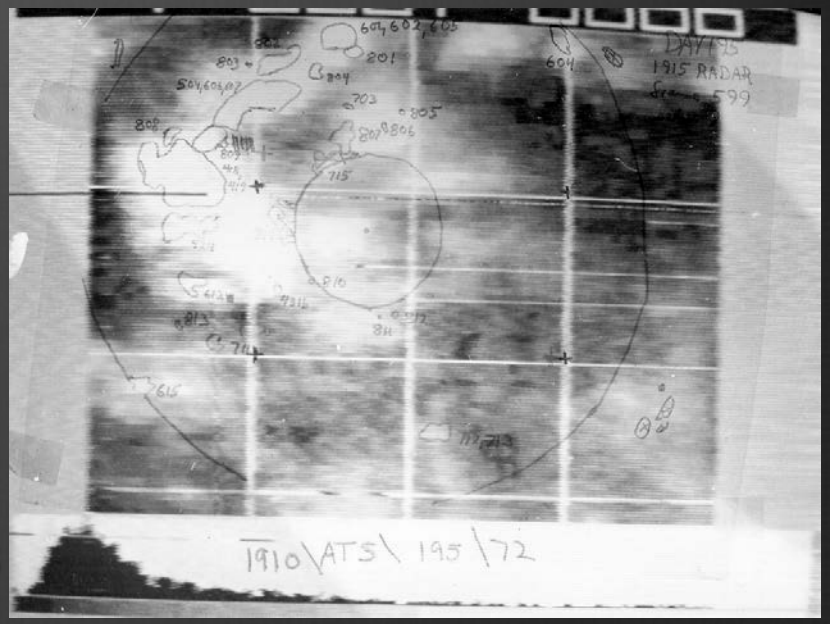
McIDAS History and McIDAS-V Status

David Santek

9 September 2013

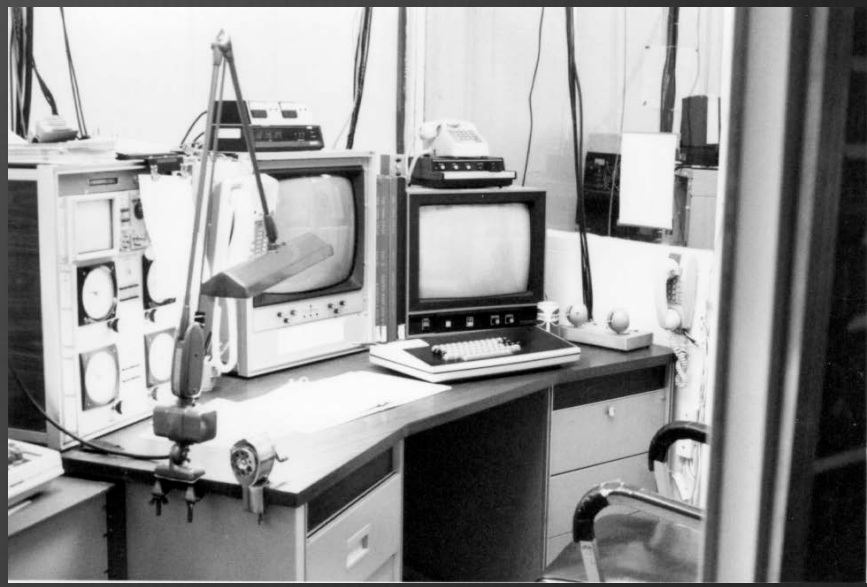
McIDAS History

- 1960s: Prof. Vern Suomi was striving to exploit the geostationary satellites for time domain information
- McIDAS was initially developed with the goal to mass produce the cloud drift winds
- For the last 40 years, McIDAS has evolved through 5 generations of hardware/software as an internationally renowned system



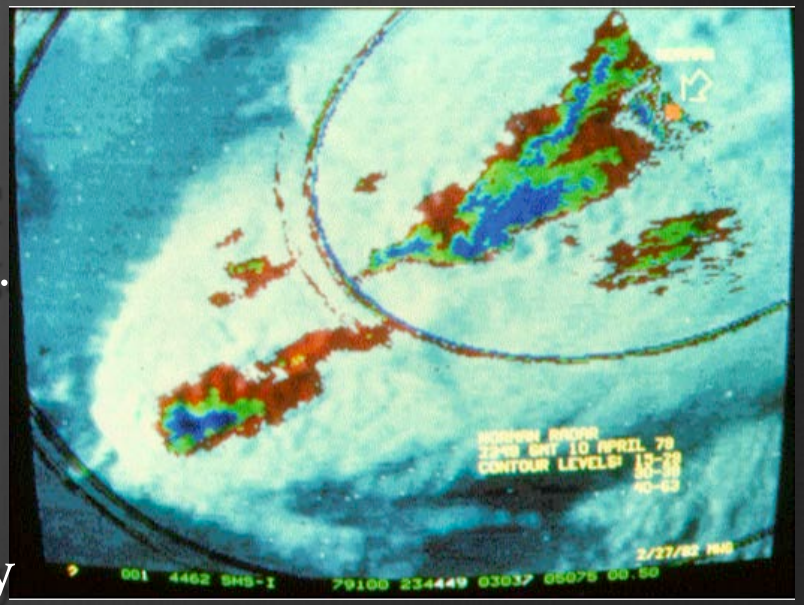
McIDAS Significant Milestones

- 12 October 1973: McIDAS was first used in a research project by Dave Martin
- 1977: McIDAS installed at WTVT in Tampa, FL; continues as an active McIDAS site today
- 1978: Cloud-drift winds were manually generated from five geostationary satellites for a year as part of the First GARP Global Experiment (FGGE)



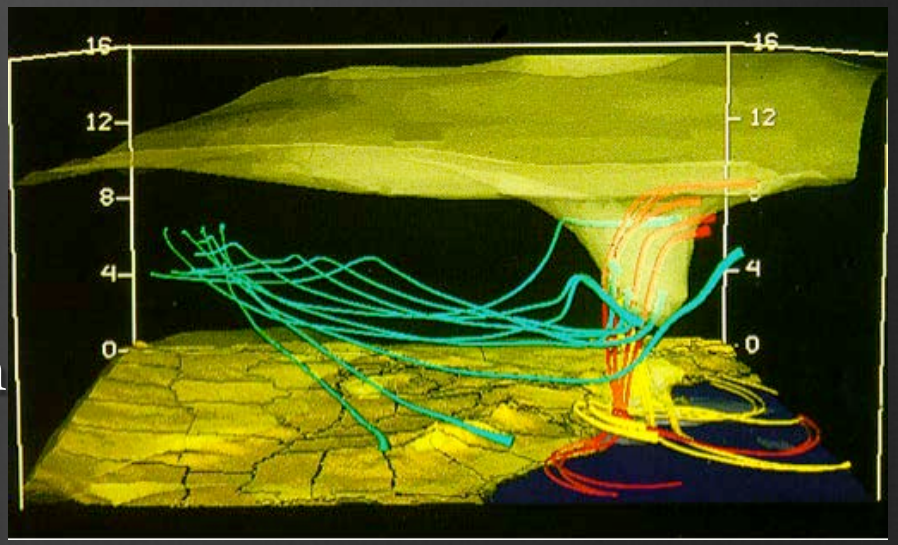
McIDAS Significant Milestones

- 1979: Congressional delegation visited SSEC to learn about advances in severe storm forecasting in wake of tornadoes in Wichita Falls, TX
- 1982: McIDAS installed at NSSFC to aid in severe weather forecasting.
  - Mesoscale Discussions began in 1986, partly in response to the availability of timely analyses
- 1982: Port to mainframe; funded by People's Republic of China



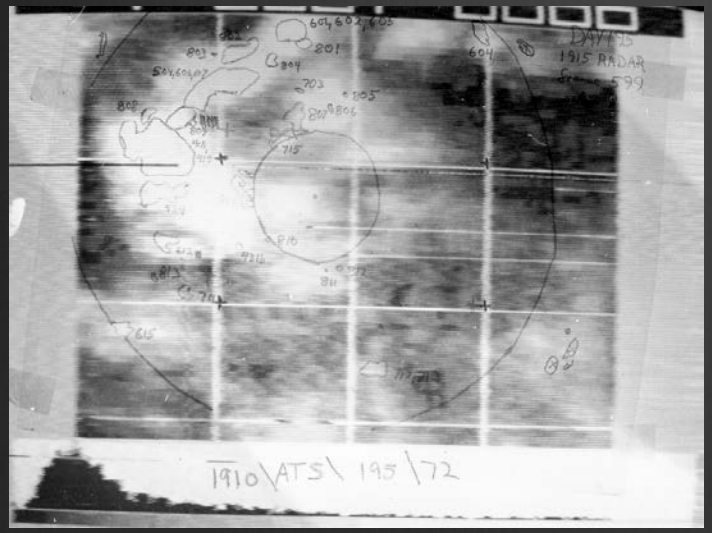
McIDAS Significant Milestones

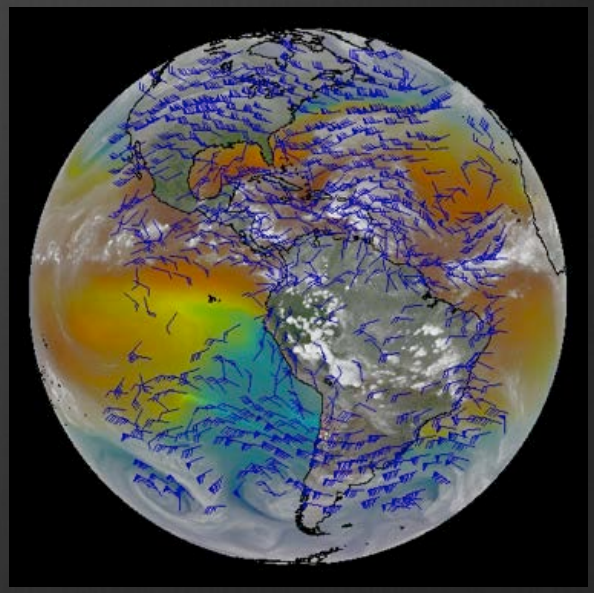
- 1982: Interactive Flash Flood Analyzer (IFFA) based on McIDAS installed at NOAA
- 1989: McIDAS Users' Group formed
- mid-1980s: McIDAS installed at Cape Canaveral and Johnson Space Center in support of the space shuttle
- late-1980s: Installed at NHC



McIDAS Significant Milestones

- 1992: McIDAS-X, Unix-based system
- 1994: CIRA RAMSDIS – GOES satellite data into NWS
- mid-1990s: Abstract Data Distribution Environment (ADDE)

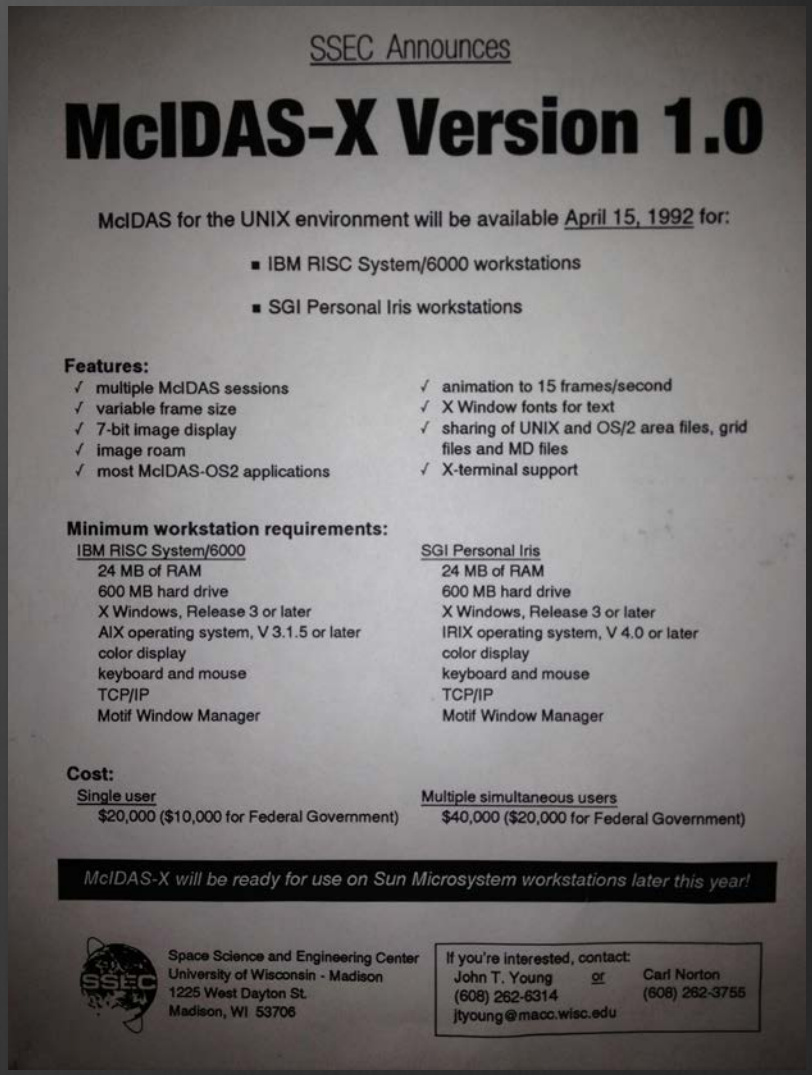




McIDAS-X
Current Chapter

McIDAS-X Introduction

- Ported code from mainframe and DOS- and OS/2-based computers to IBM AIX workstations
- Released April 1992
- A distributed system as opposed to previous mainframe



SSEC Announces

McIDAS-X Version 1.0

McIDAS for the UNIX environment will be available April 15, 1992 for:

- IBM RISC System/6000 workstations
- SGI Personal Iris workstations

Features:

- ✓ multiple McIDAS sessions
- ✓ variable frame size
- ✓ 7-bit image display
- ✓ image roam
- ✓ most McIDAS-OS2 applications
- ✓ animation to 15 frames/second
- ✓ X Window fonts for text
- ✓ sharing of UNIX and OS/2 area files, grid files and MD files
- ✓ X-terminal support

Minimum workstation requirements:

IBM RISC System/6000
- 24 MB of RAM
- 600 MB hard drive
- X Windows, Release 3 or later
- AIX operating system, V 3.1.5 or later
- color display
- keyboard and mouse
- TCP/IP
- Motif Window Manager

SGI Personal Iris
- 24 MB of RAM
- 600 MB hard drive
- X Windows, Release 3 or later
- IRIX operating system, V 4.0 or later
- color display
- keyboard and mouse
- TCP/IP
- Motif Window Manager

Cost:

Single user
$20,000 ($10,000 for Federal Government)

Multiple simultaneous users
$40,000 ($20,000 for Federal Government)

McIDAS-X will be ready for use on Sun Microsystem workstations later this year!

Space Science and Engineering Center
University of Wisconsin - Madison
1225 West Dayton St.
Madison, WI 53706

If you're interested, contact:
John T. Young (608) 262-6314 jtyoung@macc.wisc.edu
or
Carl Norton (608) 262-3755

McIDAS-X
Keys to Success

- Port to Unix
- ADDE (Abstract Data Distribution Environment)
- McIDAS-X Reglue

Resulted in the longevity of McIDAS-X

Reliability, Stability

Solid infrastructure

McIDAS-X Future

- McIDAS-X is expected to be supported until about 2020 for current GOES satellites
- NOAA/NESDIS has a million lines of product generation code
- MUG bug fixes, adaptive maintenance (changes to and new satellites)
- Enhancements continue to be funded and/or code contributed by internal projects and external sites


McIDAS
V

McIDAS-V Motivation

- McIDAS-X software (currently written in Fortran 77 and C) has a 40-year heritage resulting in limited extensibility potential
- New visualization concepts cannot be incorporated
- Forthcoming environmental satellite data cannot be utilized efficiently (GOES-R & JPSS operational systems)

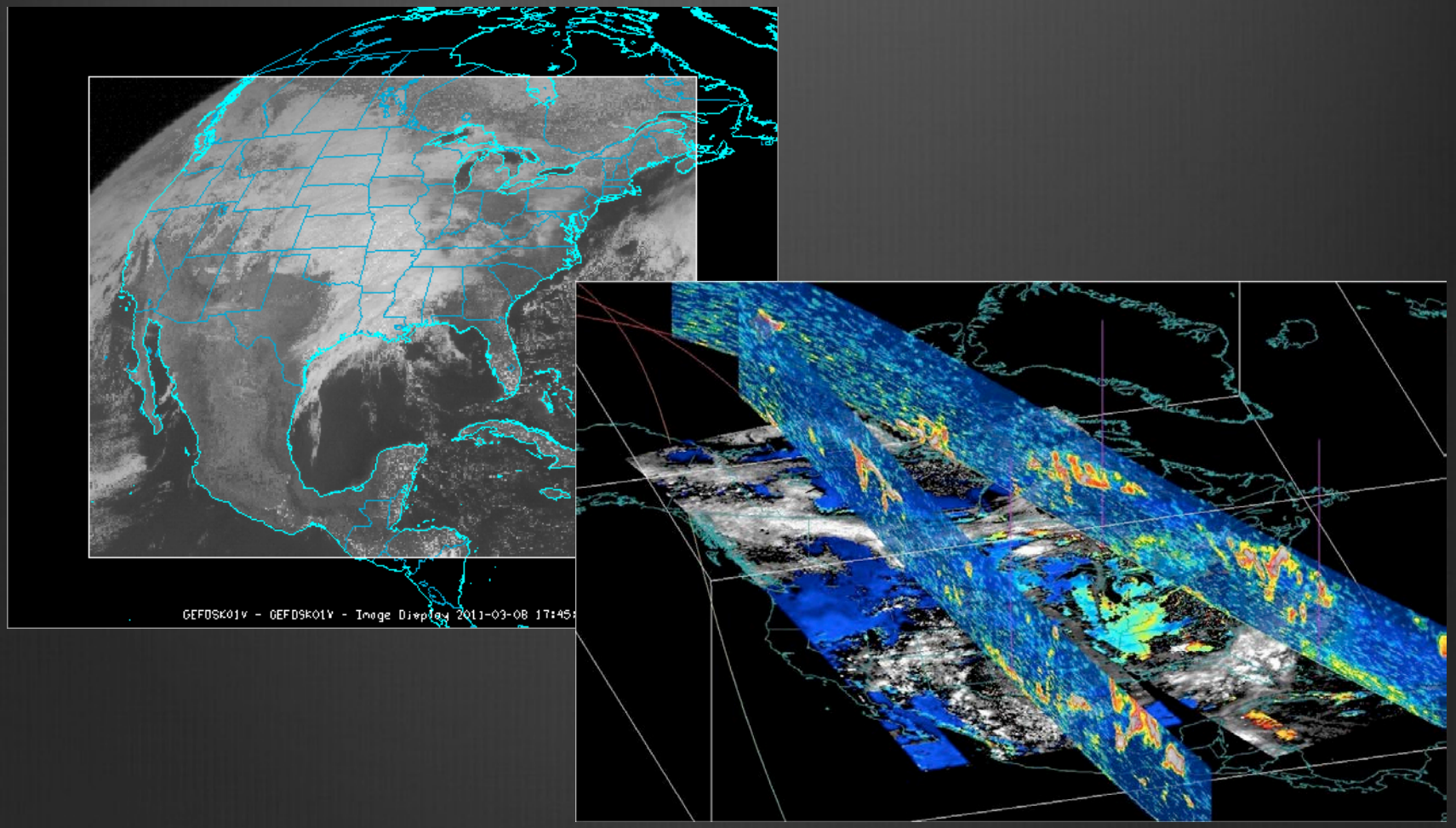
McIDAS-V Goals

- McIDAS-V shall be a powerful and versatile software system for environmental data processing, analysis and visualization
- McIDAS-V shall support existing and evolving needs of scientific research and algorithm/applications development for new programs, such as NPOESS and GOES-R as well as for retrospective data, such as that from GOES and POES
- McIDAS-V shall support data fusion and algorithm interoperability from existing and future sources
- The McIDAS team shall continue to fully support the MUG and McIDAS-X functionality as users transition to McIDAS-V
- McIDAS-V shall support operational users by providing tools and interfaces that enable a natural transition path for research results into operations
- McIDAS-V shall be used to educate students in remote sensing and physical sciences, and students must be integrally involved in its development, evolution and use

McIDAS-V Innovative

- Develop new capability in visualization and data analysis: Move beyond 2D to 3D

McIDAS-V
Innovative



McIDAS-V Milestones

- 2003: Whittaker and Santek present a McIDAS-V plan to the Directors
- 2006: Investigations of a "new approach" to data analysis and visualization
- 2007: Collaboration with Unidata to advance VisAD and IDV as the basis of McIDAS-V
- 2008: McIDAS-V becomes an "alpha"
- January 2009: beta 1
- January 2010: beta 5
- September 2010: V1.0

McIDAS-V Current Users

- In 2012:
  - McIDAS-V was downloaded by 4600 unique IP addresses
  - McIDAS-V was launched 340,000 times (lifetime total of over 1,000,000)
- Education (AOS, Texas A&M, MissState, etc.)
- Real-time: EUMETCast users
- Automated: Mexico weather service

McIDAS-V Survey

- Fall 2012: A survey was created for users of McIDAS software.
- December 2012: The survey was sent to:
  - Those on McIDAS email lists
  - A large group of scientists where it was uncertain if they ever used McIDAS
- There were 69 responses to the McIDAS-V portion of the survey; about a 10% response.

McIDAS-V Survey

Usage

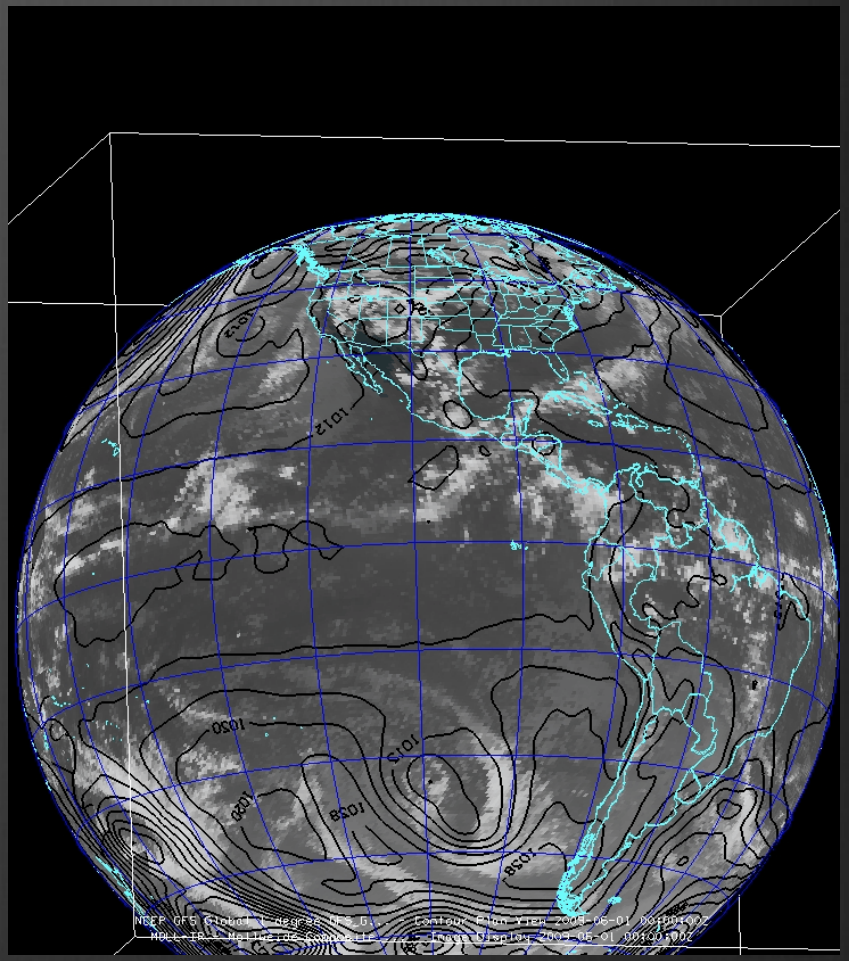
- 41% used McIDAS-V and not McIDAS-X
- 59% used both
- 41% used the software at least once a week
- 67% responders were in research; 30% in operations
- 89% used satellite data (88% geo; 44% polar)

Important attributes

- 89% wide variety of data types
- 74% imaging and animation tools
- 74% overlay multiple data types
- 70% ease of use
- 59% analysis tools

McIDAS-V Software Status

- Four main components:
  - VisAD
  - IDV
  - HYDRA
  - Additional development



McIDAS-V Software Status: VisAD

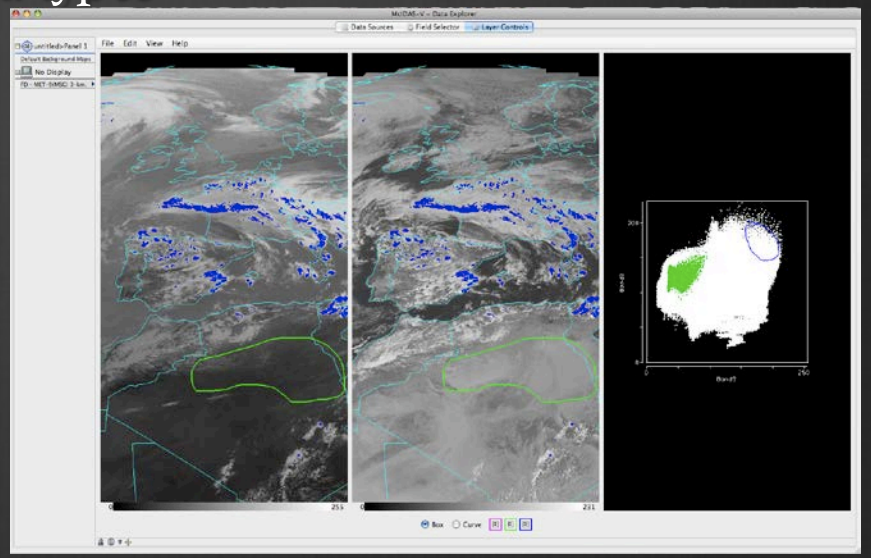
- VisAD is an open-source, Java library for building interactive and collaborative visualization and analysis tools:
  - Mathematical data model that embraces any numerical data set
  - General display model that supports 2- and 3-D displays, multiple data views, direct manipulation
  - Adapters for multiple data formats and access to remote data servers

McIDAS-V Software Status: IDV

- IDV built on VisAD (User Interface, etc.)
- The IDV is maintained by Unidata, with input and suggestions from SSEC
  - Monthly telecons between Unidata and SSEC
  - Shared programmer forums
  - Common source control
  - Includes the netCDF Java library for reading many different data formats (netCDF, HDF, GRIB, BUFR, etc.)

McIDAS-V Software Status: HYDRA

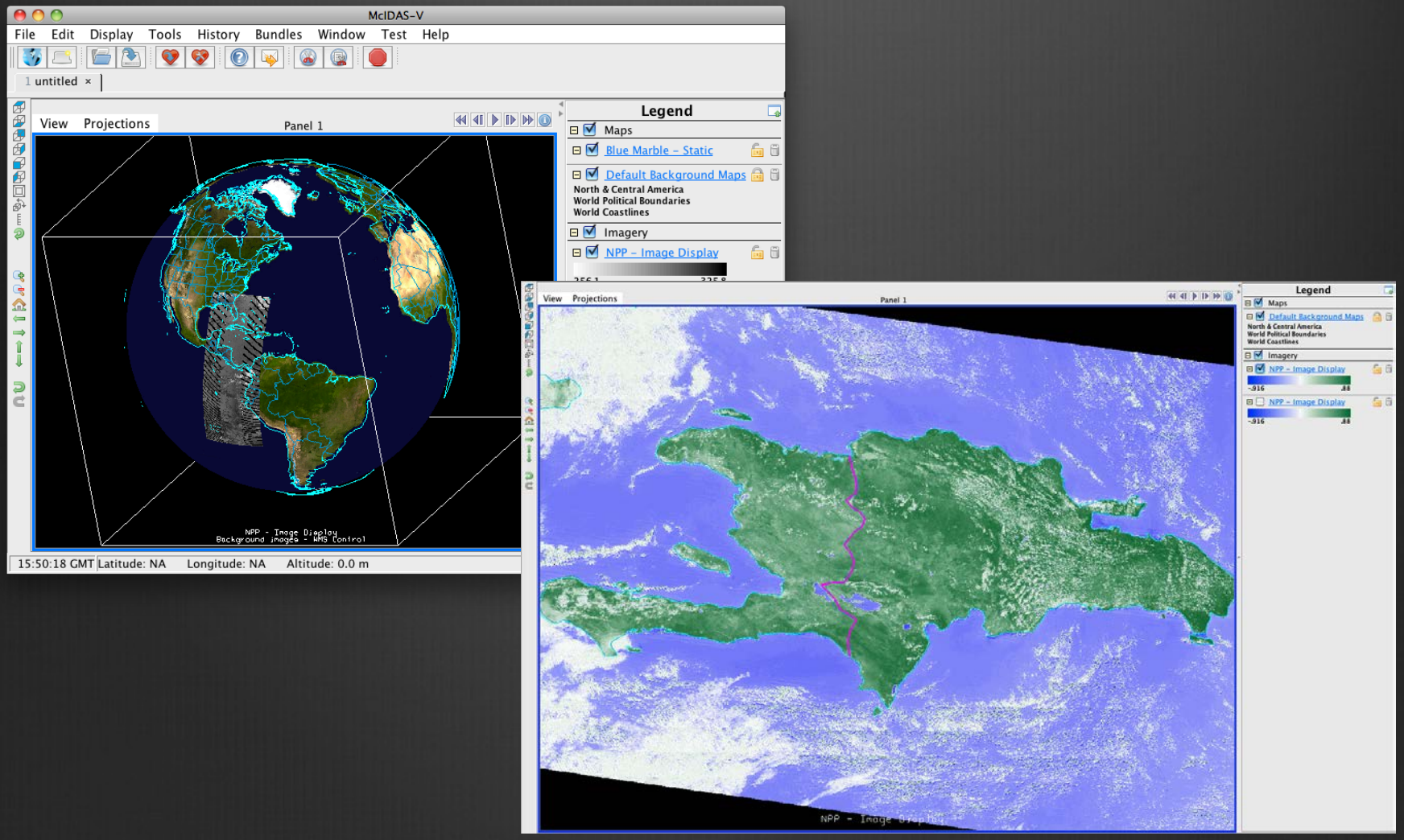
- HYDRA: HYperspectral viewer for Development of Research Applications
- Multi- and hyper-spectral data viewer and analysis package
- Not yet fully integrated with McIDAS-V
  - Does not work with all data types
  - User Interface is different



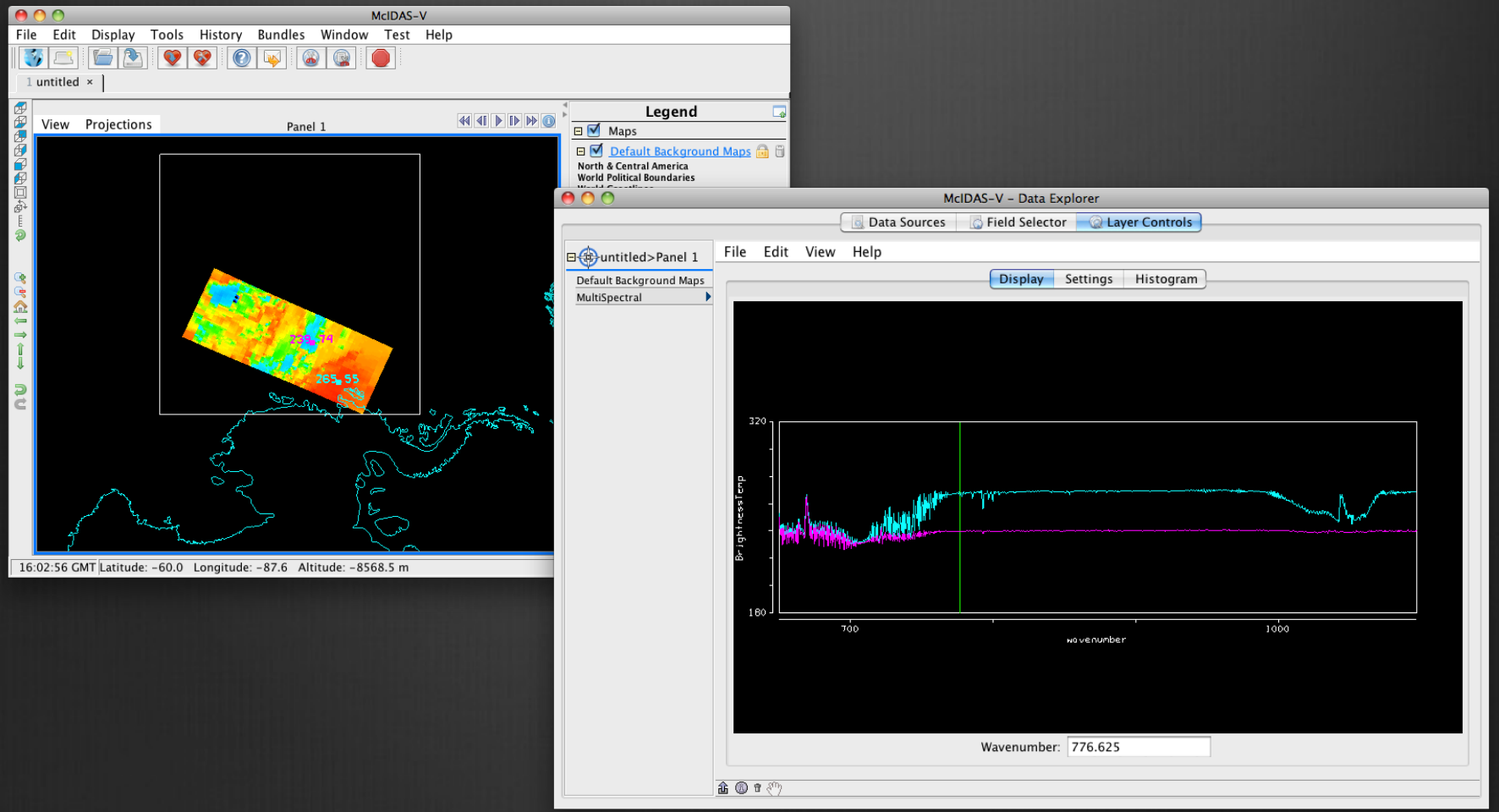
McIDAS-V Software Status

- New User Interface built on VisAD and IDV
- The top-level McIDAS-V software and interface is maintained by the MUG programmers and others.
- A new scripting capability was developed, replacing that in IDV
- Current version: 1.3

McIDAS-V
Suomi NPP VIIRS



McIDAS-V
Suomi NPP CrIS



McIDAS-V Future

- Continue to engage younger generation:
  - Workshops and training
  - Classroom
- Appeal to researchers:
  - More data fusion
  - Move beyond 2D world
- Address technical and programmatic issues through a review process:
  - Engage additional SSEC developers and researchers
  - Evaluate current state and map a plan for future

McIDAS-V Review

- Technical
  - Identify current technical issues
  - Anticipate future issues
  - Plan a technical direction
- Programmatic
  - Coordinate internal funding sources
  - Mechanism for McIDAS-V infrastructure improvements