



GOES-R AWG AM Discussion: McIDAS-V and GOES-R June 10, 2010

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Thanks to the whole imagery team!



Summary

- An overview of McIDAS-V
- ABI products in McIDAS-V
- Other applications of McIDAS-V



McIDAS-V Core

- VisAD + IDV: The Core of McIDAS-V
 - » The foundation of McIDAS-V is SSEC's Visualization for Algorithm Development (VisAD) and the Integrated Data Viewer (IDV) from Unidata. Key attributes include:
 - An abstract mathematical data model that embraces virtually any numerical information.
 - A general display model that supports very interactive 2-D and 3-D displays, time animation and direct manipulation of display objects.
 - Metadata that is integrated into each data object.
 - Adapters for multiple data formats (e.g. netCDF, HDF-5, McIDAS, Vis5D, etc.) and access to remote data servers through HTTP, FTP, DODS/OPeNDAP, and ADDE protocols.



Key Aspects of McIDAS-V

- Built on top an extensible framework for adapting new sources of data (format and type, local or remote), user interface components and for creating novel displays and analysis techniques.
- Python based user defined computation.
- Persistence mechanism (bundles) for saving and sharing interesting displays/analysis with other McIDAS-V users.
- Developed in the Java programming language – object oriented, write once run anywhere, very portable.



McIDAS-V Core

- HYDRA: Innovative Data Analysis Tools
 - » The Hyperspectral Data Research Application (HYDRA) developed at SSEC allows scientists to interrogate and display multi and hyper-spectral satellite data.
 - » HYDRA can display radiance spectra, multi-band imagery, scatter plots and transects.
 - » With the forthcoming GOES-R and NPP/NPOESS programs the HYDRA data interrogation capability is a key feature of the McIDAS-V toolkit.

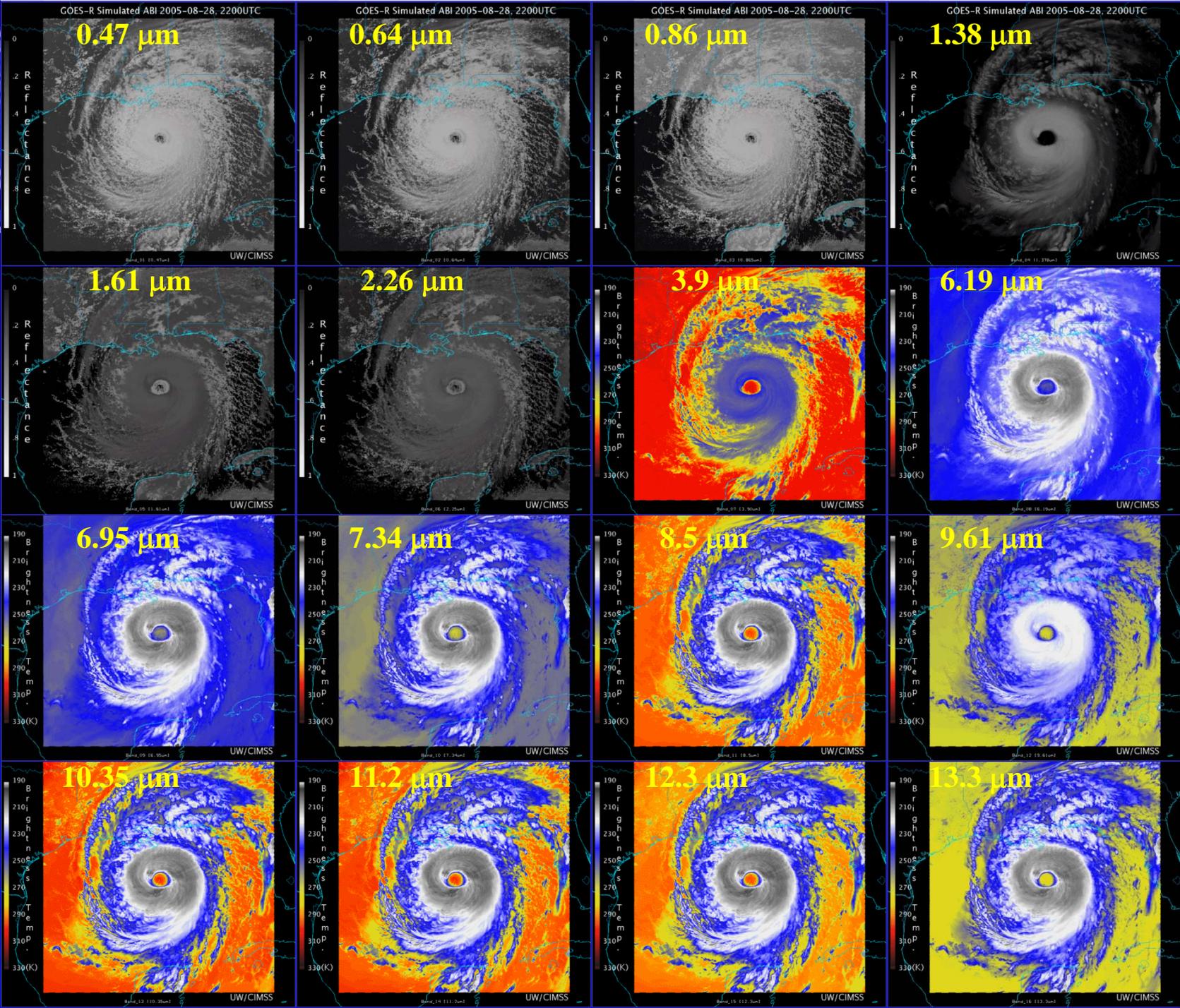


ABI Products in McIDAS-V



- Currently all of the ABI Baseline Products are able to be visualized in McIDAS-V
- In addition, McIDAS-V is being used for visualization of simulated data sets in the GOES-R Fixed Grid Format
- As they become available, we are working with the AIT to test and visualize Option 2 products

AWG Proxy ABI Simulations of Hurricane Katrina





In ABI FGF (75W)

1

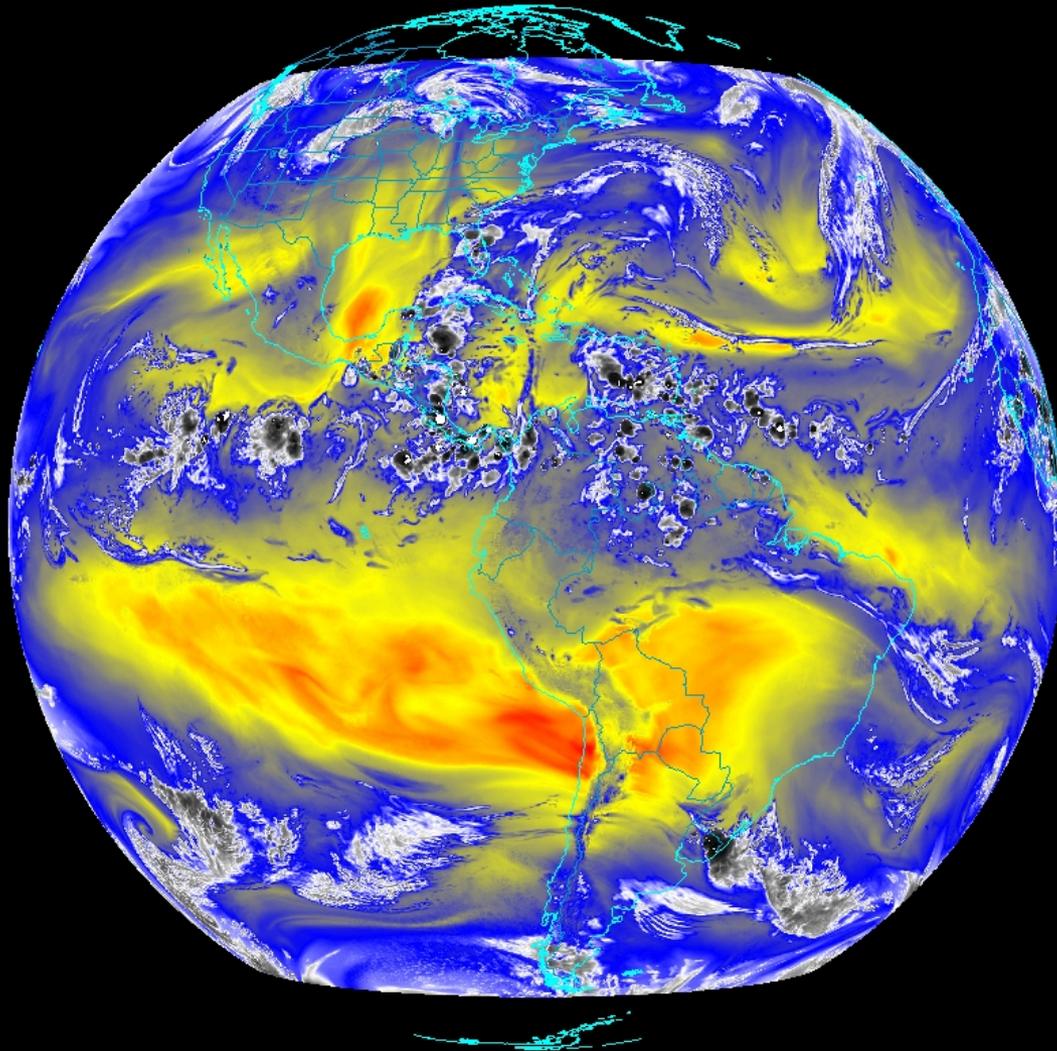
6

11

16

21

26



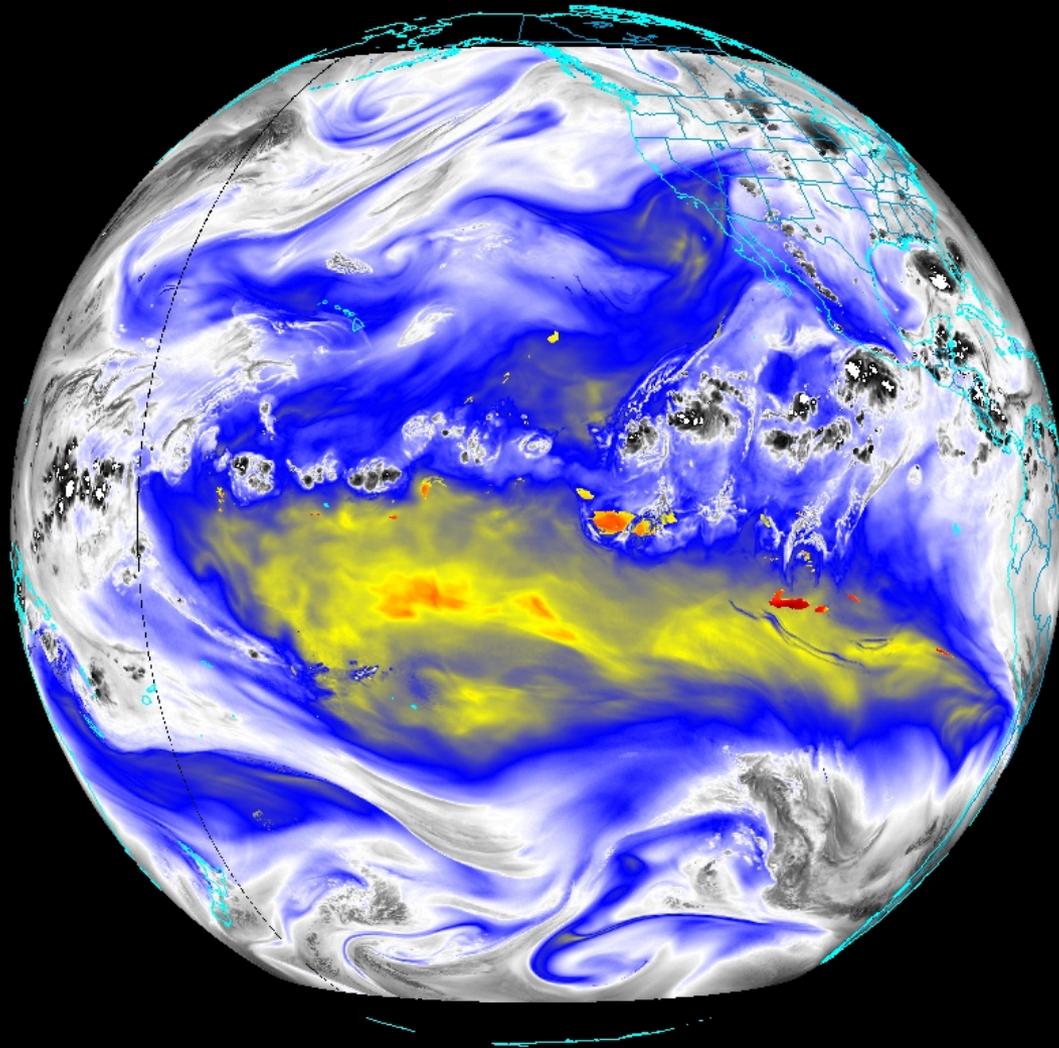
SSEC

WRF Simulation - 7.4 um Radiance - GOES-R EAST (75W)



In ABI FGF (137W)

.5 1.5 2.5 3.5 4.5 5.5 6.5 7.5 8.5 9.5



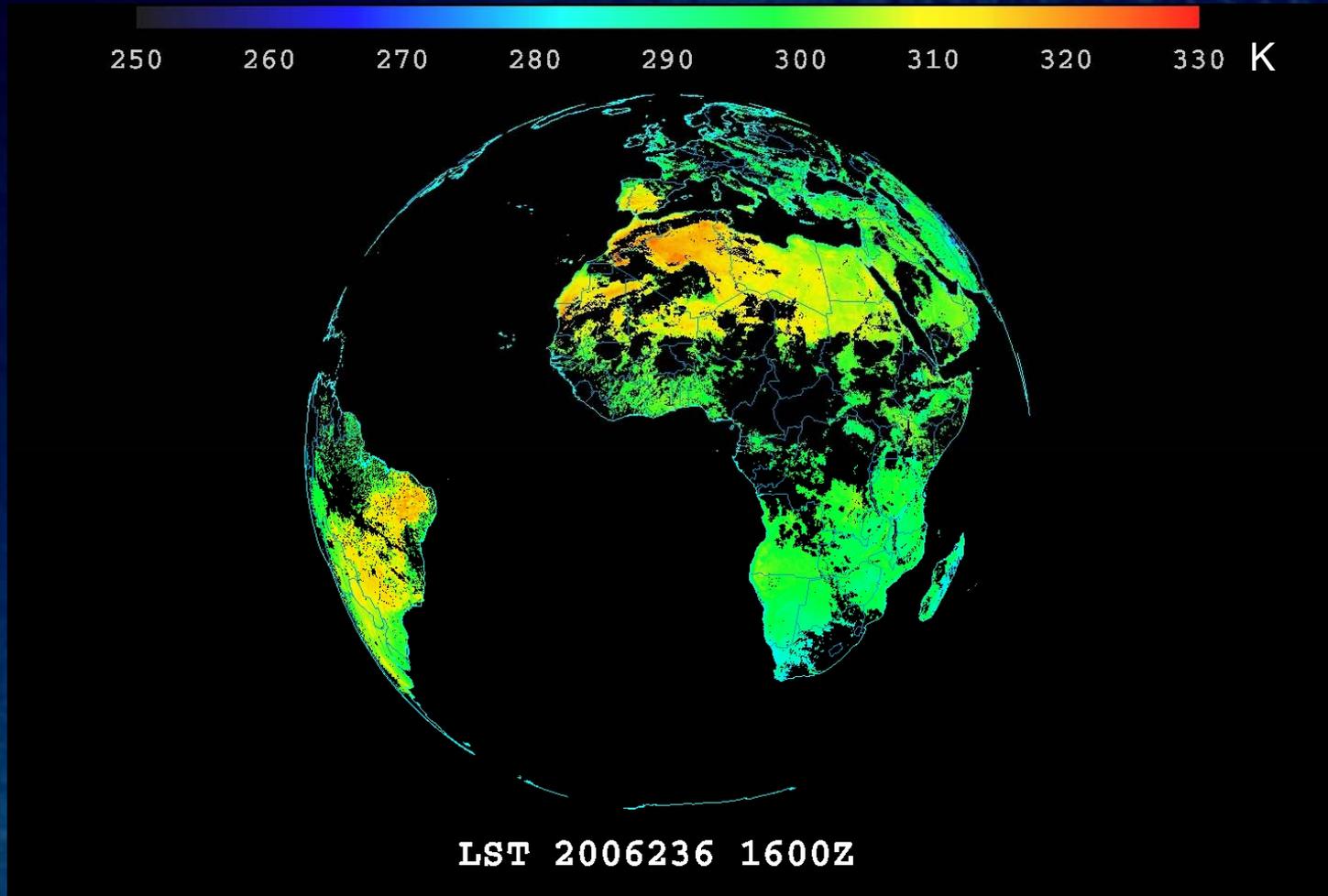
SSEC

WRF Simulation - 6.15 um Radiance - GOES-R WEST (137W)



GOES-R AIT Framework output

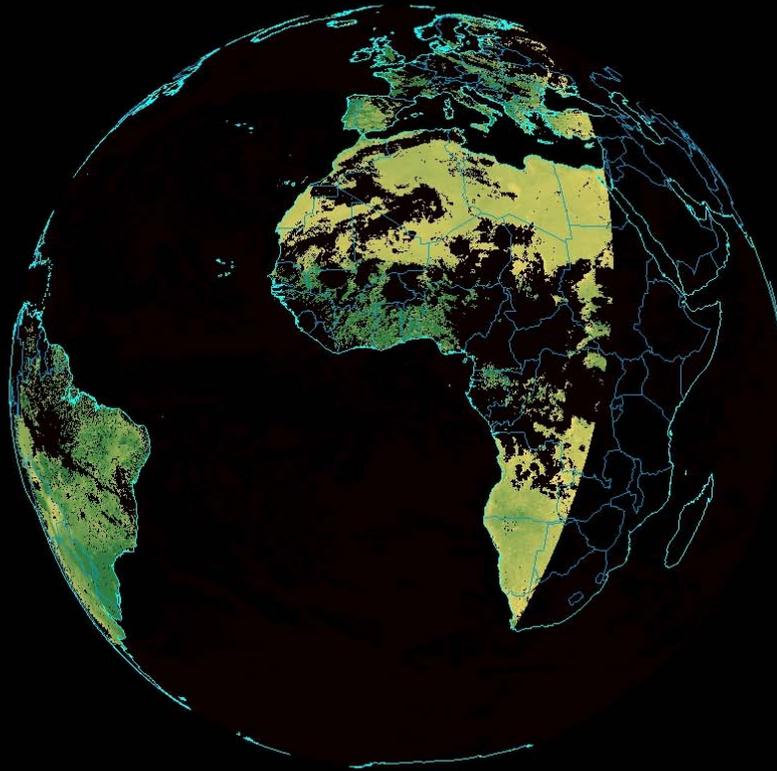
LST





GOES-R AIT Framework output

NDVI + Clouds

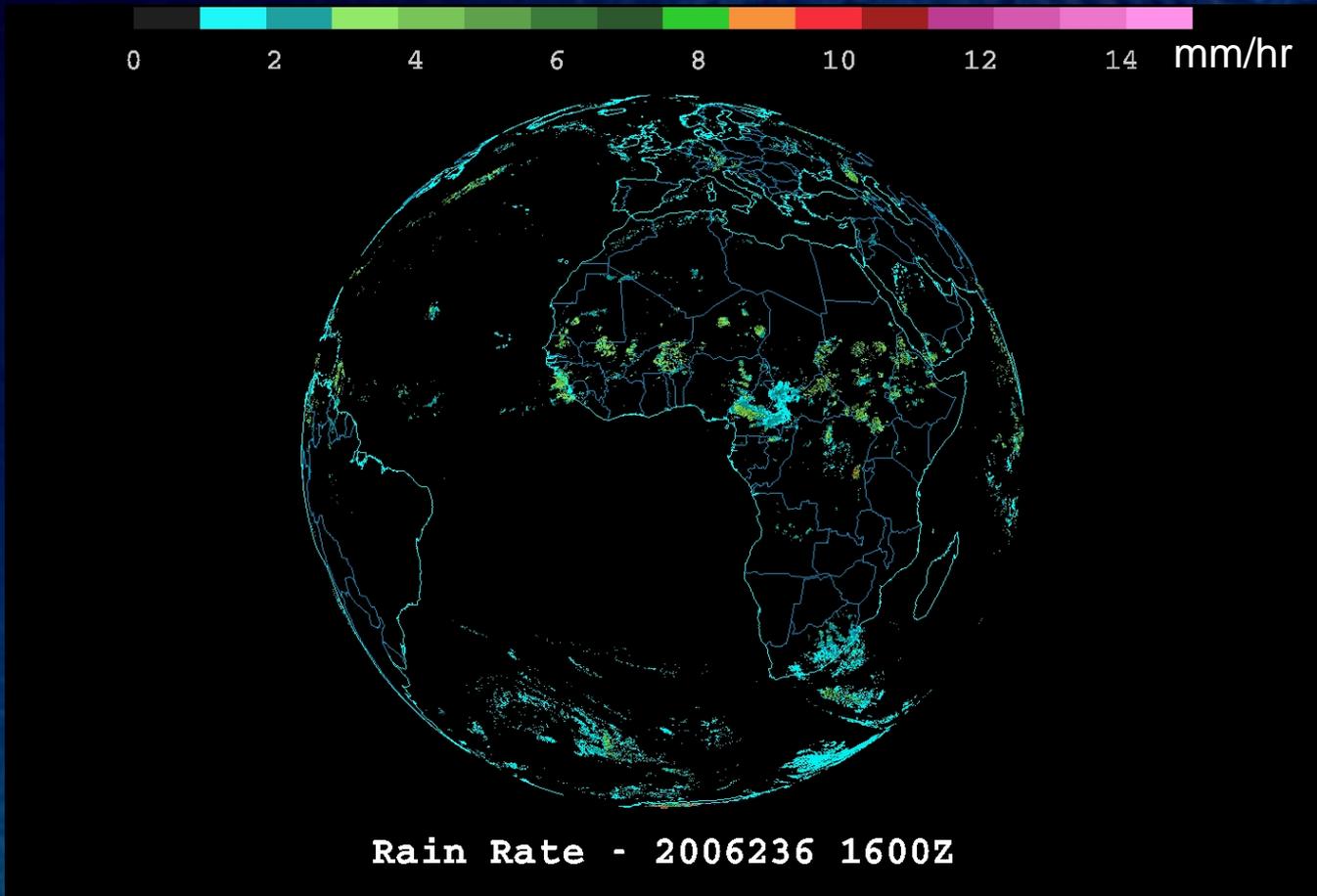


NDVI with Clouds Masked out using ACM 2006236 1600Z



GOES-R AIT Framework output

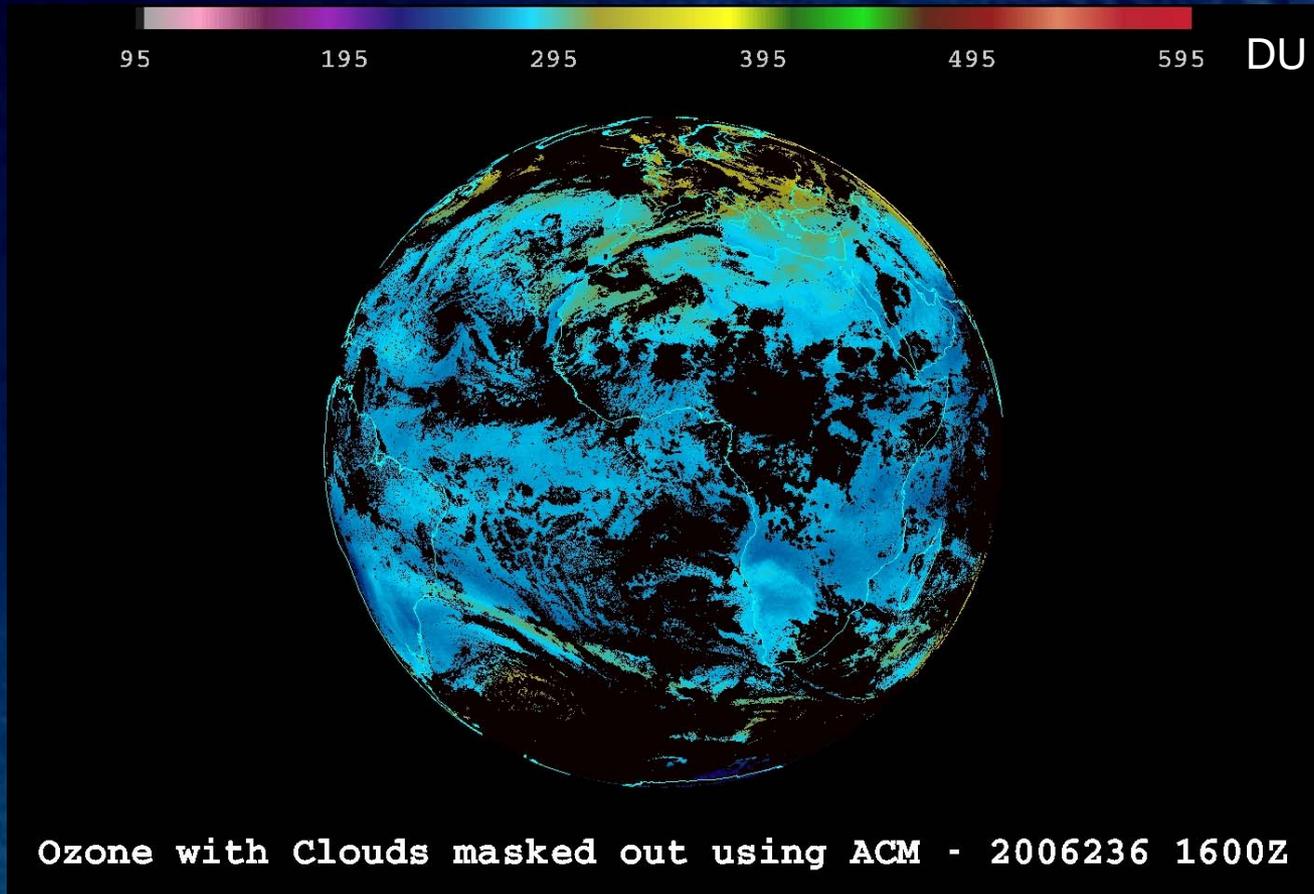
NDVI + Clouds





GOES-R AIT Framework output

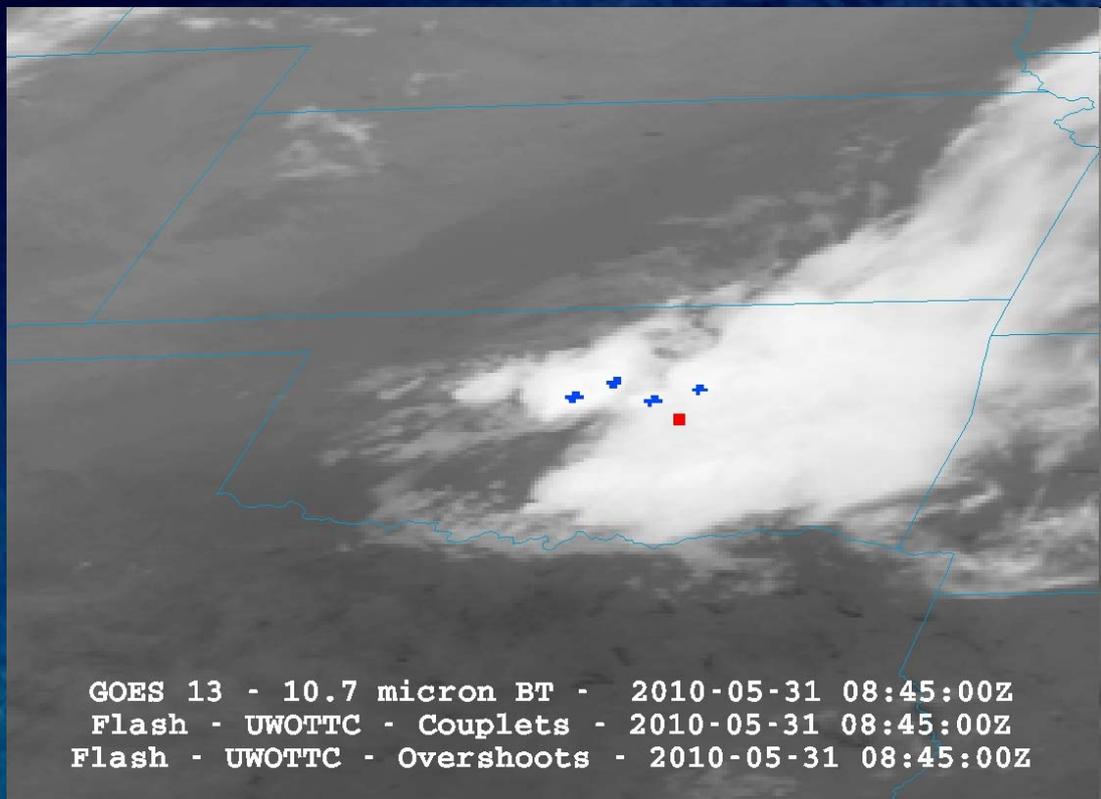
Ozone + Clouds





GOES-R AIT Framework output

Overshooting Tops and Thermal Couplets



GOES 13 - 10.7 micron BT - 2010-05-31 08:45:00Z
Flash - UWOTTC - Couplets - 2010-05-31 08:45:00Z
Flash - UWOTTC - Overshoots - 2010-05-31 08:45:00Z



Summary of ABI Products in McIDAS-V



- All of the ABI Baseline Products are able to be visualized in McIDAS-V
 - » We are currently working towards visualizing the GLM products as well.
- As they become available, Option 2 products are being tested in McIDAS-V
- Your enhancements are needed!



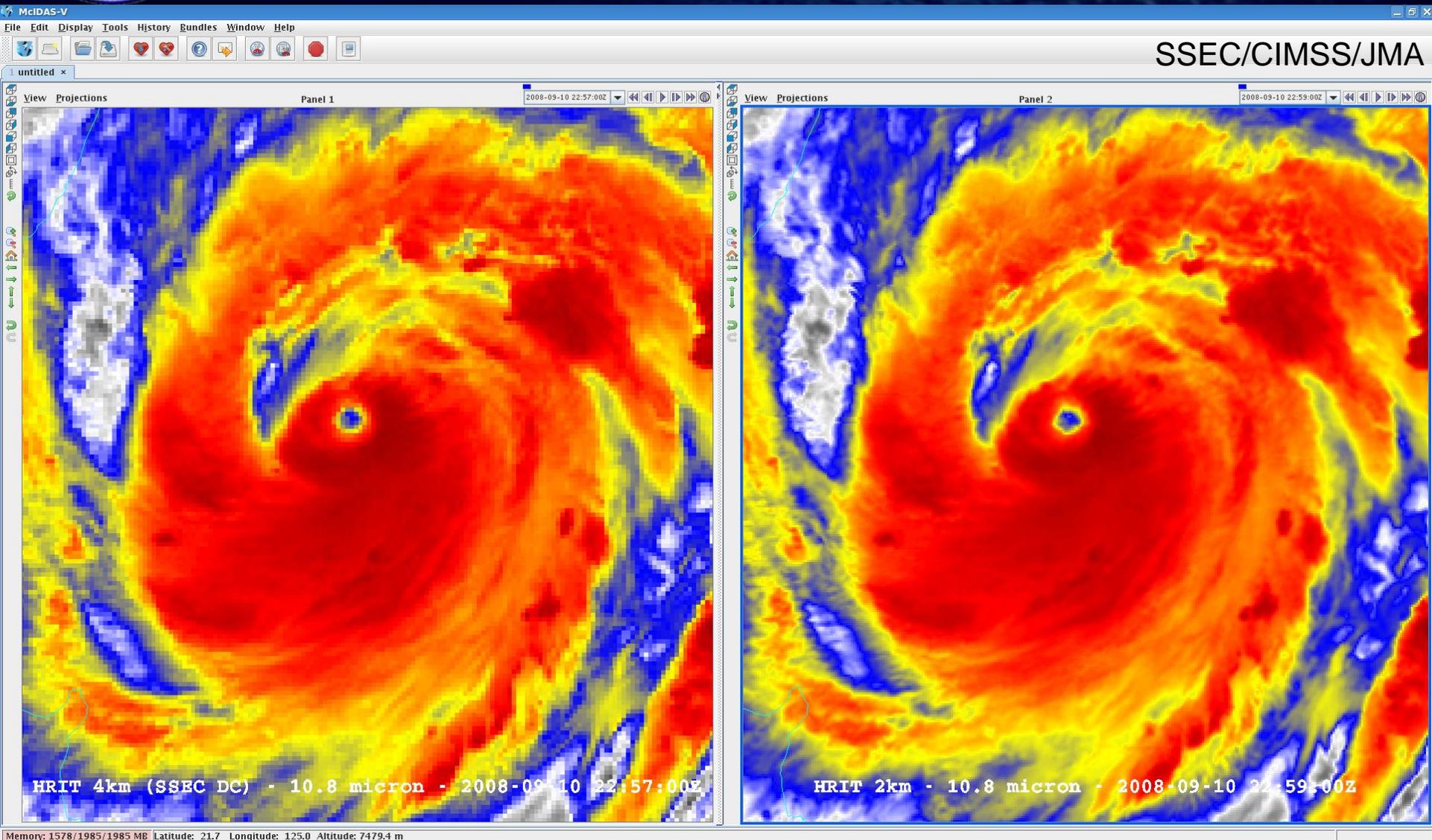
Other things that can be done with McIDAS-V



- McIDAS-V is not just simply a visualization tool for output from netCDF files in 2-D space looking in a single panel
- The use of multiple panels can be used to do a side by side analysis
- This is particularly useful in demonstrating the resolution differences in the ABI resolution as compared to current GOES



Side by Side Analysis (2 km MTSAT; data from JMA)





Side by Side Analysis (animation)

History Bundles Window Help



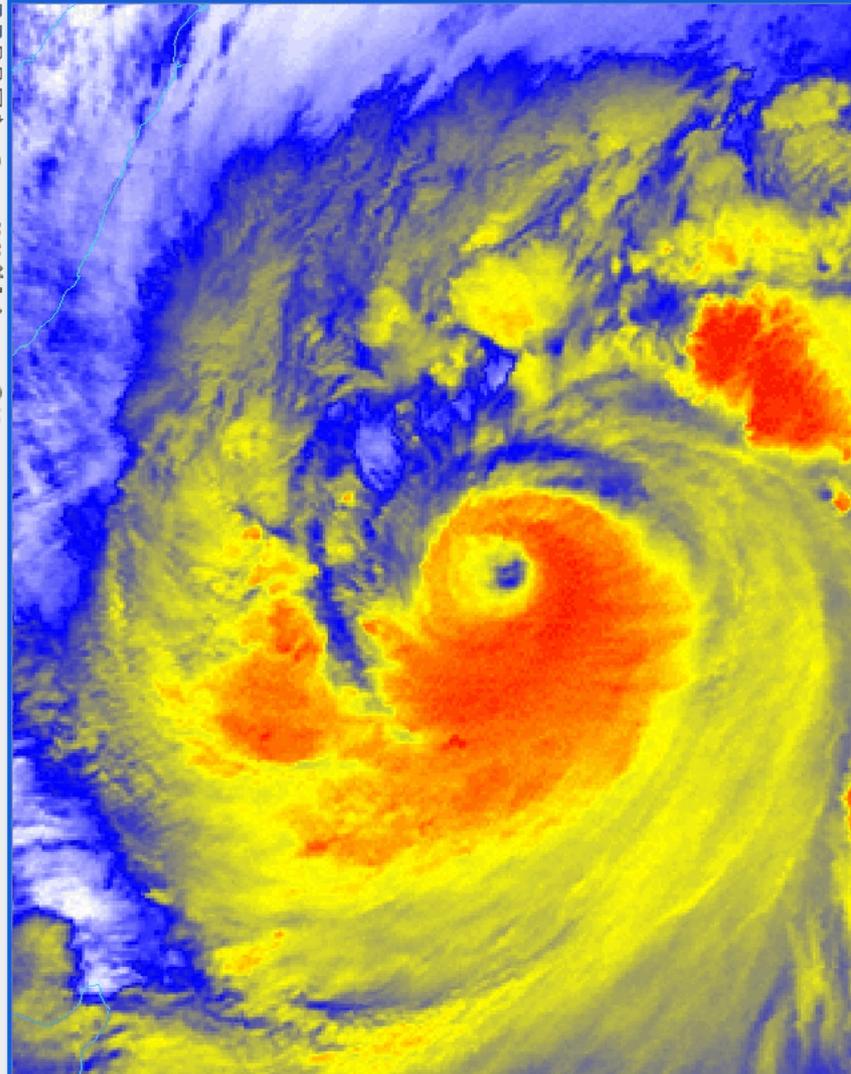
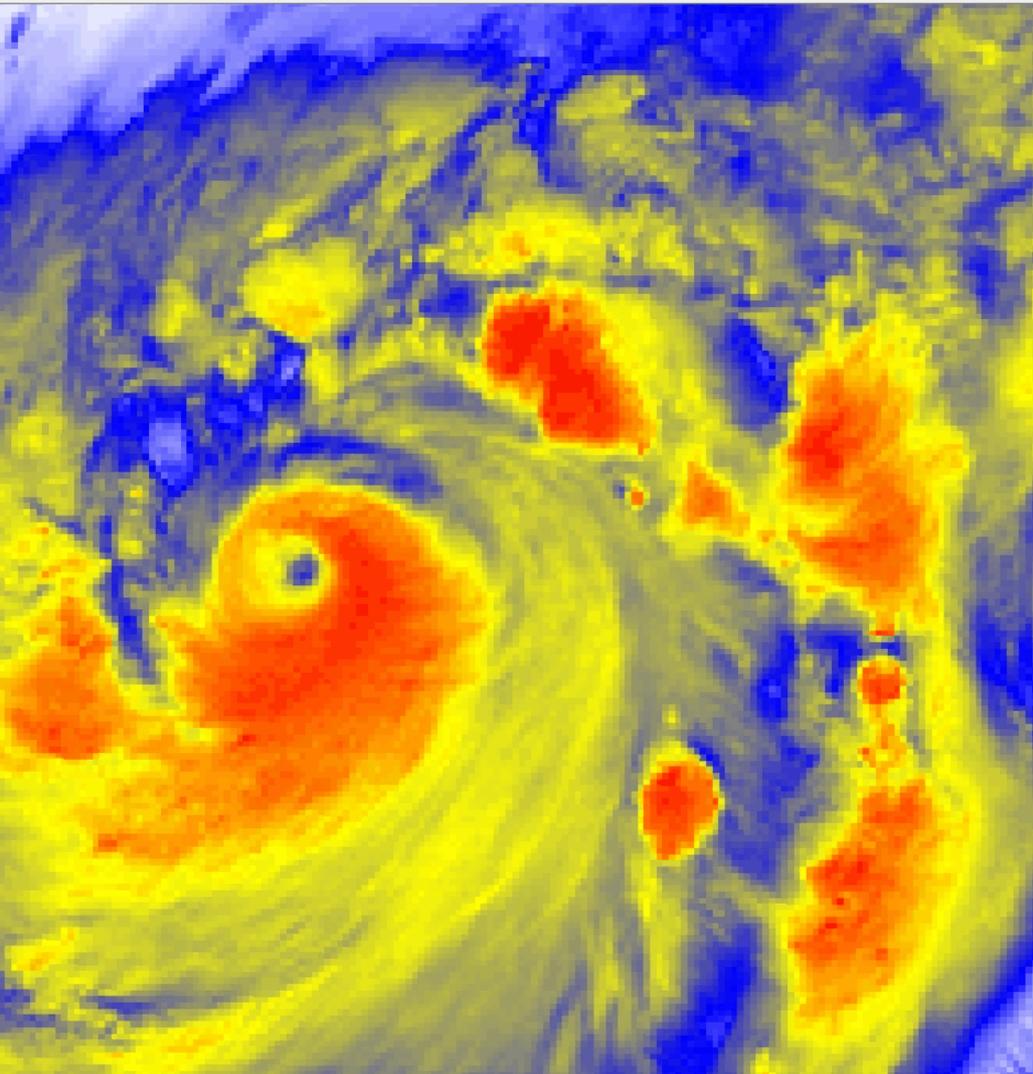
SSEC/CIMSS/JMA

Panel 1

2008-09-11 00:57:00Z

View Projections

Panel 2





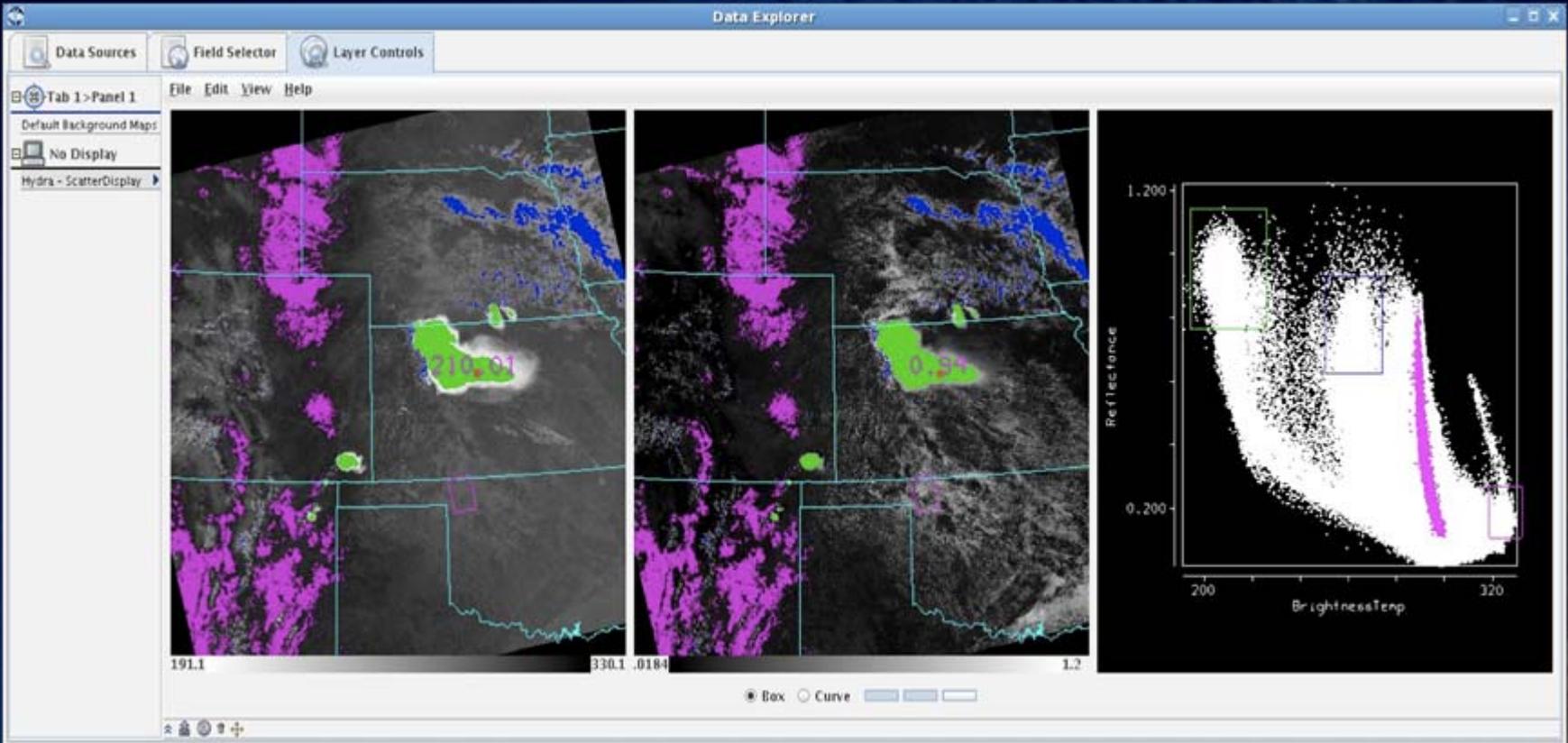
Other things that can be done with McIDAS-V



- McIDAS-V is not just simply a visualization tool for output from netCDF files in 2-D space
- Further analysis can be done, such as the detailed interrogation of spectral data and is also valuable for education and training
- Analysis can additionally be performed in both 3-D and 4-D space.



Multi-Band Scatter Plots using HYDRA

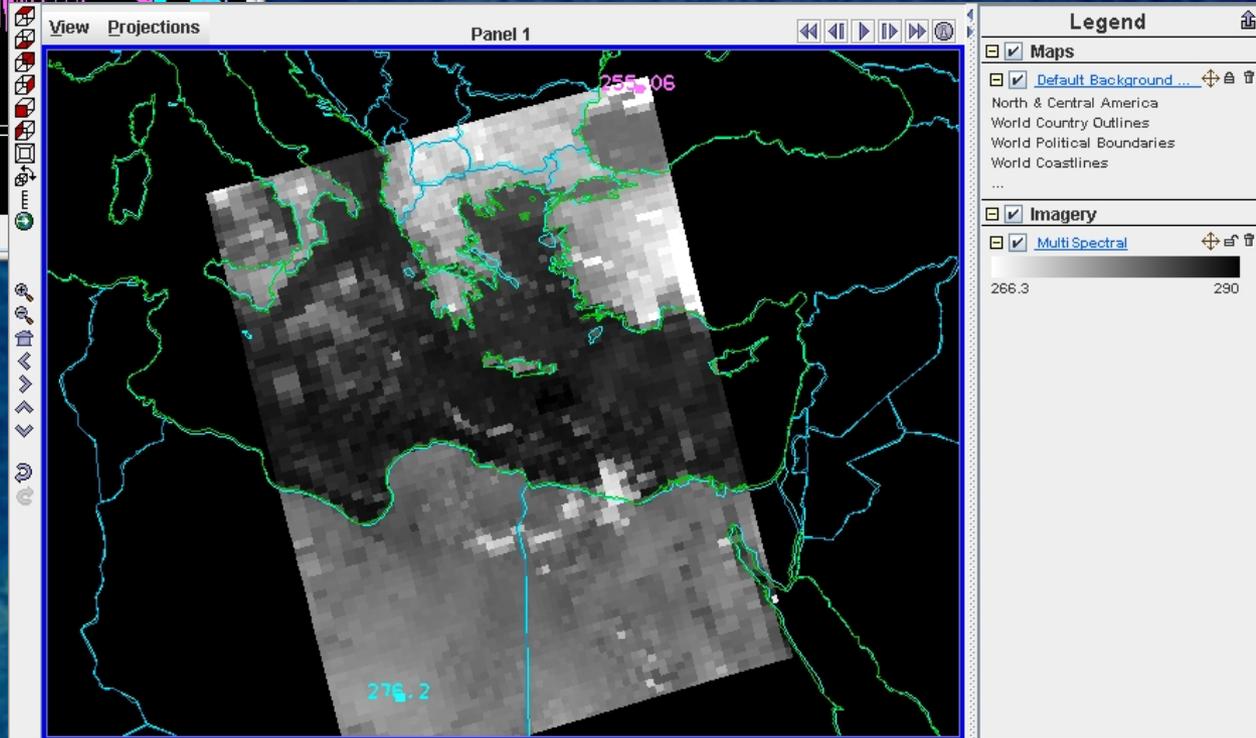
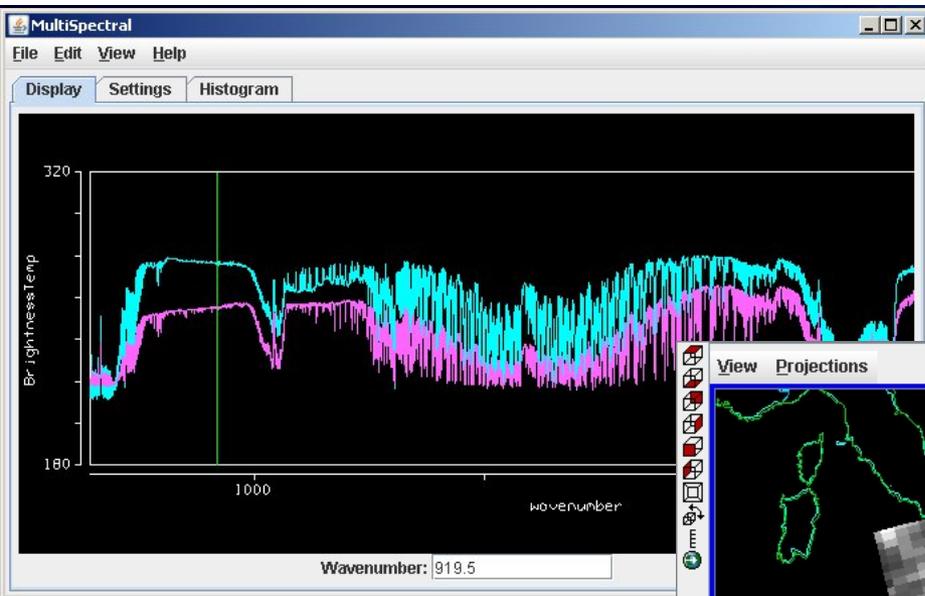


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Hyper-Spectral Analysis

IASI Spectral Signatures: Ice vs. Dust





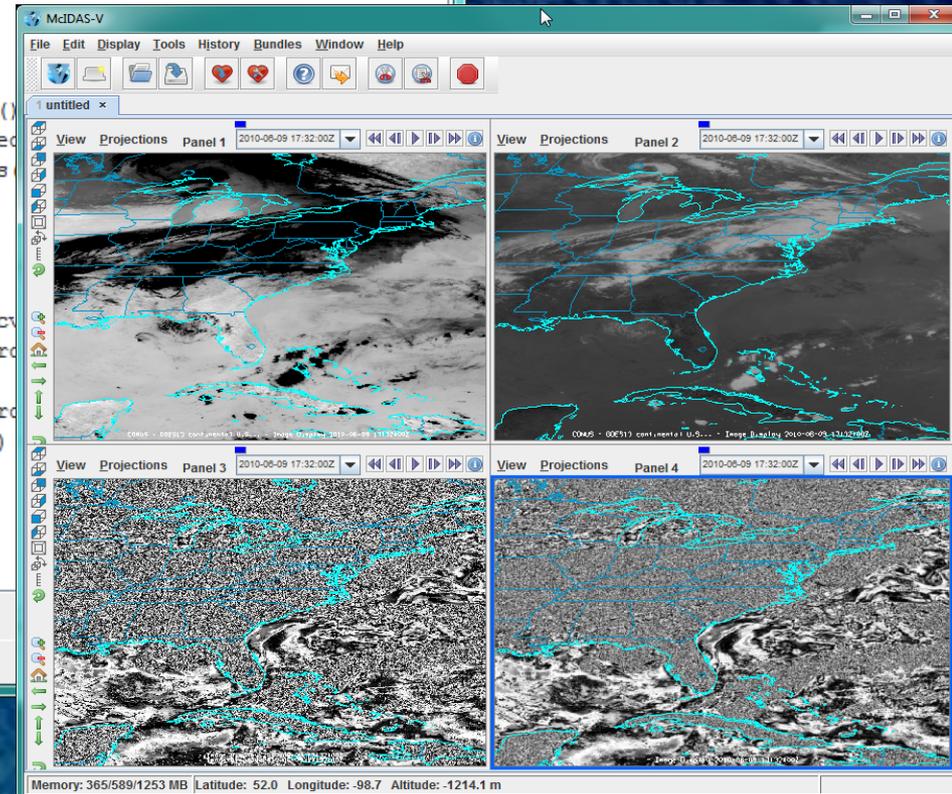
User defined Computation

```
Jython libraries
File Help
Local Jython
System
Temporary

User's library
1 def NinePointFilter(sdataset):
2     """ Simple, equal-weighted 9 point filter
3     """
4     newData = sdataset.clone()
5
6     for t in xrange(len(newData)):
7         rangeObject = newData.getSample(t)
8         vals = rangeObject.getFloats()
9         srcvals = sdataset.getSample(t).getFloats()
```

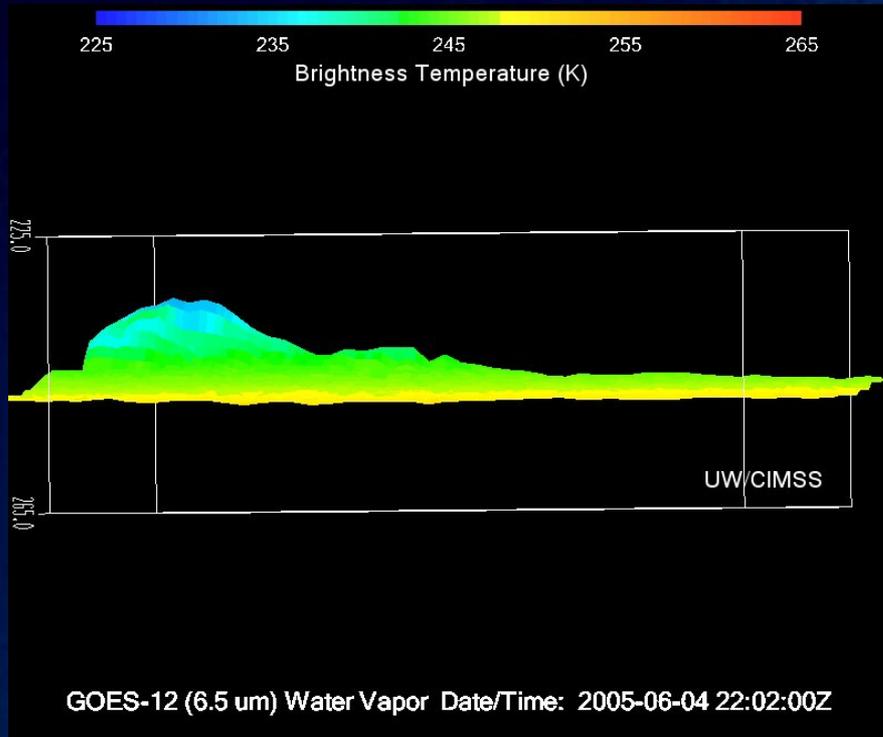
```
Jython Shell
File Edit Help
a=selectData()
b=selectData()
c = (a-b)/(a+b)
d = sin(c)
createDisplay('imagedisplay',d)
d=a-b
e=sin(d)
createDisplay('imagedisplay',e)
f=NinePointFilter(e)
createDisplay('imagedisplay',f)
print len(f), len(f[0])
1 893000
Evaluate:
```

```
getSpatialDomain(rangeObject,
                 element_size)=domain.getLengths
                 line_size-1):
                 size;
                 (1,element_size-1):
                 = (srcvals[0][k+j] + srcv
                 0][k+j-element_size] + src
                 0][k+j-element_size + 1]
                 0][k+j+element_size] + src
                 0][k+j+element_size + 1])
                 mples(vals)
Save
case
```

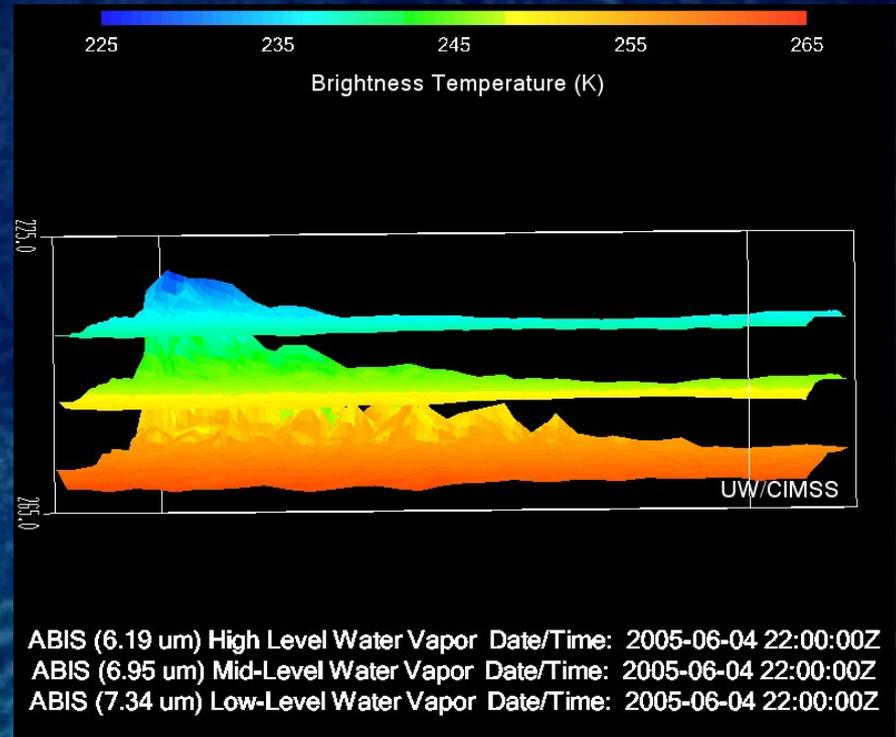




3-D Spectral Response Function analysis



Current GOES



Future GOES



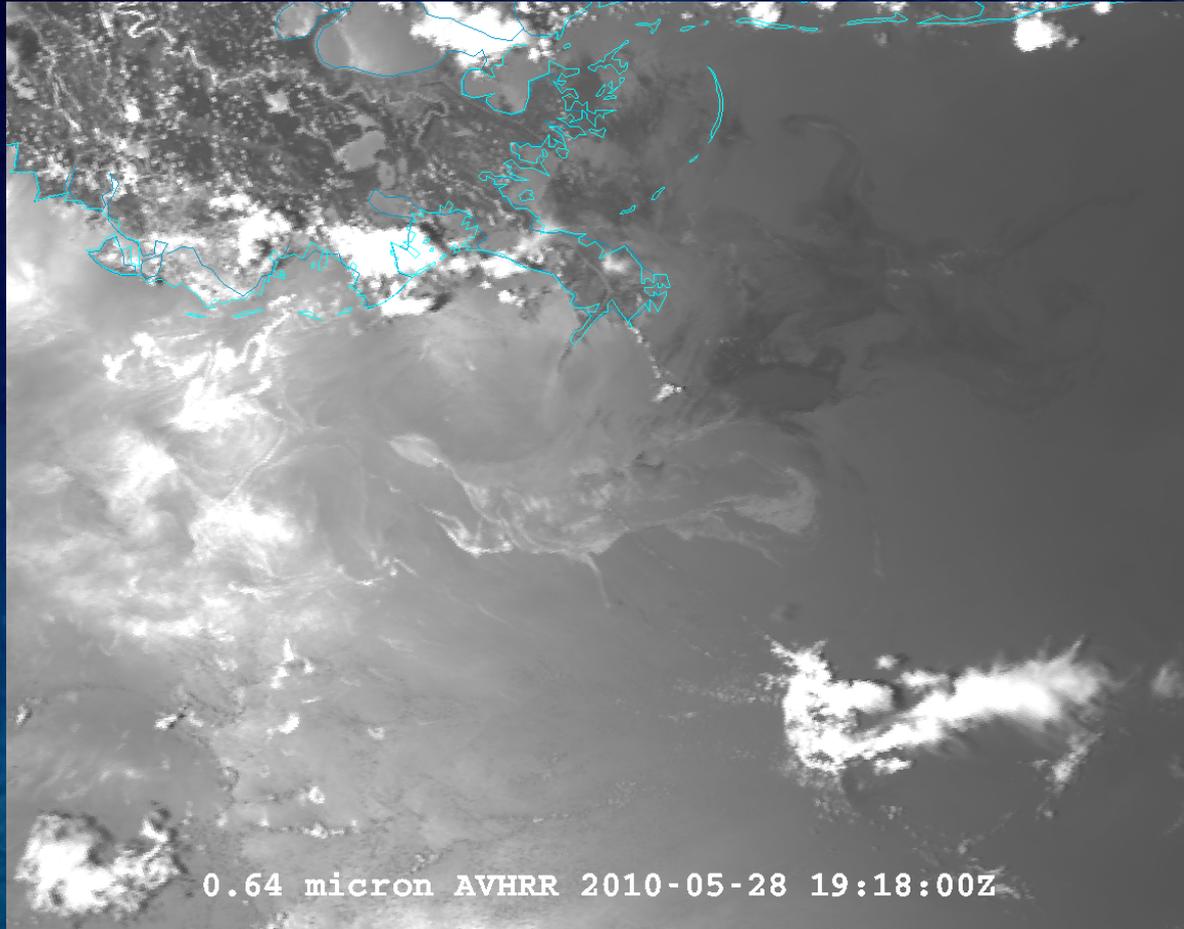
McIDAS-V for other “interesting topics”



- McIDAS-V can be used to investigate interesting phenomena that occur, utilizing a wide range of data sources including radar, GOES, AVHRR, MODIS and other data in combination with one another



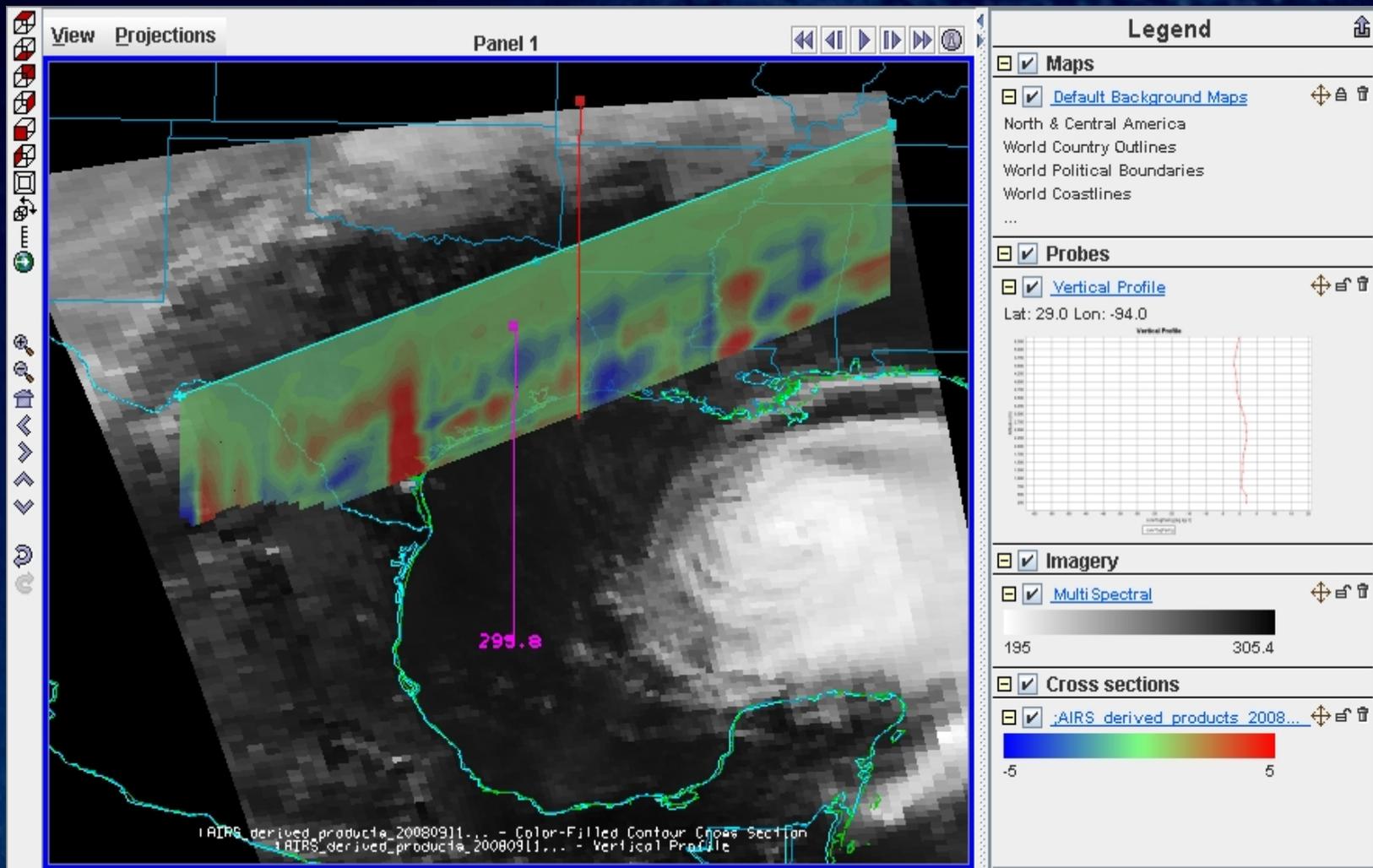
McIDAS-V: Other Applications Other Satellites



BP Deepwater oil
spill

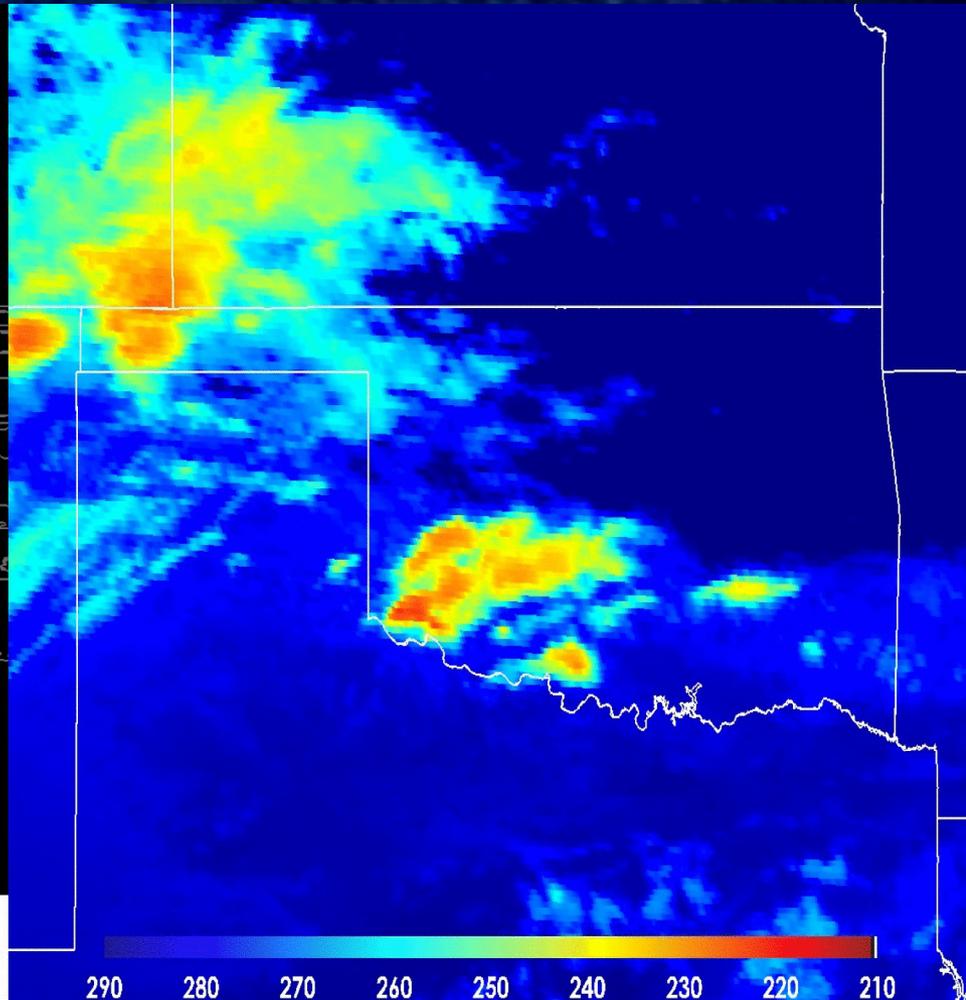
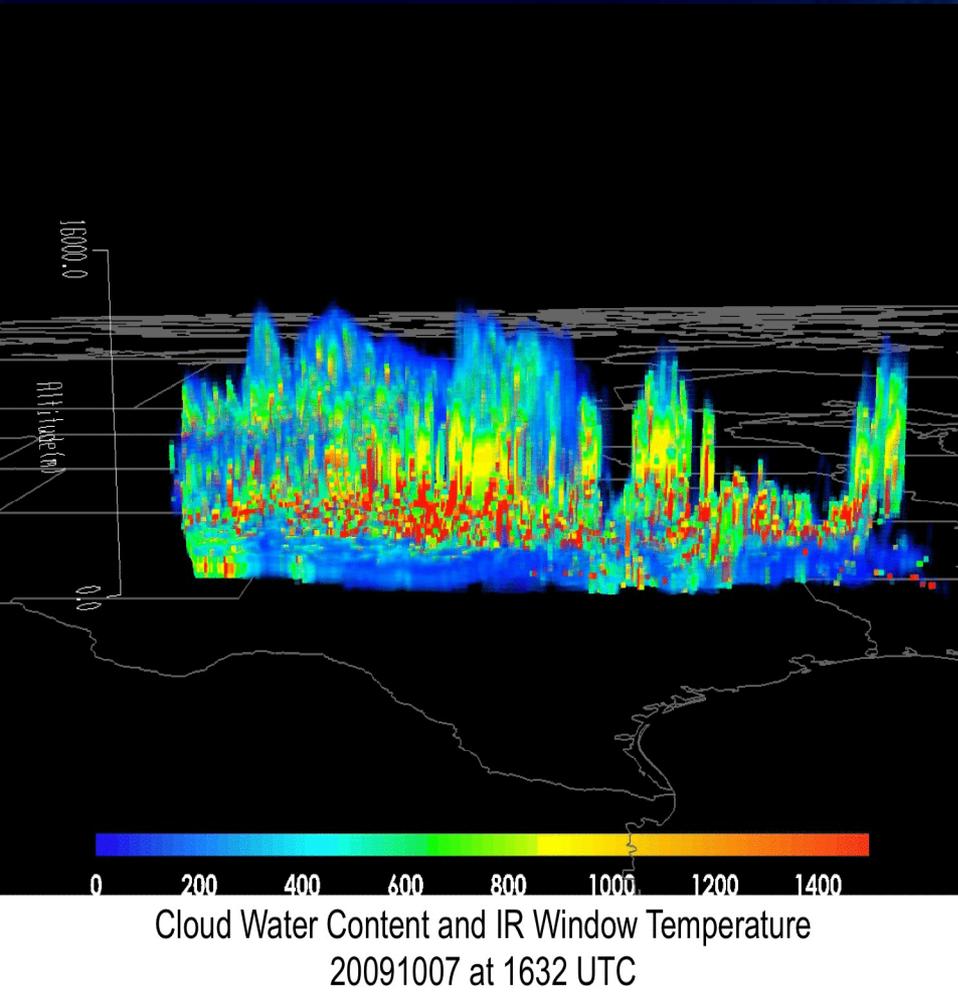


Interactive 3D Visualization of Sounding Product

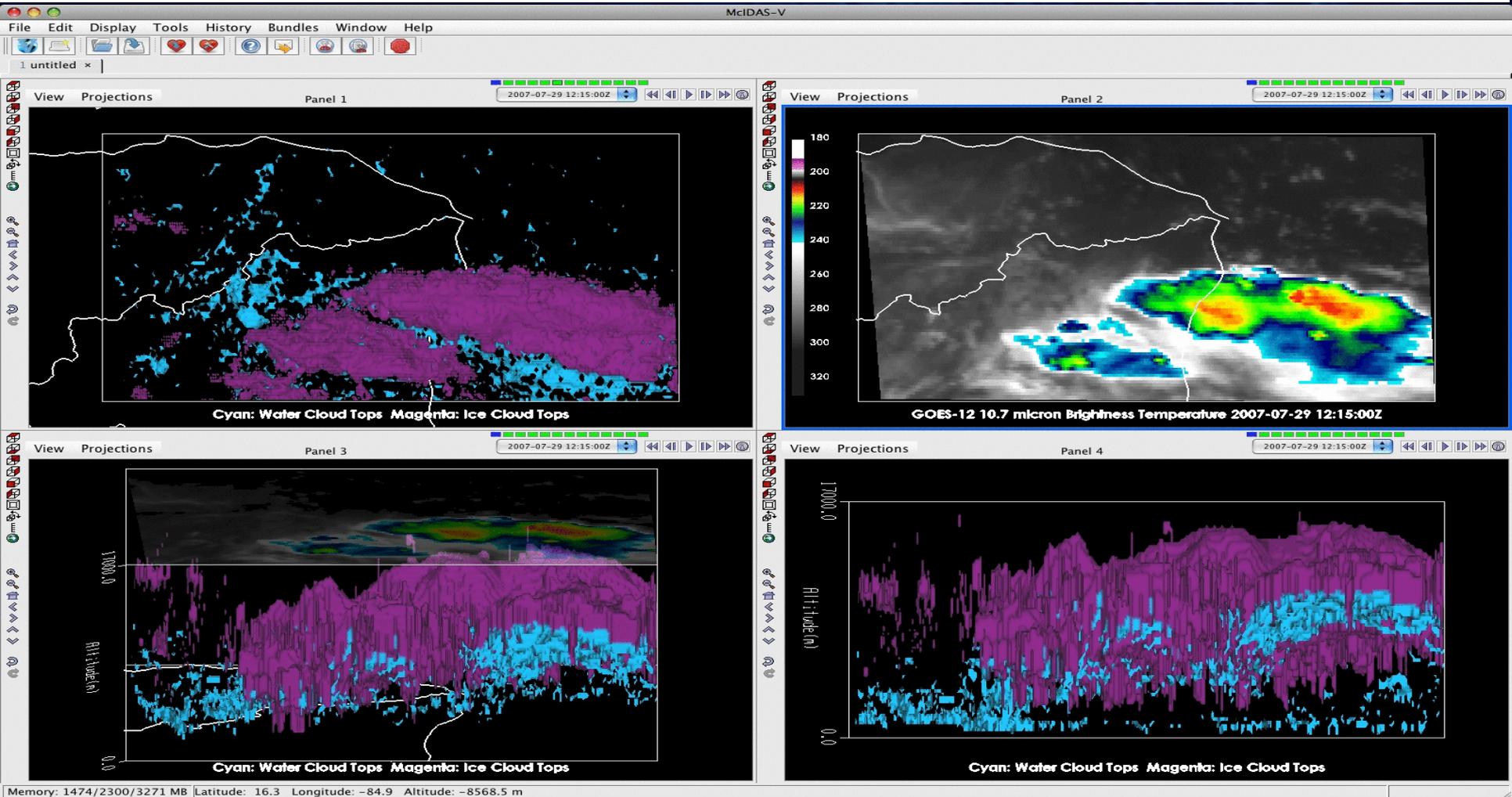




4-D Visualization



Volume Rendering example, Courtesy: Kris Bedka, NASA Langley



Courtesy: Kris Bedka, NASA Langley