NPOESS Preparatory Project Validation Program for Ocean Products from VIIRS

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Overview

The National Polar-orbiting Operational Environmental Satellite System (NPOESS) Program, in partnership with National Aeronautical Space Administration (NASA), will launch the NPOESS Preparatory Project (NPP), a risk reduction and data continuity mission, prior to the first operational NPOESS launch.

The NPOESS Program, in partnership with Northrop Grumman Aerospace Systems (NGAS), will execute the NPP Validation program to ensure the data products comply with the requirements of the sponsoring agencies.

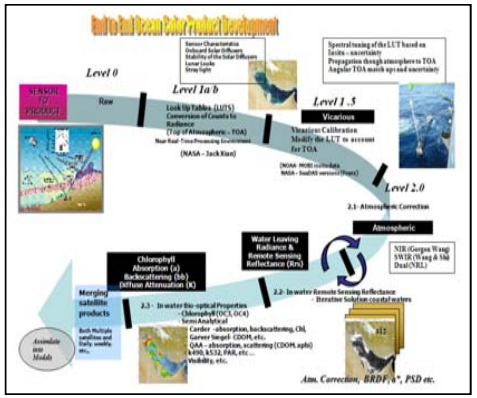
Data from the NPP Visible/Infrared Imager/Radiometer Suite (VIIRS) will be used to produce Environmental Data Records (EDRs) of Ocean Color/Chlorophyll (OC/C) and Sea Surface Temperature (SST). The ocean Cal/Val program is designed to address an "end to end" capability from sensor to end product and is developed based on existing ongoing government satellite ocean remote sensing capabilities that are currently in use with NASA research and Navy and NOAA operational products.

Therefore, the plan focuses on the extension of known reliable methods and capabilities currently used with the heritage sensors that will be extended to the NPP and NPOESS ocean product Cal/Val effort. This is not a fully "new" approach but it is designed to be the most reliable and cost effective approach to developing an automated Cal/Val system for VIIRS while retaining highly accurate procedures and protocols. This presentation will provide an overview of the approaches, data and schedule for the validation of the NPP VIIRS Ocean environmental data products.

Approach

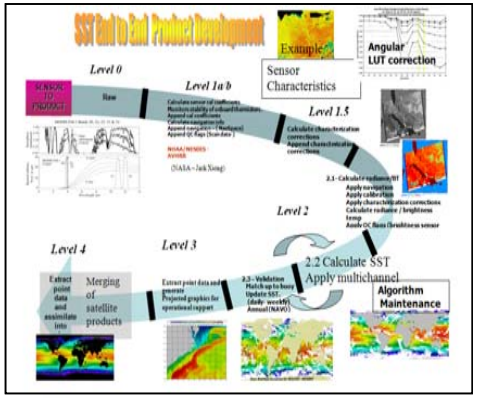
- *Overall Approach*

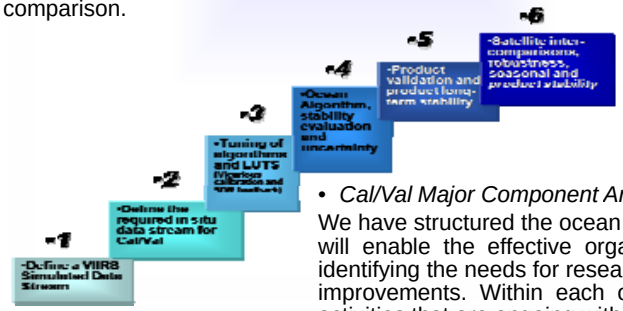
1) Develop an integrated cross-agency Cal/Val plan for the NPP products that is based on present infrastructure and architectures used for heritage satellite sensors.
2) Ensure consistency of NPP products with heritage satellite products (through extensive cross-evaluation and inter-comparison.
3) Construct a readiness program beginning with MODIS and MetOp-A/AVHRR FRAC (1km global) as a pathfinder to ocean calibration and validation for NPP and extending to the first two NPOESS operational satellites, named C1 and C2.



- *Cal/Val Philosophy*

The ocean Cal/Val program is designed to address an "end to end" capability from sensor to end product. This approach allows for the identification of procedures that are directly traceable to "value added" to the product. This approach enables metrics for defining the impact which both calibration and validation procedures have on ocean product performance and uncertainty. Additionally, the "end to end" approach addresses the necessity for both short-term and long-term Cal/Val protocols. Lastly, it ensures a coupled science and product traceability matrix for merging multiple sensors from AVHRR to MODIS, to VIIRS on NPP, to C1 and C2, thus enabling reliable, continuous sensor and product inter-comparison.





- *Cal/Val Major Component Areas*

We have structured the ocean calibration and validation in 6 investment areas which will enable the effective organization of the Cal/Val program. This is aimed at identifying the needs for research/development which will lead directly to operational improvements. Within each of these areas there are some established Cal/Val activities that are ongoing within the agencies or universities.

Activities by Cal/Val Phase

PRE-LAUNCH
- Identify and document the methods and resources required for operational calibration and validation;
- Conduct calibration and validation prototyping activities with heritage instrument SST and Ocean Color data products used as proxy data for NPP SDRs and EDRs;
- Set up methodology and tools to quality-control (QC) in situ data used in validation and long term monitoring;
- Set up a near-real time data stream to generate proxy VIIRS.

EARLY ORBIT CHECK-OUT (EOC)
- Process Navy and NOAA products, generated from VIIRS SDRs, as well as NGAS EDRs through heritage algorithms and evaluate results against heritage products.

INTENSIVE CAL/VAL (ICV)
- Conduct VIIRS clear-sky radiances against radiative transfer models and other sensors;
- Conduct targeted validation campaigns and validation against operational field data sets;
- Suggest trouble-shooting to evaluate and fix any identified EDR/SDR problems.

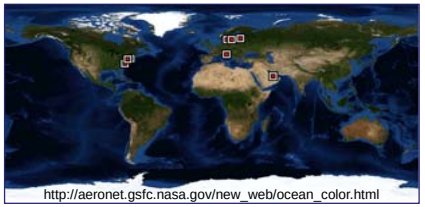
LONG-TERM MONITORING (LTM)
- Continuously monitor and analyze long-term performance via comparison to heritage products and in situ sites, and identify needed fixes to SST and ocean color algorithms.

Correlative Data

EDR	Correlative Data
SST	MODIS, AVIRIS, AVHRR, MERIS, SeaWiFS, NWS & AFWA Drifting and Moored Buoys, GHRSST, M-AERI, ECMWF, NCEP, HICO
OC/C	MODIS, AVIRIS, AVHRR, MERIS, SeaWiFS, **SeaBASS (BATS)**, HOT, MOBY & MOBY-C, AERONET-OC SeaPRISM, HICO

http://modis.gsfc.nasa.gov/

AERONET-OC site distribution



http://aeronet.gsfc.nasa.gov/new_web/ocean_color.html

Hawaii Ocean Time-Series (HOTS)

http://hahana.soest.hawaii.edu/hot/hot_jgofs.html