

NEXT-GENERATION SATELLITE METEOROLOGY TECHNOLOGY UNVEILED

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The launch of the Suomi National Polar-orbiting Partnership (Suomi-NPP) satellite in October 2011 ushered in a new era of technological advancements within the realm of low-Earth orbiting satellite sensors. In particular, the Suomi-NPP's Visible Infrared Imager Radiometer Suite (VIIRS) is an imaging sensor that incorporates many of the best characteristics (excellent radiometric fidelity, high spatial resolution, multiple spectral channels, and a broad swath) of heritage sensors: the Advanced Very High Resolution Radiometer, Operational Linescan System, and Moderate-Resolution Imaging Spectroradiometer. Under the auspices of NOAA's Joint Polar Satellite System (JPSS), the Naval Research Laboratory in Monterey (NRL-MRY), California, is part of the Suomi-NPP VIIRS Imagery and Visualization Team, providing VIIRS imagery through its newly developed website "NRL-VIIRS" at www.nrlmry.navy.mil/VIIRS.html. Though designed as a calibration and validation (CAL/VAL) resource, this publicly accessible portal offers the global community a suite of VIIRS-derived near-real-time meteorology and oceanography image products.

Currently, NRL-VIIRS products consist of organically (in-house) developed visible, IR, true color, elevated dust, natural (false color), and low cloud (nighttime) displays. NRL-VIIRS also features imagery from the superb VIIRS Day Night Band (DNB)

low light sensor, capable of providing unprecedented nighttime views of light emissions (volcanic lava flows, wild fires, Aurora Borealis and Australis, lightning, lights from fishing fleets, cities, major highway networks, and other terrestrial sources). With adequate lunar lighting, the DNB can also provide nearly "day-like" views of both surface and atmospheric reflectances (cloud features, elevated dust, smoke, sea ice, etc.). To demonstrate VIIRS oceanographic imaging capabilities, NRL-VIIRS leverages products developed from the VIIRS Ocean Color CAL/VAL team at the NRL Oceanography Division at the Stennis Space Center (NRL-SSC) in Mississippi. NRL-SSC provides NRL-MRY with image products that include chlorophyll concentrations and vertical depth visibility over the Gulf of Mexico region. Images from NRL-VIIRS have been used in a variety of applications, including newscasts, conference presentations, social networking sites, sponsor demonstrations, etc. To accommodate worldwide environmental viewing, the number of NRL-VIIRS website domains is increasing worldwide and now includes the polar regions.

Since 2004, NRL-MRY has been advertising VIIRS capabilities to the global community in two phases. In the first phase prior to launch, NRL-MRY hosted synthetic VIIRS products on "NexSat" (www.nrlmry.navy.mil/NEXSAT.html)¹ using data from heritage sensors in order to demonstrate VIIRS's future capabilities prior to its launch. The second phase (postlaunch) consists of several aspects: a) showcasing VIIRS-retrieved visible, IR, true color, and DNB products via current weather events (severe storms, tropical cyclones, wildfires, volcanic activity, metropolitan detail at night); b) continued VIIRS product development by adapting algorithms of its heritage counterparts (cloud properties, low clouds at night,

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¹ Further information on NexSat can be found in *BAMS* (Miller et al., vol. 87, no. 4, pp. 433–446, doi:10.1175/BAMS-87-4-433).

airborne dust detection, snow–cloud discrimination, etc.); and c) public awareness, education, and outreach. The near-real-time aspects of product production has been a hallmark of NRL-MRY websites, allowing users from a variety of disciplines to apply the products in both operational as well as research and development endeavors. Thanks to collaborative efforts between the Air Force Weather Agency’s Interface Data Processing Segment, the Fleet Numerical Meteorology and Oceanography Center, and NRL-MRY, the current VIIRS data latency (time between satellite overpass and appearance on the NRL-VIIRS website) is typically less than 2 hours. Also, in order to quicken the creation of products over the continental United States (CONUS), NRL-MRY utilizes VIIRS datasets from the University of Wisconsin’s Cooperative Institute for Meteorological Satellite Studies (UW-CIMSS) Direct Readout (DR) and Product Evaluation and Analysis Tool Element. Although limited in coverage (CONUS only), the line-of-sight data capture from the UW-CIMSS DR method allows NRL-MRY to produce CONUS imagery with less than one hour latency. Users can obtain archived VIIRS data within the NOAA Comprehensive Large Array-data Stewardship System website at www.class.ngdc.noaa.gov/saa/products/welcome.

NRL-MRY is in partnership with the COMET Program (www.meted.ucar.edu) to provide world-class public education on VIIRS in a variety of satellite training modules. As part of its outreach efforts, both NRL-VIIRS and NexSat provide a wealth of resources to a wide range of research and development activities. Using both websites, NRL-MRY is coordinating efforts with international scientists for several upcoming international field campaigns. NRL-MRY is partnering with government and academic agencies to assist in the development of NWS’s Advanced Weather Interactive Processing System, as well as demonstrating the GOES-R Advanced Baseline Imager sensor.

The Suomi-NPP is a partnership between NASA (<http://npp.gsfc.nasa.gov>) and NOAA (www.jpss.noaa.gov). Development of NRL-VIIRS is being funded by NOAA’s Joint Polar Satellite System program in support of the calibration and validation efforts.

FOR FURTHER READING

Hillger, D., and Coauthors, 2013: First-light imagery from Suomi NPP VIIRS. *Bull. Amer. Meteor. Soc.*, **94**, 1019–1029, doi:10.1175/BAMS-D-12-00097.1.