Operationalizing a Research Sensor: MODIS to VIIRS

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Operationalizing the Sensor

VIIRS improves on Current Operational and R&D Sensors

- High Spatial Resolution
- 22 Bands at 74 km
- Improved cloud cover, snow and ice, and ocean color
- Enhanced geometric resolution
- Improved radiometric and geometric stability
- High temporal resolution

Research Sensor - MODIS

Operationalizing the Algorithms

- VIIRS true color imagery compares very well with nearly simultaneous MODIS imagery
- Updated the VCM algorithm based on new capabilities of VIIRS, e.g.: Discrimination of cloud phase both day and night (VIIRS dynamic range and SNR were optimized based on early Terra MODIS results)
- New ground reprints and algorithms were added to support the DPSA
- Surface Albedo Algorithm Evolved from VIIRS PDR to CDR
- VIIRS Band 11 – Evolution Over Time

Operationalizing Science

Lessons learned from MODIS helped enabled quick turnaround of VIIRS results

- After 6 months of operation, all VIIRS bands continue to provide consistent, high-quality data
- VIIRS and MODIS meet sensor requirements for all elements and all bands
- Add-Ons: Band 10 Albedo
- Targeted validation (NASA and / or AFWA and CLASS and is being analyzed continuously
- VIIRS true color imagery compares very well with nearly simultaneous MODIS imagery
- Key legal for multiple EDRs
- Originally designed to support operational requirements to MODIS
- Great Terre MODIS data were available. These were analyzed and found to outperform over clouds, as VIIRS was increased
- When LOWs increased, VIIRS performance improved, confirming expected trends
- To recover ERR band was awarded to support MODIS data
- To preserve performance response, band was shifted to 750 nm

Updating the Science

Example: the VIIRS Cloud Mask (VCM)

- Marged the best features of the MODIS and CALIPI algorithm heritage into an advanced VIIRS algorithm
- Updated the VCM algorithm based on new capabilities of VIIRS, e.g.: Detection of thin cirrus (VIIRS Band 86 was enhanced to accommodate out-of-band responses)
- Detection of clouds over snow and ice (VIIRS Band 3 provides unprecedented global resolution in the shortwave infrared to highlight snow/ice characteristics)
- Example: the VIIRS Cloud Mask (VCM)

Results

Work continues to validate VIIRS data products and complete operationalization
- VIIRS data will be available under national security data products (including MODIS, VIIRS, and CLAAR) and targeted missions
- Standard rates and gaseous products for seven features, including VIIRS, MODIS, and CLAAR data and targeting analysis

Additional information and resources can be found at JPSS and NASA websites.