CIMSS support of Imagery EDR team

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• 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
• It has 5 instruments which retrieve data regarding the atmosphere, land and ocean. 3 of these instruments can be display in McIDAS-V

  – 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
Multi-channel animation

Band 1 Reflectance - 2017-03-10 18:08:11
VIIRS Channel Differencing
DNB Stray light example

VIIRS 2013-09-04 09:17:22 GMT,... uncorrected - corrected
• 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
Imagery EDR example
Scatter analysis
Product EDR Variable selection

McIDAS-V - Data Explorer

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/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_BT14_BT13
  - VIIRS-CM-IP_All/IR_Threshold_Cloud_Test_BT14_BT13
  - VIIRS-CM-IP_All/LandWater_Background_Pixel
  - VIIRS-CM-IP_All/Non_Cloud_Obstruction
  - VIIRS-CM-IP_All/QF1_VIIRS_CMP
  - VIIRS-CM-IP_All/QF2_VIIRS_CMP
  - VIIRS-CM-IP_All/QF3_VIIRS_CMP
  - VIIRS-CM-IP_All/QF4_VIIRS_CMP
  - VIIRS-CM-IP_All/QF5_VIIRS_CMP
  - VIIRS-CM-IP_All/Snow_Ice_Sea_State
  - VIIRS-CM-IP_All/Snow_Ice_Sea_State_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
  - Profile Along Track Display

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
S-NPP specific McIDAS-V 1.7 Updates

- Support for the VICMO cloud mask EDR (released March 2017) as well as backwards compatibility with IICMO data.

- Added a new "show variables" button to the Field Selector tab of the Data Explorer which can show the variable shortname or (if present) long name.

- VIIRS Formulas plugin that gives formulas to remove the bowtie deletion and create RGB displays without the bowtie.

- Added several VIIRS specific Scripting functions to load and grab information from SNPP/J1 files.
OTHER CIMSS SDR/EDR SUPPORT
Disaster monitoring
Fires and Smoke support

https://www.eumetsat.int/website/home/Images/ImageLibrary/DAT_3524803.html
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)
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.