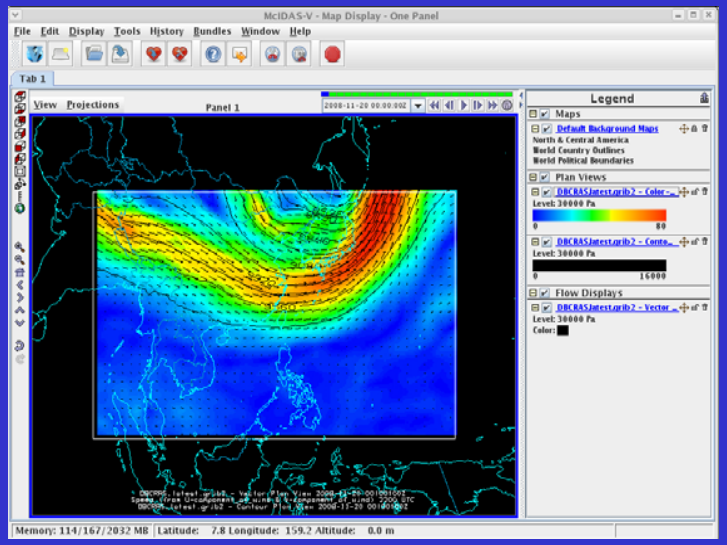
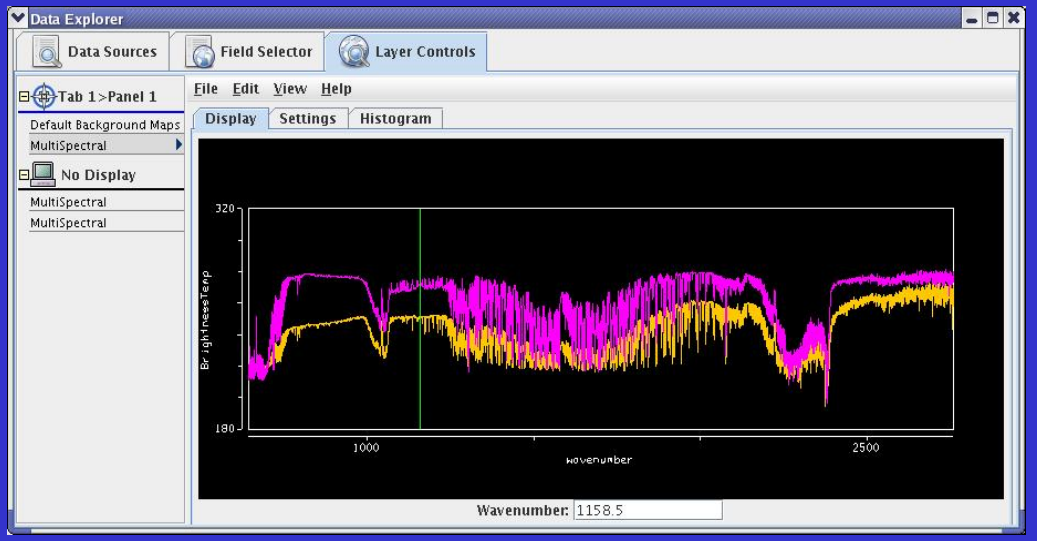
An Update on McIDAS-V Planning and Development

Tom Achtor

McIDAS Users' Group Meeting
Madison, WI – 3 June 2009





Space Science & Engineering Center (SSEC) at the University of Wisconsin - Madison

Outline

A brief history

- McIDAS-V goals and requirements
- Moving towards beta and beyond
- Supporting development in a soft money research center

Looking forward

- Addressing key development issues
- Continuing to find support
- Expanding the user base

McIDAS-V Project Requirements

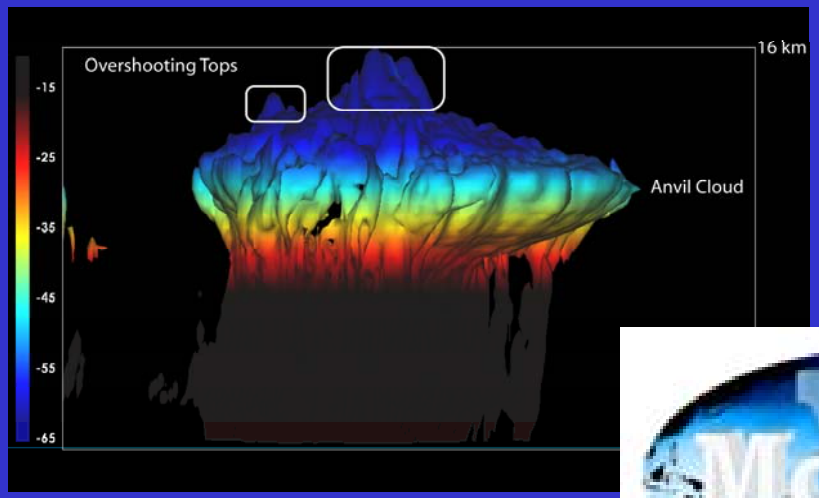
- Create a powerful and versatile software system for environmental data processing, analysis and visualization
- Continue to fully support McIDAS Users' Group (MUG) and McIDAS-X functionality as users transition to McIDAS-V
- Support existing and evolving needs of scientific research and algorithm/applications development for new programs
- Support operational users by providing frameworks in McIDAS-V, enabling a natural transition path for research results into operations
- Support data fusion and algorithm interoperability from existing and future sources
- Use system to educate students in remote sensing and physical sciences; involve students in its development, evolution and use

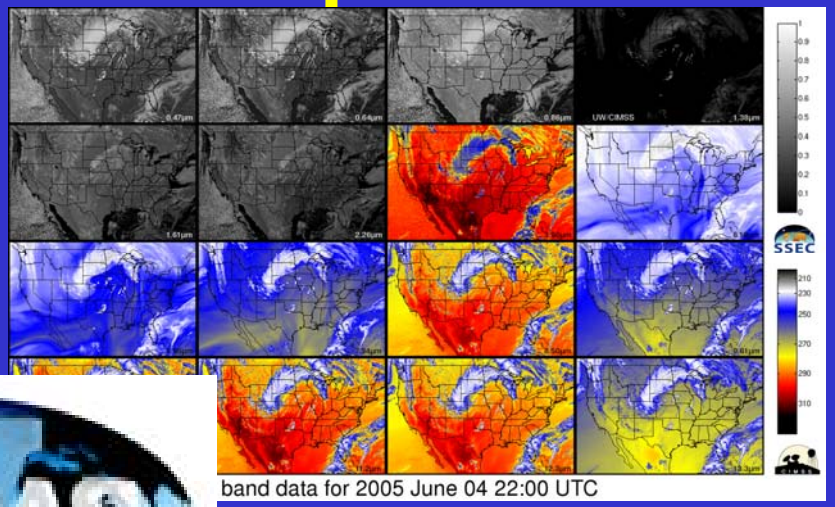
McIDAS-V
6 initial goals to beta

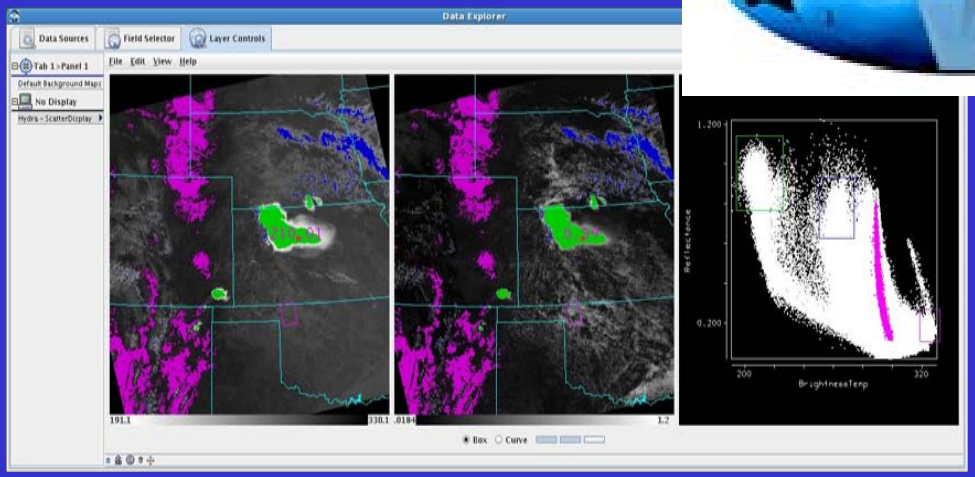
- Easy installation and configuration
- New McIDAS-V User Interface to better support satellite data analysis and visualization
- McIDAS-V must be able to “bridge” with current McIDAS-X
- Integrate HYDRA (Hyperspectral Viewer for Development of Research Applications) into McIDAS-V
- High quality documentation with ample training materials
- Make system (relatively) bug-free

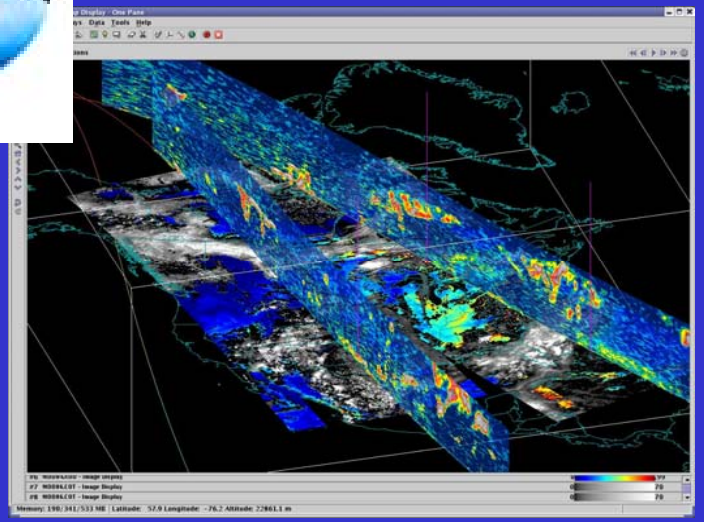
McIDAS-V reaches ‘beta’

Visit SSEC booth 435 to see a demo or talk to a developer









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McIDAS-V Support (1)

- VisAD developer Bill Hibbard provides guidance
- Unidata, through development of the IDV and continuous communication is a strong collaborator
- SSEC provides in house support for tasks without support
- MUG is providing support for the Bridge, the UI and numerous other low level improvements (e.g. performance) and for forums, training, etc
  - Active participation by the MAC is very important to support MUG needs and goals

McIDAS-V Support (2)

- The GOES-R program (Risk Reduction and AWG) is supporting the continued development of HYDRA, the inclusion of additional data types, the evaluation of operational algorithms, etc.
- The IPO (NPP/NPOESS) is providing new support for multi and hyperspectral data acquisition and analysis (e.g. AIRS, IASI)
- Individual science projects are supporting advancement by using McIDAS-V in their applications and providing feedback
- These projects support about 7 FTE

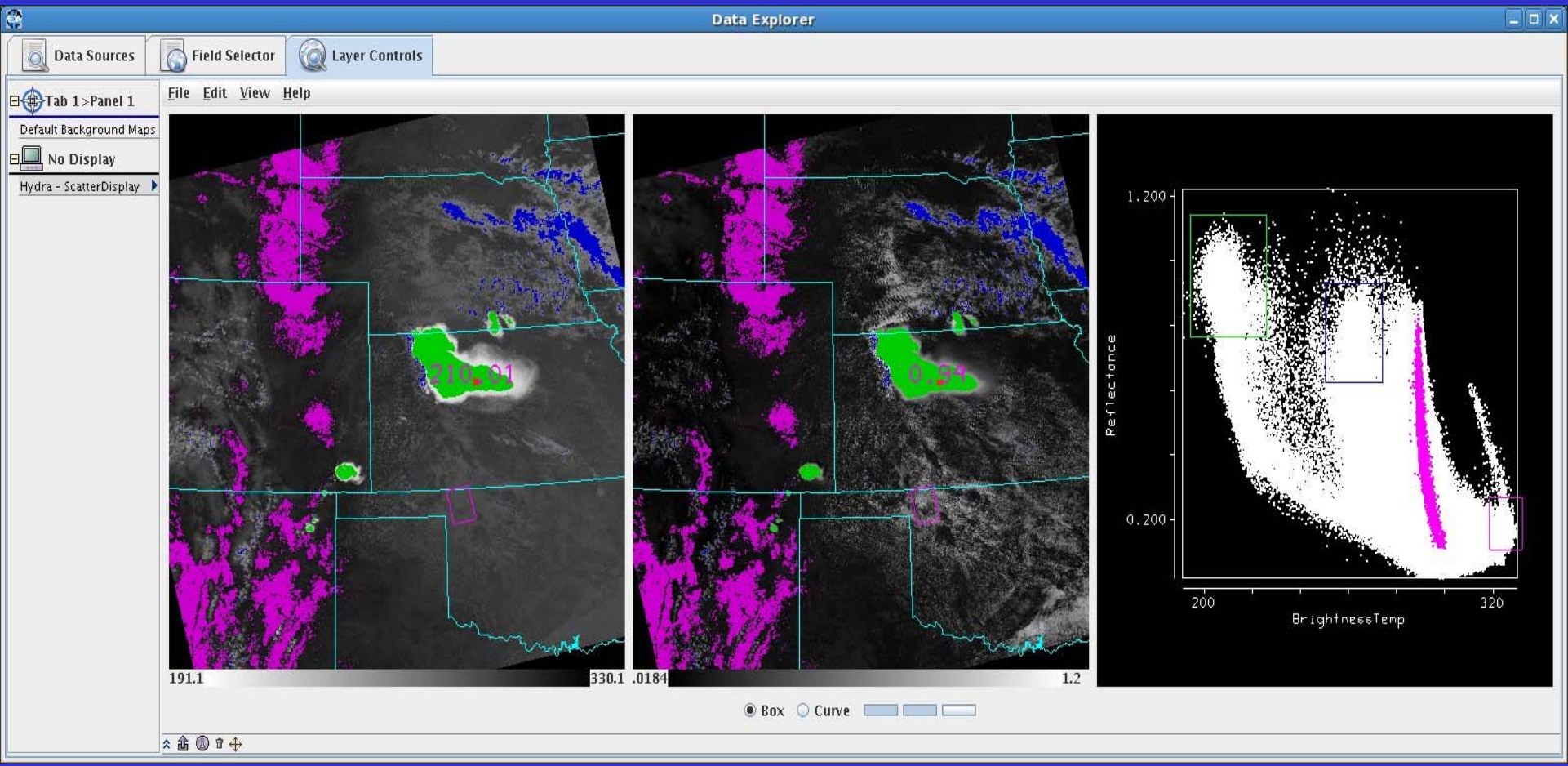
HYDRA

Interrogation of multi- and hyper-spectral data

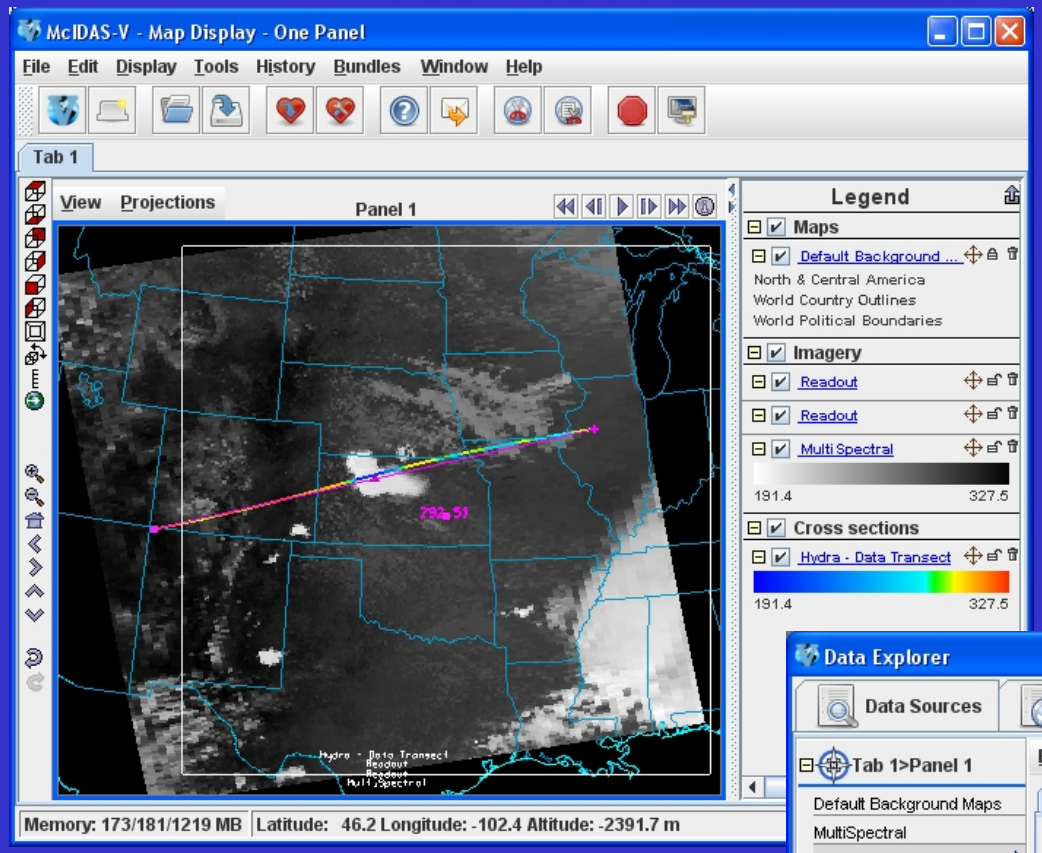
Developer: Tom Rink SSEC

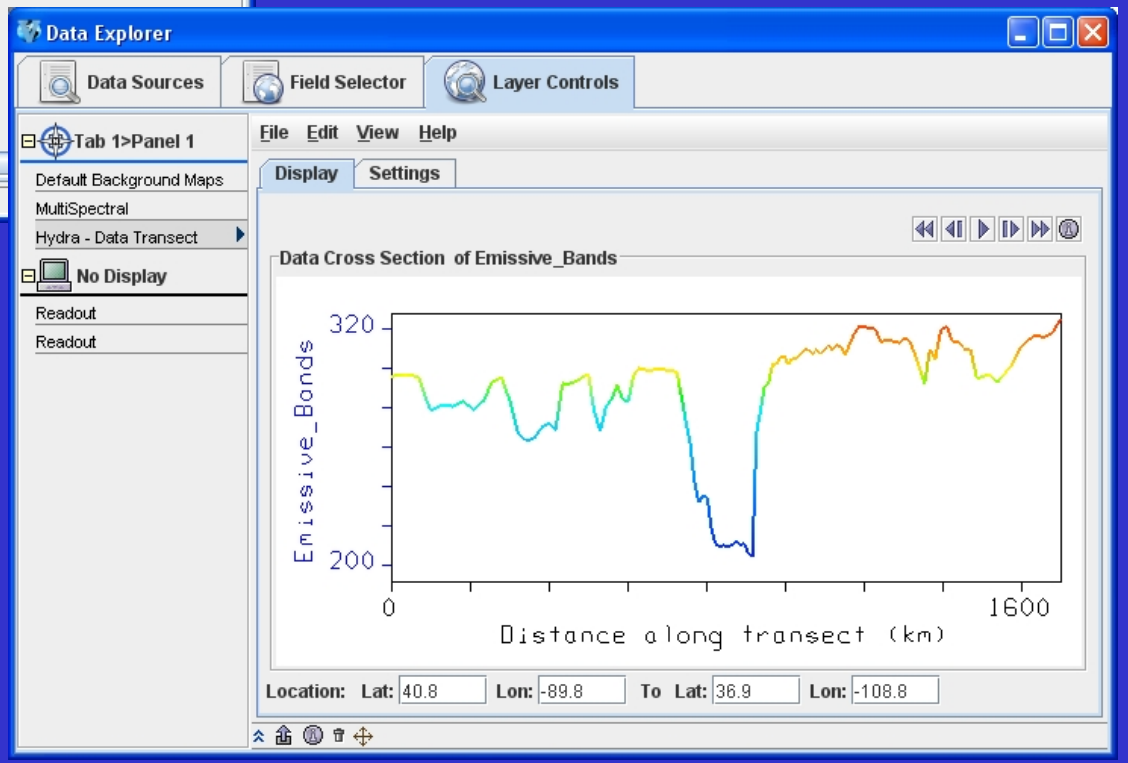
- Display individual pixel location and spectral band measurements
- Combine spectral channels in linear functions and display resulting image products
- Construct false color images from multiple channel combinations
- Create scatter plots of spectral channel combinations
- Locate image pixels in scatter plots and vice versa
- Display transects of measurements
- Compare Level 2 products (e.g. soundings of temperature and moisture as well as spectra from selected pixels)
- Integrated data and product analysis/evaluation between Geostationary and Polar observing platforms

Scatter plot of MODIS VIS–IR observations (user identifies highlighted regions)



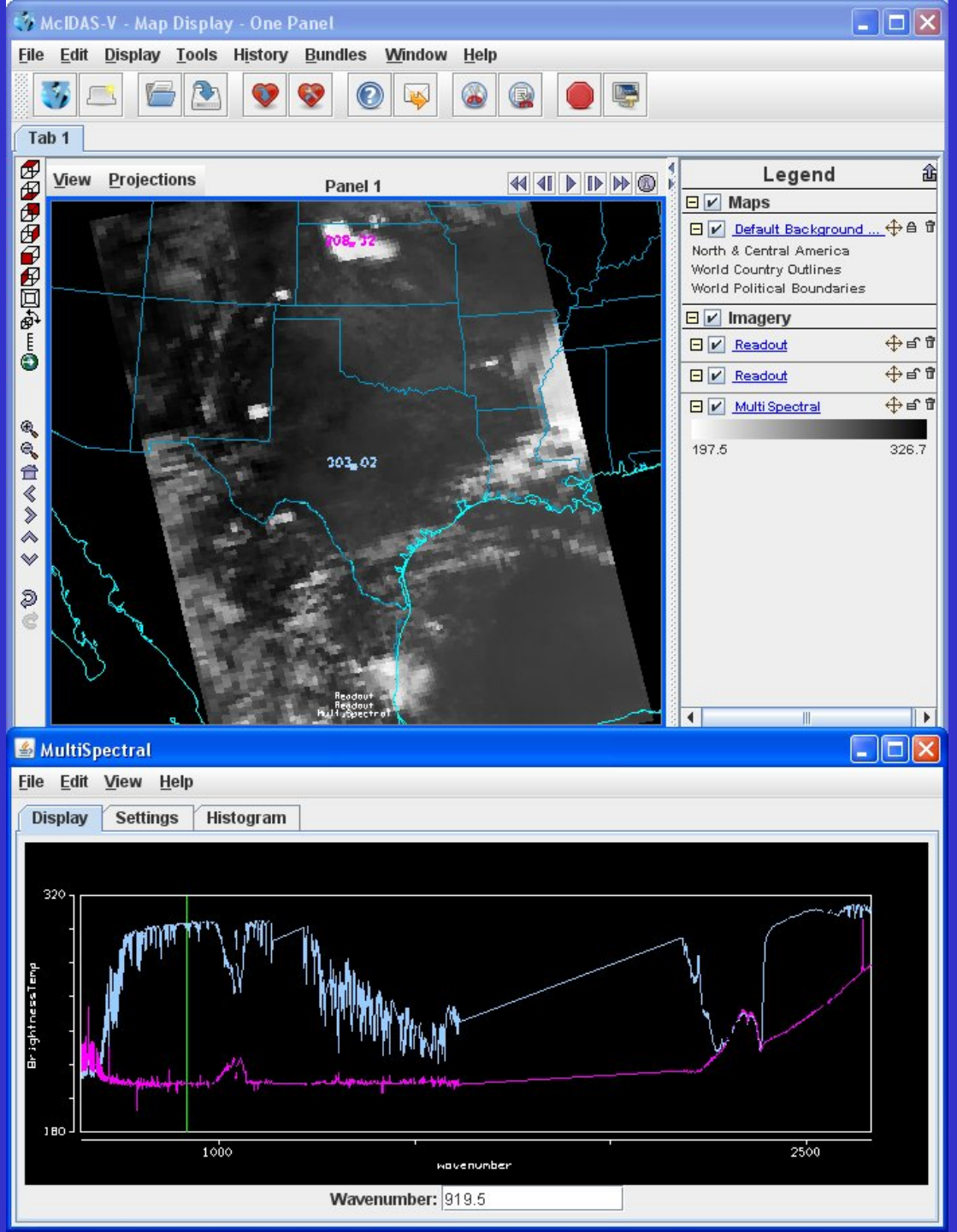
MODIS
define a transect to display radiance measurements



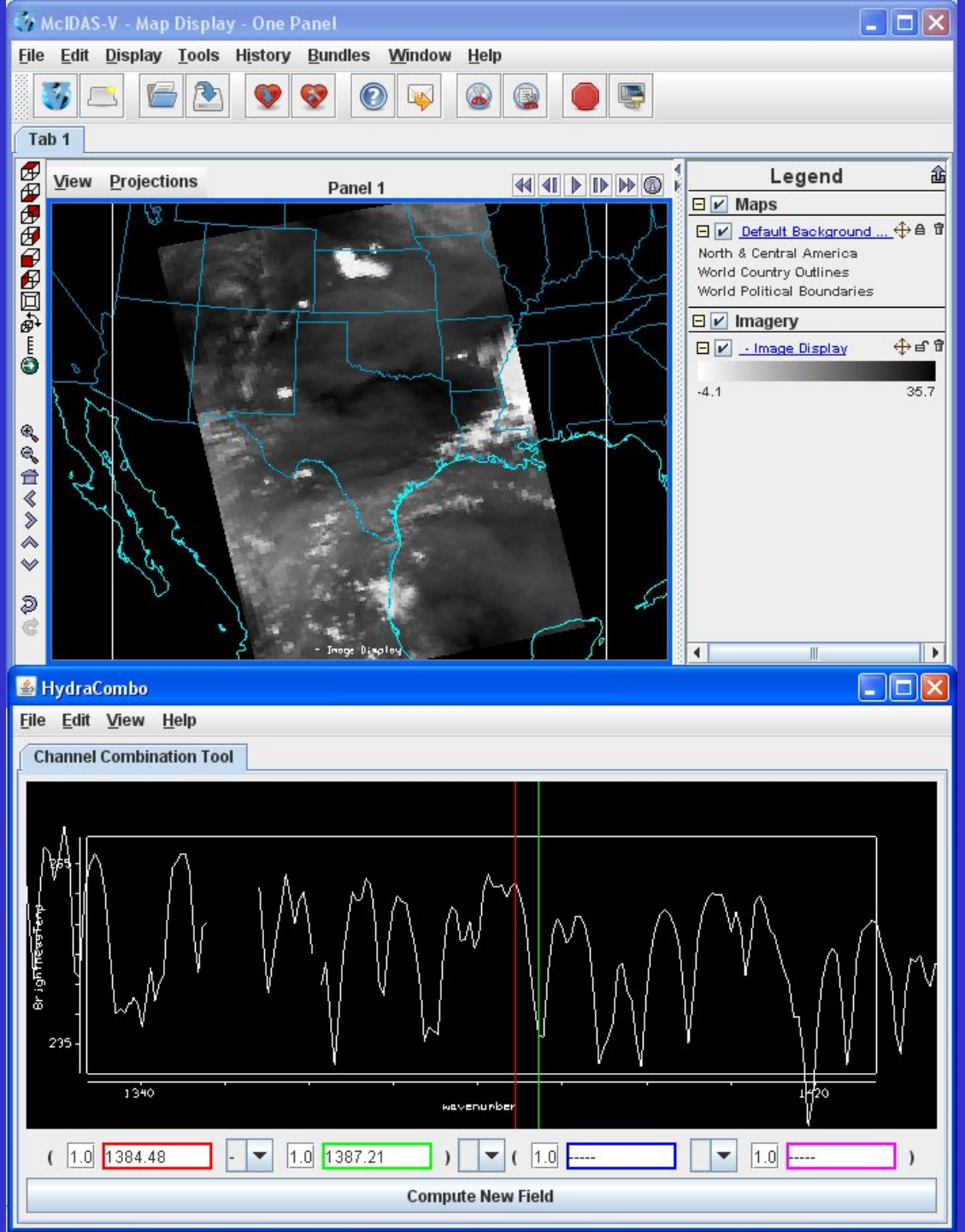


- **Convection case study: 19 June 2007**

- **AIRS granule - user selects locations for spectra**
- **Slider bar selects**
- **spectral band**
- **for display**



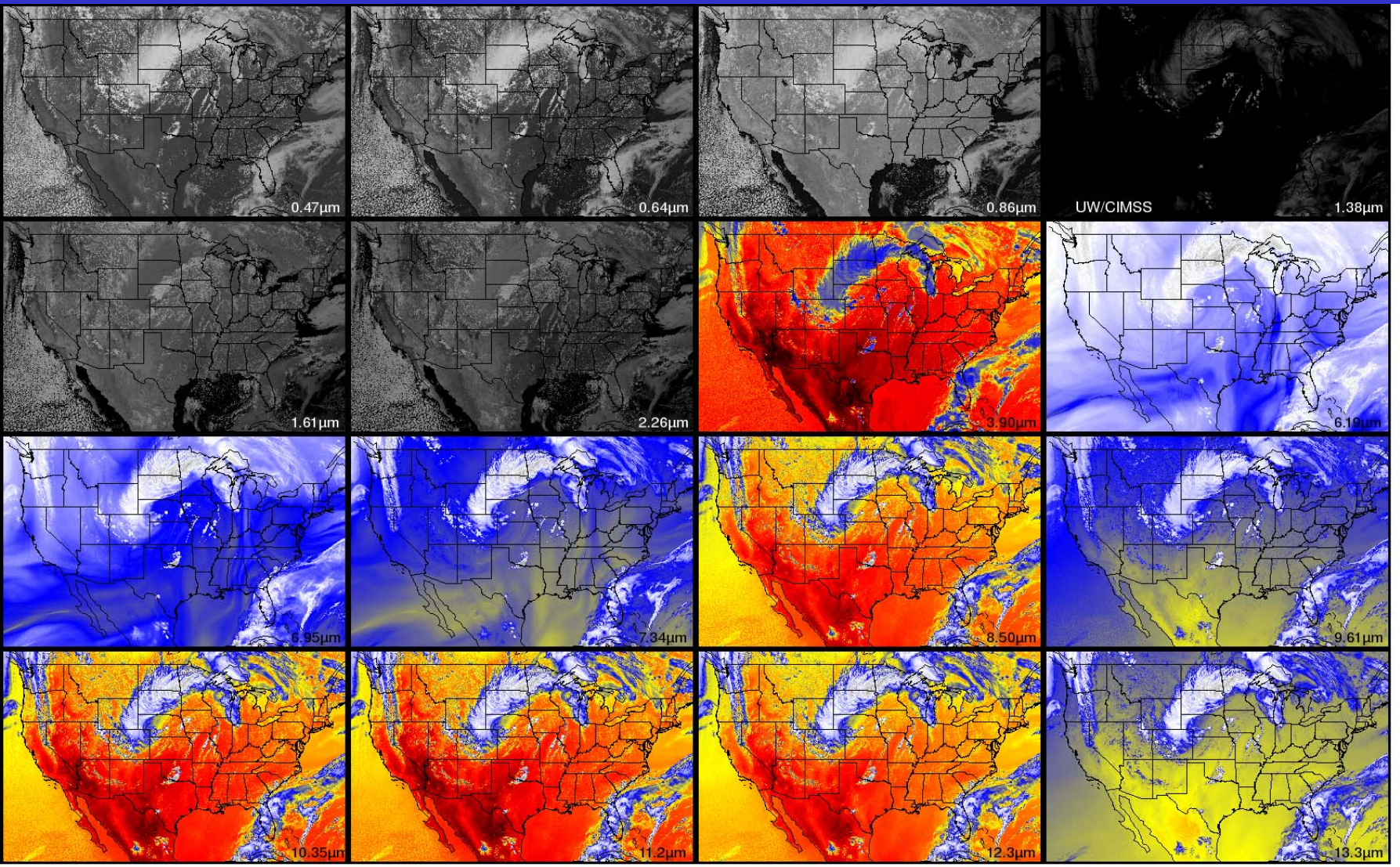
- **AIRS zooming in on spectra to display online – offline calculations: 19 June 2007**



Accessing Data in McIDAS-V

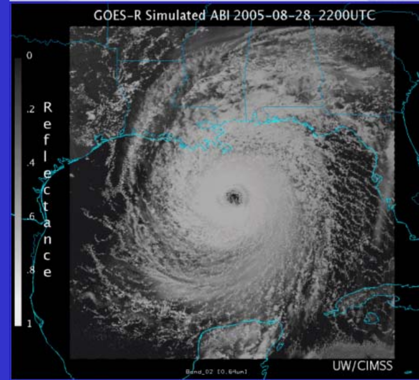
- Remote data servers
  - OpenADDE (Abstract Data Distribution Environment)
  - OPeNDAP (Open-source Project for a Network Data Access Protocol)
  - THREDDS (Thematic Realtime Environmental Distributed Data Services)
  - HTTP
- Local data
  - ADDE servers
  - VisAD file adapters

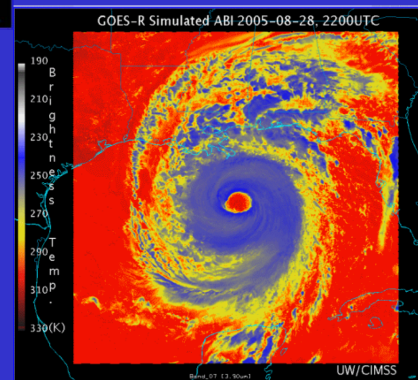
•ABI bands from NWP simulation (CIMSS AWG Proxy Team)

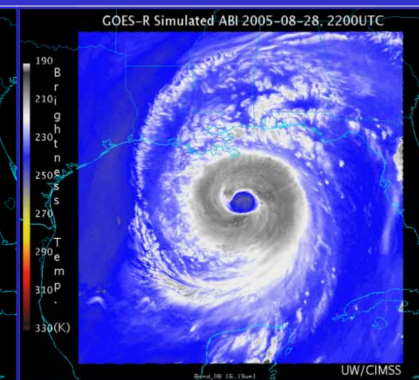


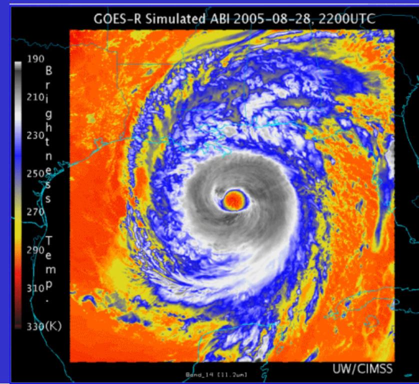
ABI band data for 2005 June 04 22:00 UTC

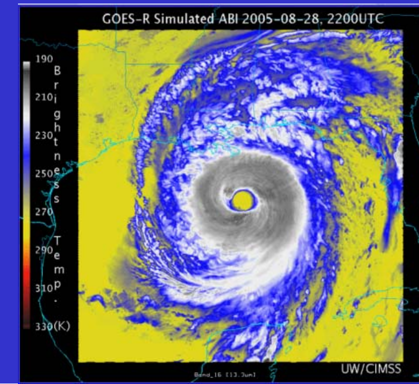
•Current Imager bands of Hurricane Katrina





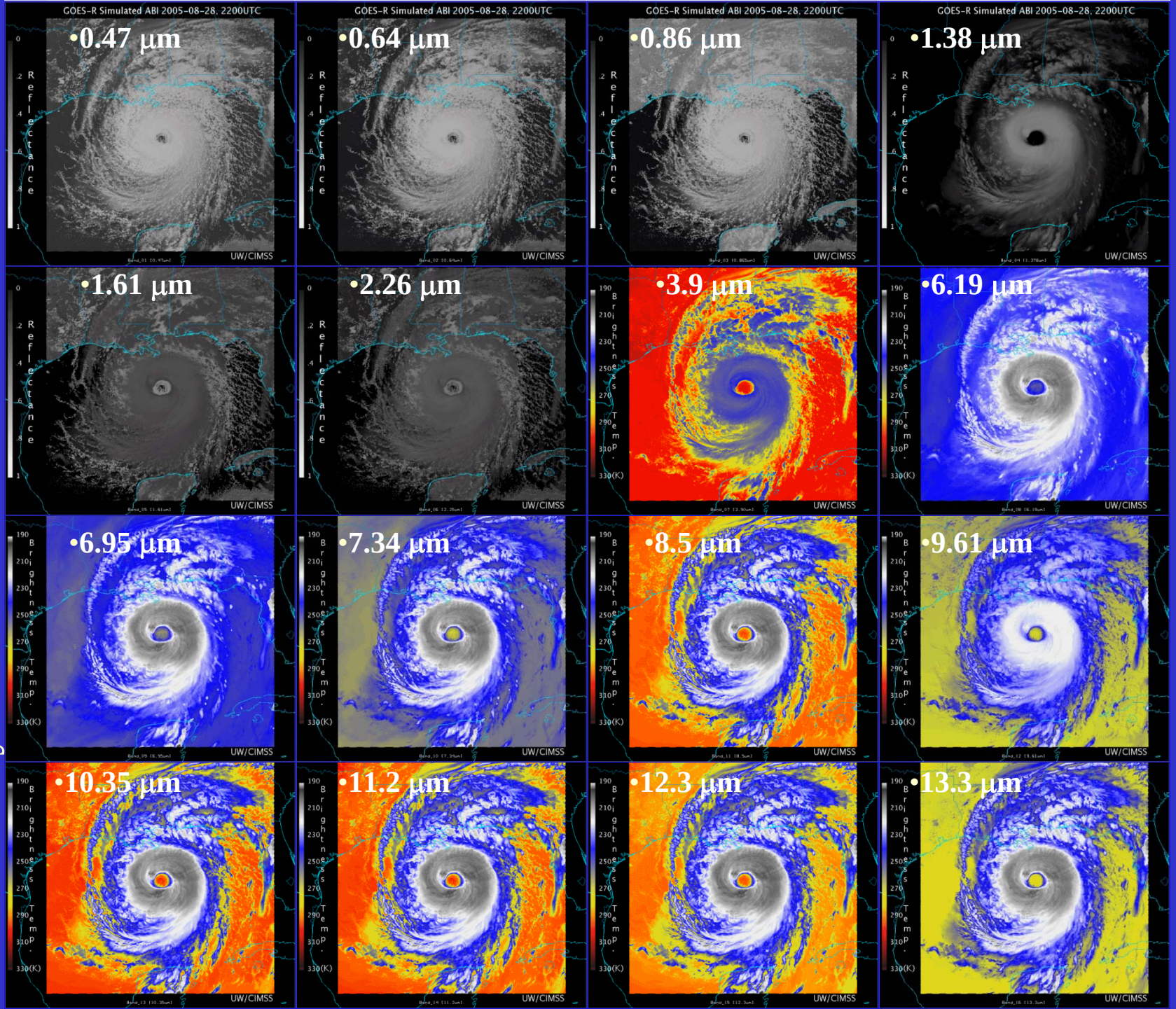






•NOAA/NESDIS STAR

•AWG Proxy ABI Simulations of Hurricane Katrina



•NOAA/NESDIS STAR and GOES-R Imagery Team

McIDAS-V Conference Presentations

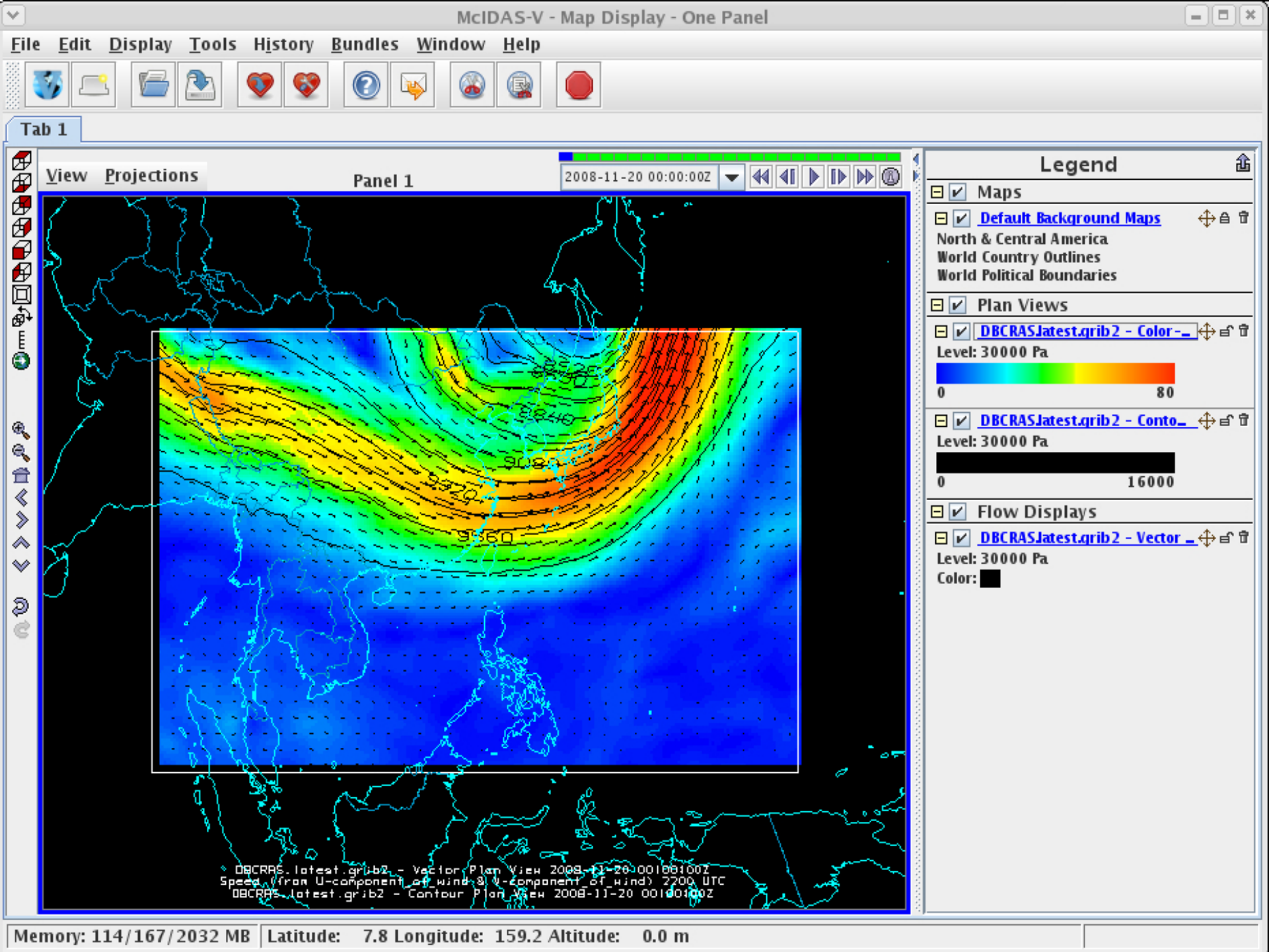
- AMS IIPS - 2005, 2006, 2007, 2008, 2009, 2010
- AMS Sat Met – 2007, 2009
- AGU Fall – 2005, 2007, 2008, 2009
- SPIE Photonics – 2007, 2008, 2008, 2009
- EUMETSAT – 2008 (workshop), 2009
- ITWG/ITSC – 2007, 2008, 2010 (workshop)
- NOAA DB - 2008

McIDAS-V Future Work

- Continue to build upon the existing capabilities of VisAD/IDV/HYDRA
  - incorporate new ideas to add functionality
- Act upon McIDAS Advisory Council priorities
  - we need an active MAC team
- Provide an open environment for developing algorithms and new visualizations that take advantage of multi and hyper-spectral data from emerging observing systems

McIDAS-V Future Work

- Support the development of applications for the NPP/NPOESS and GOES R science teams
- Advance data management and accessibility
  - develop a broad array of formats and services
- Expand documentation and training materials
- Encourage and support a vigorous User Forum


McIDAS-V - Map Display - One Panel
File Edit Display Tools History Bundles Window Help
Tab 1
View Projections
Panel 1
2008-11-20 00:00:00Z
Legend
Maps
Default Background Maps
North & Central America
World Country Outlines
World Political Boundaries
Plan Views
DBCRASJatest.grib2 - Color-...
Level: 30000 Pa
0
80
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Flow Displays
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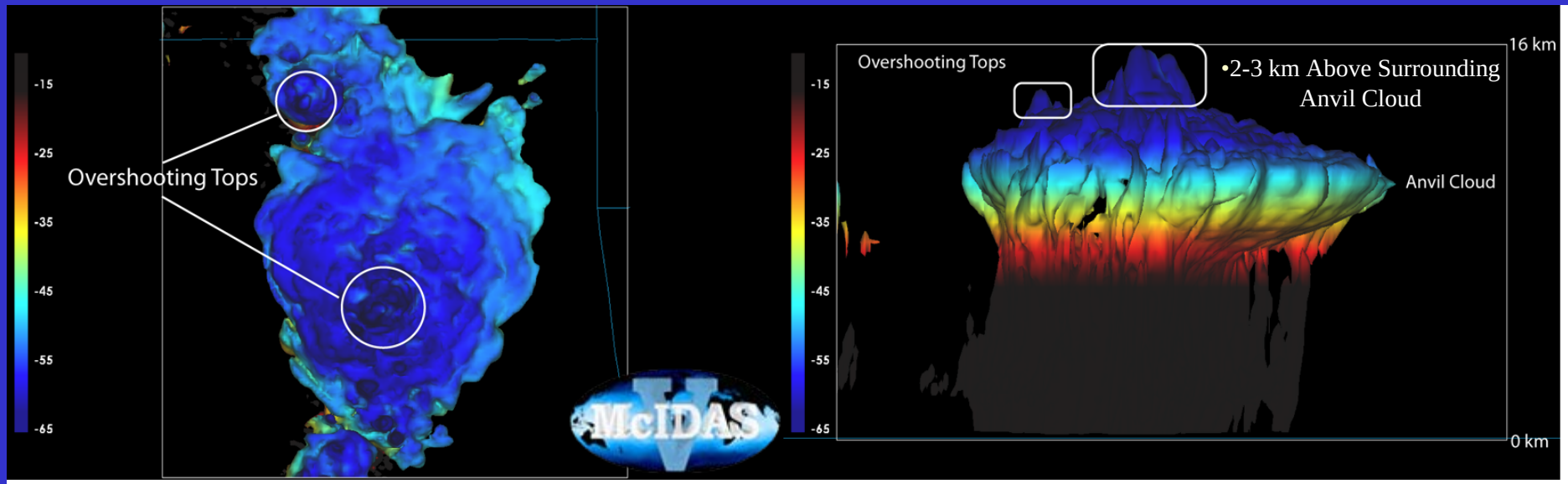
Level: 30000 Pa
Color:
DBCRAS_latest.grib2 - Vector Plan View 2008-11-20 0010010OZ
Speed (from U-component_of_wind & V-component_of_wind) 2200 UTC
DBCRAS_latest.grib2 - Contour Plan View 2008-11-20 0010010OZ
Memory: 114/167/2032 MB
Latitude: 7.8 Longitude: 159.2 Altitude: 0.0 m

•Cloud Isosurface with IR Temperature and In-Cloud Ice Content

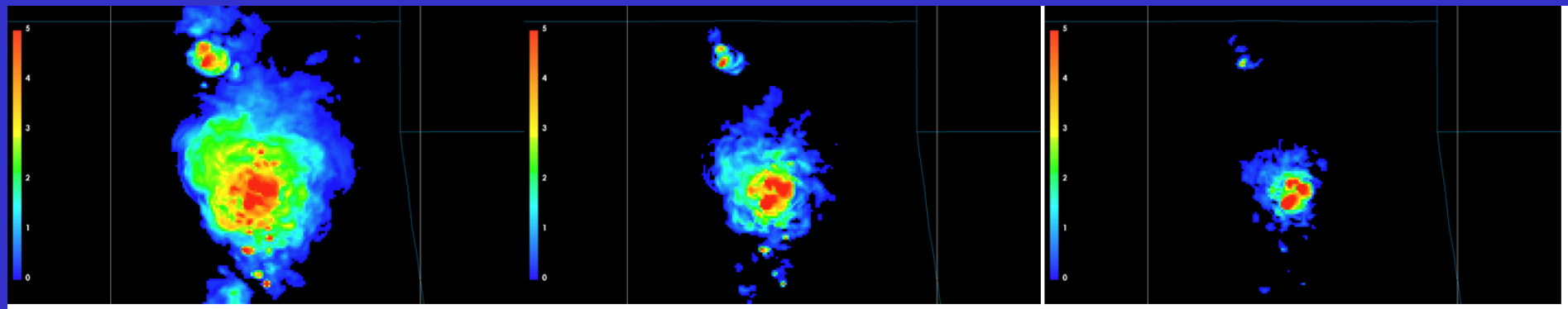
•***WRF Cloud Water Isosurface Colored By Synthetic 2 km GOES-R ABI IR Window Brightness Temperatures***

•***WRF Cloud Water Isosurface Colored by WRF 3-D Temperature Field***



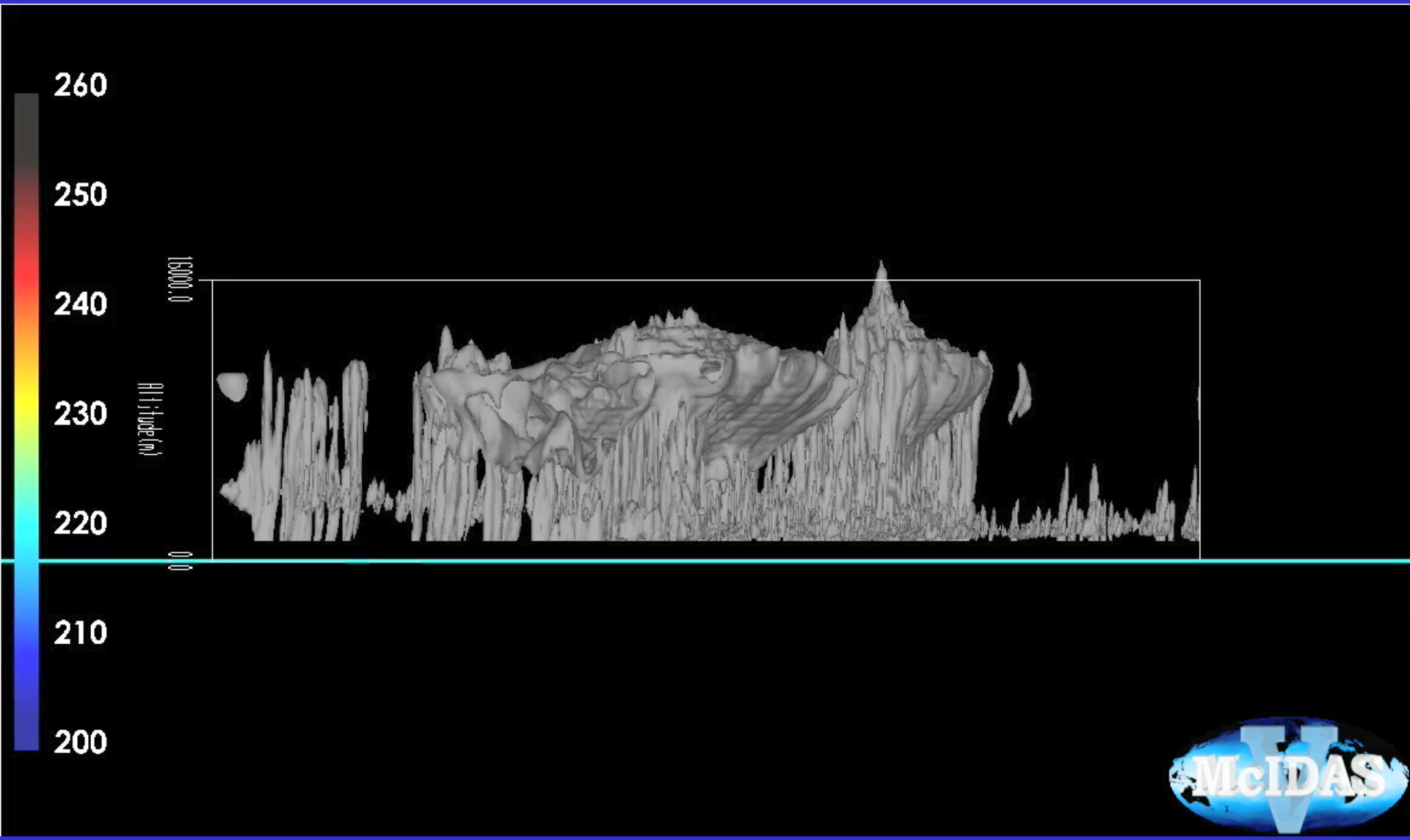
•***2 km WRF Cloud Ice Content***

•**200 hPa** •**175 hPa** •**150 hPa**



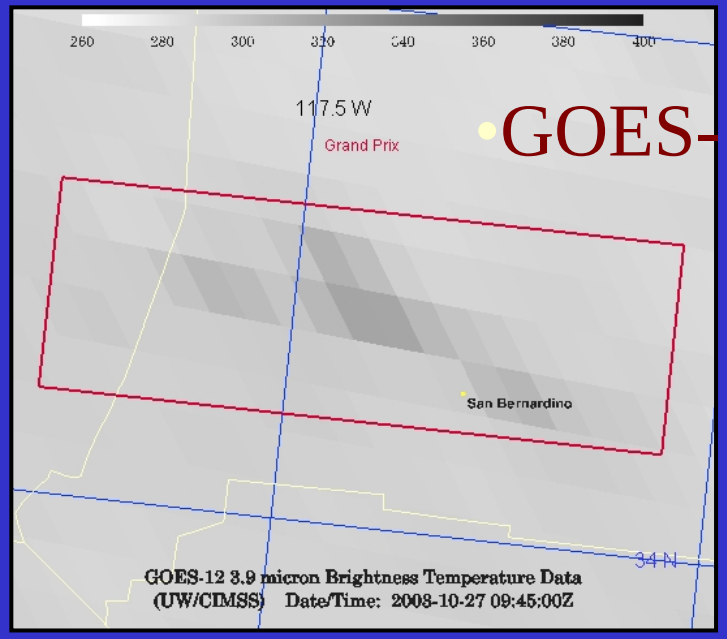
• **We used these visualizations to learn that a single overshooting top (OT) is < 15 km in diameter and is co-located with significant vertical transport of ice into the stratosphere. Stratospheric ice content can be used to validate the accuracy of OT detections from synthetic GOES-R ABI imagery**

•Cloud Isosurface Animation With Synthetic ABI IR Temperature

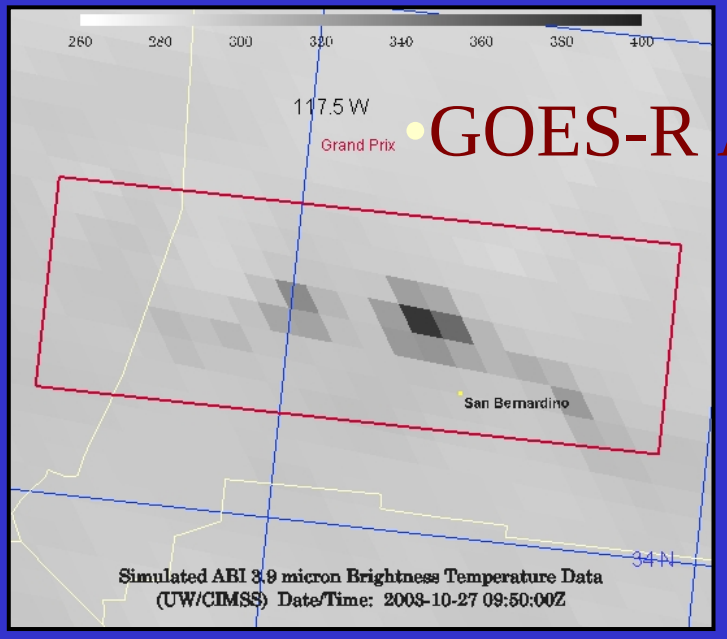


• We used these WRF simulations and visualizations to learn that a single overshooting top persists for ≤ 15 mins and that gravity waves can propagate far away (> 50 km) from their source region, representing a turbulence hazard for aviation interests

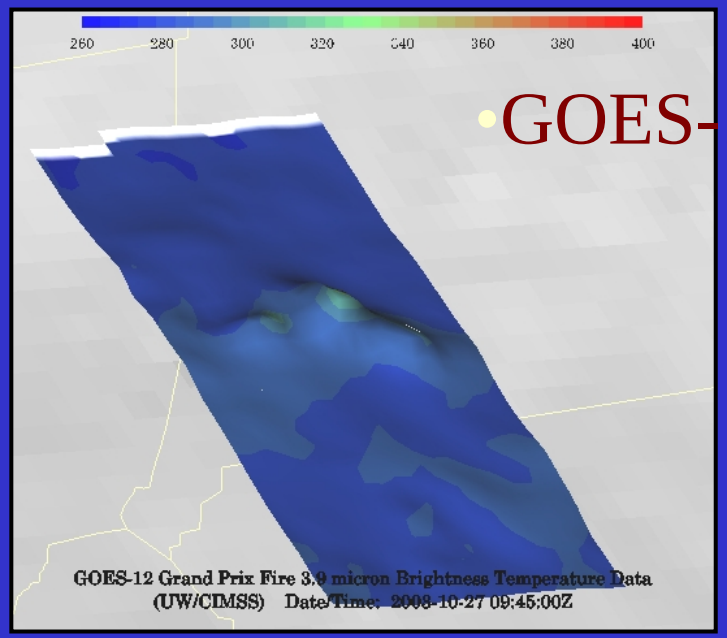
GOES-12 and GOES-R ABI
Simulation of Grand Prix Fire/Southern California



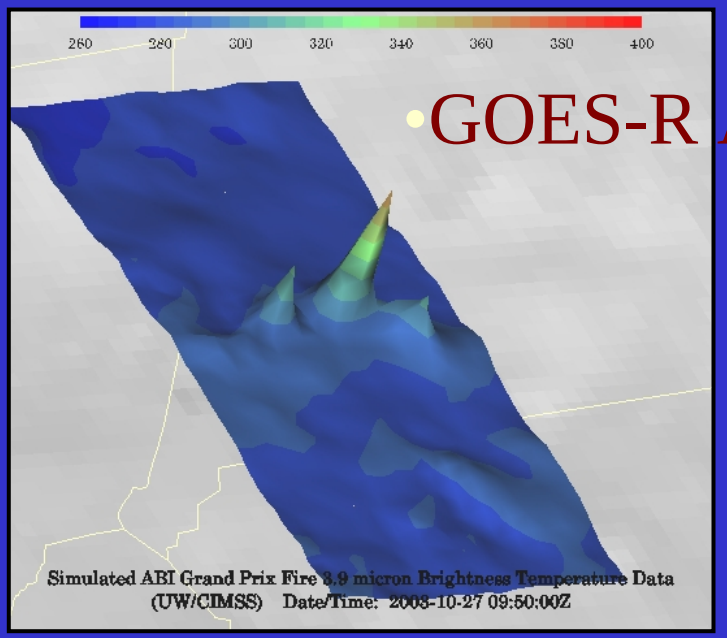
GOES-12



GOES-R ABI



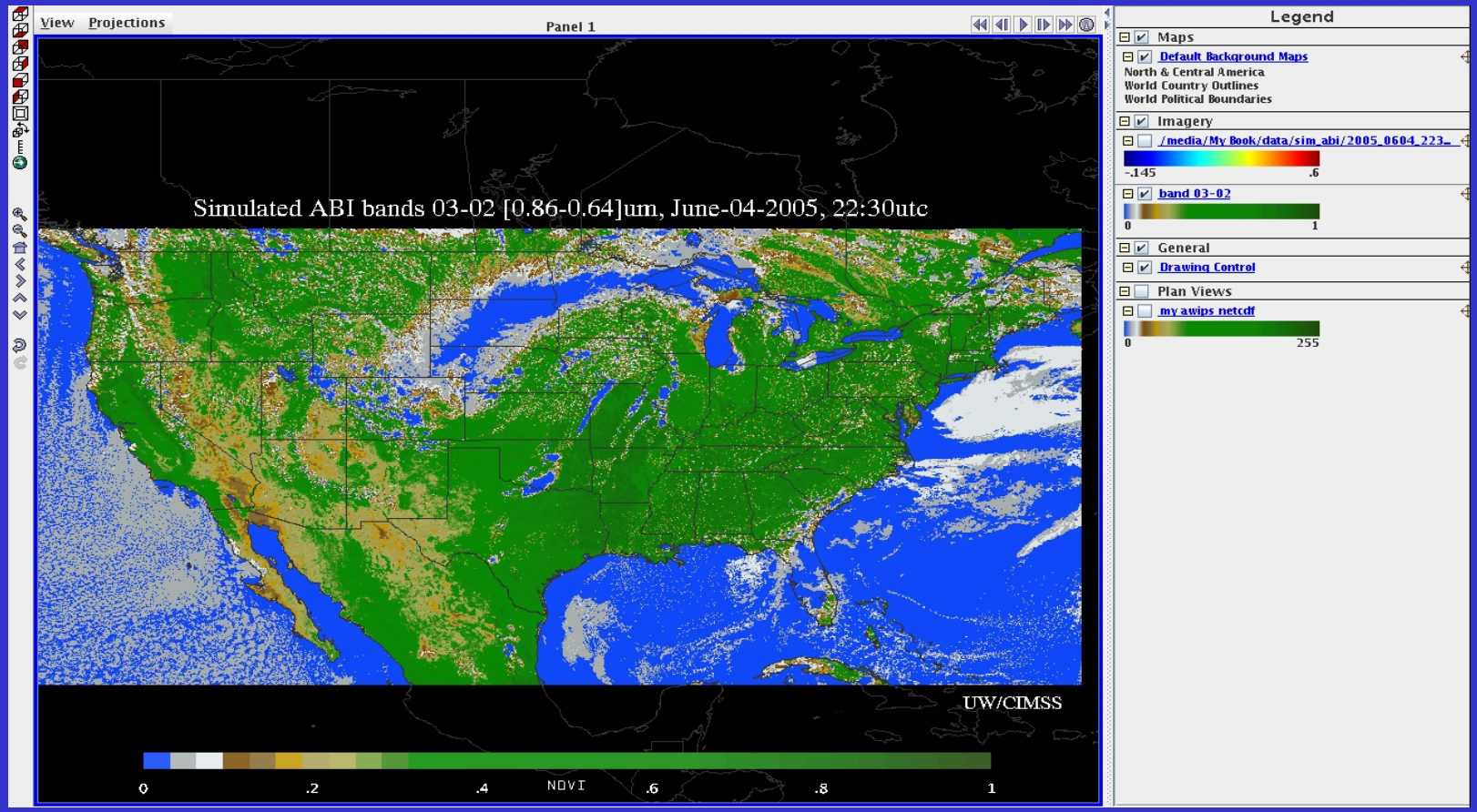
GOES-12



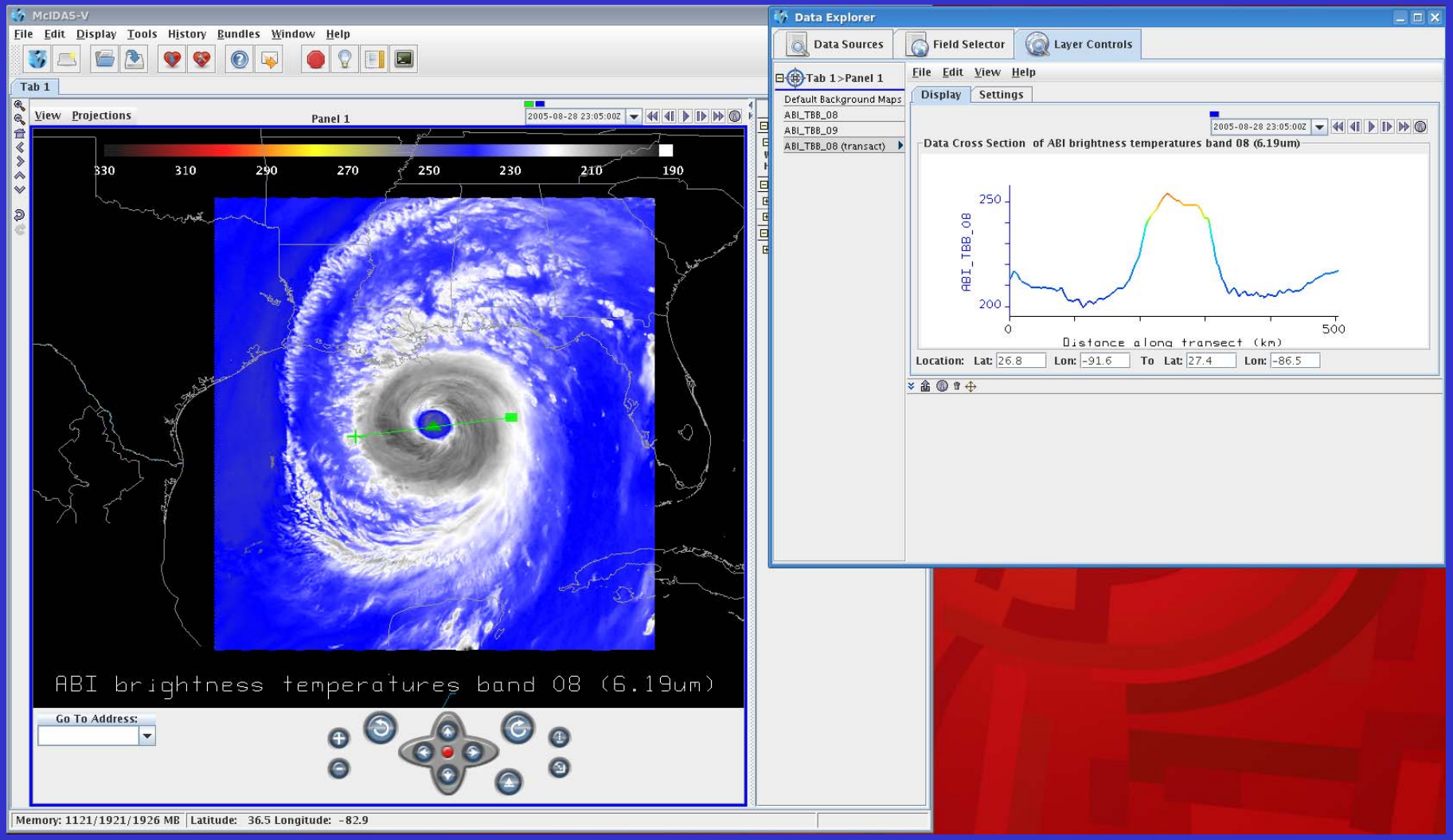
GOES-R ABI

ABI Band differencing (NDVI)

- Can compute band difference on the fly
- Band 03 (0.86um) - Band 02 (0.64um)



ABI Data Transects in McIDAS-V



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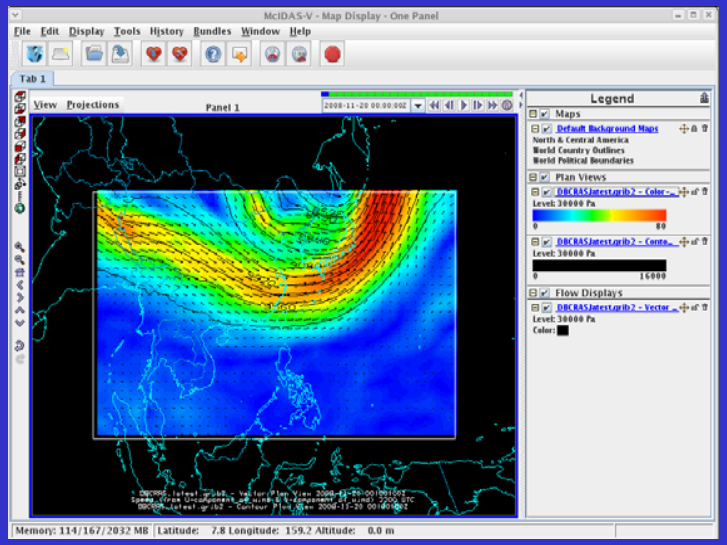

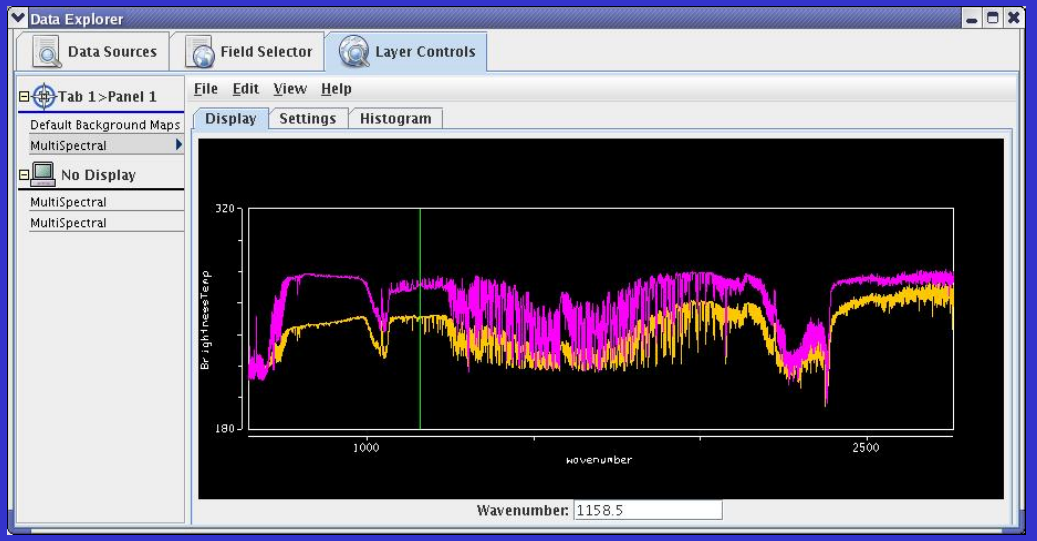

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