



CIMSS support of Imagery EDR team

William Straka III¹

Tommy Jasmin¹, Bob Carp¹, Dan Lindsey², Steve Miller³, Don Hillger²

¹Cooperative Institute for Meteorological Satellite Studies, Space Science and Engineering Center,
University of Wisconsin-Madison

²NOAA, RAMMB

³Cooperative Institute for Research in the Atmosphere, Colorado State University



Outline



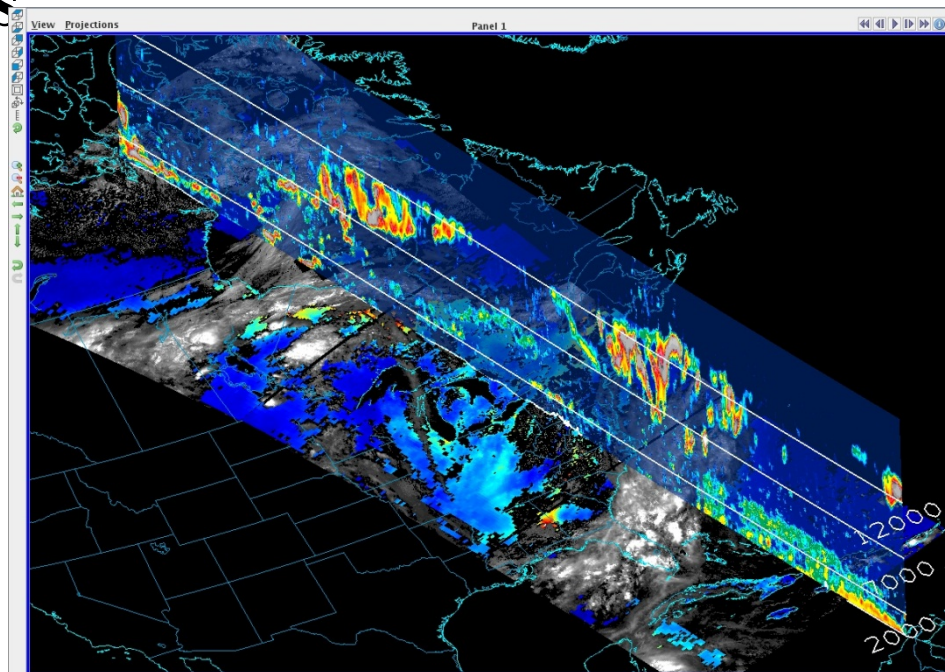
- Overview of McIDAS-V
- Examples
- McIDAS-V summary
- Other work

What is *McIDAS-V*

McIDAS-X → VisAD + IDV + HYDRA =



- **Integration of Geophysical Data**
- **Remote and Local Data Access**
- **Powerful Analysis Tools**
- **3D Visualization**
- **Ease of Re-projection**





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**
- **Developed in the Java programming language – object oriented, write once run anywhere, very portable**
- **Persistence mechanism (bundles) for saving and sharing interesting displays/analysis with other McIDAS-V users**
- **Python based user defined computation**
- **Open source, freely available, community driven software**
- **Is able to easily load and manipulate Suomi NPP (Block 1 and 2) and JPSS-1 simulated Block 2 data without any special readers**



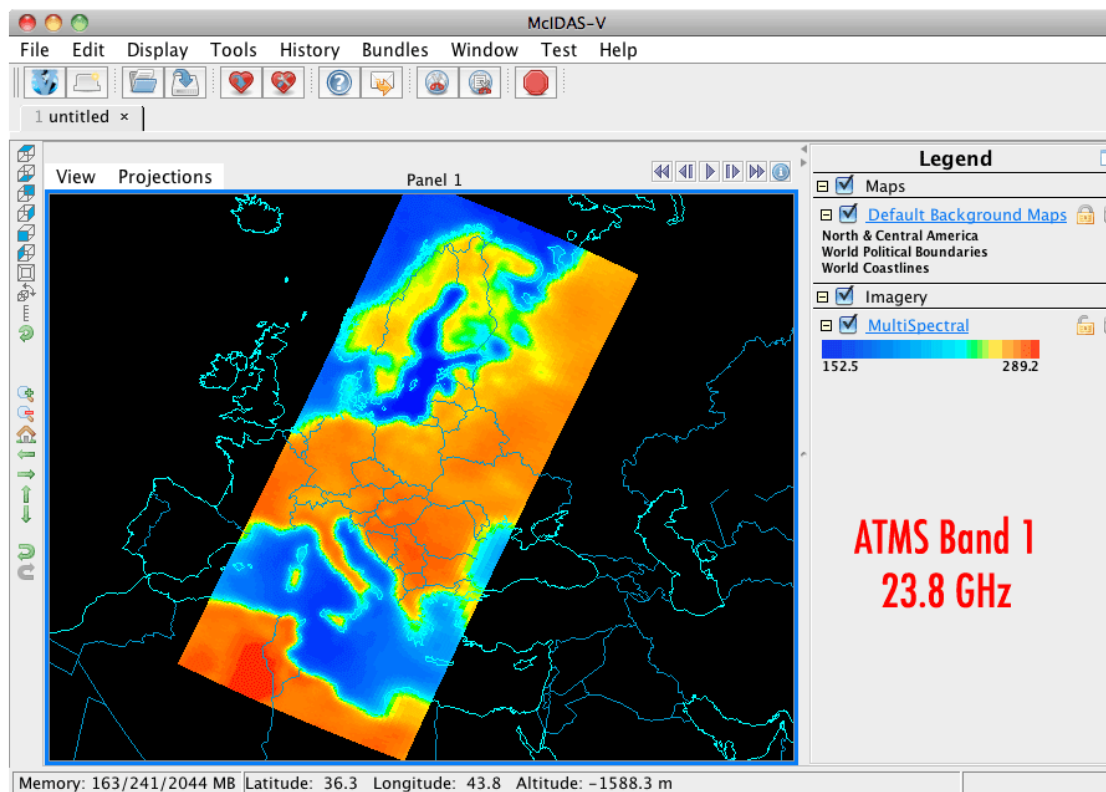
Suomi NPP



- 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

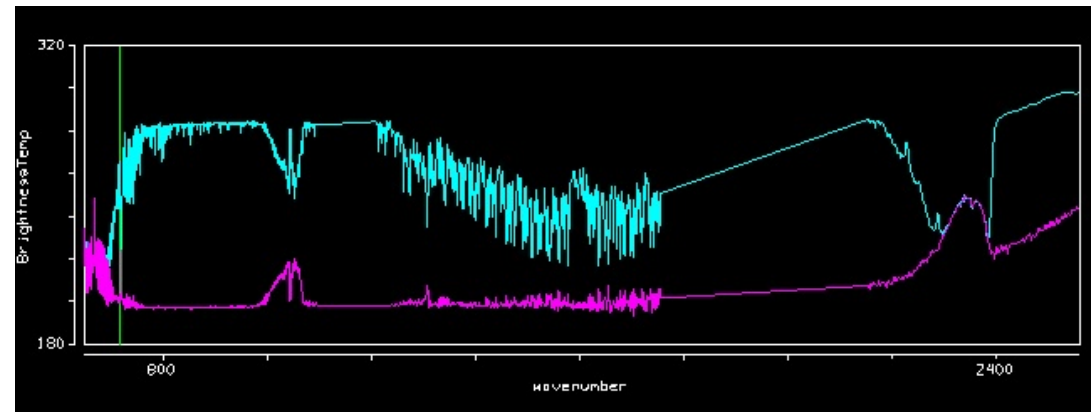
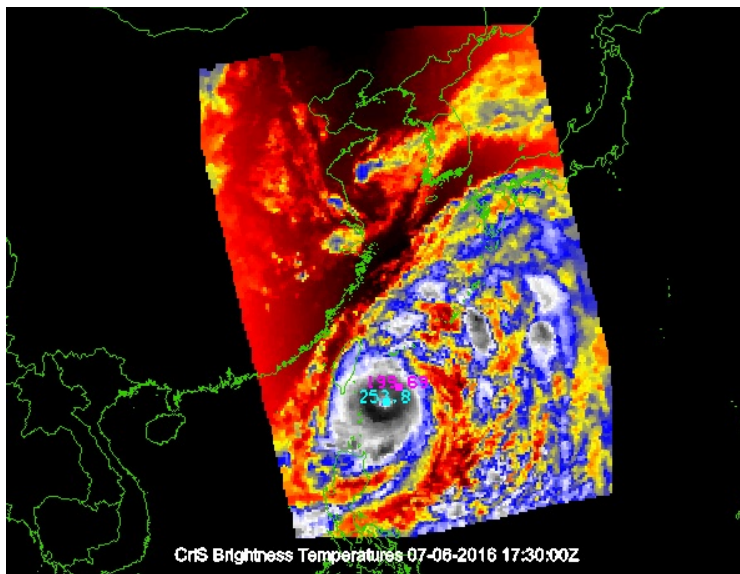
Advanced Technology Microwave Sounder (ATMS)

- 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

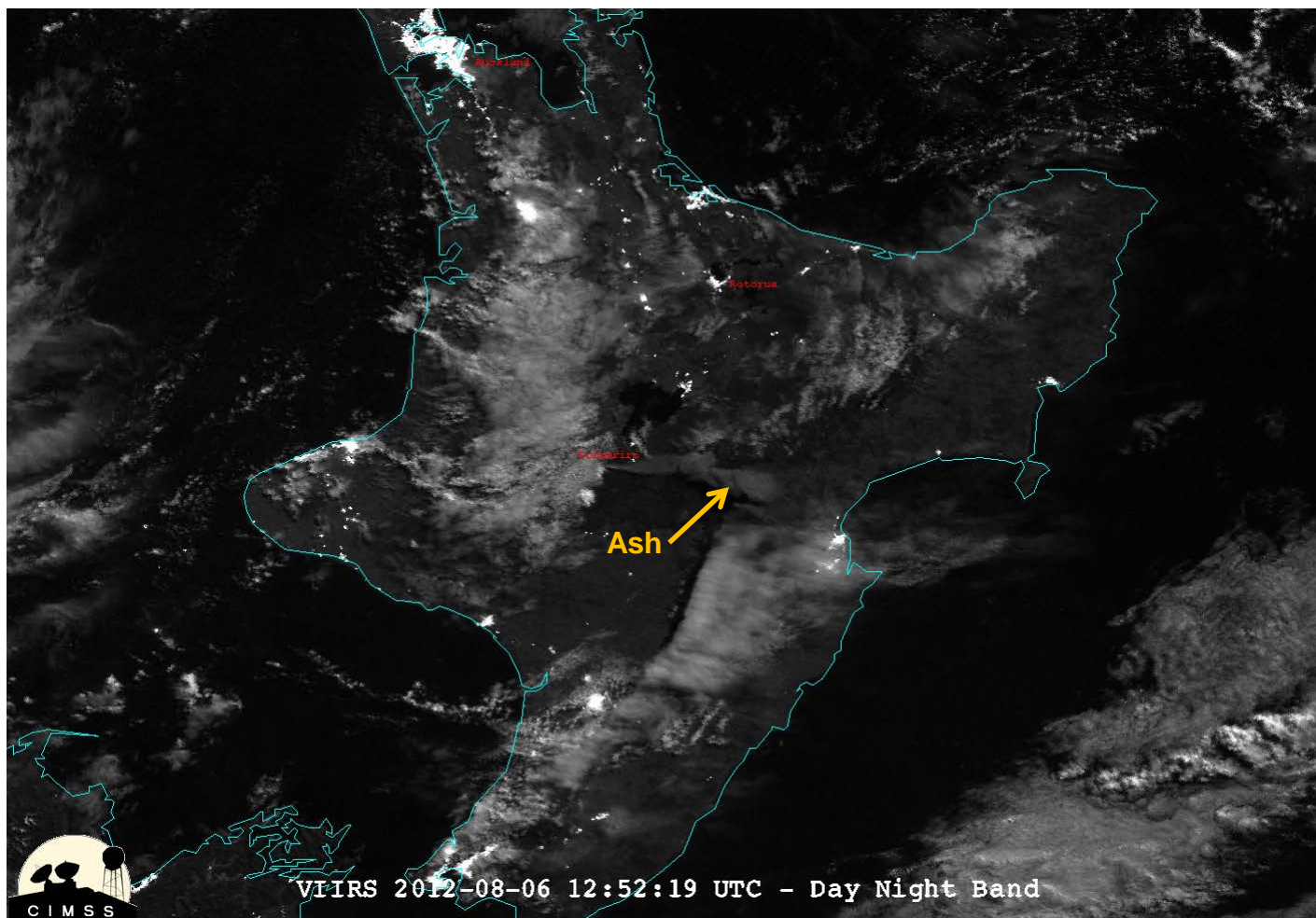
- The DNB measures visible radiances from both the Earth and atmosphere
- Wavelength of 0.7 μm , 742m x 742m pixel size
- Receives visible data from via reflection and emission sources (natural and anthropogenic)
- Stray light fix implemented August 21, 2013



Figure 1 from Lee et al (2005)



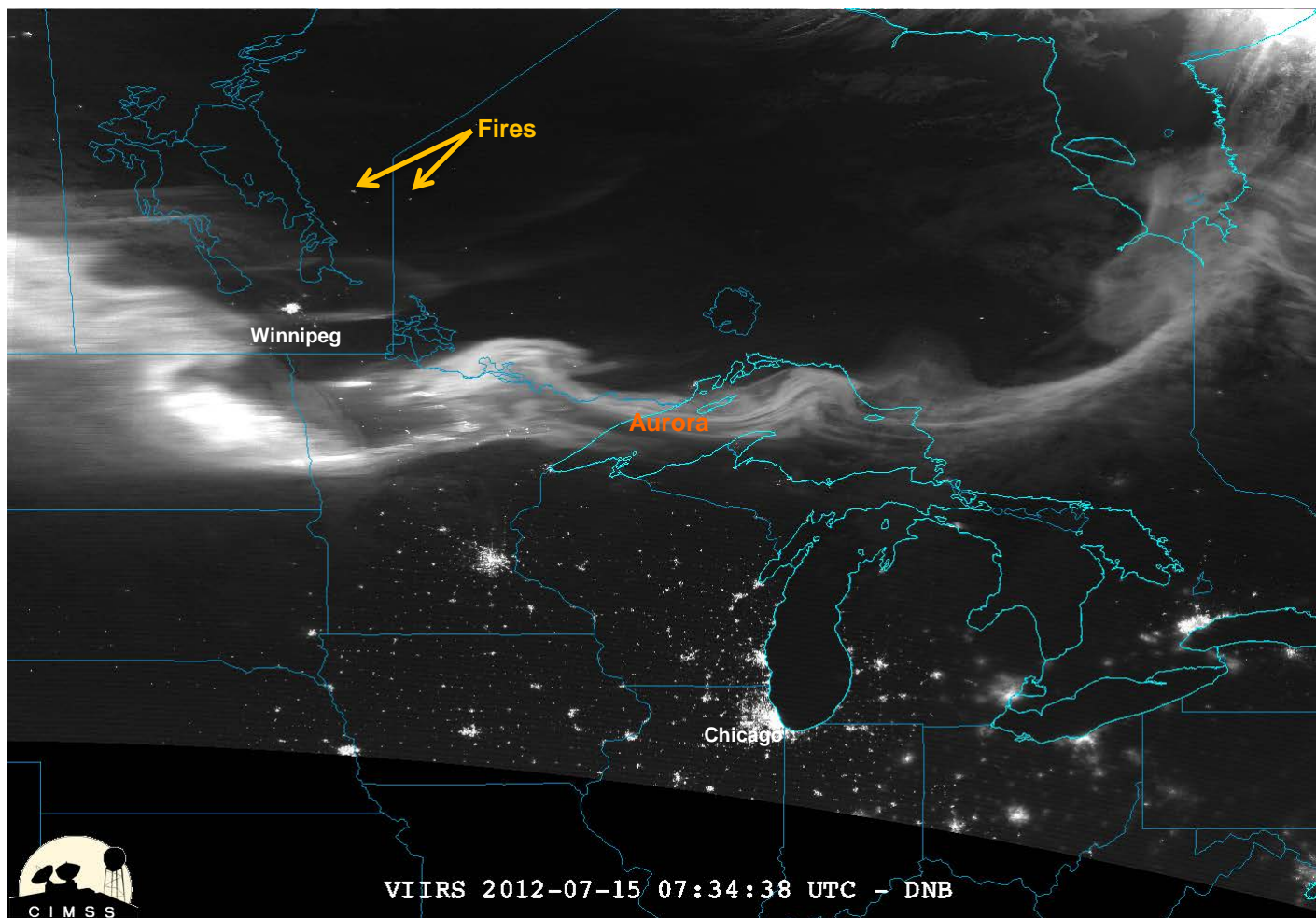
Tongariro (New Zealand) August 6, 2012 – 1252Z



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

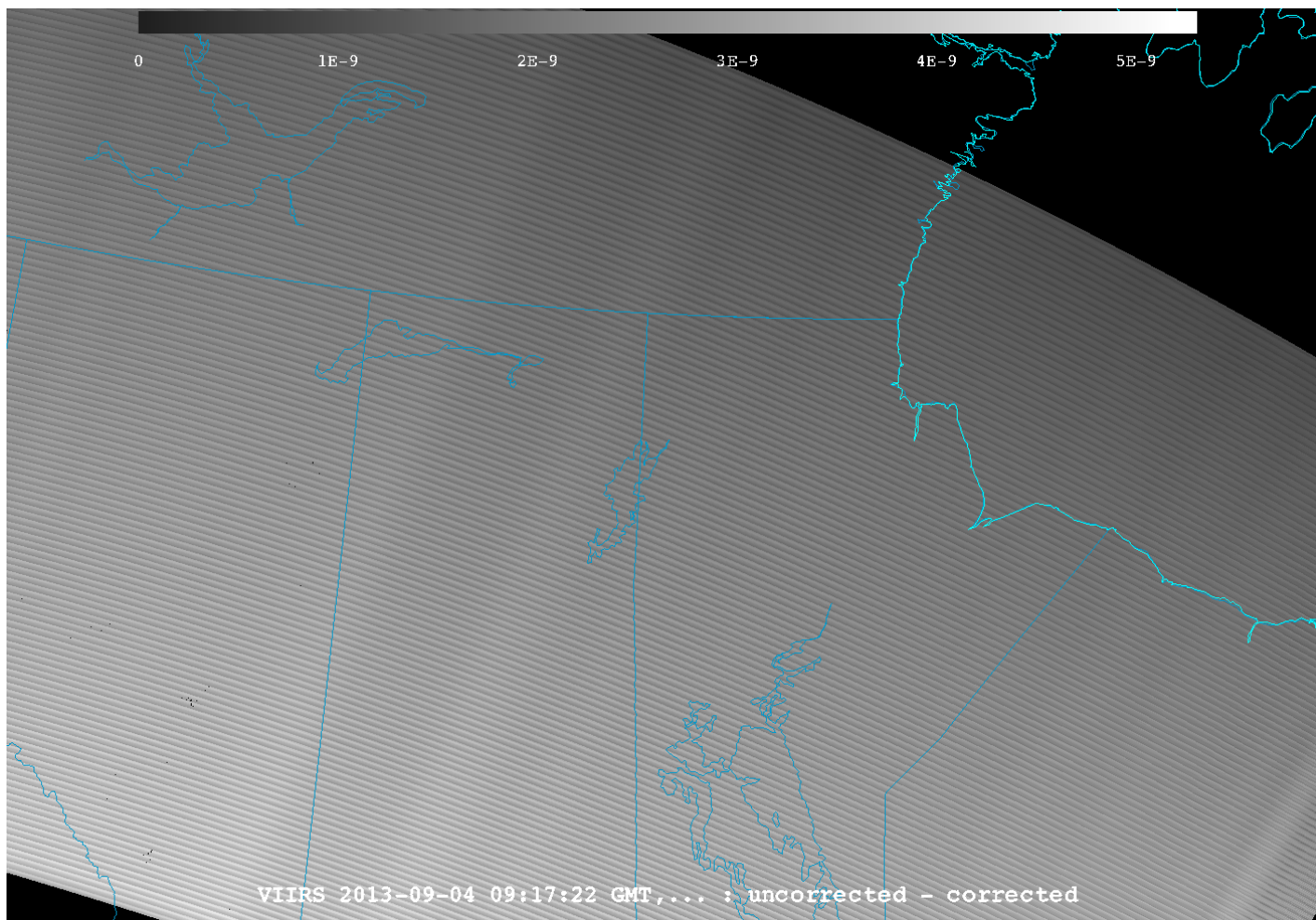


VIIRS (11, 3.9 μ m and DNB) 0733Z, July 15, 2012

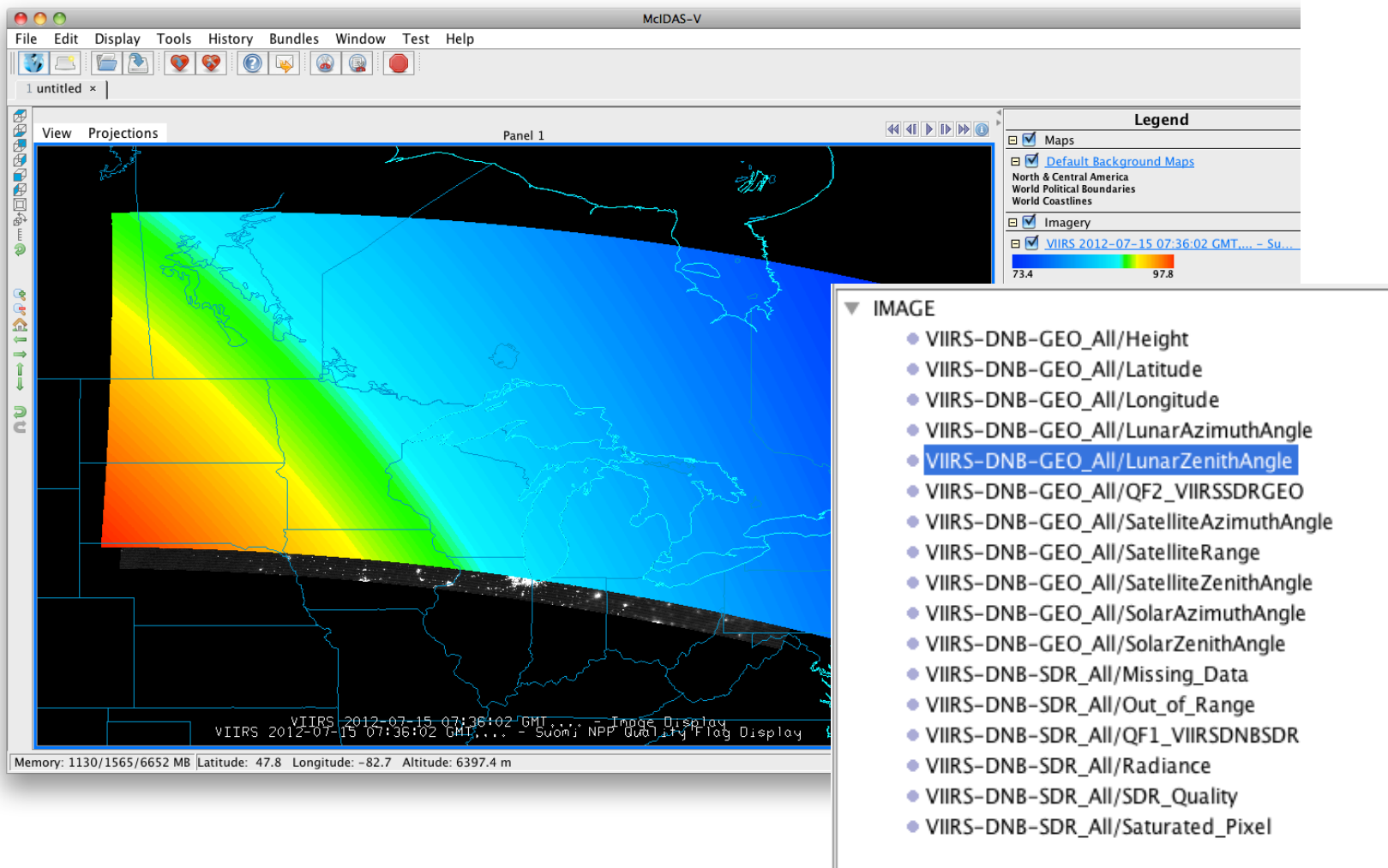




VIIRS Channel Differencing DNB Stray light example



VIIRS SDR Ancillary data





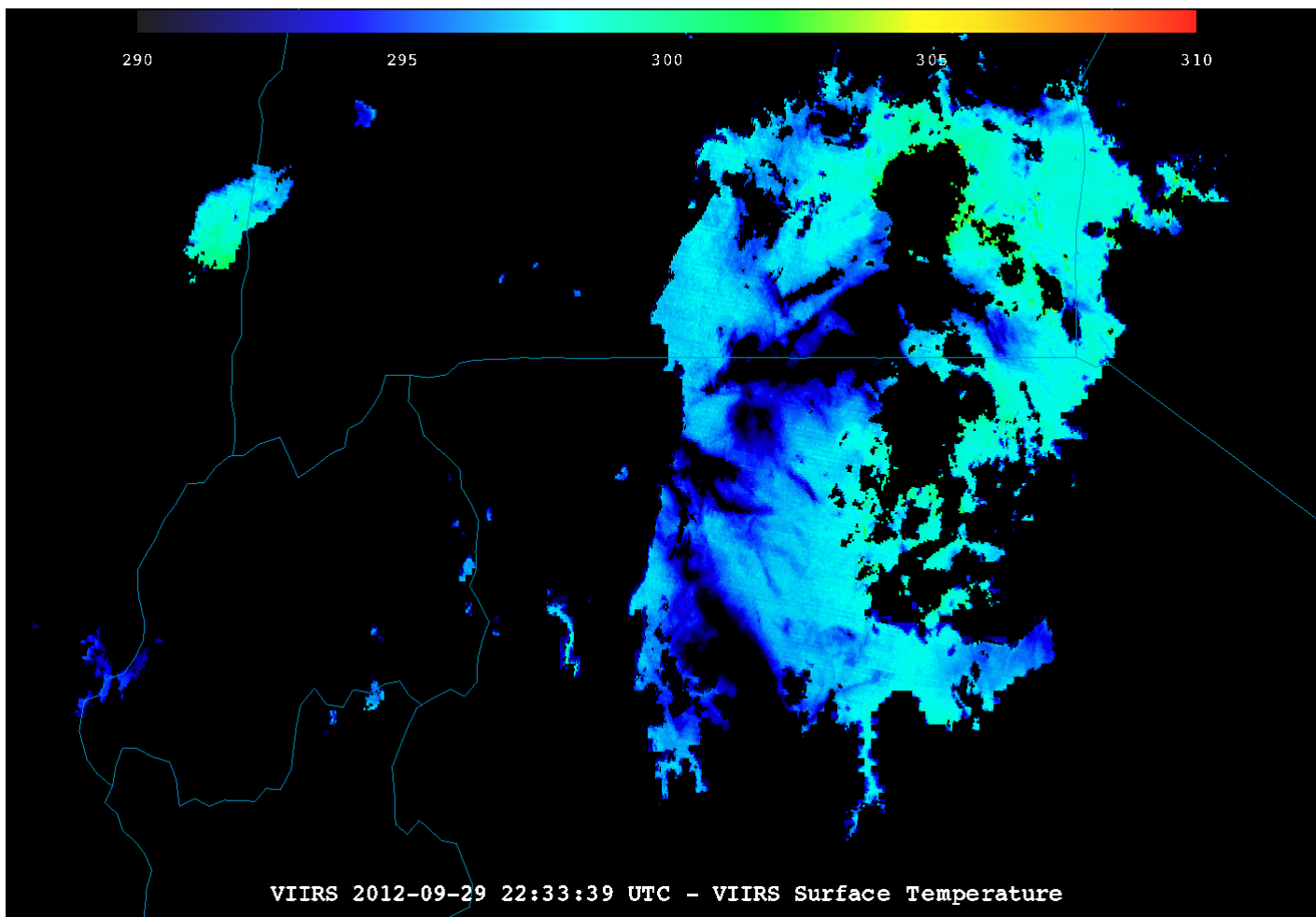
Visible Infrared Imaging Radiometer Suite (VIIRS) EDR



- 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

McIDAS-V - Data Explorer

Data Sources | **Field Selector** | Layer Controls

Data Sources:

Formulas

VIIRS 2013-04-16 08:19:56

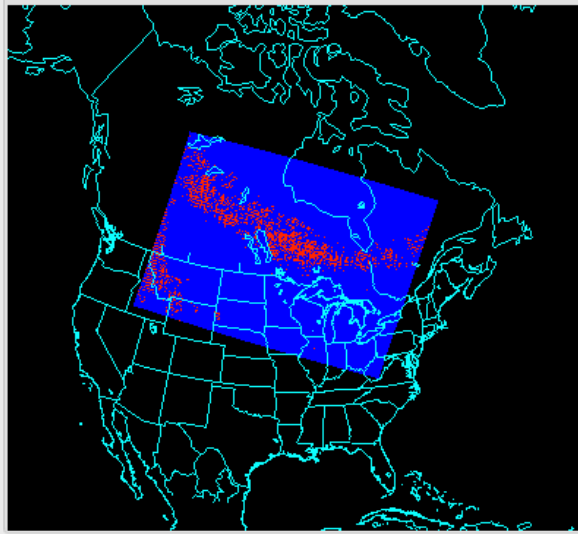
Fields

- ▼ IMAGE
 - VIIRS-CM-IP_All/Adjacent_Pixel_Cloud_Confidence_Pixel
 - VIIRS-CM-IP_All/Cirrus
 - VIIRS-CM-IP_All/Cirrus_IR
 - VIIRS-CM-IP_All/Cloud_Detection_and_Confidence_Pixel
 - VIIRS-CM-IP_All/Cloud_Mask_Quality_Pixel
 - VIIRS-CM-IP_All/Cloud_Phase
 - **VIIRS-CM-IP_All/Conifer_Boreal_Forest**
 - VIIRS-CM-IP_All/DayNight_Pixel
 - VIIRS-CM-IP_All/Degraded_Polar_Night
 - VIIRS-CM-IP_All/Degraded_Sun_Glint_in_Pixel
 - VIIRS-CM-IP_All/Degraded_TOC_NDVI
 - VIIRS-CM-IP_All/Dust_Candidate
 - VIIRS-CM-IP_All/Dust_or_Volcanic_Ash_is_present
 - VIIRS-CM-IP_All/Ephemeral_Water_Detected
 - VIIRS-CM-IP_All/Fire_Detected
 - VIIRS-CM-IP_All/High_Cloud
 - VIIRS-CM-IP_All/IR_Temperature_Difference_Test_BTMI4-BT
 - VIIRS-CM-IP_All/IR_Threshold_Cloud_Test_BTMI5
 - VIIRS-CM-IP_All/LandWater_Background_Pixel
 - VIIRS-CM-IP_All/Non_Cloud_Obstruction
 - VIIRS-CM-IP_All/QF1_VIIRSCMIP
 - VIIRS-CM-IP_All/QF2_VIIRSCMIP
 - VIIRS-CM-IP_All/QF3_VIIRSCMIP
 - VIIRS-CM-IP_All/QF4_VIIRSCMIP
 - VIIRS-CM-IP_All/QF5_VIIRSCMIP
 - VIIRS-CM-IP_All/QF6_VIIRSCMIP
 - VIIRS-CM-IP_All/Shadow_Detected_Pixel
 - VIIRS-CM-IP_All/Smoke_Candidate
 - VIIRS-CM-IP_All/SnowIce_Surface_Pixel
 - VIIRS-CM-IP_All/Spatial_Uniformity_Test_Pixel

Displays

- ▼ Imagery
 - Image Display**
 - Image Display Over Topography
 - Image Sequence Display
 - 3 Color (RGB) Image
 - 3 Color (RGB) Image over topography
 - MultiSpectral Display
 - ProfileAlongTrack Display

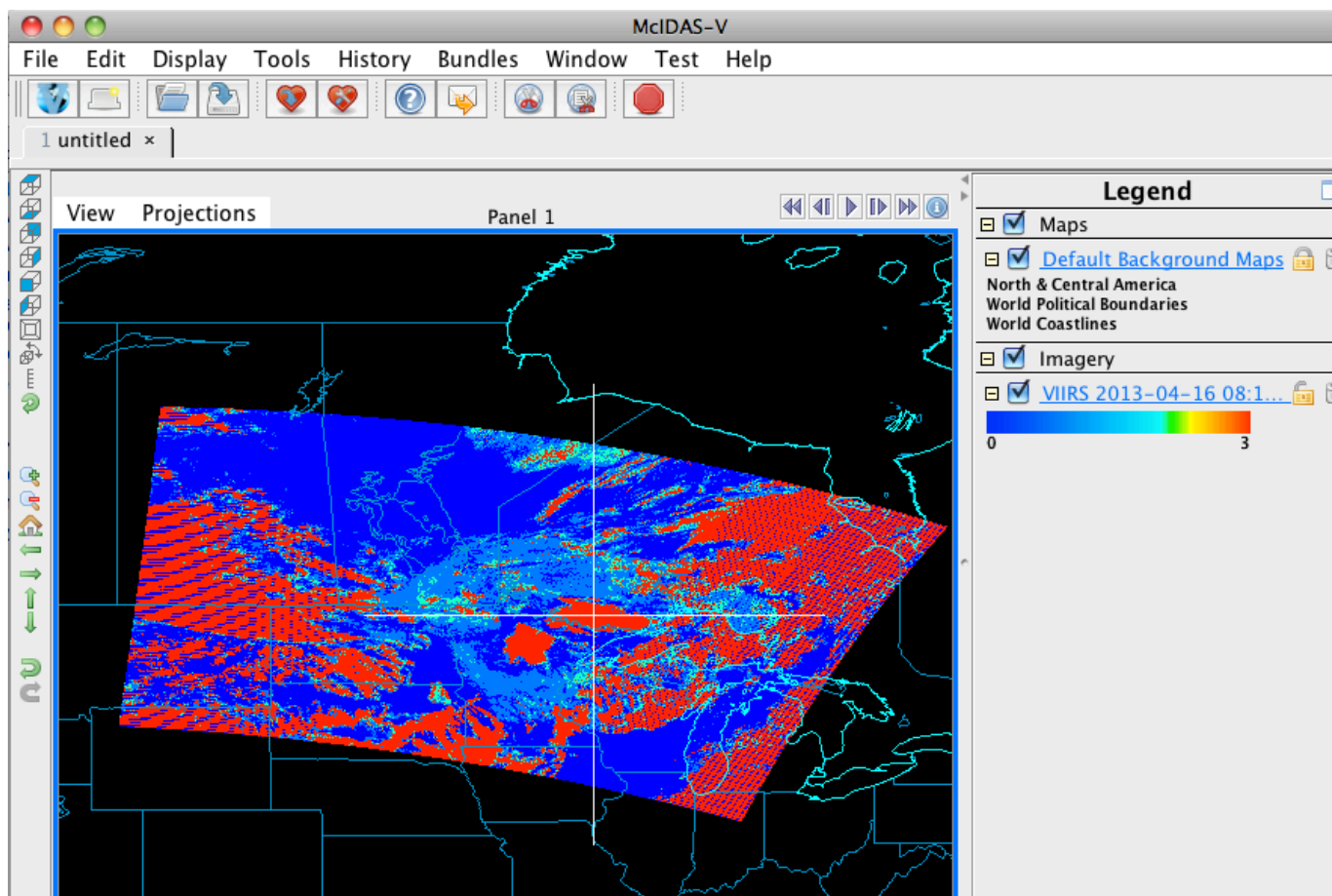
Region



Create Display



Product EDR Data Probe

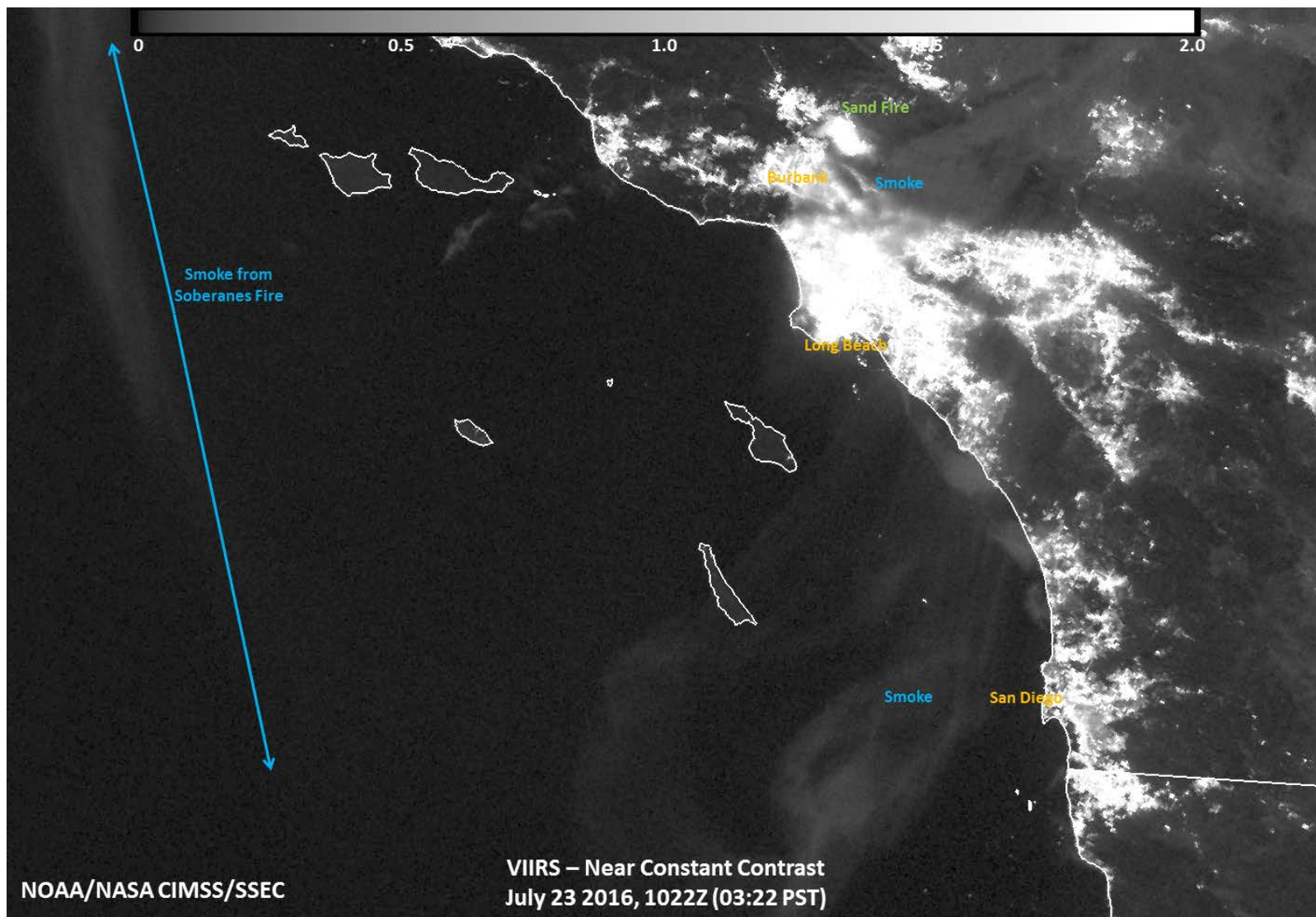


Location: Lat: 48.64 Lon: -91.41

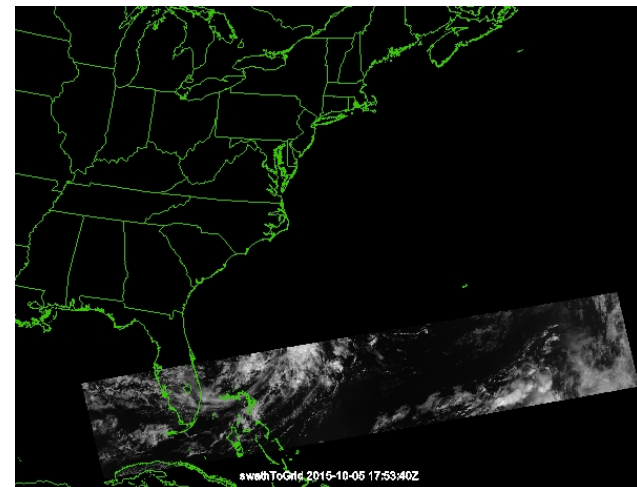
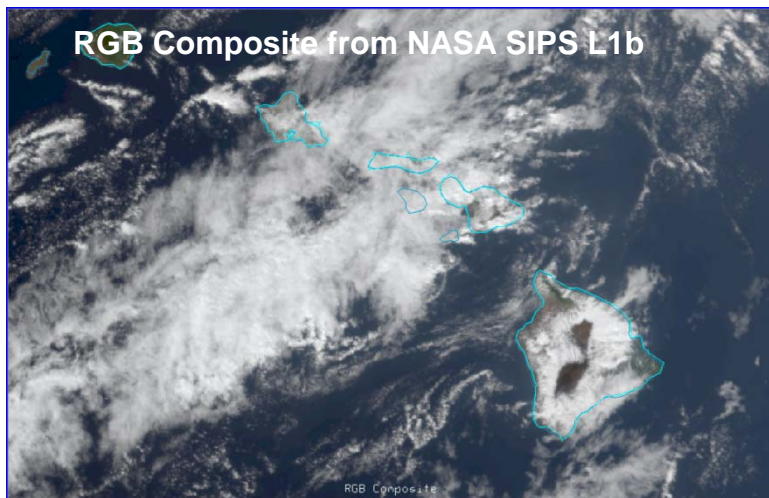
VIIRS 2013-04-16 08:19:56 GMT, ... - Suomi NPP Quality Flag Display:

Confidently Cloudy

Imagery EDR example



- 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



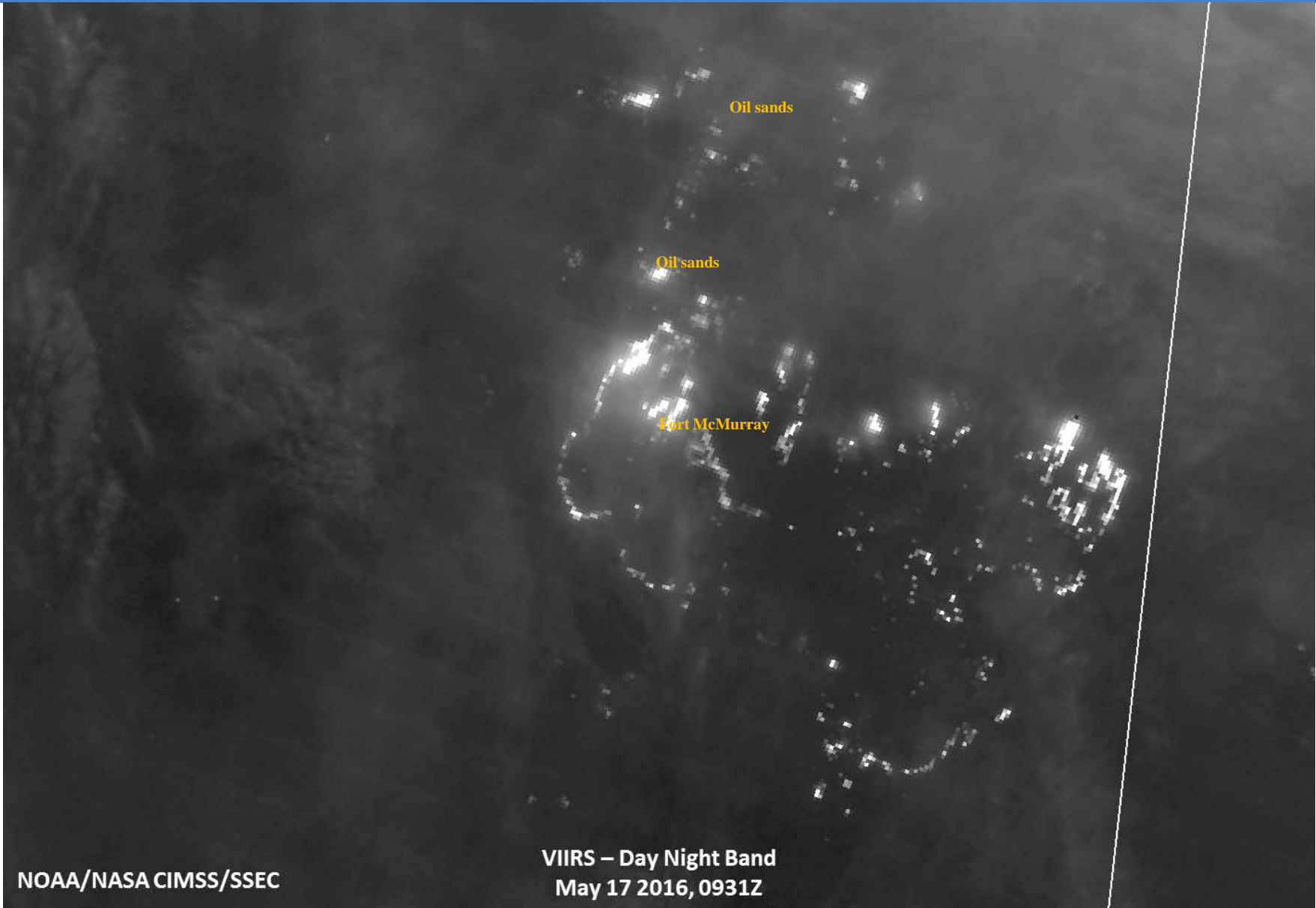


OTHER CIMSS SDR/EDR SUPPORT



Disaster monitoring

Fires and Smoke support



VIIRS – Day Night Band
May 17 2016, 0931Z

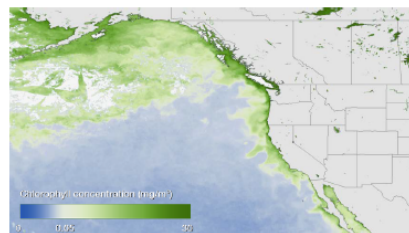


National Environmental Satellite, Data, and Information Service (NESDIS) August 2015 Newsletter



Operations – West Coast Algal Blooms

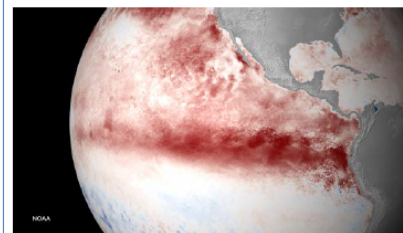
Harmful Algal Bloom is One for the Record Books



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

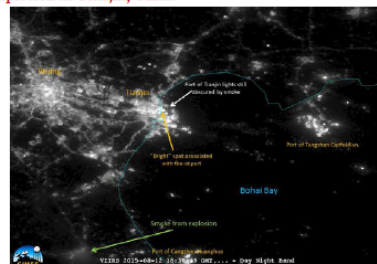
El Niño Predicted to Continue Through Spring 2016



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

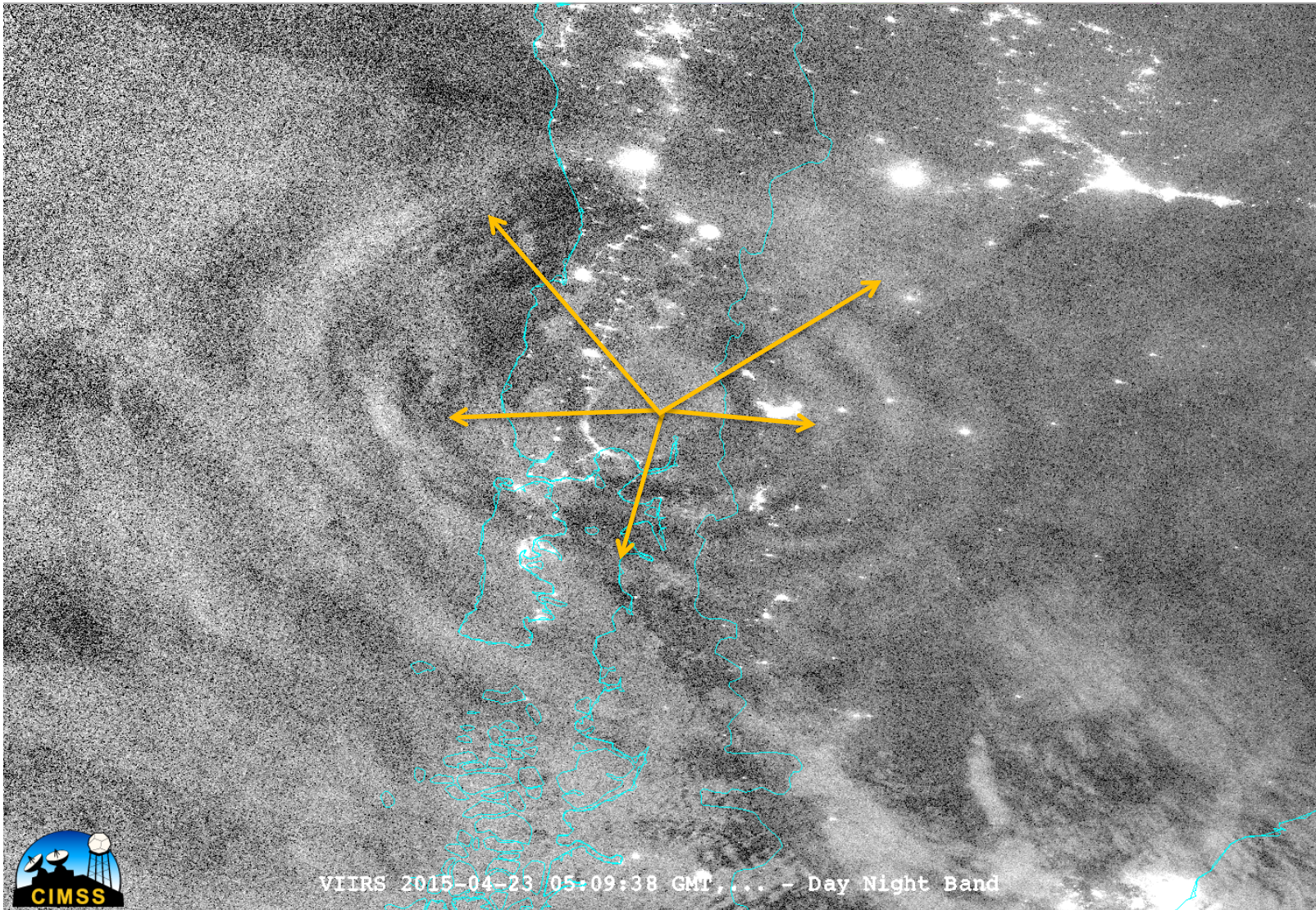
This month marks the 10th anniversary of Hurricane Katrina, which made landfall on August 29, 2005, and was the costliest and third deadliest hurricane ever. To commemorate that event, on July 28, I joined NOAA Administrator Dr. Kathryn Sullivan and Assistant Administrators from NOAA's other line offices 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





Mesospheric Gravity Wave monitoring



- Comparisons of DNB observations with ground based observations
 - Palomar Observatory
 - Amateur airglow photography (US and China)
 - Ground based low-light cameras (US and China)



Texas Thunderstorm



Eastward View from Lamy, NM over Texas Panhandle



Courtesy: T. Ashcraft and W. Lyons



Other activities



- Observations of other interesting phenomena
 - Unexplained streaking in DNB
 - Aurora
 - search for marine bioluminescent sources in Southwest Asia and Indonesia
- Participation in ongoing Cal/Val Team discussions, TIMs, and support studies concerning DNB data quality on J1 and beyond.