ANTICIPATING THE VIIRS AND MIS SENSORS ABOARD NPOESS

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The Visible/Infrared Imager/Radiometer Suite (VIIRS) is the next-generation radiometer slated to fly on the NPOESS series of satellites, the first of which is scheduled for launch in 2014, and the NPOESS Preparatory Project Satellite (NPP, scheduled for launch in 2011). VIIRS draws from many of the best capabilities of contemporary operational and research observing systems to support tomorrow's operational constellation. The twenty-two channels featured on VIIRS are derived primarily from three legacy instruments: the National Oceanic and Atmospheric Administration (NOAA) Advanced Very High Resolution Radiometer (AVHRR), the NASA Moderate Resolution Imaging Spectroradiometer (MODIS), and the Defense Meteorological Satellite Program (DMSP) Operational Linescan System (OLS). With a low-light nighttime visible sensing capability, the OLS [1] [8] provides the sole heritage to the VIIRS Day/Night Band (DNB). The DNB will measure visible radiances from the earth and atmosphere (solar/lunar reflection and both natural and anthropogenic nighttime light emissions) during both day and night portions of the orbit. Compared to the OLS, some of the DNB channel improvements include 1) reduced instances of pixel saturation, 2) smaller IFOV, leading to reduced spatial blurring, 3) superior calibration and radiometric resolution, 4) co-location with multispectral measurements on VIIRS and other NPOESS sensors, and 5) generally increased spatial resolution and elimination of cross-track pixel size

variation. The OLS can detect city lights [2][3], lightning [10]; snow cover [4][5]; and clouds [7].

We will show simulated examples of VIIRS capabilities using MODIS-derived products. For simulated examples of the DNB band we will show examples from the DMSP OLS. We will introduce the Naval Research Laboratory/NPOESS Next-Generation Weather Satellite Demonstration Project (NexSat) website which features NPOESS simulations using a variety of current sensors [9].

In addition to VIIRS, the Microwave Imager/Sounder (MIS) will fly onboard NPOESS satellites starting with NPOESS C-2[6]. Its heritage sensor, WindSat, has demonstrated that measurements from polarimetric space-based microwave radiometers can be used to retrieve global ocean surface vector winds. WindSat's retrievals have superior spatial resolution, improved wind vector ambiguity removal, and the ability to measure high wind speeds. In this presentation, examples of WindSat retrievals (wind vectors, total precipitable water, rainrate and sea surface temperature) will preview MIS capabilities. We will emphasize operational weather forecasting applications, including the assessment of tropical cyclones and the monitoring of topographically-forced winds. We will also include a comparison of WindSat winds to those of the QuikScat scatterometer.

References

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