

VIIRS PRODUCT EVALUATION AT THE OCEAN PEATE

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The Visible and Infrared Imager/Radiometer Suite (VIIRS) is an instrument that will be flown on the National Polar-orbiting Operational Environmental Satellite System (NPOESS) Preparatory Project (NPP). VIIRS is a multi-disciplinary sensor that will be used to generate Atmosphere, Land and Ocean products. The data products will be generated by the Interface Data Processing Segment (IDPS) at the NOAA National Environmental Satellite, Data, and Information Service (NESDIS) and delivered to the other NPP segments.

The Ocean Product Evaluation and Analysis Tool Element (PEATE) is a component of the NASA Science Data Segment (SDS). The SDS is a distributed facility comprising a central Science Data Depository and Distribution Element (SD3E) and multiple, discipline-specific PEATEs. The PEATEs are tasked with acquisition of the NPP science data products and supporting the evaluation of the products by the NASA science teams. The products will be acquired either directly from the IDPS or from the Archive Data Segment / Comprehensive Large Array Stewardship System (ADS/CLASS).

The NPOESS and NPP data products will be generated and delivered at three levels: unprocessed packet data as Raw Data Records (RDRs), unpacked and calibrated instrument data as Sensor Data Records (SDRs), and retrieved geophysical parameter data as Environmental Data Records (EDRs). The purpose of the PEATEs is to assess the quality of the EDRs to determine whether they can serve as Climate Data Records (CDRs). This includes both evaluating the EDRs generated by IDPS and recommending improvements to the science algorithms used in the operational software. The Ocean EDRs are Ocean Color/Chlorophyll (OCC) and Sea Surface Temperature (SST).

The Ocean PEATE is being supported within the existing Ocean Biology Processing Group at NASA Goddard Space Flight Center (GSFC) and using the capabilities of the Ocean Data Processing System (ODPS). The ODPS performs automated data acquisition and ingest, product generation, archiving, and distribution for satellite science data products. It currently supports Ocean Color and SST products for multiple active and heritage missions.

The methods used to evaluate the VIIRS Ocean EDRs, and particularly the OCC EDR, will be based on the techniques developed for the active sensors: the Sea-viewing Wide Field-of-view Sensor (SeaWiFS) and the Moderate-resolution Imaging Spectroradiometer (MODIS). These methods employ a multi-pronged approach that includes evaluation of both the SDRs and EDRs. In addition, the EDRs will be processed to Level-3 global products on daily and longer time scales to support time-series analyses and comparisons with other data sets.

For the SDR evaluation, the Ocean PEATE will support the NPP Instrument Characterization Support Team (NICST), which is the NASA lead organization for VIIRS calibration. Specifically, the Ocean Team will collaborate with the NICST in the analysis of the on-orbit calibration data from the solar diffuser and the measurements collected for the lunar calibration. This follows the approach being used for MODIS, which involves close cooperation between the Ocean and Calibration teams.

The evaluation of the EDRs will be twofold. First, the data will be matched with *in situ* measurements of radiometry, chlorophyll and Inherent Optical Properties (IOPS). These data are collected from field programs run by various institutions, analyzed and archived in the SeaWiFS Bio-optical Archive and Storage System (SeaBASS) developed and maintained by the OBPG. Second, the data will be cross-calibrated against Level-3 products, either from VIIRS or other sensors, to characterize detector- and scan-based artifacts in the data products.

The Level-3 global products support a variety of long-term evaluations and are critical for the evaluation of the long-term consistency of the EDRs. Like the EDRs, the Level-3 products will be evaluated in multiple ways. The individual fields in the products will be compared with the same parameter generated from other sensors to evaluate their consistency, on global, regional and zonal scales. The same technique will be applied to analyze the effects of algorithm changes under consideration, using products generated using both the old and new algorithms. In

addition, temporal anomaly analysis will be performed on the Level-3 products to evaluate their long-term behavior.

The OBPG has developed a proven set of tools and techniques for performing comprehensive assessment of Ocean Color data product quality and consistency, and the ODPS provides a highly capable computing environment to support these activities. By applying all of these methods and capabilities, the Ocean PEATE will support a rigorous evaluation of the VIIRS Ocean EDRs by the NASA science team.

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