

McIDAS-V - Suomi NPP ATMS, VIIRS, and CrIS Analysis and Visualization



With the October 2011 launch of the first JPSS satellite, Suomi NPP, SSEC's McIDAS-V scientific analysis and visualization software has proven a useful tool for early evaluation of these new data.

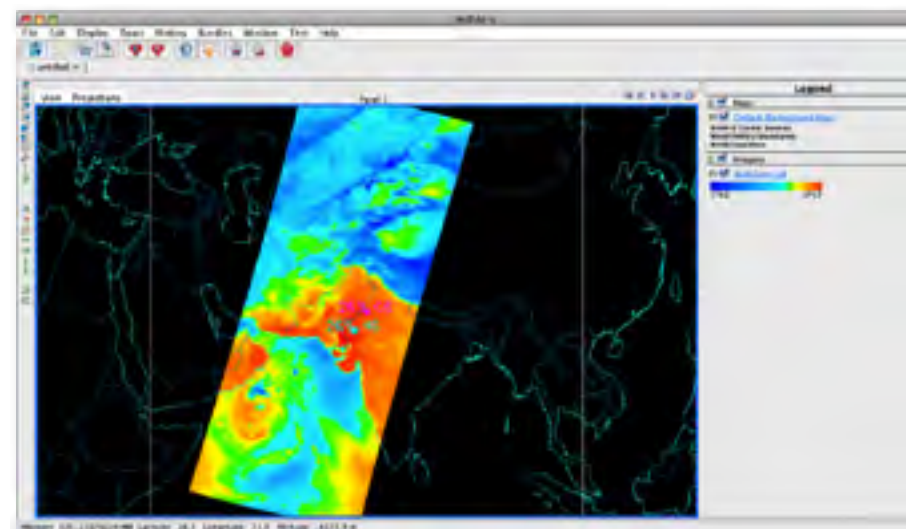


Figure 1. This image is from some of the first data received from the spacecraft.

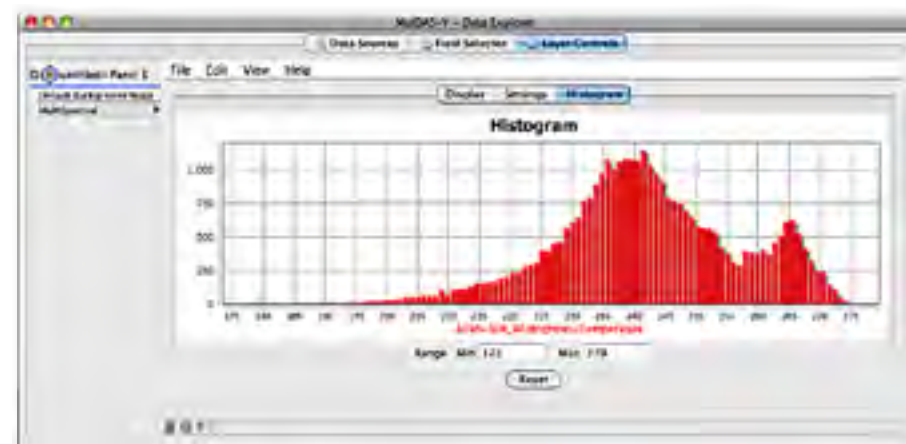


Figure 2. ATMS Channel 16 and brightness temperature histogram, Day 1: 08-Nov-2011.

VIIRS

The second Suomi NPP instrument to transmit data was the next-generation imager, VIIRS. The Visible Infrared Imaging Radiometer Suite is a scanning radiometer producing visible and infrared imagery with many improvements over predecessor instruments MODIS, AVHRR, and OLS. Its 22 channels include 5 I-Bands, 16 M-Bands, and a Day/Night band. The true-color image to the right was produced with McIDAS-V within hours of the VIIRS sensor door opening.

Figure 3. Amazon River Delta, created in McIDAS-V within hours of VIIRS activation. [Tom Rink, SSEC/CIMSS]



ATMS

The first instrument from Suomi NPP to transmit data was ATMS on 08 November 2011. ATMS is the Advanced Technology Microwave Sounder, a cross-track scanner with 22 channels. Based on predecessor instruments AMSU-A1, AMSU-A2, and AMSU-B, it provides sounding observations to produce profiles of atmospheric temperature and moisture. These data are critical for weather forecasting and climate monitoring continuity.

The current release of McIDAS-V, Version 1.2, allows scientists to work with ATMS granules obtained from CLASS or the SSEC Atmosphere PEATE. An arbitrary set of contiguous granules can be aggregated for display. Once loaded, all core McIDAS-V capabilities are available, including subsetting, reprojecting, formulas, statistics, etc. Figure 2 is from some of the first data received from the spacecraft.



VIIRS (cont.)

The NESDIS/StAR team led by NOAA scientist Don Hillger, based at CIRA in Fort Collins, CO, was tasked with checkout and evaluation of Suomi NPP imagery. This team recognized early the value in utilizing McIDAS-V as one of their visualization and analysis tools. This team has identified, reported, and resolved many key issues with VIIRS imagery since launch. These images are just two examples of VIIRS data visualizations made by the NESDIS/StAR team.

Figure 4. M-band (750 m) true-color/RGB image (for 14 December 2011) over northeastern India and Nepal. Note the large amount of pollution over India relative to Tibet, and how the mountains trap it to the south. [Dan Lindsey, NOAA/StAR]

CrIS

After several delays, much-anticipated data from CrIS, the Cross-track Infrared Sounder, started flowing on 20 January 2012. Due to an unexpected format change in the data organization for CrIS, support for CrIS is not present in McIDAS-V 1.2. However, it is available in the nightly builds and will be present in the next stable release.

CrIS ushers in the next era of hyperspectral data, with its 1,305 infrared spectral channels. Such data provide a high-resolution 3D view of the atmosphere. The ability for scientists to easily work with hyperspectral data was anticipated and developed many years ago at SSEC through the Hydra standalone

Figure 5. The grey-scale image shows CrIS fields of view at 1502.5 cm-1, re-projected to a uniform grid, over the eastern coast of Brazil (2012-04-13, 03Z).

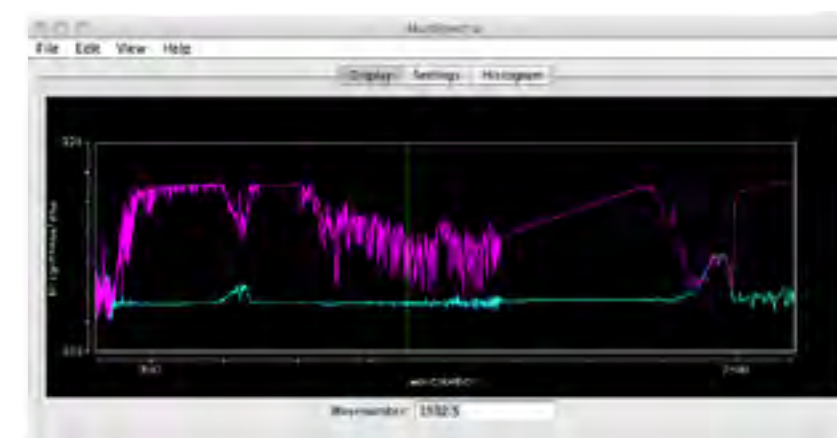
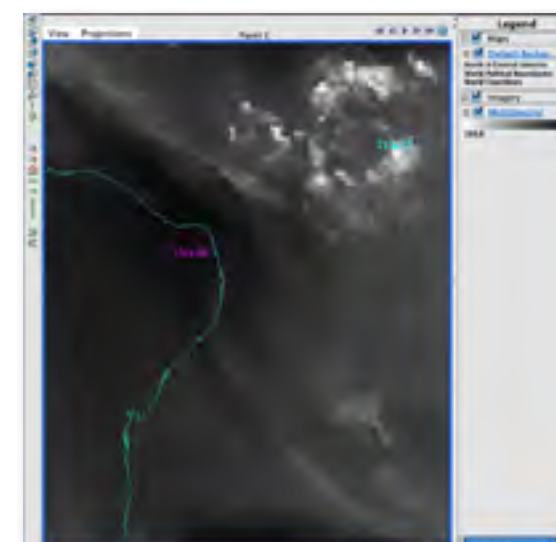


Figure 6. The spectra display aggregates the long wave (LW), medium wave (MW), and short wave (SW) products. The spectra graphs are updated automatically as the user drags the readout probes in the main display, finding the nearest FOV in the product file. Likewise, the image is updated as the green wavenumber selector is re-positioned along the spectral domain (x-axis).

application. The Hydra (Hyper-spectral Viewer for Development of Research Applications) capabilities are now integrated into McIDAS-V, and allow a very novel way of interactively manipulating data by spatial extent and spectral range at the same time.

These two figures provide a McIDAS-V interactive interrogation of a CrIS SDR (Sensor Data Record). The grey-scale image shows CrIS fields of view at 1502.5 cm-1, re-projected to a uniform grid, over the eastern coast of Brazil (2012-04-13, 03Z).

Suomi NPP brings the next generation technology of remotely-sensed land, ocean, and atmospheric data. Through their efforts on McIDAS-V, SSEC researchers continue to ensure that users have a powerful, freely-available visualization and analysis tool to realize the full potential of the Suomi NPP data.

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