McIDAS support of Suomi-NPP /JPSS and GOES-R L2

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Outline

- Suomi-NPP/JPSS Overview and McIDAS-V Examples
- McIDAS-X and -V Support of GOES-R ABI Level 1b and 2 Products

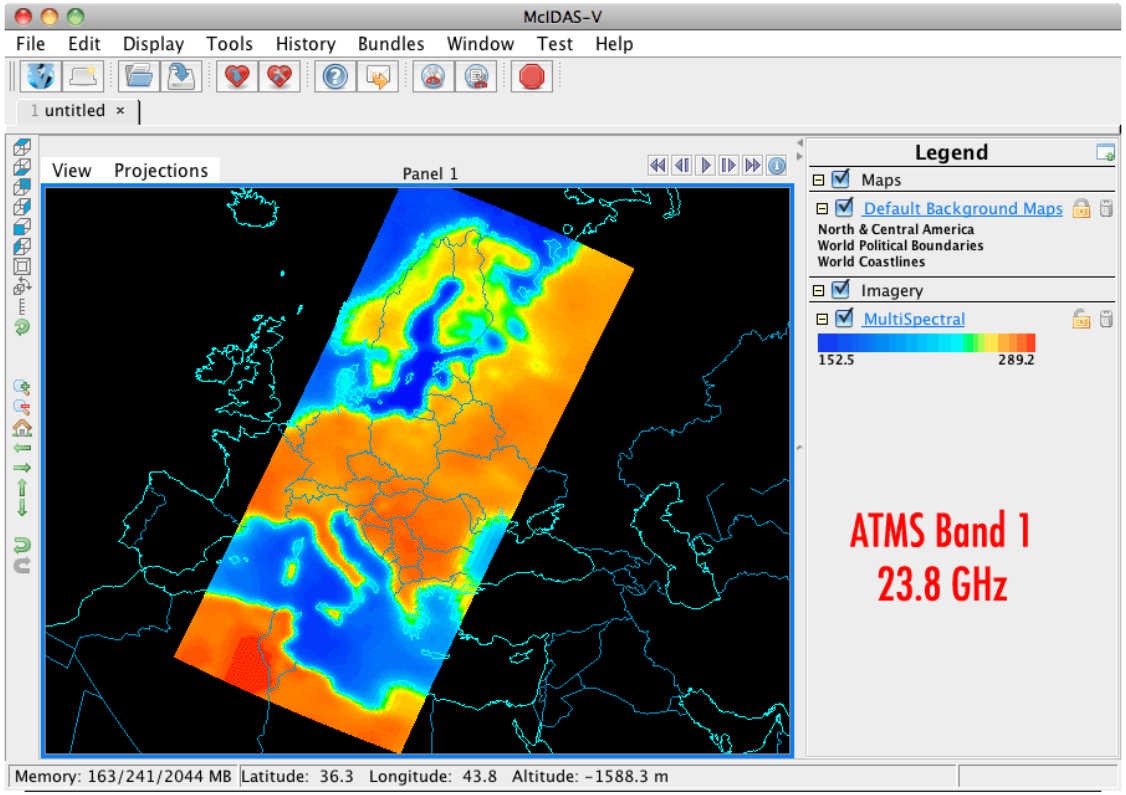
SUOMI-NPP/JPSS OVERVIEW AND MCIDAS-V EXAMPLES

Suomi NPP

- S-NPP observes the Earth's surface twice every 24-hour day, once in daylight and once at night.
- It has 5 instruments which retrieve data regarding the atmosphere, land and ocean
  - VIIRS
  - CERES
  - CrIS
  - ATMS
  - OMPS

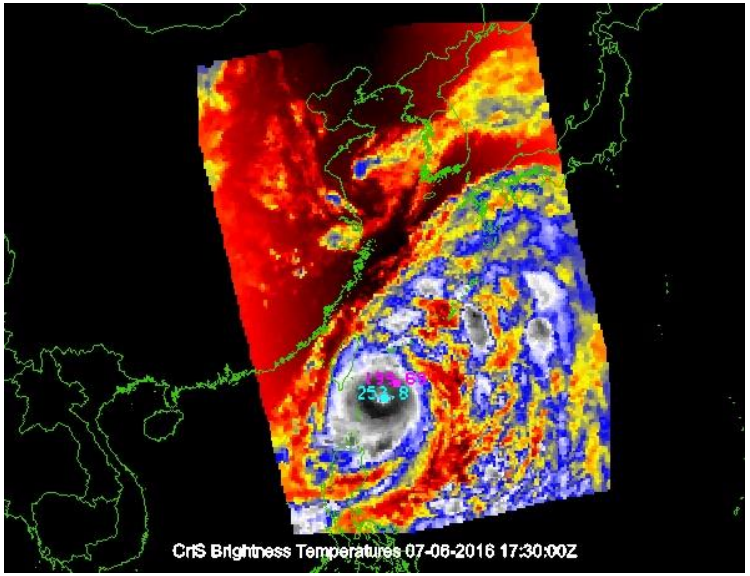
Advanced Technology Microwave Sounder (ATMS)

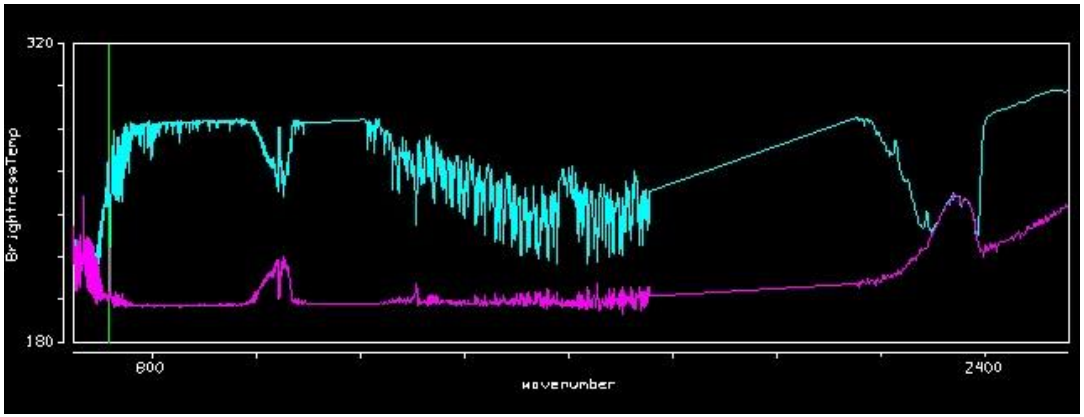
- 22 microwave channels, combining all the channels of the preceding AMSU-A1, AMSU-A2, and AMSU-B sensors into a single package
- Provides sounding observations needed to retrieve profiles of atmospheric temperature and moisture for forecasting models and continuity for climate monitoring purposes.



Cross-track Infrared Sounder (CrIS)

- 1,305 infrared spectral channels
- Designed to provide high vertical resolution information on the atmosphere's structure of temperature and water vapor.





Visible Infrared Imaging Radiometer Suite (VIIRS)

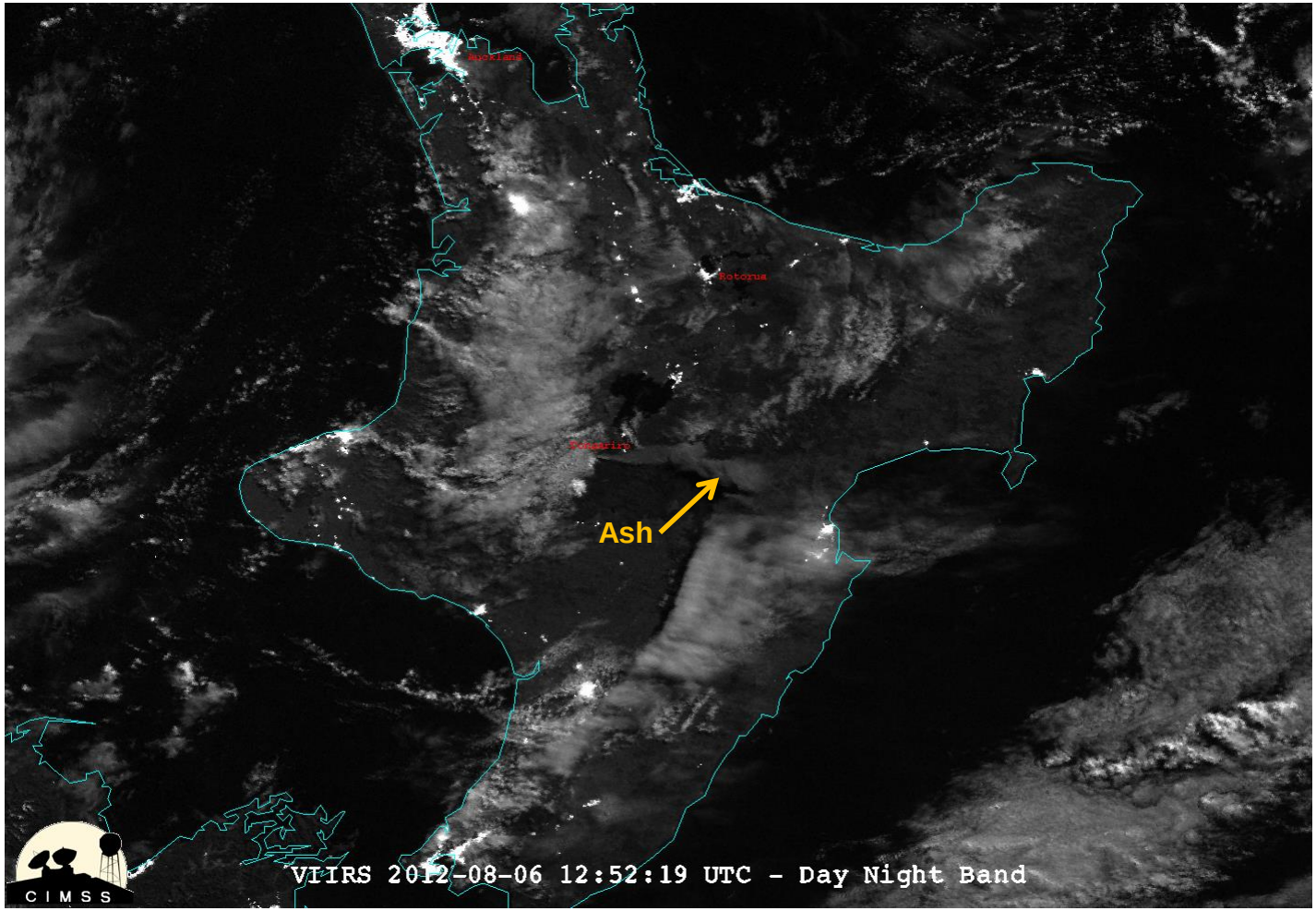
- Has 22 channels at three different resolutions
  - 16 Moderate Band (M-Band) channels (~750 m at nadir)
  - 5 high resolution (I-Band) channels (~375 m at nadir)
  - Day Night Band (~750 m at nadir)
- M and I band data encompass data from 412 nm to 12 µm
- Used to produce Level 2 products

Day Night Band

- The DNB measures visible radiances from both the Earth and atmosphere
- Wavelength of 0.7 μm, 742m x 742m pixel size
- Receives visible data from via reflection and emission sources (natural and anthropogenic)
- Stray light fix implemented August 21, 2013

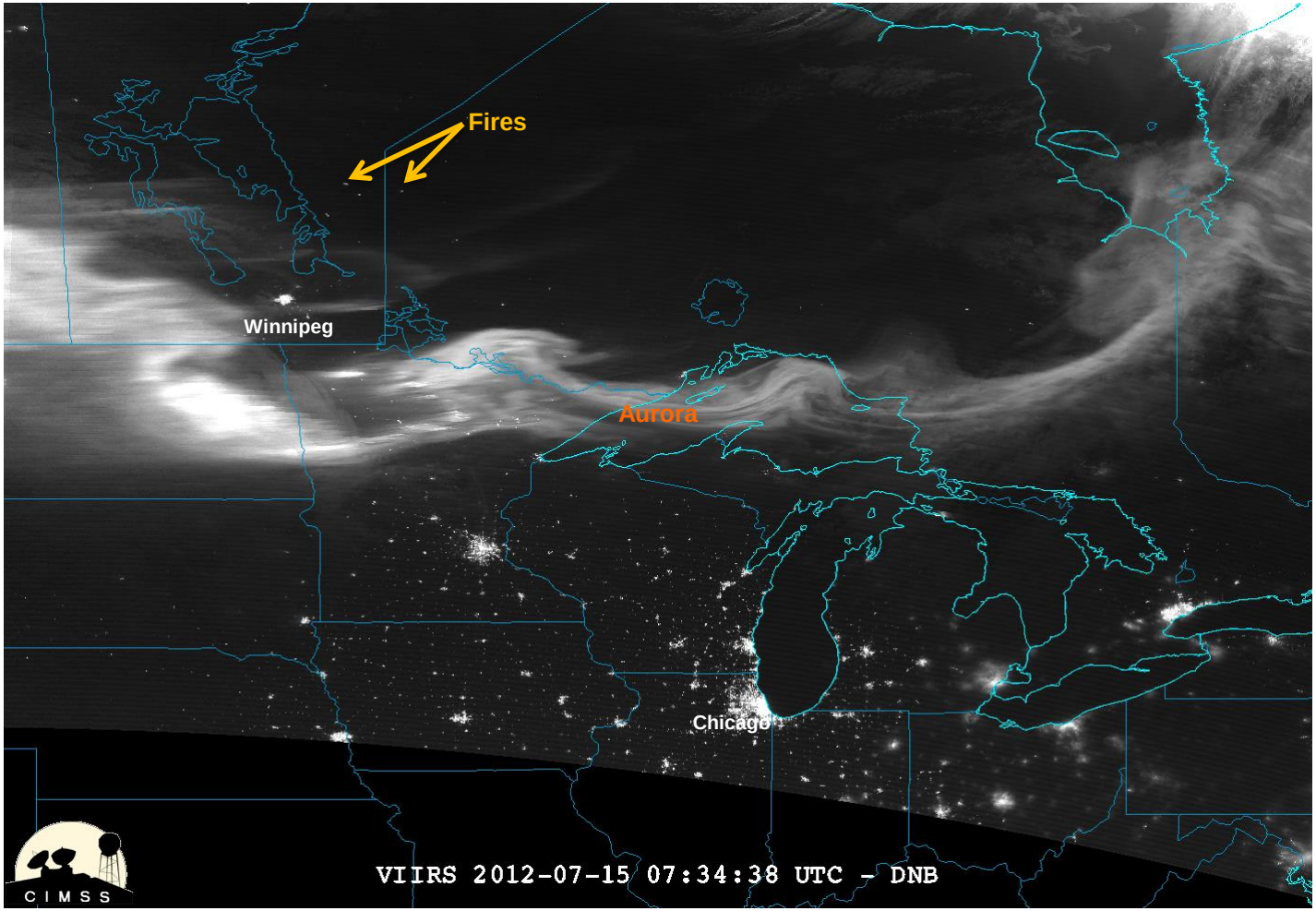
Figure 1 from Lee et al (2005)

Tongariro (New Zealand)
August 6, 2012 – 1252Z

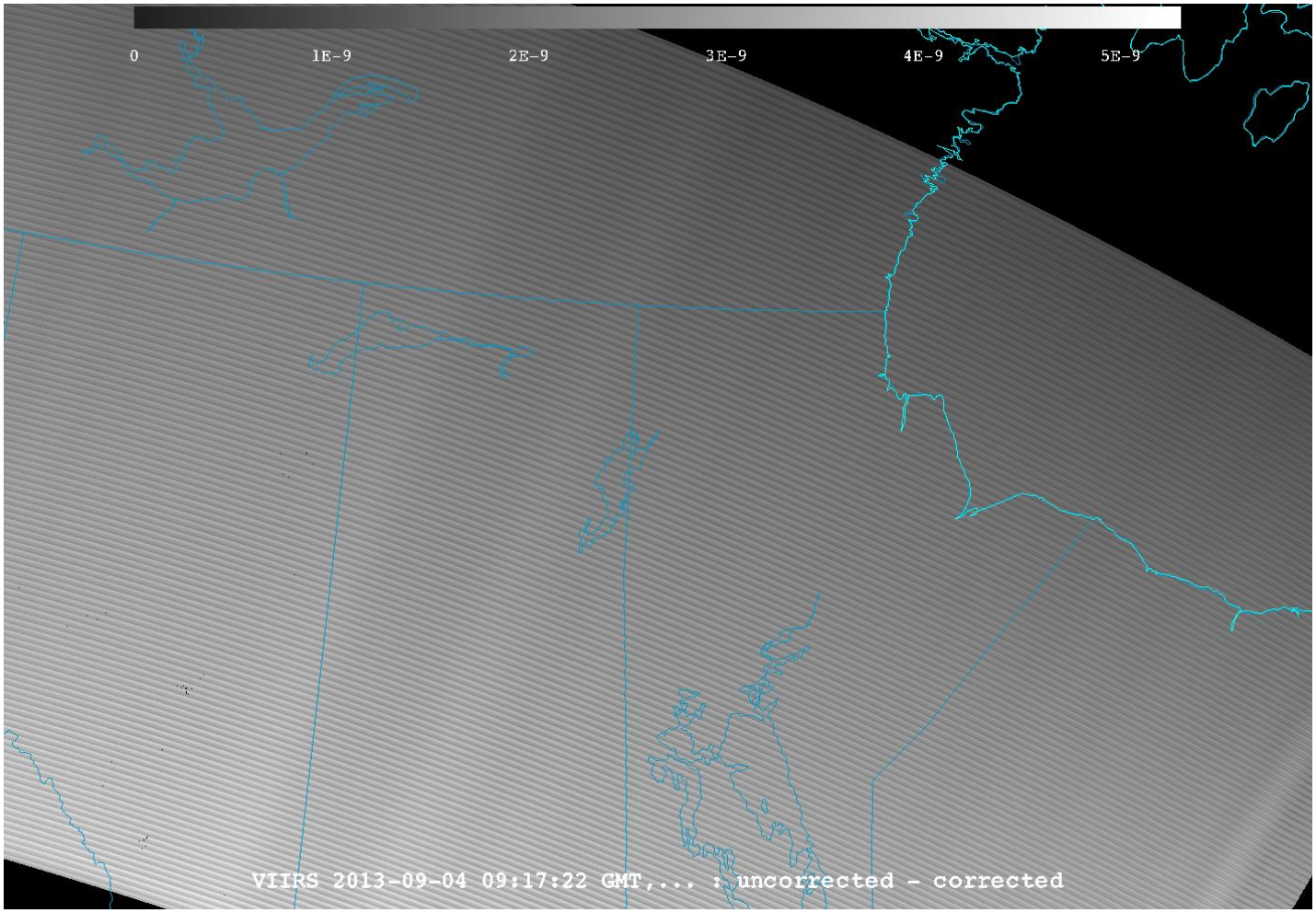


NASA Image of the Day
http://earthobservatory.nasa.gov/NaturalHazards/view.php?id=78791

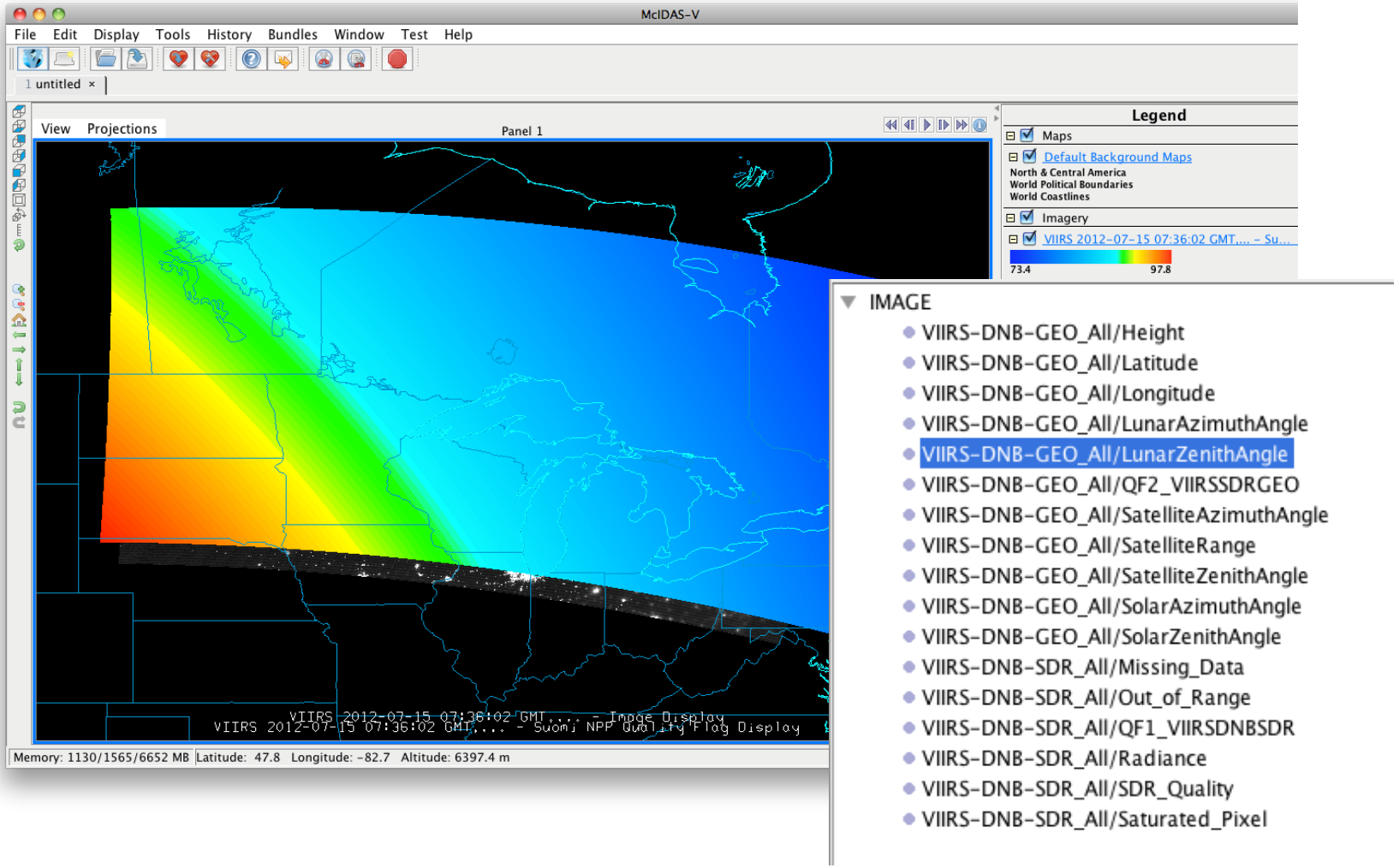
VIIRS (11, 3.9μm and DNB) 0733Z, July 15, 2012



VIIRS Channel Differencing
DNB Stray light example



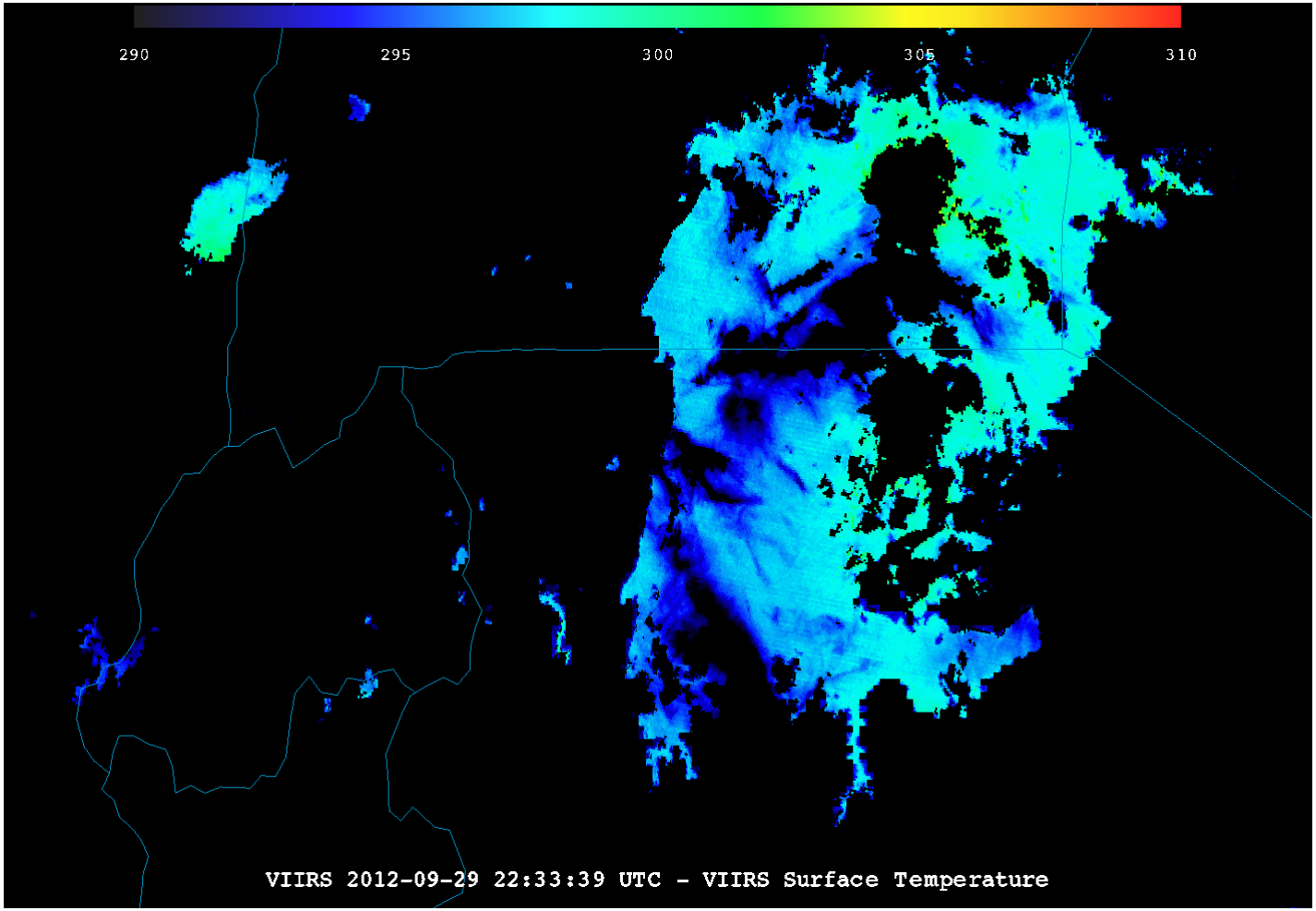
VIIRS SDR
Ancillary data



Visible Infrared Imaging Radiometer Suite (VIIRS) EDR

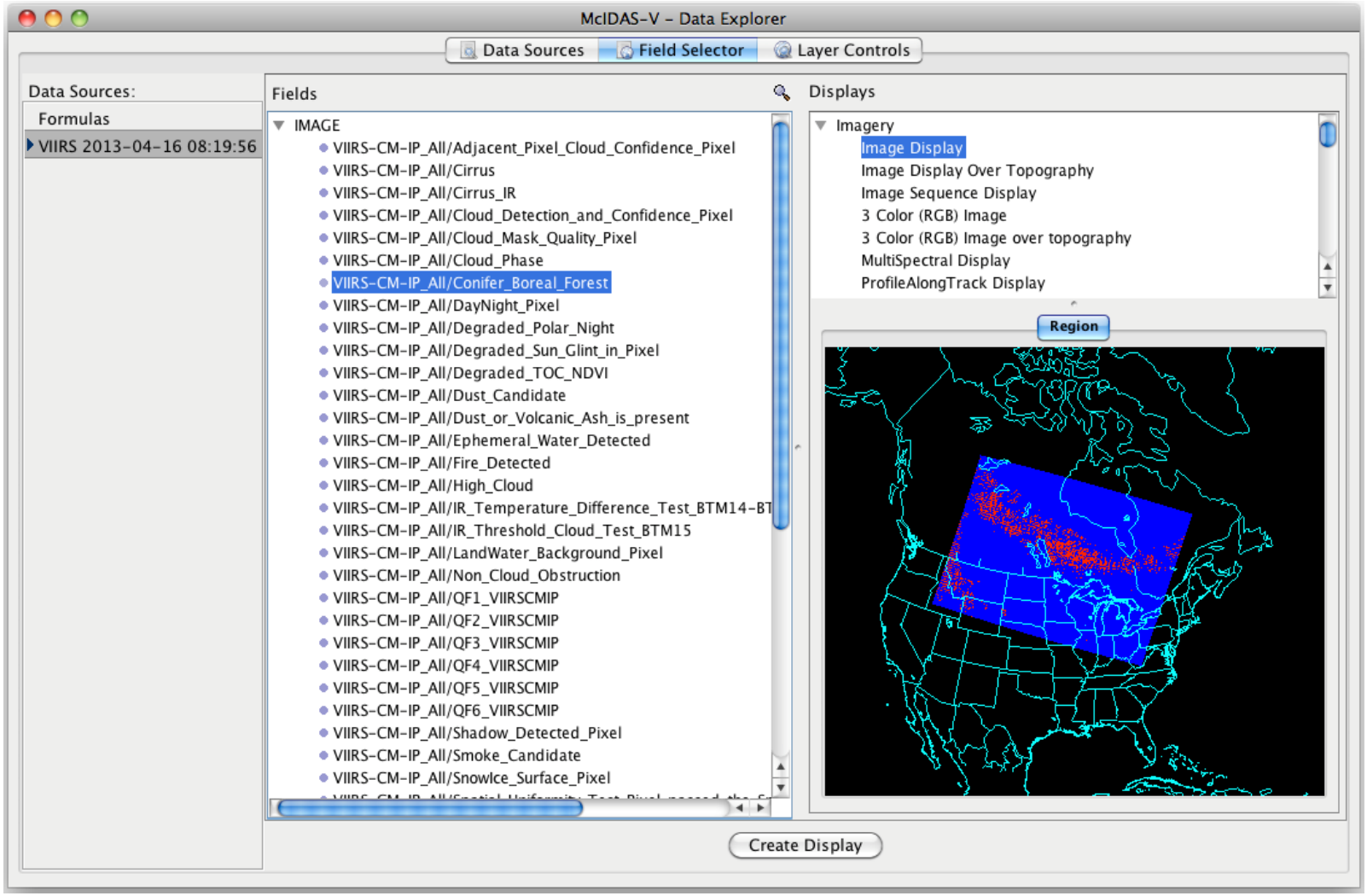
- There are a series of 20 Environmental Data Records (EDRs) produced from VIIRS
- McIDAS-V has been able to successfully ingest all EDRs including NDE Enterprise output
- McIDAS-V can unpack and display bit level data.
  - Ex. Displaying VCM test results

VIIRS DNB and Surface temperature EDR 2236Z, 09/29/2012

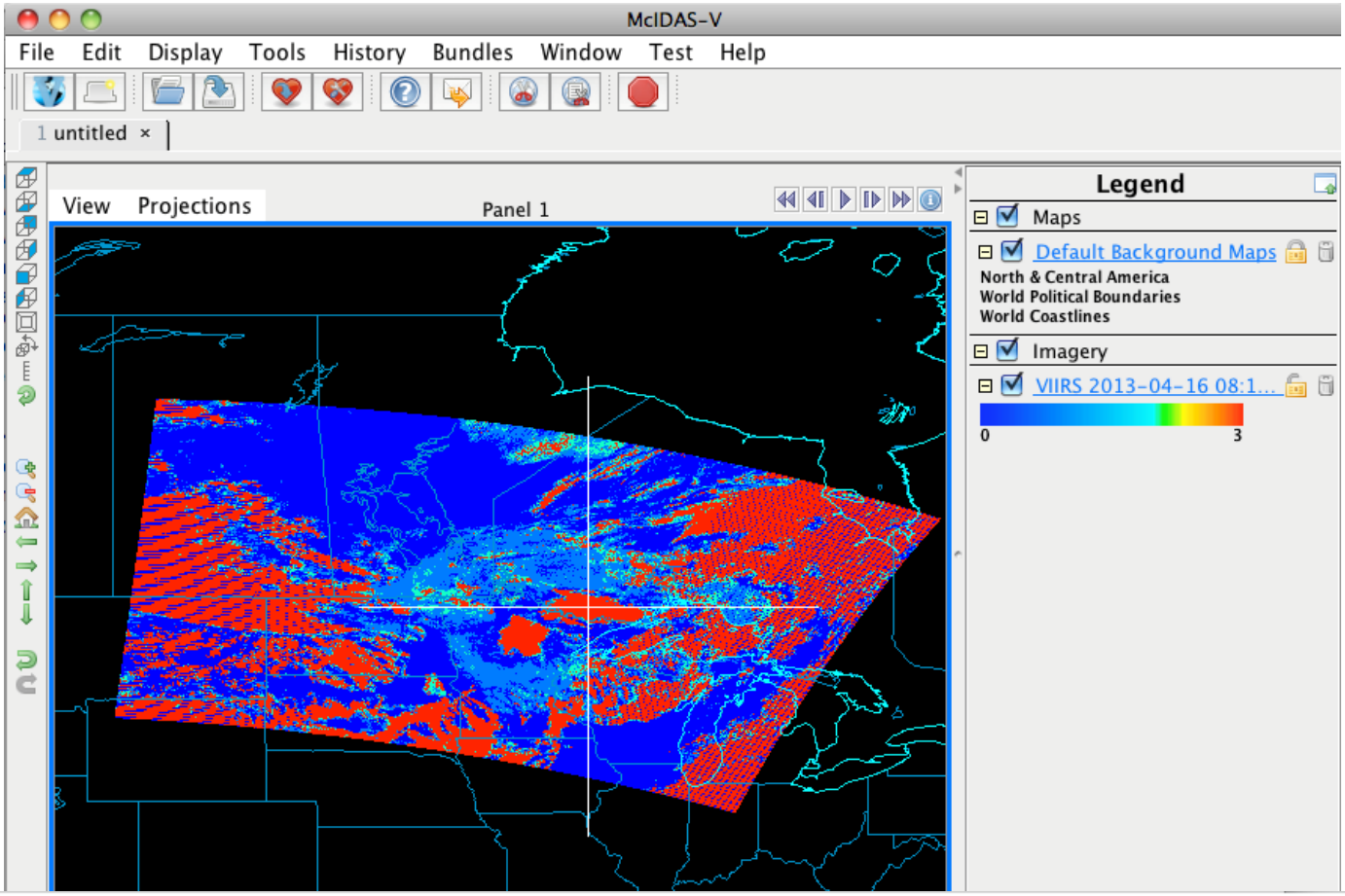


Lake Victoria

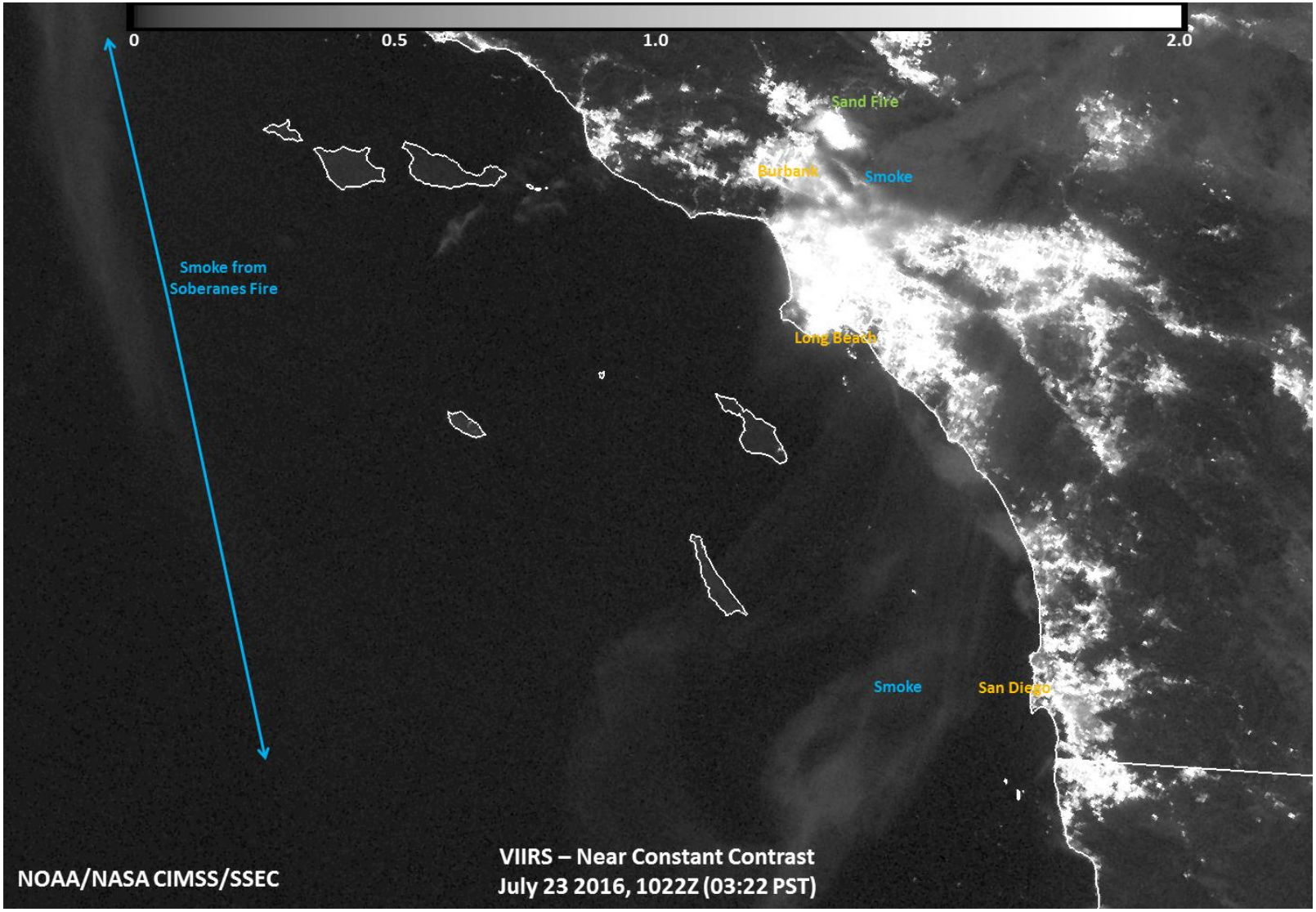
Product EDR Variable selection



Product EDR Data Probe

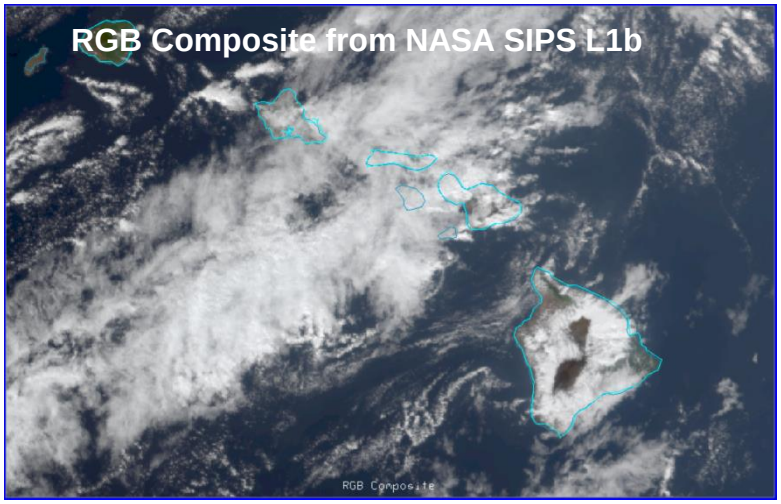


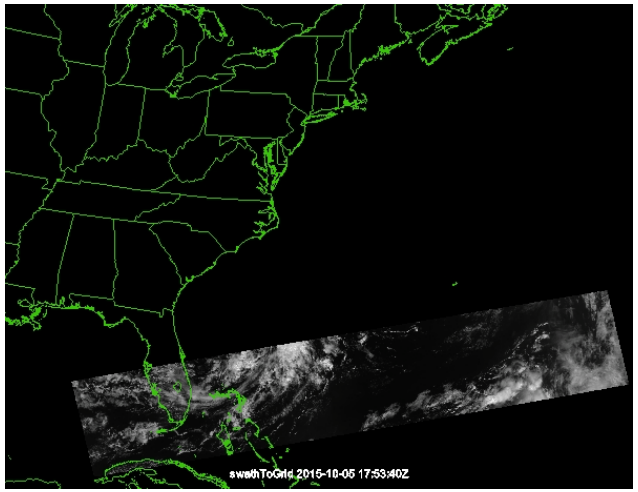
Imagery EDR example



S-NPP/JPSS specific McIDAS-V Status

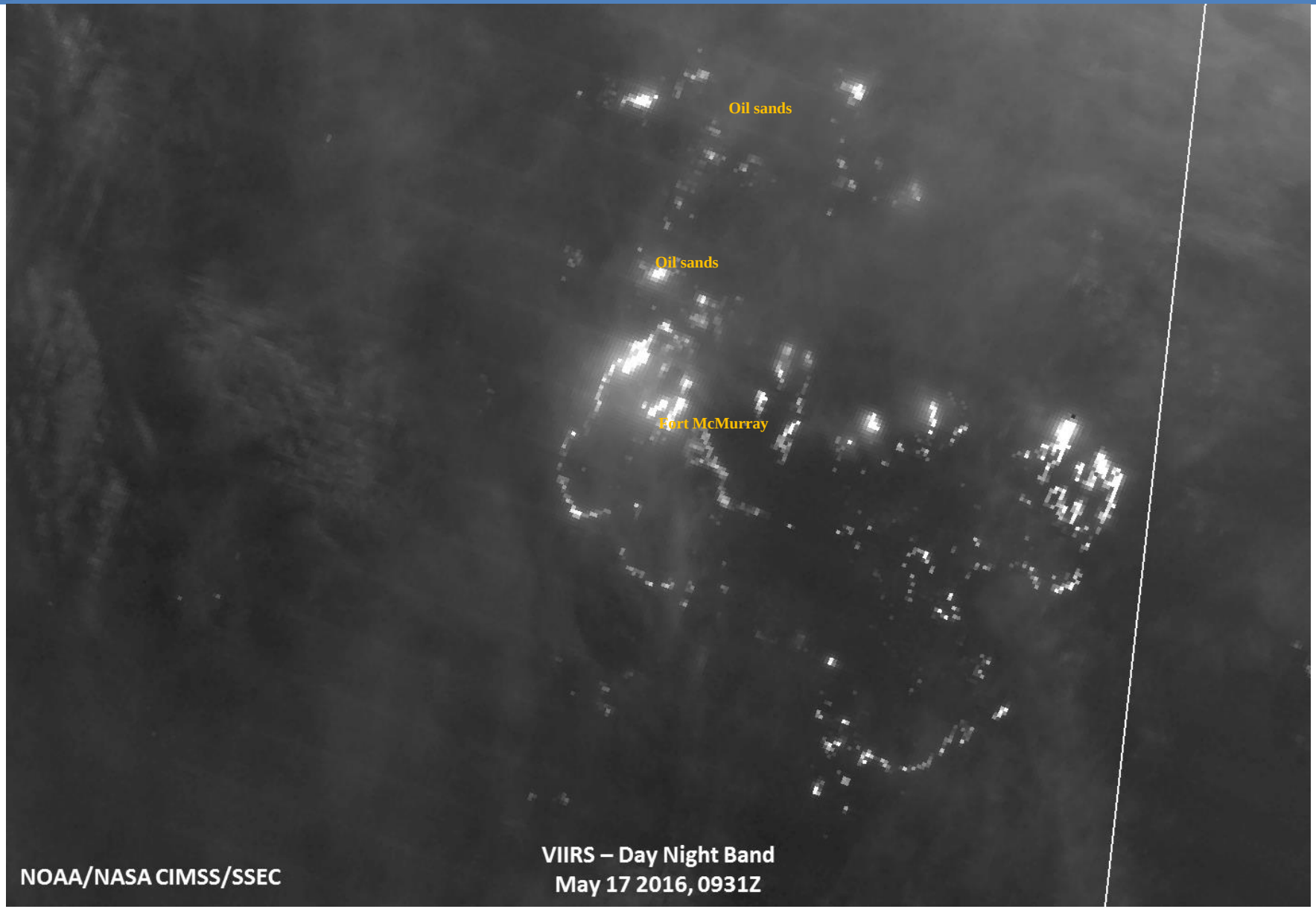
- Expanded granule concatenation for SDRs and EDRs
- Support for both NASA and NOAA L1b formats
  - Needed due to the move of the APEATE to NASA SIPS
- Works with Is able to easily load and manipulate Suomi NPP (Block 1 and 2) and JPSS-1 simulated Block 2 data without any special readers



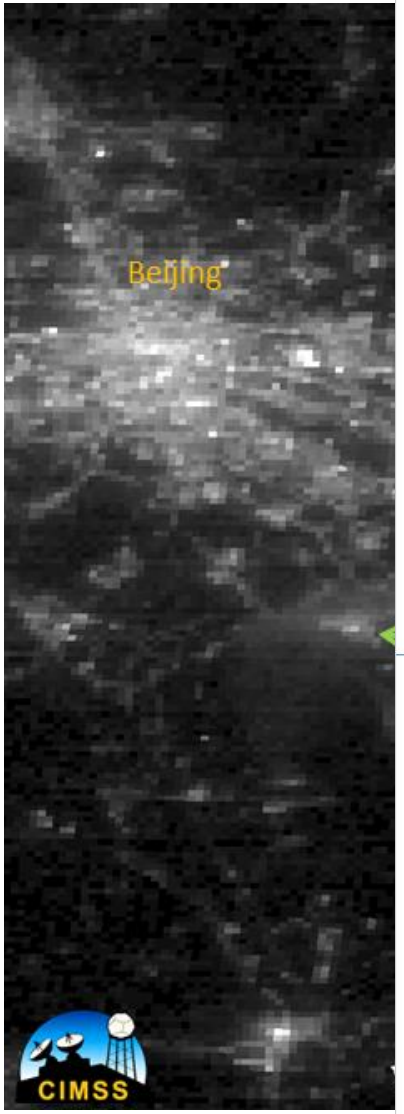


OTHER CIMSS SDR/EDR SUPPORT

Disaster monitoring
Fires and Smoke support



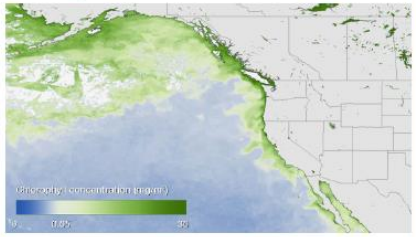
Disaster monitoring
Tianjin, China Port explosion



National Environmental Satellite, Data, and Information Service (NESDIS)
August 2015 Newsletter

Operations – West Coast Algal Blooms

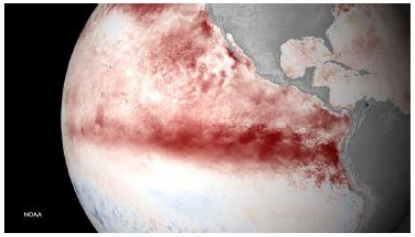
Harmful Algal Bloom is One for the Record Books



Coinciding with above average sea surface temperatures, a record breaking algal bloom continues to expand across the North Pacific, reaching as far north as the Aleutian islands and as far south as southern California. Average chlorophyll concentrations were determined using data from the Visible Infrared Imaging Radiometer Suite (VIIRS) on board the NOAA/NASA Suomi NPP satellite. The darkest green areas have the highest surface chlorophyll concentrations and the largest amounts of phytoplankton, including both toxic and harmless species. With its large size, the bloom has had a large impact on marine life. Fishery closures have occurred in Washington, Oregon, and California, due to extremely high levels of an algal toxin called domoic acid produced by *Pseudo-nitzschia* phytoplankton.

Spotlight – Pacific Ocean Temperatures

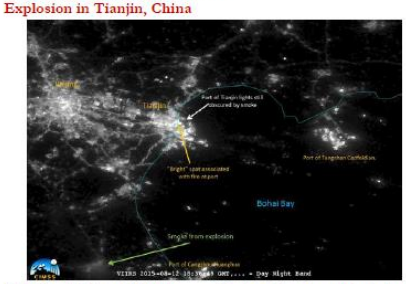
El Niño Predicted to Continue Through Spring 2016



NOAA's National Weather Service released an updated forecast on August 13, predicting a greater than 90% chance that El Niño will continue through the Northern Hemisphere winter, and around an 85% chance that it will last into early spring 2016. The above image displays the weekly sea surface temperature departure from the 1981-2010 average, from the week of August 10. Rising sea surface temperatures in the equatorial Pacific indicate that this year's El Niño could be the strongest ever recorded. Temperature and precipitation impacts from El Niño are expected to increase into the late fall and winter. El Niño will likely contribute to a below normal Atlantic hurricane season and above-normal central and eastern Pacific hurricane season.

Image of the Month

Explosion in Tianjin, China



The Suomi NPP satellite flew over Tianjin, China about 80 minutes after a major explosion on August 12. The day/night band of the VIIRS instrument captured images that show the thick smoke from the fire, the Port of Tianjin lights obscured by smoke, and bright spots associated with the fire. The above image was produced by the Cooperative Institute for Meteorological Satellite Studies at the University of Wisconsin, Madison.

Message from Dr. Stephen Volz

Assistant Administrator for NESDIS

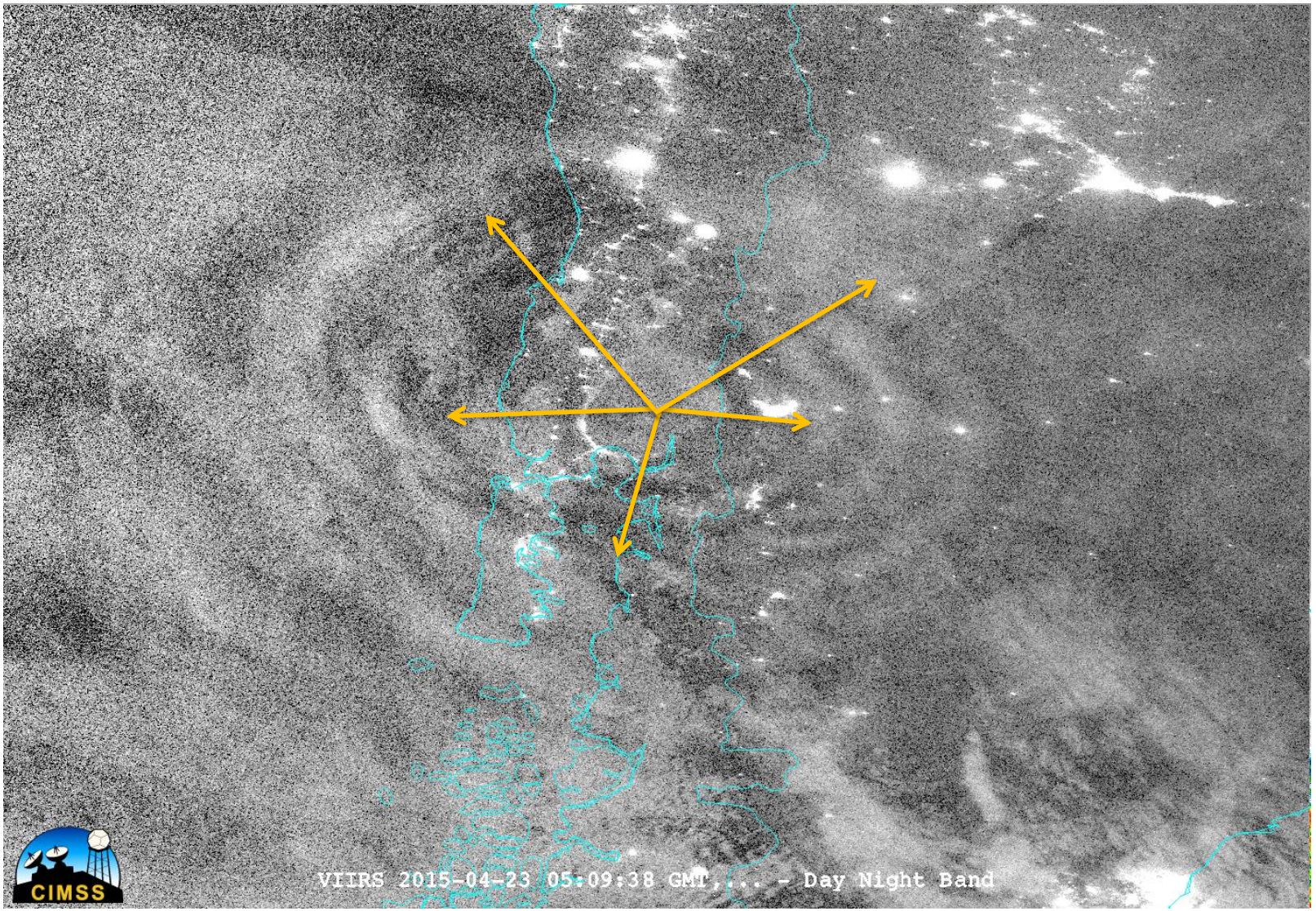
This month marks the 10th anniversary of Hurricane Katrina, which made landfall on August 29, 2005, and was the costliest and third deadliest hurricane ever. To commemorate that event, on July 28, I joined NOAA Administrator Dr. Kathryn Sullivan and Assistant Administrators from NOAA's other line offices for a special briefing to mark a decade of science progress since the 2005 Atlantic hurricane season, which remains the most active on record. If you missed this special event, the audio file and presentation is available here.

Nominations are now being accepted for the NOAA-David Johnson Award. This award, presented by the National Space Club, is given to young professionals who have developed an innovative application of Earth observation satellite data that can be used for operational purposes to assess and/or predict atmospheric, oceanic, or terrestrial conditions. Please encourage gifted scientists to apply by the October 2 deadline.

I hope that you have had an enjoyable August recess and I welcome you back to D.C. Please contact Sierra Jones (sierra.jones@noaa.gov) if you have any questions regarding NOAA's satellite and information services.

www.nesdis.noaa.gov

Mesospheric Gravity Wave monitoring



MCIDAS-X AND -V SUPPORT OF GOES-R ABI LEVEL 1B AND 2 PRODUCTS

GOES-R Products

Baseline Products

Advanced Baseline Imager (ABI)

- Aerosol Detection (Including Smoke and Dust)
- Aerosol Optical Depth (AOD)
- Clear Sky Masks
- Cloud and Moisture Imagery
- Cloud Optical Depth
- Cloud Particle Size Distribution
- Cloud Top Height
- Cloud Top Phase
- Cloud Top Pressure
- Cloud Top Temperature
- Derived Motion Winds
- Derived Stability Indices
- Downward Shortwave Radiation: Surface
- Fire/Hot Spot Characterization
- Hurricane Intensity Estimation
- Land Surface Temperature (Skin)
- Legacy Vertical Moisture Profile
- Legacy Vertical Temperature Profile
- Radiances (ABI L1B)
- Rainfall Rate/QPE
- Reflected Shortwave Radiation: TOA
- Sea Surface Temperature (Skin)
- Snow Cover
- Total Precipitable Water
- Volcanic Ash: Detection and Height

Geostationary Lightning Mapper (GLM)

- Lightning Detection: Events, Groups & Flashes (L2+)

Space Environment In-Situ Suite (SEISS)

- Energetic Heavy Ions
- Magnetospheric Electrons & Protons: Low Energy
- Magnetospheric Electrons: Med & High Energy
- Magnetospheric Protons: Med & High Energy
- Solar and Galactic Protons

Magnetometer (MAG)

- Geomagnetic Field

Extreme Ultraviolet and X-ray Irradiance Suite (EXIS)

- Solar Flux: EUV
- Solar Flux: X-ray Irradiance

Solar Ultraviolet Imager (SUVI)

- Solar EUV Imagery

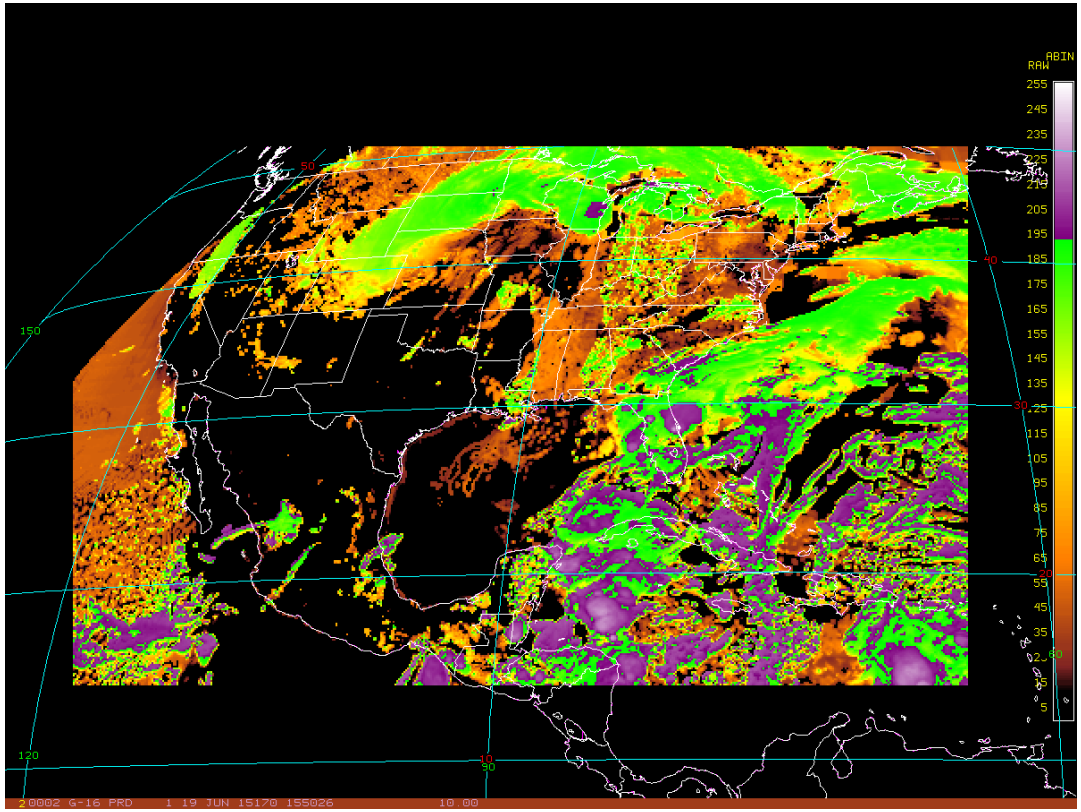
Future Capabilities

Advanced Baseline Imager (ABI)

- Absorbed Shortwave Radiation: Surface
- Aerosol Particle Size
- Aircraft Icing Threat
- Cloud Ice Water Path
- Cloud Layers/Heights
- Cloud Liquid Water
- Cloud Type
- Convective Initiation
- Currents
- Currents: Offshore
- Downward Longwave Radiation: Surface
- Enhanced "V"/Overshooting Top Detection
- Flood/Standing Water
- Ice Cover
- Low Cloud and Fog
- Ozone Total
- Probability of Rainfall
- Rainfall Potential
- Sea and Lake Ice: Age
- Sea and Lake Ice: Concentration
- Sea and Lake Ice: Motion
- Snow Depth (Over Plains)
- SO_2 Detection
- Surface Albedo
- Surface Emissivity
- Tropopause Folding Turbulence Prediction
- Upward Longwave Radiation: Surface
- Upward Longwave Radiation: TOA
- Vegetation Fraction: Green
- Vegetation Index
- Visibility

McIDAS-X: Level 2 ABI Products

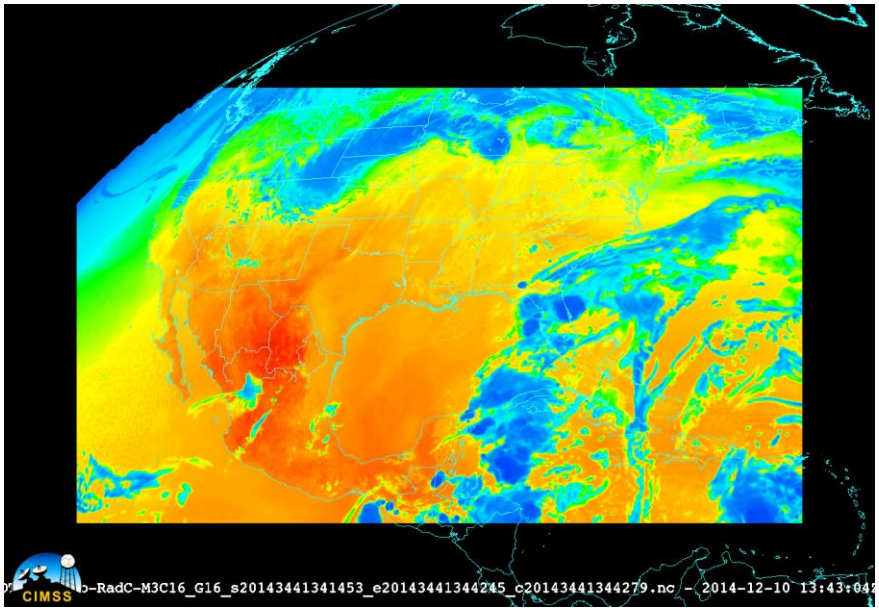
- McIDAS-X ADDE server in development for Level 2 ABI products is available in McIDAS-X 2016.2 (released Oct 2016)



McIDAS-X display of Cloud Top Height

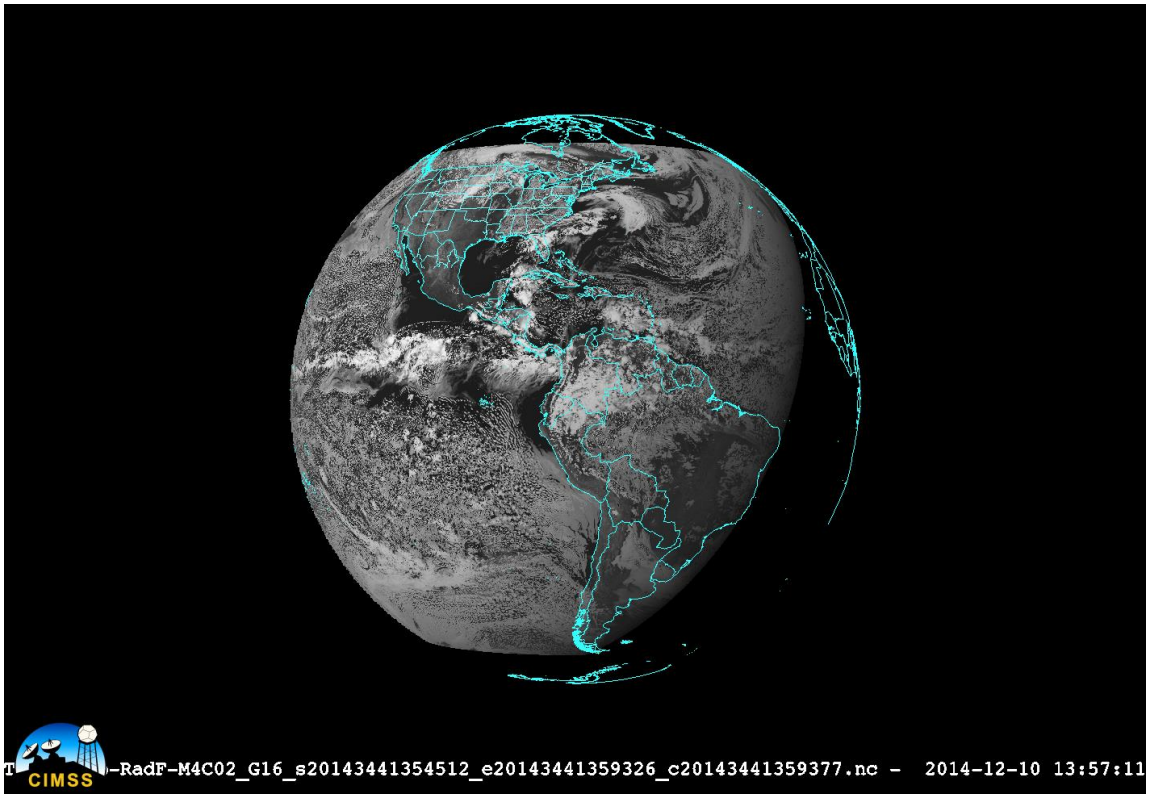
McIDAS-V: ABI Level 1B and L2+

- McIDAS-V version 1.6
  - Both L1b and L2+ products can be read in directly using General file chooser
- Local L2+ ADDE file access will be added later
  - Note : Linux and OSX versions of 1.6 have *preliminary* (limited) ABI L1b local ADDE server integrated in.



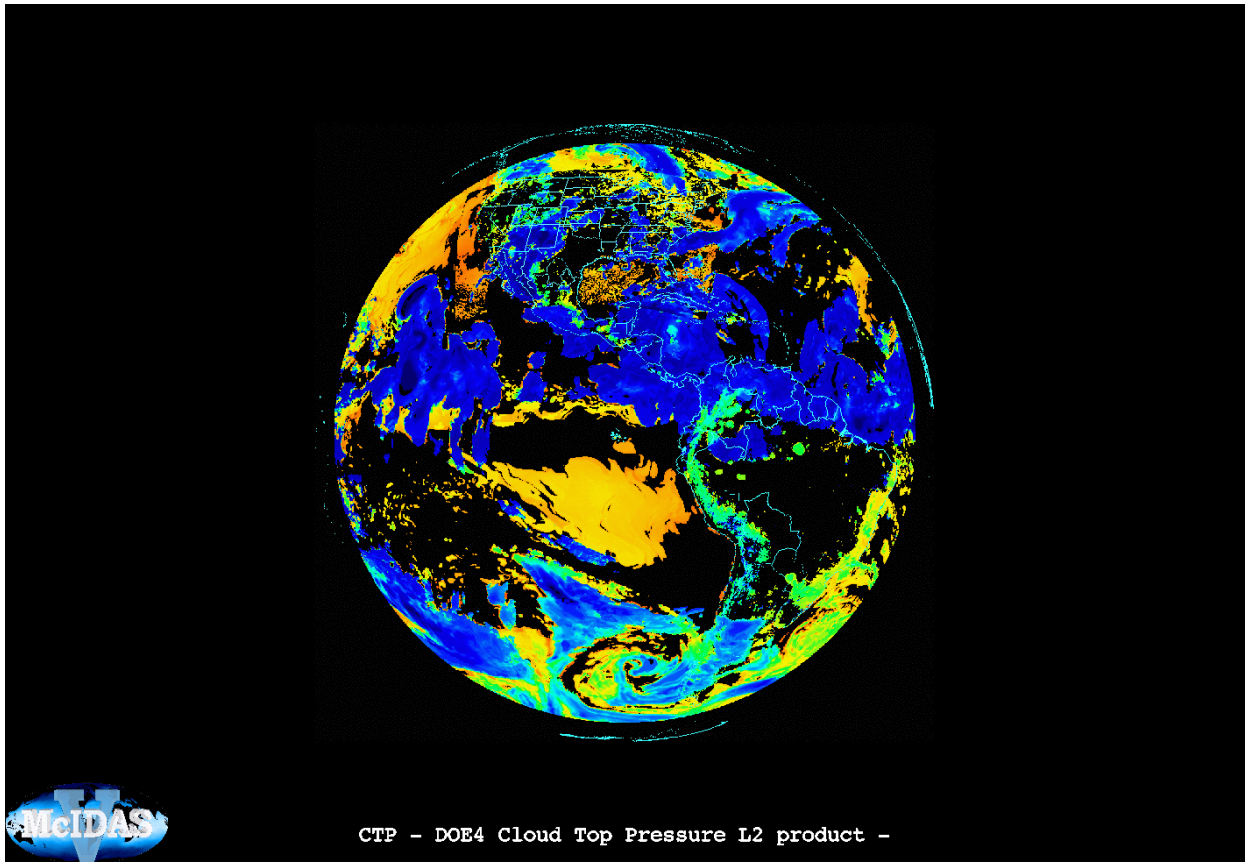
McIDAS-V display Band 16

McIDAS-V: ABI Level 1B

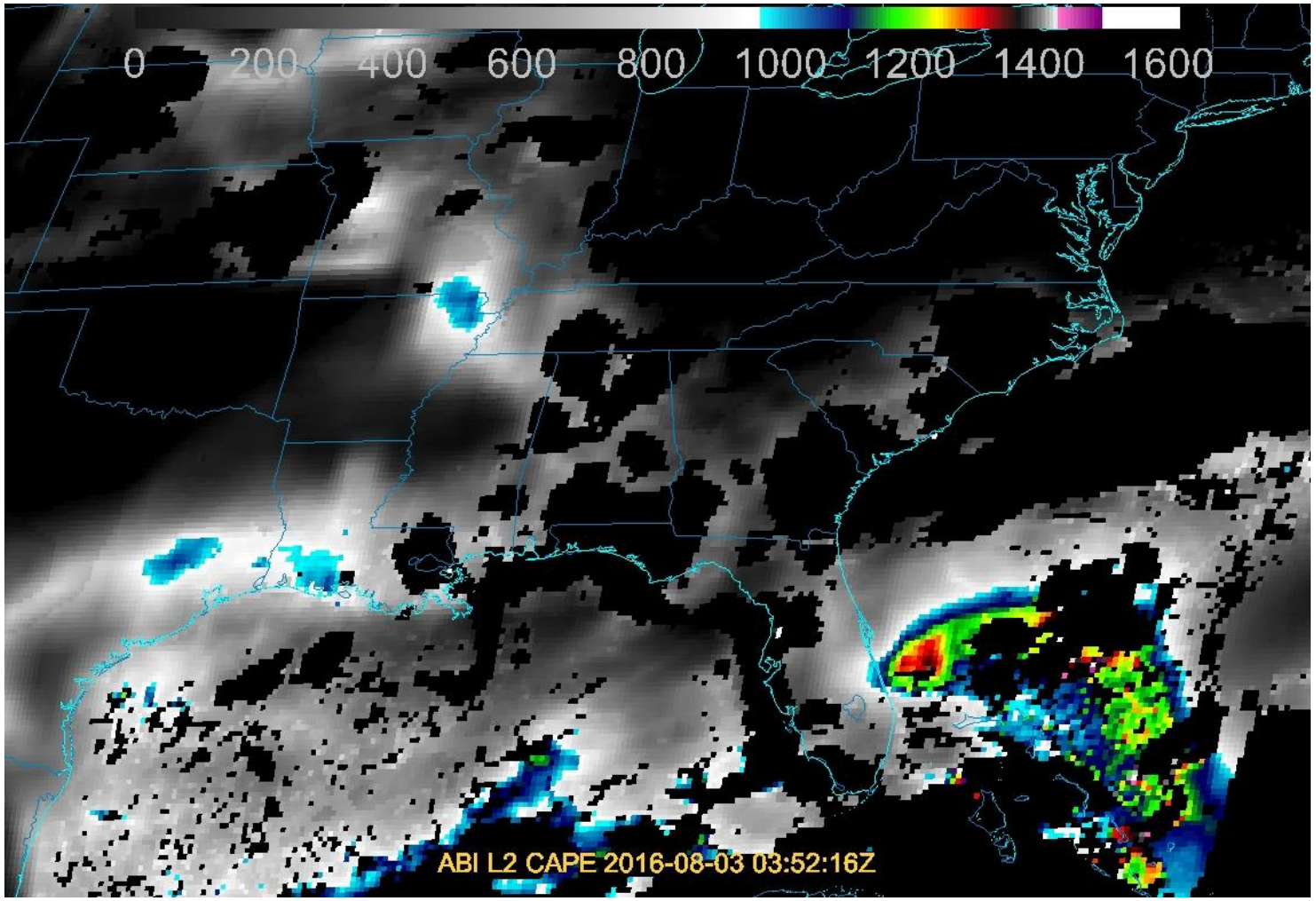


McIDAS-V display Band 2

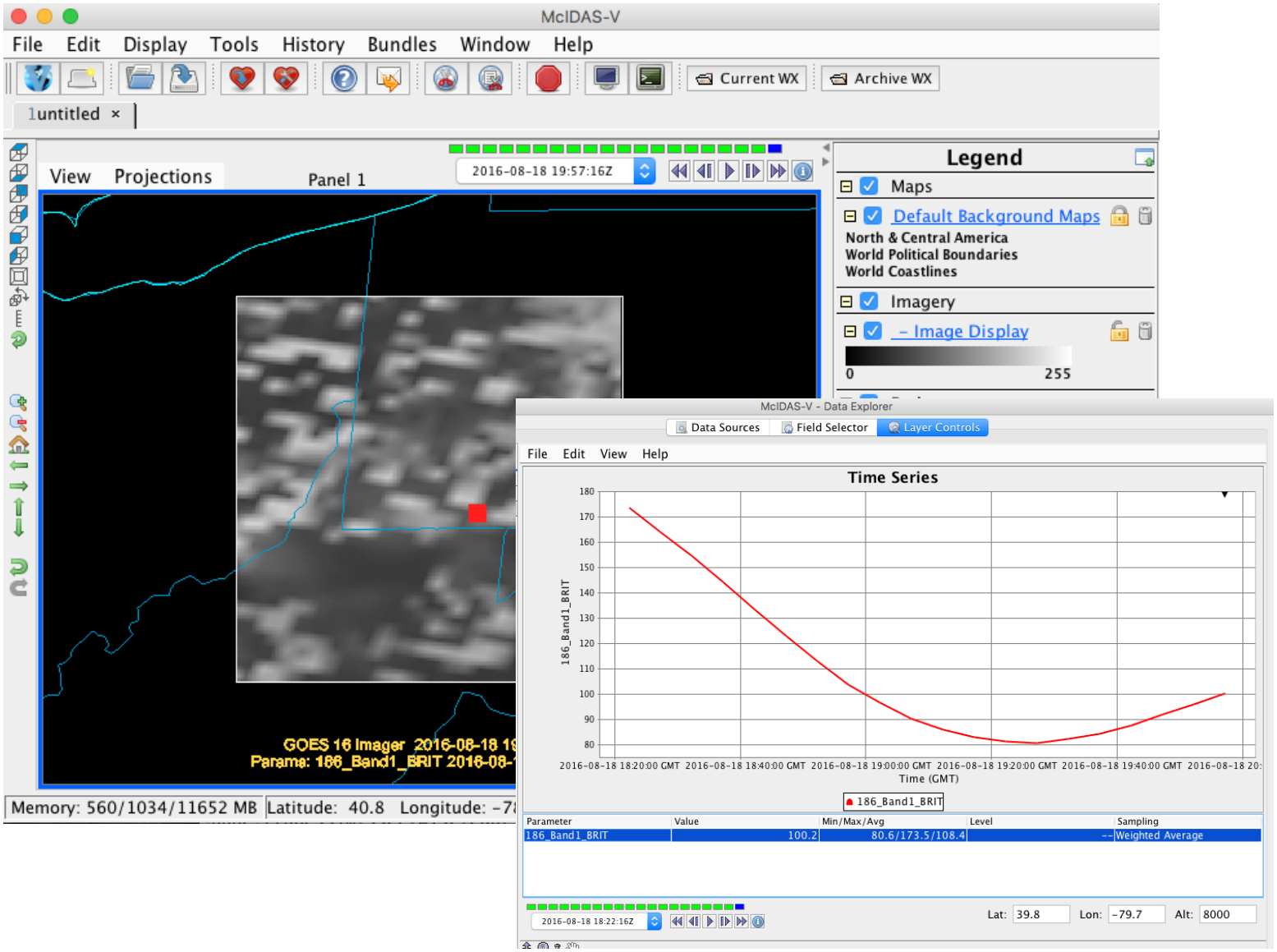
McIDAS-V: Level 2 Products



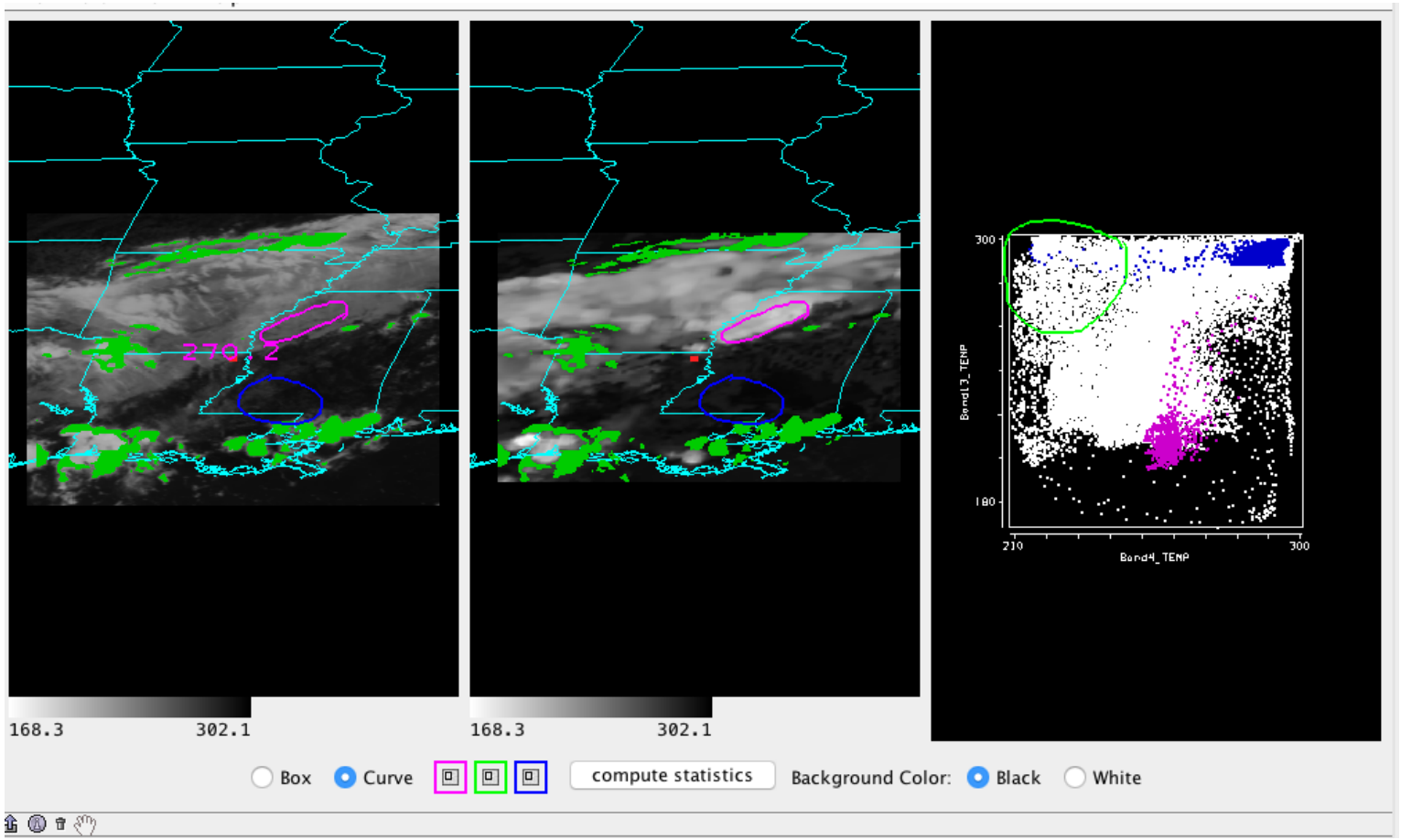
McIDAS-V: DOE-4 Level 2 CAPE



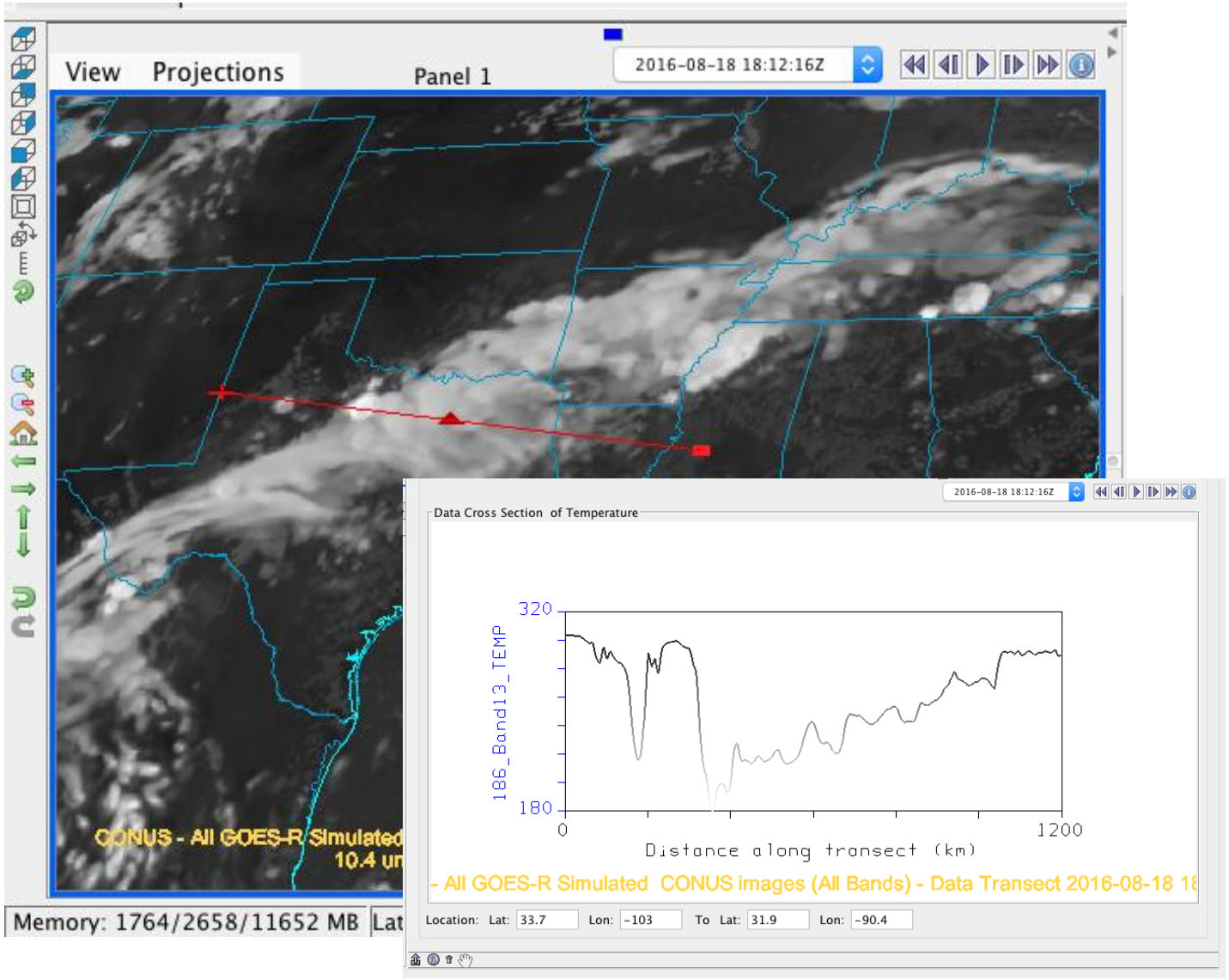
Analysis tools
McIDAS-V Time Series



Analysis tools
McIDAS-V: Scatter Plot



Analysis tools
McIDAS-V: Data Transect



McIDAS GOES-R Status

- Initial development complete:
  - ABI Level 1B and limited L2 ADDE server available as part of 2016.2 release (Oct 2016)
  - All servers are for GOES-R **mission standard format** netCDF files only. SCMI files are **not** supported.
- In development:
  - GLM ADDE server (modifications are needed due to format change)
- Continued testing by teams (ex. Imagery team) of various servers

Uses of McIDAS for L2+ Products Post Launch

- Ability to quickly visualize the L2+ (ABI and GLM) Products (McX and McV) and produce images for presentations
  - Note: McIDAS-X servers do not currently read in DQFs

- McIDAS-V has the ability to provide data analysis tools for teams (transects, simple scatter plots, time series) via ADDE servers

Launch time!

News | Mission | Spacecraft | Team | Press

GOES-R to Launch November 19, 5:42 PM EST

November 10, 2016

An Atlas V rocket is set to lift off Nov. 19 at 5:42 p.m. EST to deliver NOAA's latest-generation weather satellite, GOES-R, into orbit. After several months of processing at Astrotech in Titusville, Florida, the GOES-R spacecraft has been encapsulated inside a payload fairing for protection during the climb through Earth's atmosphere aboard an ULA Atlas V launch vehicle on the way to orbit. Carrying the most advanced sensors of their kind, the GOES-R spacecraft will fly more than 22,000 miles above Earth where it will offer weather forecasters an unblinking eye on conditions on the planet below.

Official L1b and L2+ Products available publically sometime 2017