagram Display

A sounding diagram can be made for any point inside a data grid of numerical weather prediction model output with temperature and humidity (the dew-point temperature is computed by Unidata code from temperature and relative humidity grids), or from balloon soundings (RAOBs). The sounding display and its table and controls appear in a separate window. To learn more about the aerological displays see Sounding Display Controls.

Flow Displays

For parameters with a vector nature such as wind, vector and streamline displays of flow are available.

- Vector Plan View
- Streamline Plan View
- Wind Barb Plan View
- Vector Cross Section
- Wind Barb Cross Section
- 3D Volume Vector
- 3D Volume Trajectory

Vector Plan View

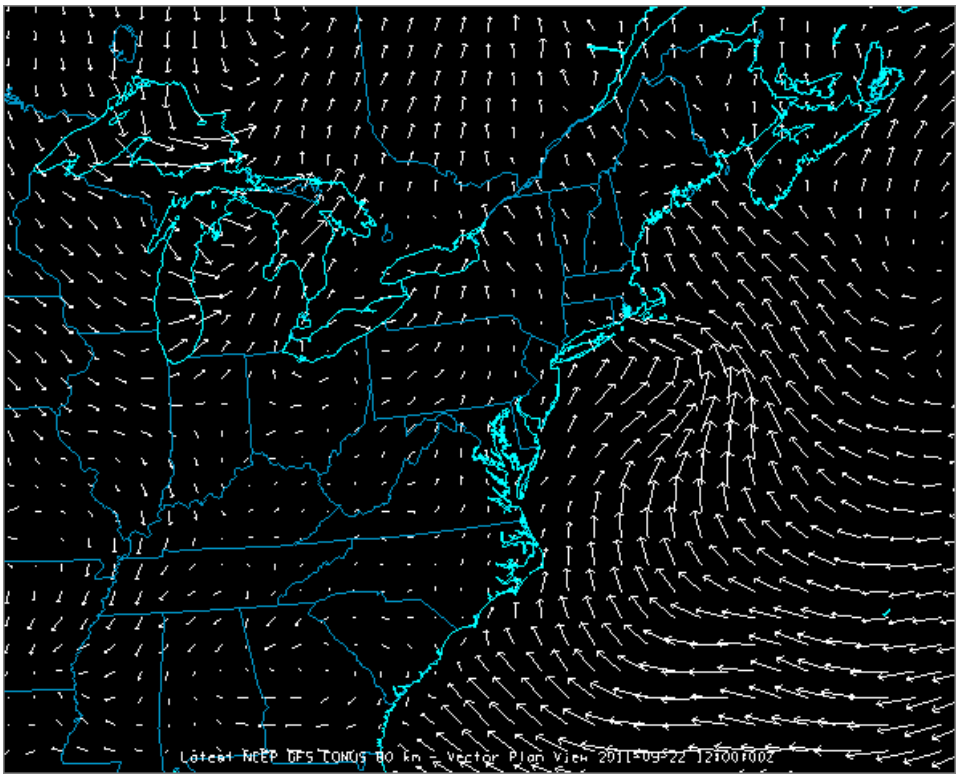


Image 1: Vector Plan View Display

Streamline Plan View

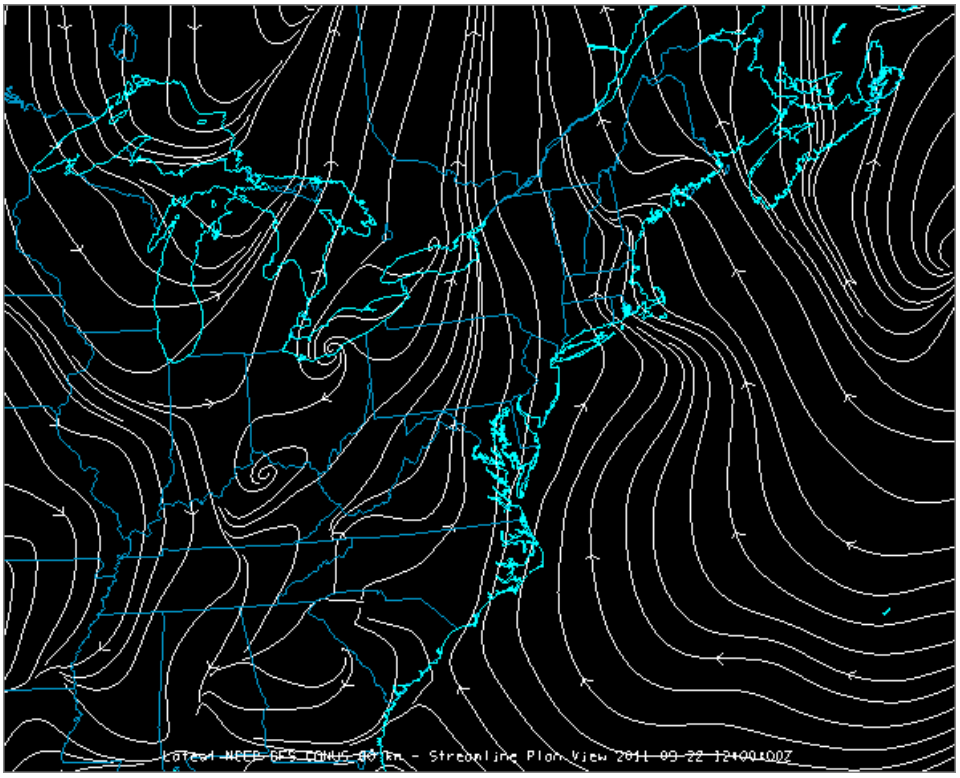


Image 2: Streamline Plan View Display

Wind Barb Plan View

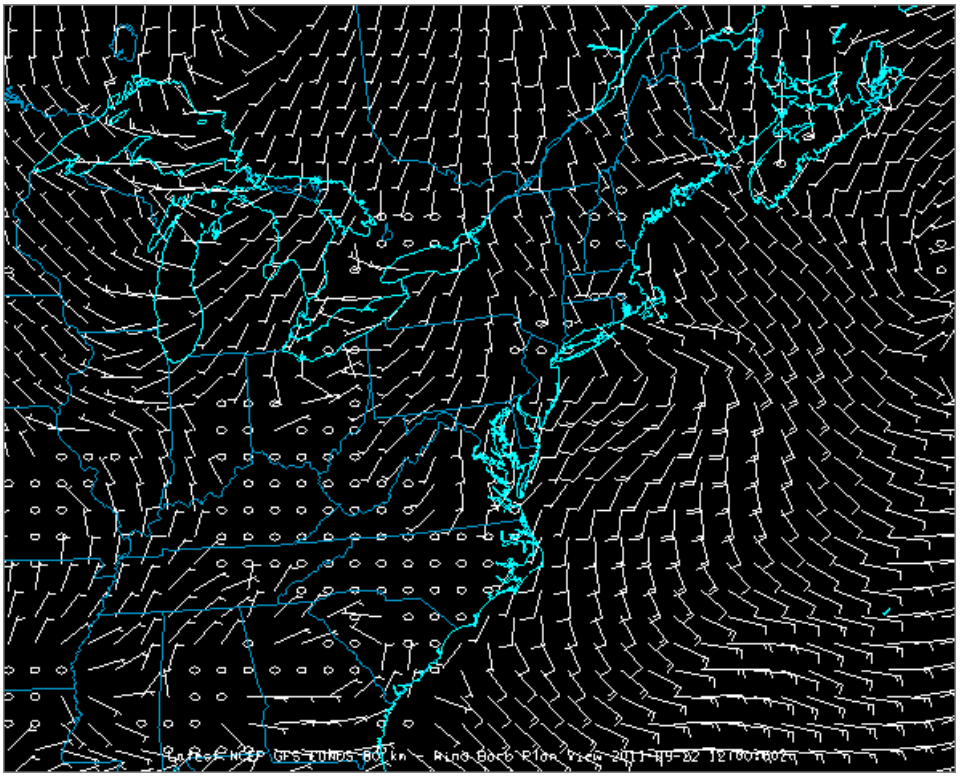


Image 3: Wind Barb Plan View Display

Vector Cross Section

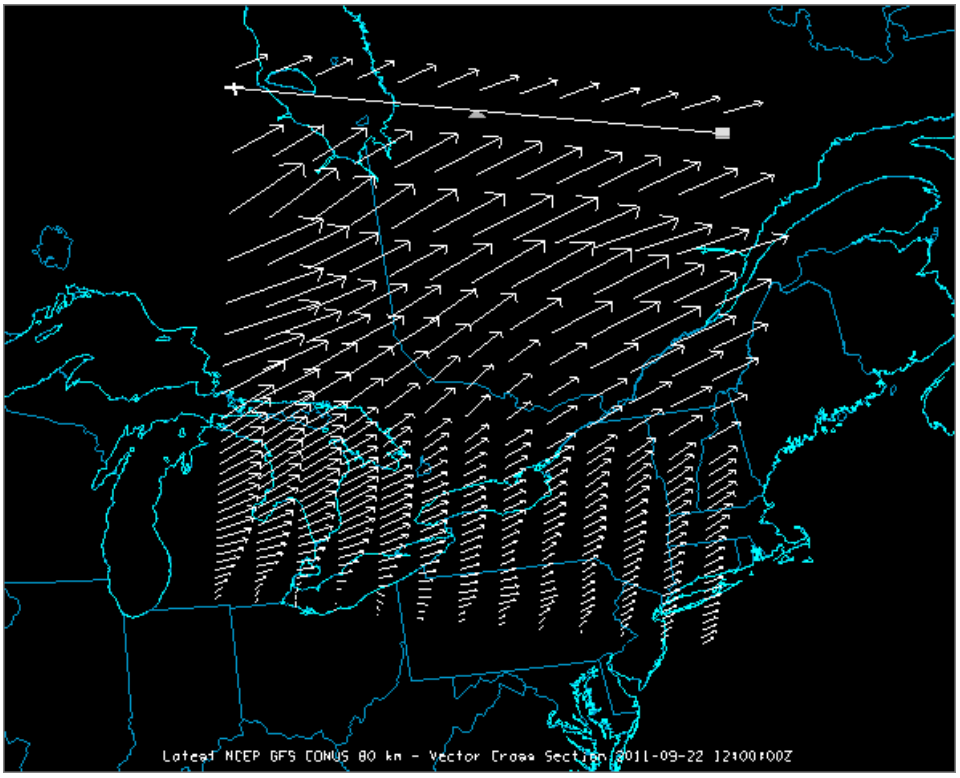


Image 4: Vector Cross Section Display in the Main Display Window

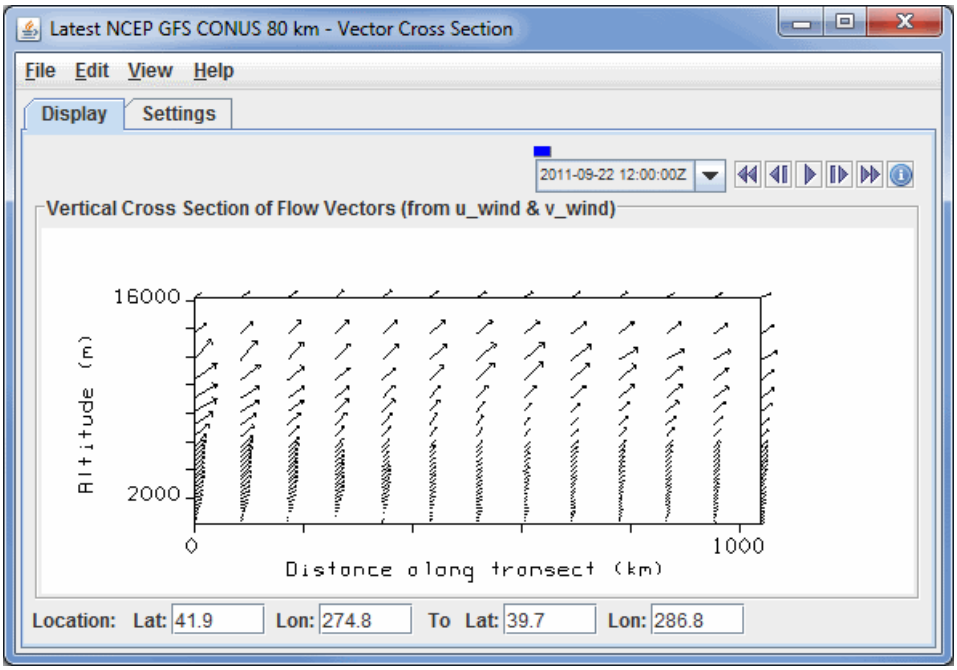


Image 5: Vector Cross Section Display in the Layer Controls Tab

Wind Barb Cross Section

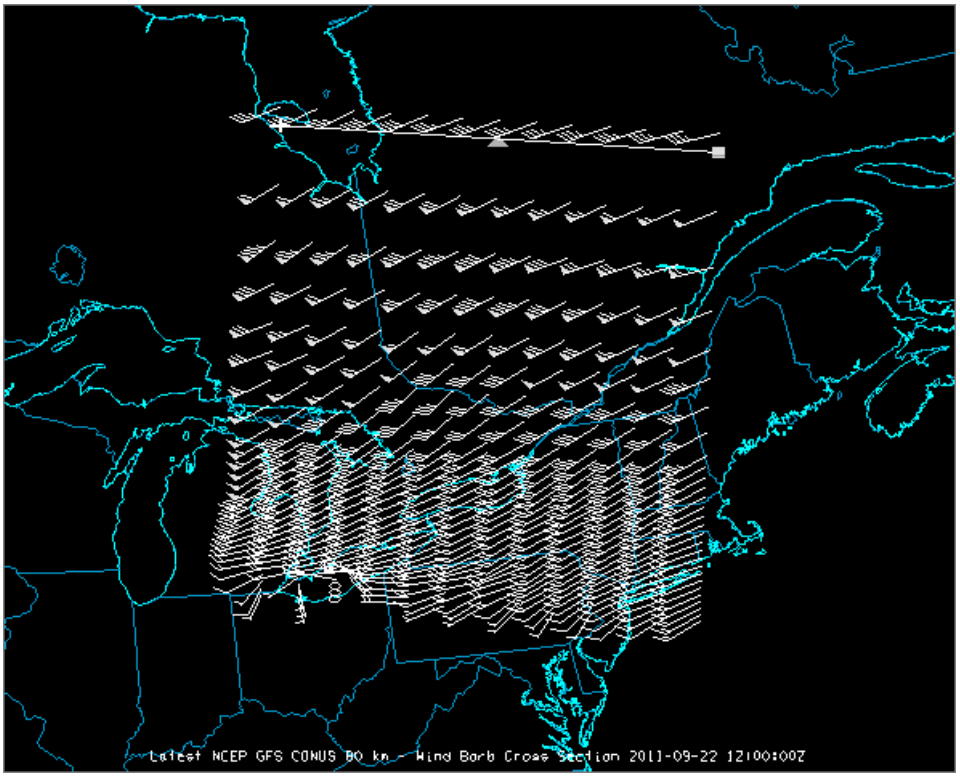


Image 6: Wind Barb Cross Section Display in the Main Display Window

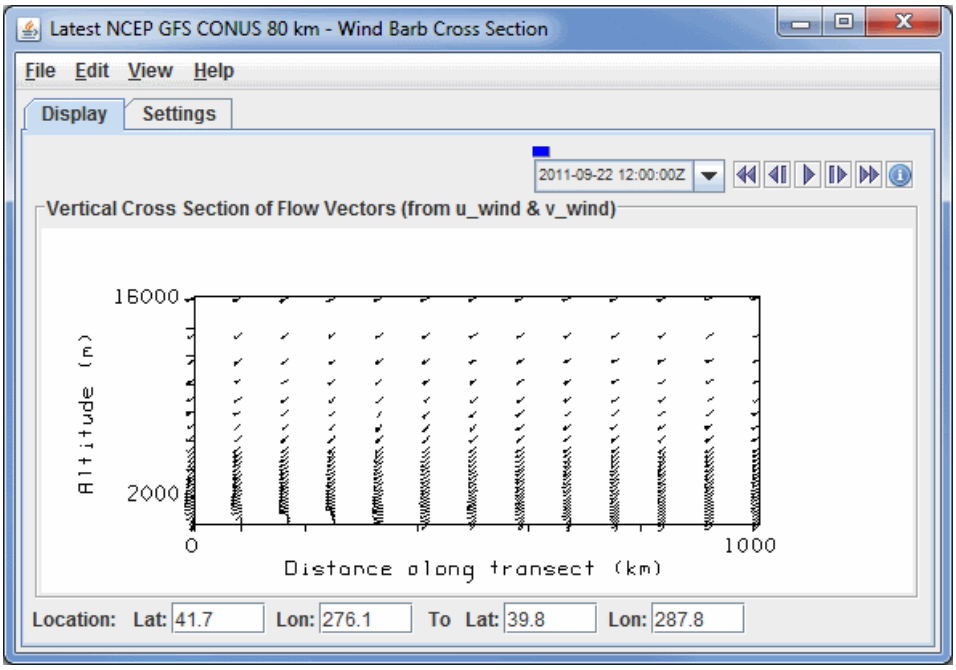


Image 7: Wind Barb Cross Section Display in the Layer Controls Tab

3D Volume Vector

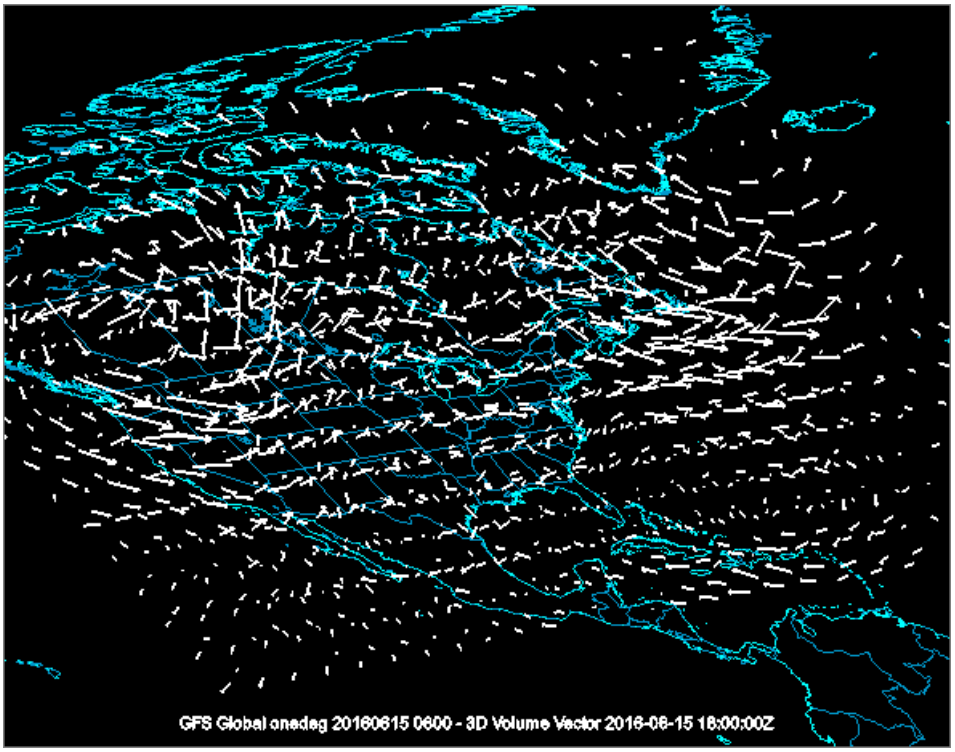


Image 8: 3D Volume Vector Display

3D Volume Trajectory

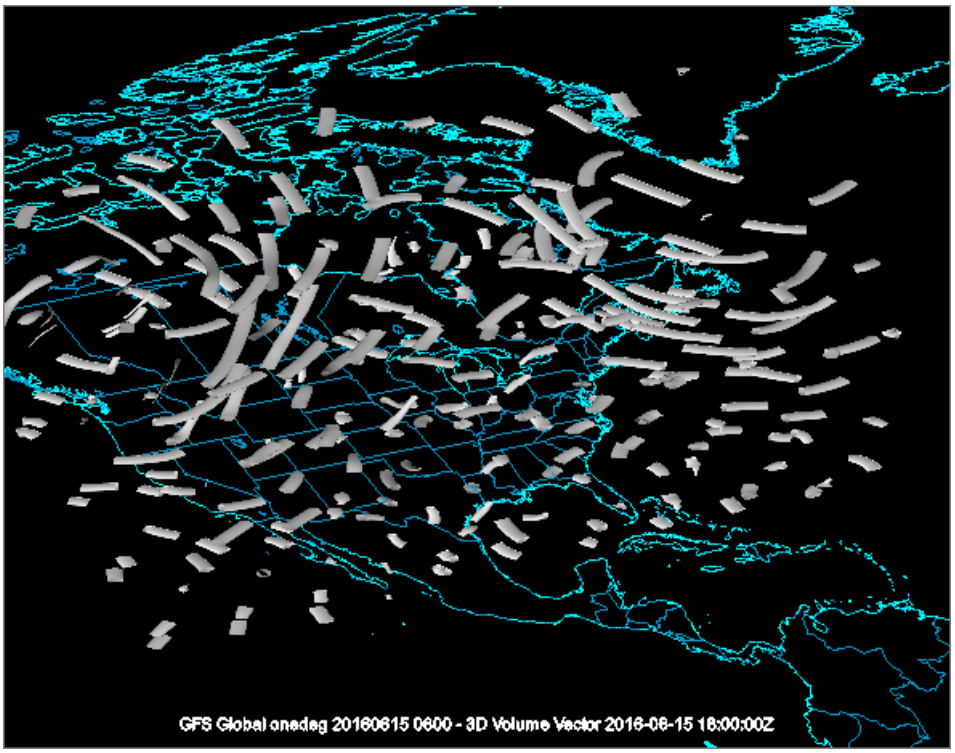


Image 9: 3D Volume Trajectory Display

For more information see Flow Display Controls and 3D Flow Display Controls.

Observations

- Point Data Displays
- Track Displays
- Front Positions

Point Data Displays

You can make plots of point data such as meteorological surface (METAR) and synoptic surface weather station observations.

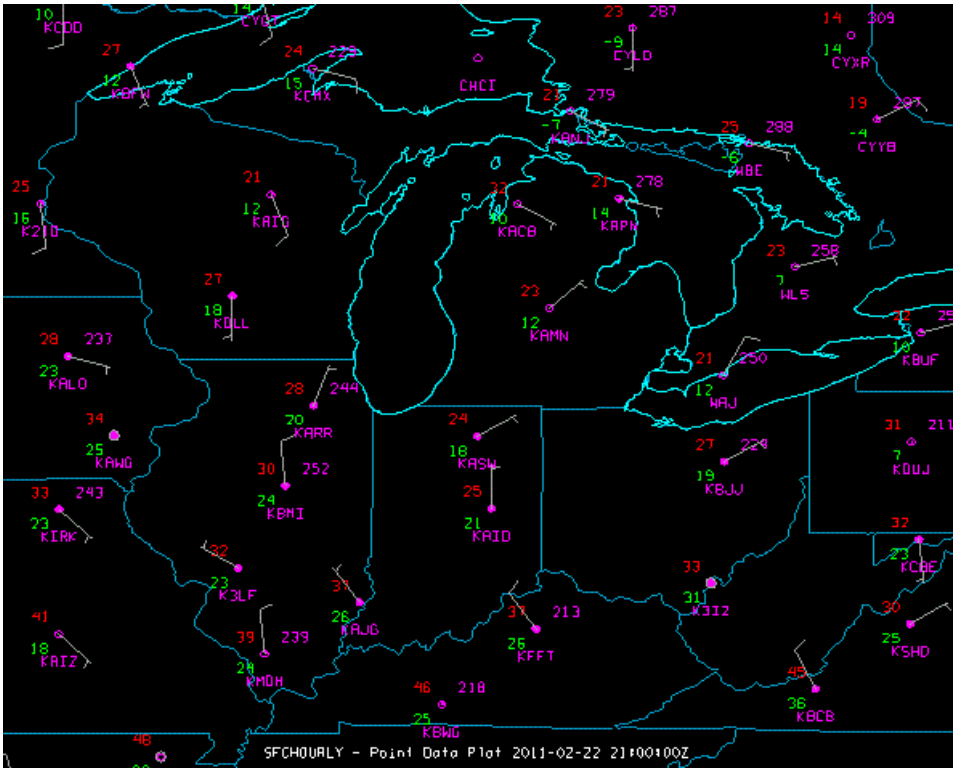


Image 1: Point Data Plot

For more information see Displaying Surface and Upper Air Point Data . You can change the plot layout with the Layout Model Editor.

You can plot non-meteorological point data as well. The image below depicts the locations of earthquakes, sized by magnitude and colored by depth. Earthquake data can be obtained from the U.S. Geological Survey (USGS) in Google Earth (KMZ) format and can be loaded into McIDAS-V in the General->Files/Directories Chooser with the Data Type of "Google Earth Files KML/KMZ". Using the Layout Model Editor, you can specify how your data will be displayed in the Main Display window.

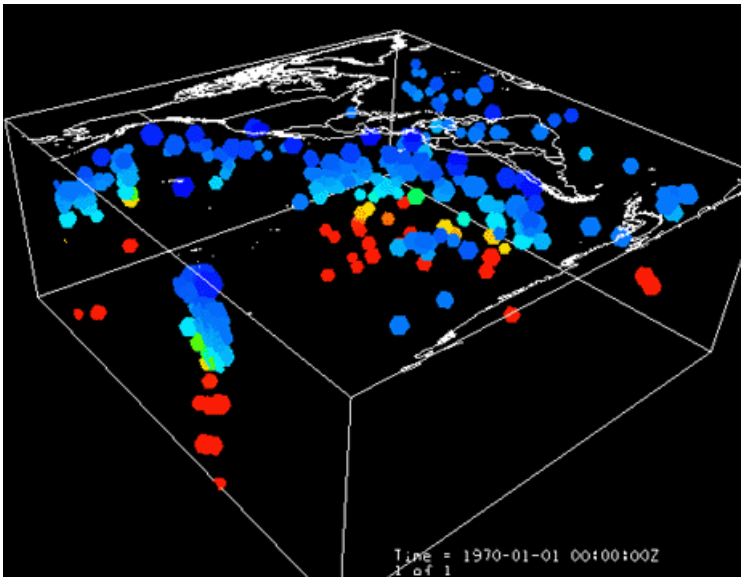


Image 2: Locations Display

Track Displays

Aircraft and drifting buoy tracks can be plotted to show the path of the sensor. You can also plot the track data as observations along the track. The track path is brought into McIDAS-V through the General->Files/Directories Chooser with the Data Type of "Text Point and Trajectory Data files". The Flythrough feature is invoked in the Main Display Window through the **View->Flythrough** menu item. You can set the Flythrough to follow the track path by creating and importing an XML file with location (latitude, longitude, and altitude) data via **File->Import** in the Flythrough window.

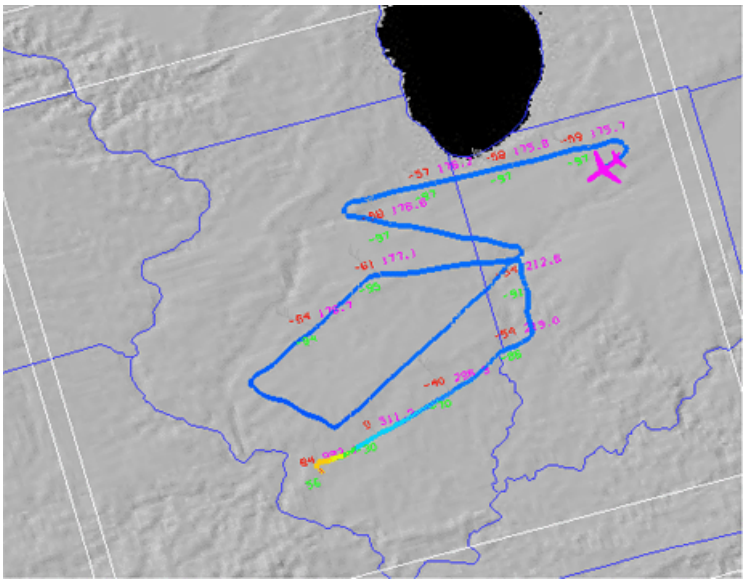


Image 3: Track Colored by Parameter Display with a Flythrough

Front Positions

Via ADDE, McIDAS-V has the ability to plot a frontal analysis or a forecast of frontal positions. You can create these displays by selecting **Front Positions** in the **Data Sources** tab of the Data Explorer. For more information about this feature, see Displaying Fronts and Front Controls.

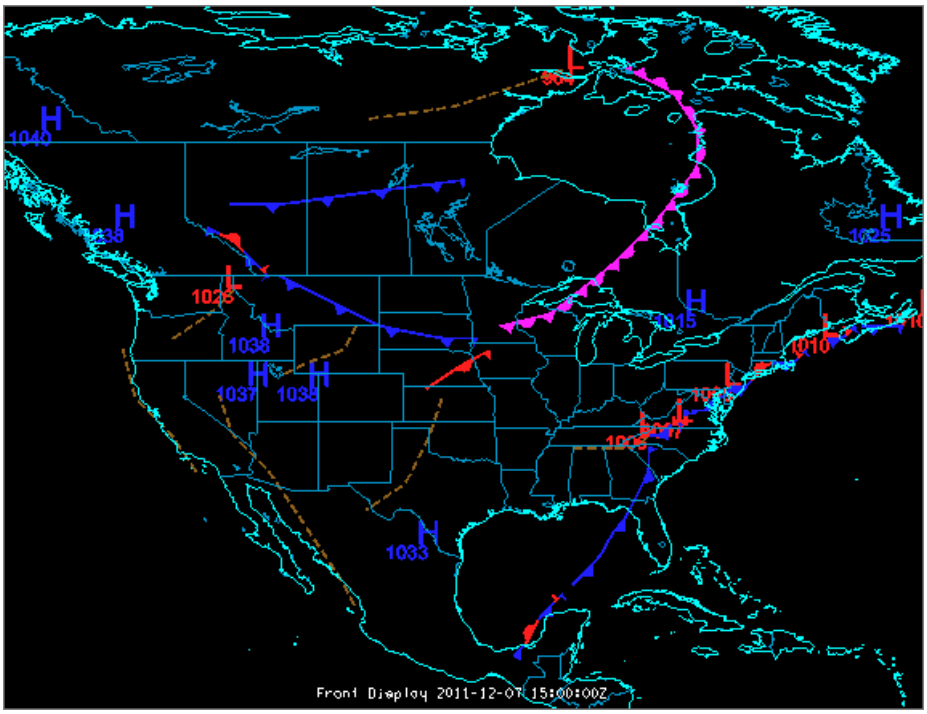


Image 4: Front Positions

Miscellaneous Display Types

- Globe Display
- Multi-Panel Display
- ProfileAlongTrack Display
- Data Transect Display
- Grid Table Display
- Omni Display
- Map and Transect Display

Globe Display

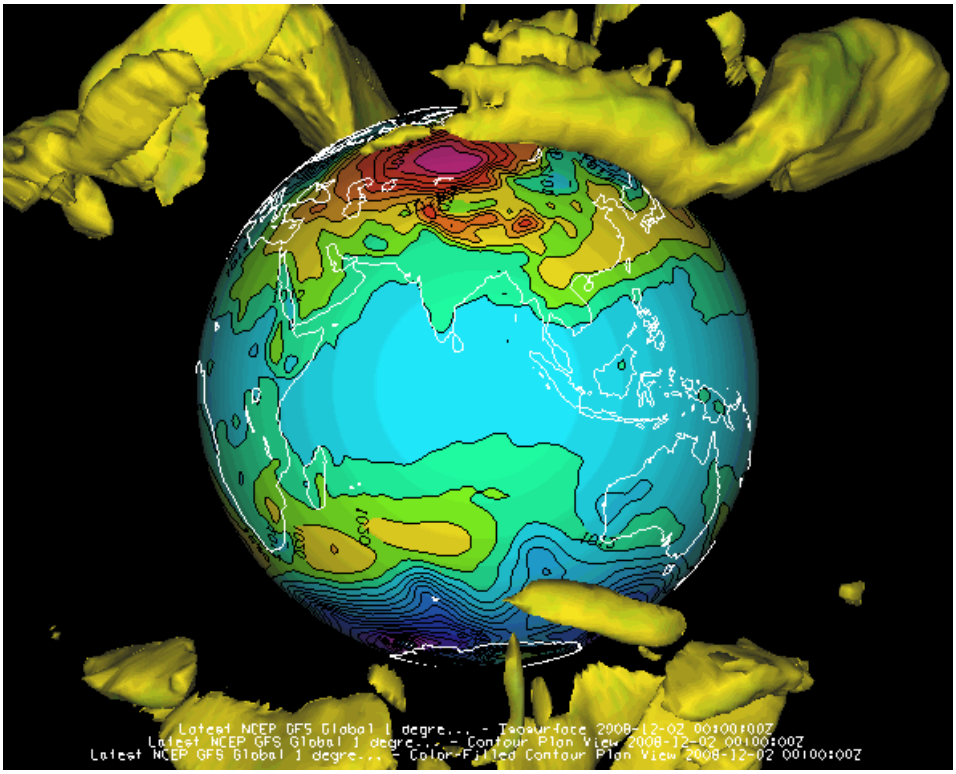


Image 1: The Globe Display

The illustration shows a McIDAS-V globe display of the earth, with AVN numerical weather prediction model output of mean sea level pressure (as color-shaded image and contour lines) and 50 m/s wind speed isosurfaces showing the jet streams. The upper vertical scale is set to 32,000.

For more about this display and how to make it, see Using the Globe Display.

Multi-Panel Display

You can create multi-panel map and globe displays through the **File->New Display Tab (Window)->Map (Globe) Display->\# panel(s)** menu. Below is an example of a four panel display of storms over Mississippi and the Gulf of Mexico. The first panel is radar reflectivity from central and southern Mississippi. Panel two is a Goes East visible satellite image. Panel three contains point data metars over the Gulf coast region. Panel four is a Goes East IR satellite image, with an enhancement for temperature.

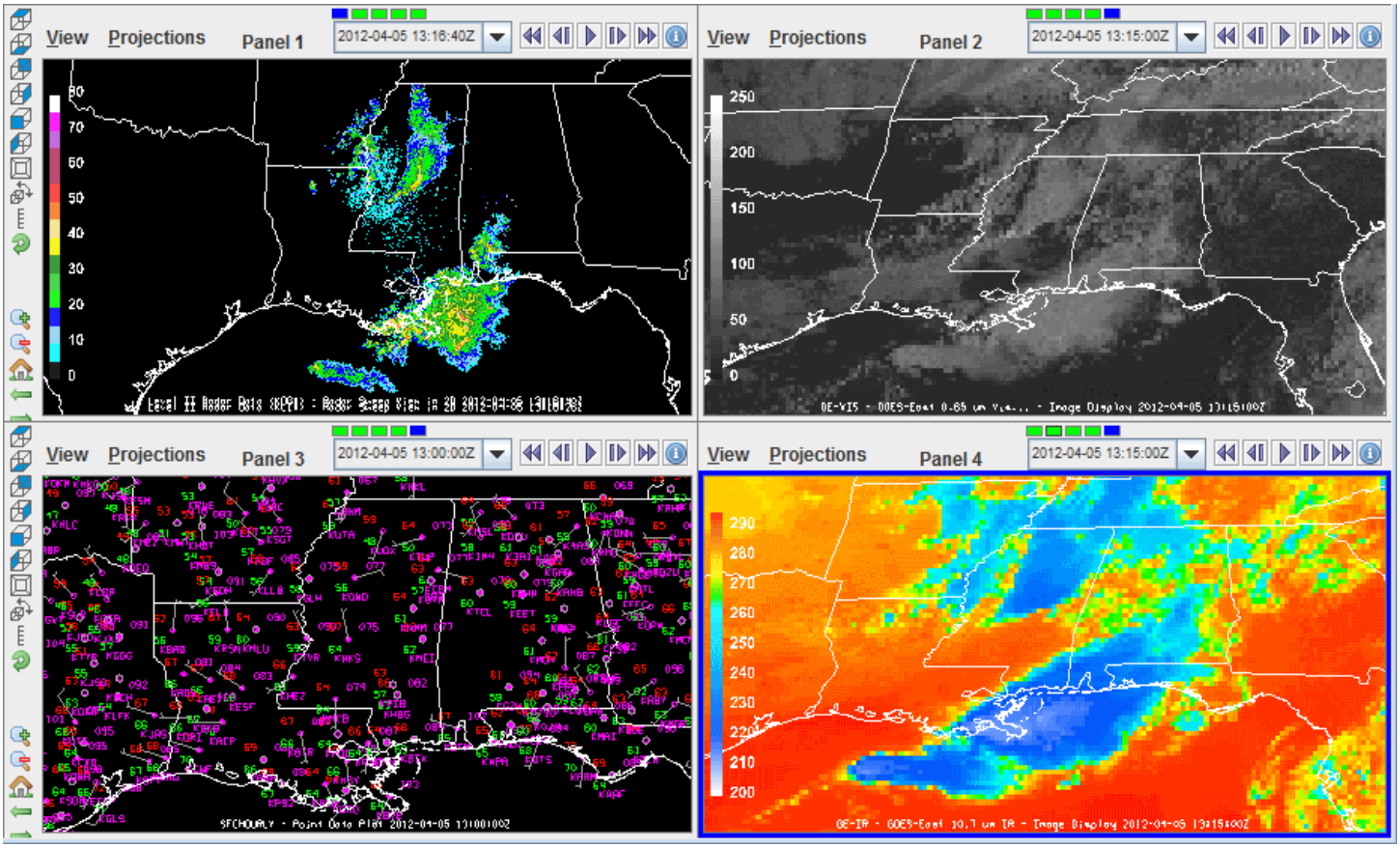


Image 2: Four Panel Map Display

ProfileAlongTrack Display

The ProfileAlongTrack display plots CALIPSO, CloudSat, and HSRL2 lidar data. See ProfileAlongTrack Controls for more information on this display. The image below shows CloudSat radar reflectivity (vertical curtain) displayed using the ProfileAlongTrack display type overlaid on a GOES-16 ABI image.

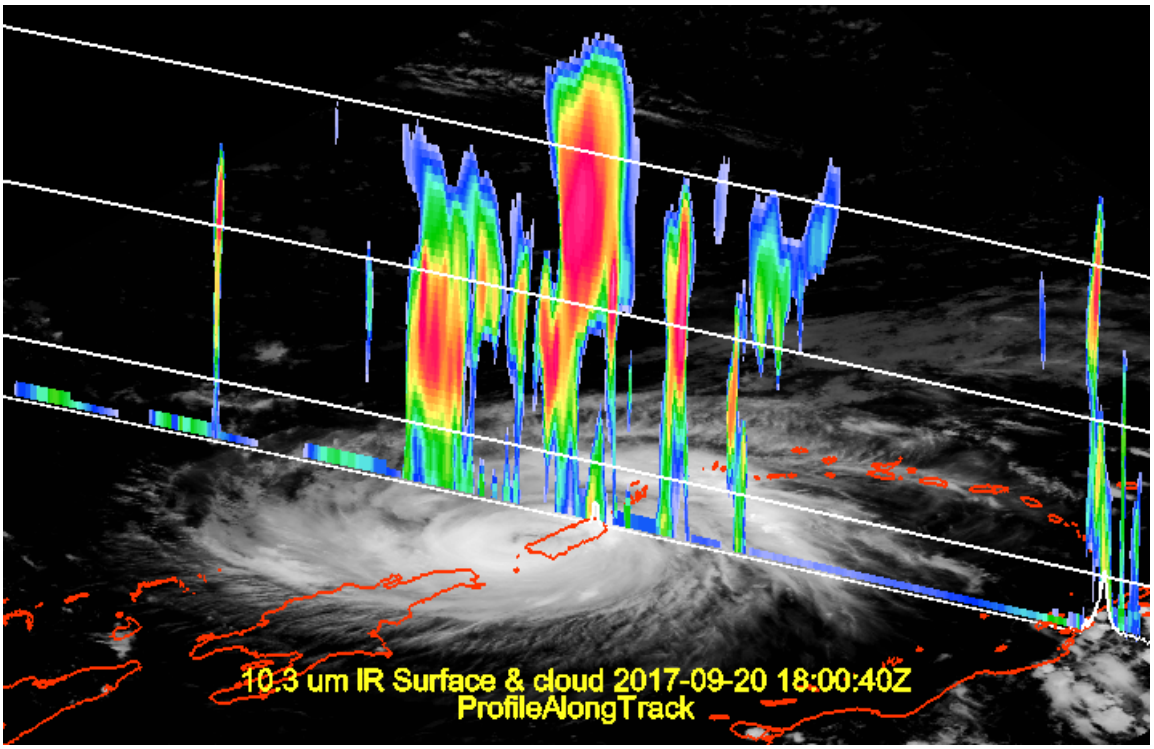


Image 3: ProfileAlongTrack Display

Data Transect Display

The Data Transect display plots in the **Layer Controls** tab of the Data Explorer, and plots a line of data at a constant height. The X-axis of the plot

represents distance, and the Y-axis represents the numerical value of the parameter you are plotting. In the Main Display window, you can drag the end points of the transect line, to move the transect to your desired location. See Data Transect Controls for more information on this display.

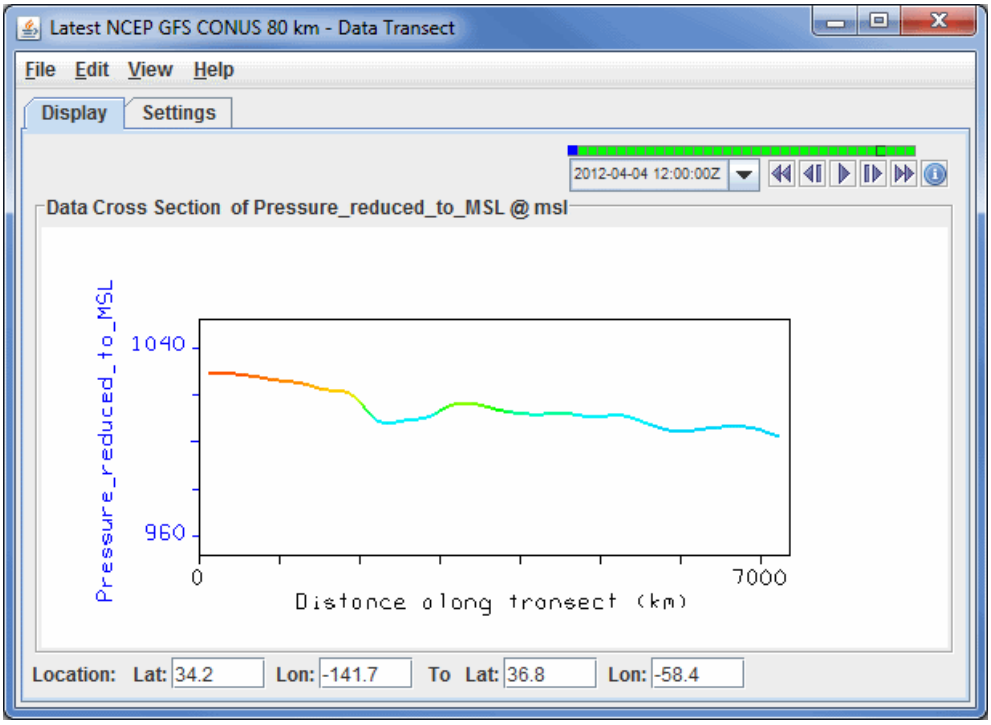
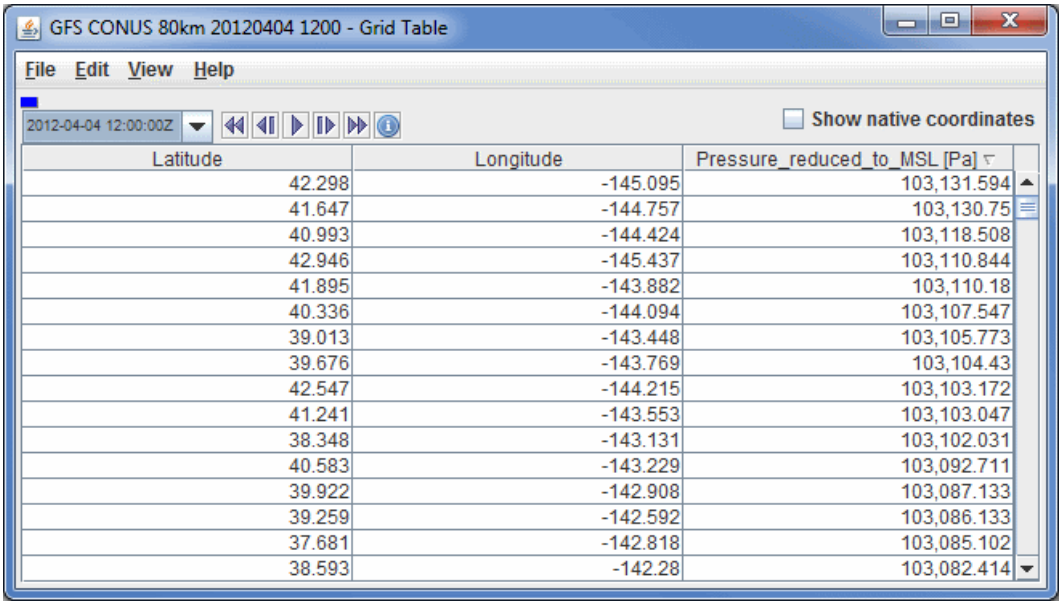


Image 4: Data Transect Display

Grid Table Display

The Grid Table display plots in the **Layer Controls** tab of the Data Explorer, and plots a chart of the numerical value of the field you are displaying at individual latitudes, longitudes, and altitudes (if available). See Grid Table Controls for more information on this display.



Latitude	Longitude	Pressure_reduced_to_MSL [Pa]
42.298	-145.095	103,131.594
41.647	-144.757	103,130.75
40.993	-144.424	103,118.508
42.946	-145.437	103,110.844
41.895	-143.882	103,110.18
40.336	-144.094	103,107.547
39.013	-143.448	103,105.773
39.676	-143.769	103,104.43
42.547	-144.215	103,103.172
41.241	-143.553	103,103.047
38.348	-143.131	103,102.031
40.583	-143.229	103,092.711
39.922	-142.908	103,087.133
39.259	-142.592	103,086.133
37.681	-142.818	103,085.102
38.593	-142.28	103,082.414

Image 5: Grid Table Display

Omni Display

The Omni display is a VisAD Spread Sheet, loaded with the parameter selected and its coordinates and units. The Spread Sheet is used to create a display where you have complete control over which coordinates are the axes, how it is colored, and so on. See more in the Omni Control.

For use of the Spread Sheet, see the VisAD Spread Sheet document at http://www.ssec.wisc.edu/~curtis/ss.html.

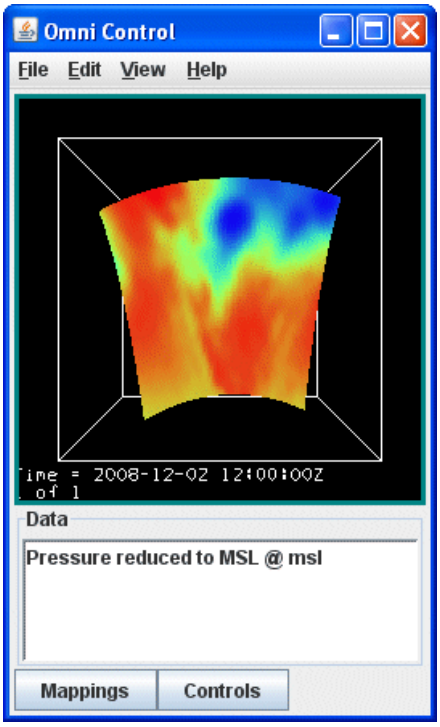


Image 6: Omni Control Display

Map and Transect Display

The Main Display window allows for various configurations of maps and transects. Through the Main Display window, use the **File->New Display Tab (Window)->Transect Display->\# panel(s)** to create a tab that contains anywhere from one to four transects. Additionally, as shown below, there are a few panel configurations that allow for having maps and transects in the same display. These configurations can be found under **File->New Display Tab (Window)->Misc**, where there are options for one map and one transect, one map and two transects, as well as two maps and one transect.

For more on using the transect panel type, see Transect Views.

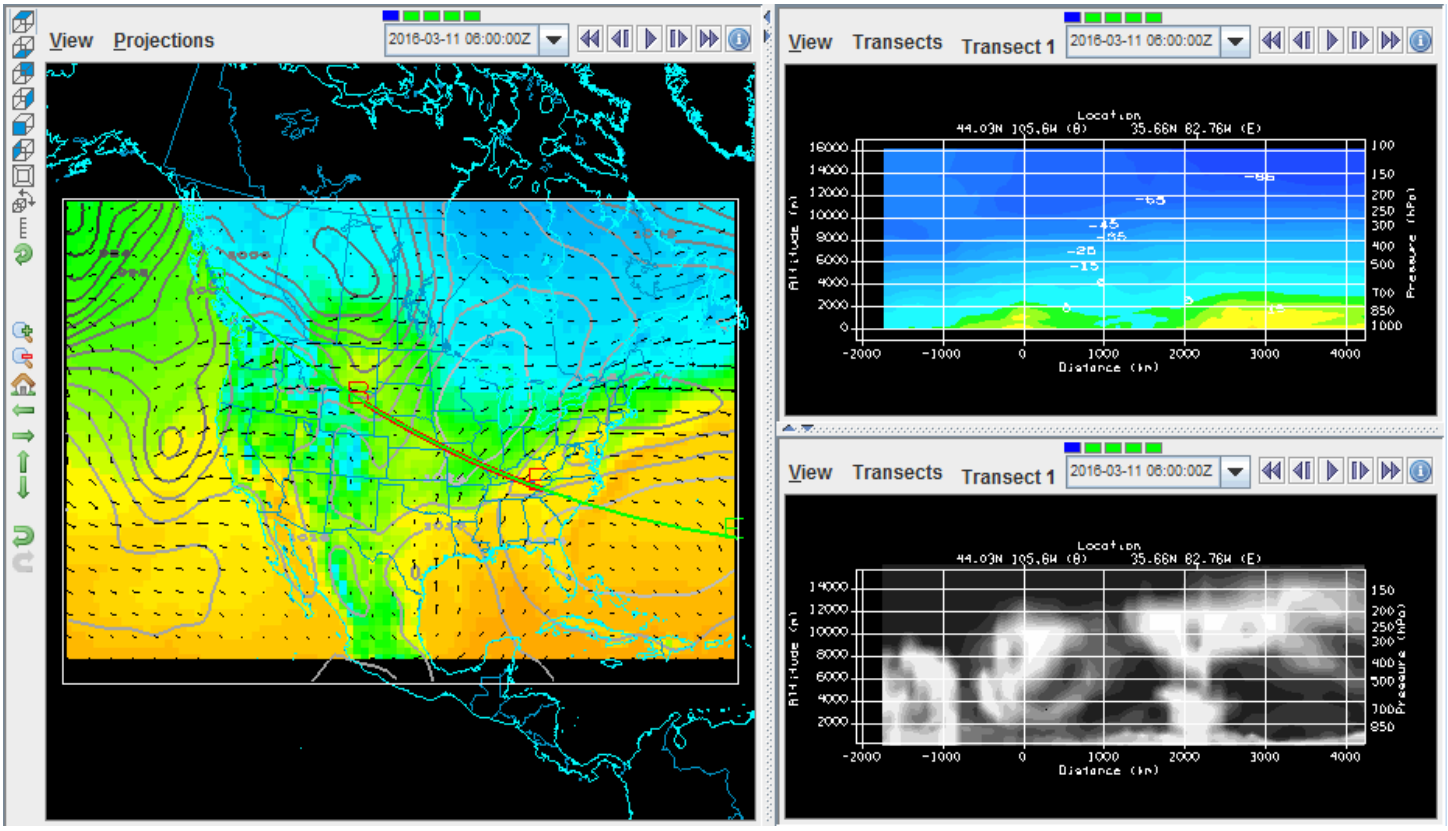


Image 7: Map and Transect Display

FAQ - Frequently Asked Questions

This section contains a list of questions commonly asked by users. The questions are organized by categories. You can find the answer to each question by clicking on the question, or the category that the question is in.

General

- What is McIDAS-V?
- Is McIDAS-V still under development?

Using McIDAS-V

- What do I do if McIDAS-V will not work on my computer?
- Where are the McIDAS-V files stored on my computer?
- How can I tell if McIDAS-V is busy doing something?
- How can I save a display?
- How can I change the start-up settings?
- How can I change the amount of memory available to McIDAS-V?
- How can I reset the map projections?
- How can I set the default projection?
- How can I change the color table range of a displayed parameter?
- When I set a color table transparent, why doesn't it show up that way?
- When I load an image, why is it displayed with fewer colors than I expect?
- When I load an image, why does it appear pixelated (blocky)?
- How do I change which maps are displayed by default?

Data

- What is Fast Rendering and when should I use it?
- What is the difference between the Standard Atmosphere and Vis5D pressure to height conversion?
- Why do I get an error when I try to load radar data that I downloaded from NCDC?
- When I try to read in my GRIB data, why do I get an ucar.grib.NotSupportedException?
- How are grids resampled in McIDAS-V?
- Why can't I create a time series from single time grids?
- How do I create a time series from individual grid files with different time steps?
- What are the wind speed thresholds for different wind barbs?

Video Cards

- Do I need a special video card to run McIDAS-V?
- Why does the display go gray or get corrupted when I resize my McIDAS-V display?
- If I'm having problems with the OpenGL version under Windows, can I run the Direct-X version Java 3D?

Common Installation Errors

- How do I get around a security error when installing McIDAS-V on my 10.8 OSX machine?

- What do I do if I am told to upgrade JDK when installing McIDAS-V?
- How do I solve write permissions errors on OSX?
- How do I solve shortcut permissions errors on OSX?
- Why am I am seeing a "Canvas3D: Non-recoverable graphics configuration error" when installing on my Windows 7 64-bit machine?

Common Run-Time Errors

- Why do I see 'Local servers cannot write to userpath:' errors when starting McIDAS-V?
- What do I do if I get a 'Could not create a graphics configuration' error?
- What do I do if I get 'JAVA 3D Error: GLX extension is not supported' and 'Could not create a graphics configuration' errors?
- What do I do if I see 'Connection refused' or 'No public datasets found' errors when connecting to the listed data servers?
- Why am I having drawing problems on Monitor2 of a two-monitor system?
- Why is there no map drawn in the McIDAS-V Main Display window?
- How do I fix the spurious map lines in my Main Display window?
- Why do my images display blank (black or white) when there should be valid data?
- Why do I get an error that starts something like "Unexpected Signal : 11 occurred at PC=0x6F79CE1" when starting McIDAS-V under Linux?

Reporting Problems

- What kind of support is provided for McIDAS-V?
- How do I report problems?
- How do I open the Error Logs Console?
- What do I do if McIDAS-V is locked up and not responding?

General FAQ

Q. What is McIDAS-V?

A. McIDAS-V is a **free**, open source, visualization and data analysis software package that is the next generation in the Space Science and Engineering Center's (SSEC) 40 year history of sophisticated McIDAS software packages. McIDAS-V displays weather satellite (including hyperspectral) and other geophysical data in 2- and 3-dimensions. McIDAS-V can also analyze and manipulate the data with its powerful mathematical functions. McIDAS-V is built on SSEC's VisAD and Unidata's IDV libraries, and an integrated version of SSEC's HYDRA software package.

Q. Is McIDAS-V still under development?

A. Development of McIDAS-V is ongoing at SSEC and as it progresses new features will be added and any problems/bugs will be fixed. The development will be driven by the needs of the community of users. Suggestions, comments and collaboration are welcomed and encouraged. The goal is to provide new and innovative ways of displaying and analyzing data, as well as provide the common displays that many users have come to expect.

Using McIDAS-V FAQ

Q. What do I do if McIDAS-V will not work on my computer?

A. Listed below is a basic checklist of steps to follow if your McIDAS-V is not working properly. Once you successfully complete each step in the process, restart McIDAS-V and try again. If the problem still exists, proceed to the next step, and so on.

1. Make sure that your ***drivers*** are up to date. Please see the **Graphics Cards and Drivers** section of the System Requirements page for more information.
2. Try downloading this Java3D example to see if you can view it. Please see the **Java Versions** section of the System Requirements page for more information. If this example does not work, then your system does not support Java3D.
   Note: If your system does not support Java3D version 1.3.1+ McIDAS-V will not work for you.
3. Set a small heap size by setting the ***Memory*** option to 512 megabytes in the User Preferences window's **Advanced** tab. If this resolves the issue, you can start increasing the memory until the problem appears again. Stay below the memory value that produces the problem.
4. Disable Java Access to Image Data by Reference by unchecking ***Enable access to image data by reference*** option in the User Preferences window's **Advanced** tab.
5. Rename your **McIDAS-V** document directory to start with a clean set of options. This will undo the changes made in steps 3-4 listed above, but it will eliminate any corrupt startup bundles or settings.
6. Repeat steps 3-4 with a clean slate.

Q. Where are the McIDAS-V files stored on my computer?

A. McIDAS-V files are divided into two categories: "system files" (supplied files that should not be edited) in the **McIDAS-V-System** directory and "user files" (new user-created files and supplied ones that contain user settings and preferences) that are in the **McIDAS-V** directory. The files in **McIDAS-V-System** are specific to the version of McIDAS-V. The files in **McIDAS-V** are not dependent on McIDAS-V version (such as XML files containing color enhancements, formulas, projections, etc.), so these settings will be carried from version to version. The system file directory can be changed during installation and its location defaults to the OS application directory (e.g., **C:\Program Files** on Windows, **/Applications** on OS X). The user file directory is created in the user's document directory (e.g., **C:\Documents and Settings*user*** or **C:\Users*user*** on Windows, **/Users/*user*/Documents** on OS X, **/home/*user*** on Linux). Files in these directories should not be edited by the user, but rather contact the McIDAS Help Desk or post to the McIDAS-V Support Forums for assistance if it is necessary to edit them.

Q. How can I tell if McIDAS-V is busy doing something?

A. The lower right corner of the Main Display window shows a box with progress bars if McIDAS-V is busy making a display or doing anything. In the status bar at the bottom, messages will appear when McIDAS-V is reading data from a server or disk. Also, while the displays are being created, there is usually a "please wait" notice in the lower left corner of the main display. When McIDAS-V is in the middle of a process in the Data Explorer window, the cursor will change to a spinning, blue ring.

Q. How can I save a display?

A. McIDAS-V supports JPEG, PNG, and GIF image formats. McIDAS-V can also write out an image and the corresponding Google Earth KML or KMZ files. Animations can be captured as QuickTime movies or animated GIFs. See Image Captures for more information. You can save a particular McIDAS-V state with all displays, data sources, maps, etc. by saving the data as a bundle. You can also save a bundle as a favorite.

Q. How can I change the start-up settings?

A. You can customize many of the McIDAS-V properties through the User Preferences window, accessed through the **Edit->Preferences** menu item in the Main Display window. This allows you to configure the many features of McIDAS-V.

You can set a bundle to open by default when you start McIDAS-V. To do this, save a bundle as a favorite and set it as your default bundle in the Defaults panel of the **Advanced** tab of the User Preferences window.

You can also set the locations of the Main Display window and the Data Explorer window, as well as the number of tabs and panels. To do this, save a default layout via the **File->Default Layout** menu item in the Main Display window.

Q. How can I change the amount of memory available to McIDAS-V?

A. You can change the amount of memory used by McIDAS-V by editing the **Memory** in the **Advanced** tab of the User Preferences window by selecting **Edit->Preferences...** from the Main Display window. See Running McIDAS-V for more information.

Q. How can I reset the map projections?

A. This can be controlled with the **Projections->Auto-set Projection** menu check-box. You can switch an existing display to its native data set projection using the display control's **View->Use Data Projection** menu.

Q. How can I set the default projection?

A. The default projection is set with the **Default Projection** field in the **Display Window** tab of the User Preferences window. This window is accessed via the **Edit->Preferences** menu item in the Main Display. If you do not want to use any of the native projections of McIDAS-V, you can create your own projections with the Projection Manager which is accessed from the **Projections->New/Edit** menu item in the Main Display window. The default projection is overridden by the projection saved in the default bundle, or by displaying new data, if the **Projections->Auto-Set Projection** menu checkbox is checked on. As a result, you may never see the default map projection unless your default bundle has the default projection, and you have the checkbox checked off. Choosing a default map projection is not necessary to use of McIDAS-V, it is just a feature to allow for further user-customization of their sessions.

Q. How can I change the color table range of a displayed parameter?

A. You can change the range for a display parameter in the Color Table Editor. This can be accessed in the **Layer Controls** tab of the Data Explorer by clicking the button next to Color Table, or by right-clicking on the color bar in the Legend of the Main Display window and selecting **Edit Color Table**. The range of the color table can be changed next to the Range button in the Color Table Editor. Alternatively, you can change the range outside of the Color Table Editor by right clicking on the color bar in the Legend of the Main Display window and selecting **Change Range...**, which opens a Change Range window where you can enter new values. If you always want to use a specific data range for a parameter, you can create a user parameter default so the range you desire will always be used when displaying the parameter. This can be done through the **Tools->Parameters->Defaults** menu item in the Main Display window to get to the Parameter Defaults Editor.

Q. When I set a color table transparent, why doesn't it show up that way?

A. Using transparency in a color display may give unexpected results. In general, only the last thing added can be fully transparent. If you have a display that is transparent, then add in a new display, you may not see it. You can use the display control's **View->Bring to Front** menu to remove and re-add the display that you want to be transparent so it is last.

Q. When I load an image, why is it displayed with fewer colors than I expect?

A. First, check that your display configuration is set to the maximum number of colors (e.g., 32 bit) so that McIDAS-V is able to display imagery and color tables using a full range of colors. If that is set correctly, it's possible that the range of values defined for the color table is less than the range of values in the displayed image. You can view or modify the range of values defined for the color table by right-clicking on the color bar in the Legend of the Main Display window and selecting either **Change Range...** or **Edit Color Table**. Right-clicking also displays other options that let you apply a different color table or edit the current one. If you created a contour display, you may also need to lower the Contour Interval in the Contour Properties Editor.

Q. When I load an image, why does it appear pixelated (blocky)?

A. A displayed image can appear pixelated (blocky) due to one or more factors, including the resolution of the displayed image, the magnification and pixel sampling factors at which it was displayed, and the zoom factor.

For example, if you display an 8 km resolution image while zoomed in to a small geographic region such that each display pixel represents a higher resolution value (e.g., 1 km^2 of the earth surface) the image pixels need to be duplicated to fill the display and thus the image will appear pixelated. The same effect will occur with any image if you zoom in (using the Zoom/Pan Toolbar buttons or other zooming actions) to where the display resolution is higher than the image resolution.

If you believe that the displayed image is more pixelated than it should be for its given resolution, check the settings of the Magnification sliders in the **Field Selector's Advanced** tab and the Pixel Sampling slider in the **Layer Controls** tab. In order to display the image at the highest possible resolution (its native resolution), the line and element magnifications must be set to 1 (sliders all the way to the right) and the pixel sampling set to 0 (slider all the way to the left).

Q. How do I change which maps are displayed by default?

A. By default, there are three maps that are displayed: 'North & Central America', 'World Political Boundaries', and 'World Coastlines'. Other system maps are included with the Map Controls, and their visibilities can be toggled on and off. Additional maps are contained in plugins that can be found under the Maps category in the Plugin Manager. Users can add their own shapefile maps through the **Edit -> Add Your Own Map** menu item in the **Layer Controls** of the Default Background Maps. To set a new group of maps as the default, use the **File -> Default Maps -> Save as the Default Map Set** menu item. This creates a maps.xml file in the McIDAS-V directory that includes which map layers are displayed, as well as different display settings including the line thickness, style, and color. Once the default map is saved, this will be used any time a new tab or window is created, and it will be persisted between sessions. To remove a default map setting that has been saved, use the **File -> Default Maps -> Remove Local Map Defaults** menu item. Removing the default map set requires a restart of McIDAS-V to take effect.

Data FAQ

Q. What is Fast Rendering and when should I use it?

A. By default, McIDAS-V will try to adjust the data layer (images, contours, etc.) renderings to account for projection seams. This is computationally intensive in some cases and slows down the display of data. If you change your User Preferences setting to **Use fast rendering**, McIDAS-V will not try to account for the projection seams. You can turn on/off Fast Rendering for individual displays in their Properties dialogs.

Q. What is the difference between the Standard Atmosphere and Vis5D pressure to height conversion?

A. McIDAS-V displays pressure surfaces by converting the pressure to a height in some reference system. There are two reference systems that come standard with McIDAS-V - the U.S. Standard Atmosphere and Vis5D. The U.S. Standard Atmosphere only computes has conversions for pressures up to about 80 km. The Vis5D coordinate system uses a logarithmic conversion:

```
P = 1012.5 * e^( H / -7.2 ) (^ denotes exponentiation) H = -7.2 * Ln( P / 1012.5 ) (Ln denotes natural log)
```

so it can be used for heights above 80 km.

Q. Why do I get an error when I try to load radar data that I downloaded from NCDC?

A. There are few common problems that can cause this:

1. **The files are in a compressed tar file** - Typically, when you download Level II data from NCDC, the files are in a compressed TAR file which holds the individual volume scans. You need to extract the volumes from the TAR file with utilities like tar, gunzip, WinZip into a directory.
2. **You are using the Files chooser** - You should load the radar data using the **Radar->Level II->Local** file chooser in the **Data Sources** tab of the Data Explorer, not the **General->Files** chooser. In some cases, the files do not have any location information in them. The Level II data chooser allows you to associate a station location with the data file, using the directory name as a first guess.
3. **You are trying to load Level III raster products** - McIDAS-V only handles the Level III data that is stored in radial format (Base Reflectivity, Storm Relative Velocity, Base Velocity, 1 and 3 hour precipitation, Echo Tops).

Q. When I try to read in my GRIB data, why do I get an ucar.grib.NotSupportedException?

A. For McIDAS-V to read in GRIB data, it needs access to lookup tables for decoding the information in the data. McIDAS-V comes pre-configured with most of the commonly used tables from NCEP, FNMOC, etc, but some GRIB data from regional centers may use tables other than the defaults. If McIDAS-V does not have the necessary table, you will get the NotSupportedException. You can add in new tables by following the instructions in the User's Guide section on Adding in new GRIB tables.

Q. How are grids resampled in McIDAS-V?

A. McIDAS-V uses two methods for resampling data - weighted average and nearest neighbor. These are the default sampling modes for VisAD, which McIDAS-V is based on. For any grid, the samples are organized in a topology, which may be triangles (Irregular2D), squares (Gridded2D), tetrahedra (Irregular3D) or cubes (Gridded3D). For target points the system finds which topology element contains the target. For nearest neighbor, it gets the values at the vertex of that containing topology element closest to the target point. For weighted average, it computes a weighted average of all vertices of that containing topology element, where the weights are bilinear in 2D and trilinear in 3D. (source: Bill Hibbard, SSEC)

Q. Why can't I create a time series from single time grid files?

A. If you receive an error message similar to the following:

```
An error has occurred: Creating display: Color-Shaded Plan View org.python.core.PyException visad.UnitException: visad.UnitException: Set: units dimension 1 does not match Domain dimension 2
```

the files may not have a "time" dimension defined in them. It is recommended that you use the NetCDF Markup Language (NcML) to aggregate the files. See http://www.unidata.ucar.edu/software/thredds/current/netcdf-java/ncml/Aggregation.html for more information on aggregating files.

Q. How do I create a time series from individual grid files with different time steps?

A. If you have individual files of gridded data for multiple time steps that you want to display as a single layer to utilize the Time Animation

Widget, there are two methods of doing this. First, in the **Data Sources** tab of the Data Explorer, navigate to the **Gridded Data->Local** or the **General Files/Directories** chooser. Select the *Aggregate Grids by Time* **Data Type**, navigate to the directory where your files are stored, and use Shift+click to select the files you wish to include in your layer. In the **Field Selector**, you will see that all of the times you selected for the data are grouped together. You can select your display type, create the display, and all of the data times will be loaded in as one layer and you can animate through them.

Alternatively, you can add all of the files individually through the **Gridded Data->Local** or **General->Files/Directories** chooser (without the *Aggregate Grids by Time* **Data Type**) and use the *Make a time sequence from single time grids/images* formula. This is a native formula of McIDAS-V that can be found under the **Miscellaneous** tree of formulas in the **Field Selector**. Using this formula, you can select all of the individual files, and McIDAS-V will add all of them to the Main Display window as a single layer you can animate through time.

Q. What are the wind speed thresholds for different wind barbs?

A. Below is a table that shows different wind speed thresholds when it comes to plotting wind barbs of gridded or point data. In this table, 'x' represents wind speed in knots.

Wind Barb	Knots	Wind Barb	Knots
	x = 0		52.6 ≤ x ≤ 57.5
	0 < x ≤ 2.5		57.6 ≤ x ≤ 62.5
	2.6 ≤ x ≤ 7.5		62.6 ≤ x ≤ 67.5
	7.6 ≤ x ≤ 12.5		67.6 ≤ x ≤ 72.5
	12.6 ≤ x ≤ 17.5		72.6 ≤ x ≤ 77.5
	17.6 ≤ x ≤ 22.5		77.6 ≤ x ≤ 82.5
	22.6 ≤ x ≤ 27.5		82.6 ≤ x ≤ 87.5
	27.6 ≤ x ≤ 32.5		87.6 ≤ x ≤ 92.5
	32.6 ≤ x ≤ 37.5		92.6 ≤ x ≤ 97.5
	37.6 ≤ x ≤ 42.5		97.6 ≤ x ≤ 102.5
	42.6 ≤ x ≤ 47.5		102.6 ≤ x ≤ 107.5
	47.6 ≤ x ≤ 52.5		107.6 ≤ x ≤ 112.5

Video Cards FAQ

Q. Do I need a special video card to run McIDAS-V?

A. Your graphics system must support 3D; make sure you have the latest video driver for your graphics card. This is included in the Windows operating system. On Linux the driver must support GLX, an X windows system extension to OpenGL programs. See Operating System Requirements for more information.

Q. Why does the display go gray or get corrupted when I resize my McIDAS-V display?

A. ATI cards do not always work correctly with the OpenGL version of Java 3D under Windows. If you experience problems with corrupted displays (sets of triangles, spurious lines, weird looking displays) and have an ATI card and are running Windows, try the following:

- Right click on the Windows Desktop and select Properties from the pop-up menu.
- From the **Settings** tab, make sure the color quality is 16 bit.
- Click the Advanced button and select the **OpenGL** tab. Depending on your card, either click the button for Force 16 bit buffer (or something like that) or click on the Compatibility settings button and click the "Force 16 bit" radio button.
- Click the OK buttons to exit the Display Properties dialog.
- Try McIDAS-V again and see if it works better.
- If not, try using the Direct-X installer instead of the OpenGL installer.

Q. If I'm having problems with the OpenGL version under Windows, can I run the Direct-X version Java 3D?

A. If you are using the version of Java 3D distributed with McIDAS-V (1.3.2), you can switch between the OpenGL and Direct-X versions of Java 3D with a command line switch. If you are using runMcV.bat to start McIDAS-V, edit that file and uncomment the appropriate line. If you have your own script for starting McIDAS-V, add in the **-Dj3d.rend=d3d** option to your start line (before -jar or class name).

Common Installation Errors FAQ

Q. How do I get around a security error when installing McIDAS-V on my 10.8 OSX machine?

A. After double-clicking on the *.dmg installer file, you may see the following error:

```
"McIDAS-V Installer" can't be opened because it is from an unidentified developer.

Your security preferences allow installation of only apps from the Mac App Store and
identified developers.
```

To get around this, you could turn off the security checks or follow the next steps which will work around the security for the McIDAS-V installation. To do this, right-click on the installer icon to get a dropdown menu, and choose **Open**. After choosing **Open**, you should see the following message:

```
"McIDAS-V Installer" is from an unidentified developer. Are you sure you want to open
it?

Opening "McIDAS-V Installer" will always allow it to run on this Mac.
```

Once you click **Open** in this window, you will be prompted to enter a login/password for the administrator account. After entering this information, click **OK** and the installation should proceed without error.

Q. What do I do if I am told to upgrade JDK when installing McIDAS-V?

A. A user reported --- The first time I ran the script, it told me I needed to upgrade my JDK. So I installed jdk1.6.0_03 and Java3D 1.3.1. Then McIDAS-V installed without any problem.

Q. How do I solve write permissions errors on OSX?

A. Browse for a writable directory (e.g. /Users/mcuser). Under "Select Additional Tasks", uncheck "Create Launcher and Configuration shortcuts in Applications folder"

Q. How do I solve shortcut permissions errors on OSX?

A. At Extracting files: McIDAS-V Configuration.app/Contents/Info.plist/Applications/McIDAS-V Configuration.app/Contents/Info.plist I can not create this file. To solve this, click "Cancel" and restart the installer. Follow instructions under Error #2 above.

Q. Why am I am seeing a "Canvas3D: Non-recoverable graphics configuration error" when installing on my Windows 7 64-bit machine?

Common Run-Time Errors FAQ

Q. Why do I see 'Local servers cannot write to userpath:' errors when starting McIDAS-V?

A. To use local servers in McIDAS-V, there is a background server listening process called *mcservl*. This process run for the duration of the session, and after McIDAS-V is exited, the process take extra time to terminate. If McIDAS-V is closed and started again before the *mcservl* process terminates, local servers will not be able to start and the 'Local servers cannot write to userpath:' error occurs. Once this error comes up, click OK. If you attempt connecting to a local dataset, a message will pop up directing you to the ADDE Data Manager, where navigating to the ***Local Servers -> Start Local Servers*** menu item will start up the local servers correctly so that local servers can be used in the session. To avoid this error, it is recommended that a user waits about 10 seconds after exiting McIDAS-V before starting again.

Additionally, if running 64bit Debian or Ubuntu operating systems, this message can appear at startup if the ia32-libs package is not installed on the workstation. The ia32-libs are the 32bit libraries that 32bit applications need to execute on a 64bit system.

Q. What do I do if I get a 'Could not create a graphics configuration' error?

A. First, check for the most updated video card driver. If the problem still remains, the 32bit Linux installer comes with an option to install Java3D 1.3. Rerun the installer and select to install Java3D 1.3.

Q. What do I do if I get 'JAVA 3D Error: GLX extension is not supported' and 'Could not create a graphics configuration' errors?

A. GLX is an extension that must be supported by the graphics card. This error is most likely occurring because the graphics drivers for RHEL are not properly configured.

Assuming that the latest graphics drivers are installed, they must be configured in the window system configuration file. Since RHEL uses Xorg, look in the file

    /etc/X11/xorg.conf

and see if there are any references to "GLX" or "glx" (and possibly "dri"). If there are, try uncommenting them and rebooting.

Q. What do I do if I see 'Connection refused' and 'No public datasets found' errors when connecting to the listed data servers?

A. If you have a firewall and are trying to get data from the remote servers (image, radar, point, and upper air data), error messages such as "Error opening connection ... Operation timed out" or "No Data Available" are normal. For these servers to send data, your firewall software must allow connections on ports 112 (ADDE) and 8080 (THREDDS Data Server).

Q. Why am I having drawing problems on Monitor2 of a two-monitor system?

A. Some graphics card/driver combinations don't allow McIDAS-V window functions to work correctly in Monitor2 of two-monitor systems. For example, if your system has this problem and you move the McIDAS-V windows to Monitor2, the Image Chooser's Advanced tab in the Field Selector may not be visible, or adding a new tab in the Main Display may result in most of the window going blank ("graying out"). You may also receive the error (or see it in the mcidasv.log file), '*...adding a container to a container on a different GraphicsDevice*'.

For now, the only working solution for this problem is to move the McIDAS-V windows to Monitor1. After doing this, the windows should display correctly and you should be able to successfully add new tabs and run bundles.

If you are running Red Hat with a NVIDIA graphics card using TwinView and are having problems, go to the preferences, click on the primary display, and make sure the "Make this the primary display..." checkbox is checked.

Q. Why is there no map drawn in the McIDAS-V Main Display window?

A. Try changing your memory to use 1 GB or lower and restart McIDAS-V. You can change the amount of memory used by McIDAS-V by editing the **Maximum Heap Size** in the **Advanced** tab of the Preferences by selected **Edit->Preferences...** from the Main Display window.

Q. How do I fix the spurious map lines in my Main Display window?

A. If you run into this problem, you should first try changing your **Enable access to geometry by reference** VisAD setting in the **Advanced** tab of the User Preferences window. You can get to the User Preferences window through the **Edit->Preferences** menu item in the Main Display window. This option is turned on by default, but turning this option off can help to remove random/extraneous map lines that sometimes appear in the display. This is a problem that may occur more frequently on systems with ATI graphics cards. After changing this preference, click **OK** and restart McIDAS-V (any changes to the Advanced Preference require a restart to take affect).

If this did not solve the map line problem, look in the **Layer Controls** tab of the Data Explorer for the Default Background Maps. Determine which map is causing the spurious lines by toggling the visibility of the maps on and off. Once you determine which map is causing the lines, change the **Fast Rendering** option for this map.

Q. Why do my images display blank (black or white) when there should be valid data?

A. The first thing to do is to make sure that your graphics drivers are up to date. If this does not solve the problem, another option is to change the amount of memory allocated to McIDAS-V. From the Main Display window's menu bar, select **Edit->Preferences**. This opens a User Preferences window, where you want to select the **Advanced** tab. At the top of the window there are two options for selecting memory. Click the radio button that allows you to specify the numerical value of memory allocated to McIDAS-V. Enter in a value of 512 megabytes and click OK to save the change. Then exit and restart McIDAS-V (changes in the Advanced User Preferences require a restart of McIDAS-V to take effect). If this resolves the issue of white images, you can start increasing the memory until the problem appears again. Stay below the memory value that produces the problem.

We have also received reports of this problem (blank images in the Main Display window) occurring on computers with the Mobile Intel 4 Series Express Family of graphics cards. If you have a computer with that configuration and are seeing the problem, try setting the card's "Vertex Processing" configuration setting to "Enable Software Processing". That setting is recommended because it will likely work with a typical amount of memory allocated to McIDAS-V (e.g., 80% of available). If the "Vertex Processing" option is set to a different value (e.g., "Application Settings" and "Default settings"), you may have to select a memory value of 800 MB or less in order to avoid the problem.

Q. Why do I get an error that starts something like "Unexpected Signal : 11 occurred at PC=0x6F79CE1" when starting McIDAS-V under Linux?

A. If the error message also includes a line that is looking for a Library with "dri" in it's name (e.g.: Library=/usr/X11R6/lib/modules/dri/i915_dri.so), it means that you are trying to load the DRI library in your X server which is not compatible with Java 3D. You need to comment out the line:

```
Load "dri"
```

in your X server configuration file (xorg.conf or XF86Config).

Reporting Problems FAQ

Q. What kind of support is provided for McIDAS-V?

A. For information about obtaining help and support for McIDAS-V, check out the Documentation and Support page in the McIDAS-V User's Guide.

Q. How do I report problems?

A. First, check this FAQ and the McIDAS-V Support Forums to make sure this is a problem that has not yet been reported.

If you experience unexpected problems that are not reported in those locations, please let us know. See the Documentation and Support section of the manual for the procedures on how to do this.

Q. How do I open the Error Logs Console?

A. Open a console to show error logs with the **Help->Show Console** menu.

Q. What do I do if McIDAS-V is locked up and not responding?

A. First, you need to retrieve a stack track of the program so we can find out why this is happening. McIDAS-V provides a web-based service that produces a stack trace. Just view the URL:

```
http://127.0.0.1:8788/
```

and send the McIDAS-V Support Team on the Contact Us page. Note: This service is only available from browsers running on the machine McIDAS-V is running on.

You can also use this service to shutdown McIDAS-V.

McIDAS-X Commands in McIDAS-V

Listed Below are several common McIDAS-X commands, followed by a brief description of the corresponding method used in McIDAS-V.

ADDE Datasets

DATALOC ADD - Enter server and dataset information in the chooser, or use the **ADD ADDE Servers...** button in the **ADDE Servers** tab of the User Preferences window.

DATALOC LIST - Select server in chooser and use Dataset pull down menu to view available datasets.

DSINFO - Select the chooser with the data you want to view (Image, Point, etc.), connect to the server and view "Data" type list to see available descriptors.

DSSERVE ADD - Open the **Local ADDE Data Manager** and select **File -> New Local Dataset**.

DSSERVE DEL - Open the **Local ADDE Data Manager** and select which dataset to delete by clicking on the dataset and then selecting **Edit -> Remove Selection**.

DSSERVE LIST - Open the **Local ADDE Data Manager**, which lists all of the remote datasets.

Frame Control

A, B, L - Use the Time Animation Widget above the 3D display to control the looping.

D - Use the middle mouse button click option to probe the data in the Main Display window.

E - Move the mouse anywhere over the image, and the lat/lon readout will be displayed at the bottom of the Main Display window.

K, W - Use the **Layer Visibility** checkboxes in the Legend to control the visibility status of images, maps, and other layers in the Main Display window.

O - Use **Layer** checkboxes in the Legend to control visibility, or right-click on the item in the Legend, and use the **View->Bring View to Front** option to reorganize layers.

Gridded Data

GRDDISP - Use the Gridded Data Chooser to select a Catalog and Data Source.

GRDIMG - Once the gridded data is loaded in the **Field Selector**, select which field to display, and select Color-Shaded Plan View in the **Displays** panel.

Image Data

IMGDISP - Use the Satellite Imagery chooser to select dataset, add the data, and load the image(s).

IMGFILT - Once the data is loaded in the **Field Selector**, select **Formulas->Image Filters**.

IMGLIST - After the Image Type is chosen, select the **Absolute Times** tab to view the list of available times of the data.

IMGOPER - Many formulas are built into McIDAS-V, which can be accessed in the **Field Selector** tab of the Data Explorer. You can also create and edit formulas and Jython methods.

IMGPLOT - Use the Transect/Probe displays.

IMGPROBE - Click the middle mouse button over the image or use Data Probe/Time Series display.

IMGREMAP - Use the Projections menu to create or change projections.

Image Enhancements

COMBINE - Once the data source is loaded into the **Field Selector**, select **Formulas->Imagery->RGB** in the **Data Sources** panel. When you click **Create Display**, a second Field Selector window will pop-up for selecting the red, green, and blue fields. After the fields are selected, the image will be displayed.

EB - Change the range of the data being display by interactively modifying the color bar, or click the **Change** button next to Contour in the **Layer Controls** tab to open the Contour Properties Editor.

EU LIST - Right-click on the color table in the Legend or **Layer Controls** to get a list of available color tables.

EU MAKE - Use the **Tools->Color Table Editor** menu item.

EU REST - Right-click on the color table in the Legend or **Layer Controls** and select a new enhancement.

EU SAVE - Use the **Tools->Color Table Editor** menu item. Here, you can create/modify an existing color bar. To save, click **File -> Save As**.

Surface Data

PTDISP - Use the **Point Observations->Plot/Contour** chooser to select data, and display Point Data as a Point Data Plot and choose your layout model for how to plot your point data. Use the **Tools->Layout Model Editor** menu item to create/edit a new layout model.

PTCON - Use the **Point Observations->Plot/Contour** chooser to select data. In the **Field Selector**, select a parameter under Gridded Fields, and select which Display and Level to use.

SFCCON - Use the **Point Observations->Plot/Contour** chooser to select surface data. Select a parameter under Gridded Fields, and choose Contour Plan View.

SFCLIST - Use the **Point Observations->Plot/Contour** chooser to select surface data. Select Point Data as your field. Display the Point Data as a Point Data List. The chart of surface data will be listed in the **Layer Controls** tab of the Data Explorer.

SFCPLOT - Use the **Point Observations->Plot/Contour** chooser to select surface data. Display Point Data as a Point Data Plot, and choose layout model for how to plot the point data. Use the **Tools->Layout Model Editor** menu item to create/edit a new layout model.

SFCRPT - Weather Text Products Display (**Tools->Text Data->Weather Text Products (from server)**). Select **Observed Data->Sounding Data**, and the station in the **Locations** tab.

Upper Air Data

HODO - Use the **Point Observations->Soundings chooser** to select upper air data. Create a Skew-T in the **Field Selector** tab. Once the Skew-T is created in the **Layer Controls** tab, select the **Hodograph** tab above the image.

PTDISP - Use the **Point Observations->Plot/Contour** chooser to select data, and display Point Data as a Point Data Plot and choose your layout model for how to plot your point data. Use the **Tools->Layout Model Editor** menu item to create/edit a new layout model.

PTCON - Use the **Point Observations->Plot/Contour** chooser to select data. In the **Field Selector**, select a parameter under Gridded Fields, and select which Display and Level to use.

RAOBCON - Use the **Point Observations->Soundings chooser** to select upper air data. Use the Gridded Fields to display contours in the Plan View Display.

RAOBPLOT - Use the **Point Observations->Soundings chooser** to select upper air data. Display Point Data as a Point Data Plot, and choose a layout model for how to plot the point data. Use the **Tools->Layout Model Editor** to create/edit a new layout model.

RAOBPRT - Weather Text Products Display (**Tools->Text Data->Weather Text Products (from server)**). Select **Observed Data->Sounding Data**, and the station in the **Locations** tab).

UAEDIT - Use the **Point Observations->Soundings** chooser to select upper air data. Create a Skew-T in the **Field Selector** tab of the Data Explorer. Once the Skew-T is displayed, it can be interactively modified by clicking and dragging on the temperature and dew point temperature profiles.

UALIST - Use the **Point Observations->Plot/Contour** chooser, and select upper air data from the Server/Dataset chosen. In the **Field Selector**, select Point Data as the Field, Point Data List as the display, and the Level for the data to be displayed.

UAPLOT - Use the **Point Observations->Soundings** chooser to select upper air data. Create a Skew-T in the **Field Selector** tab of the Data Explorer.

Other

EG - Click the **Remove all layers** button in the Main Display window, select **Edit->Remove->All Layers** in the Main Display window, or click the trash can icon next to the item in the Legend.

HELP - Click the **Help** menu in the Main Display window and select User's Guide or Getting Started. Also, you can click on the question mark icon in the bottom right corner of the Data Explorer to open the User's Guide to the section appropriate to what is being viewed.

Scheduler (SKED, SKE, SKL, SKU) - Set up polling options in data sources (right-click on the Data Source in the **Field Selector** and select Properties), or run background scripts through cron. Active polling can be used to automatically reload data at a set interval.

WWDISP - Shape files from the **General->Catalogs** chooser.

ZA - Text option in the Drawing Controls (**Display->Draw Freely**).

ZLM, CW - Shape options in the Drawing Controls (**Display->Draw Freely**).