

Algorithm and Product Development at NOAA's CoastWatch Program

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NOAA/NESDIS/STAR



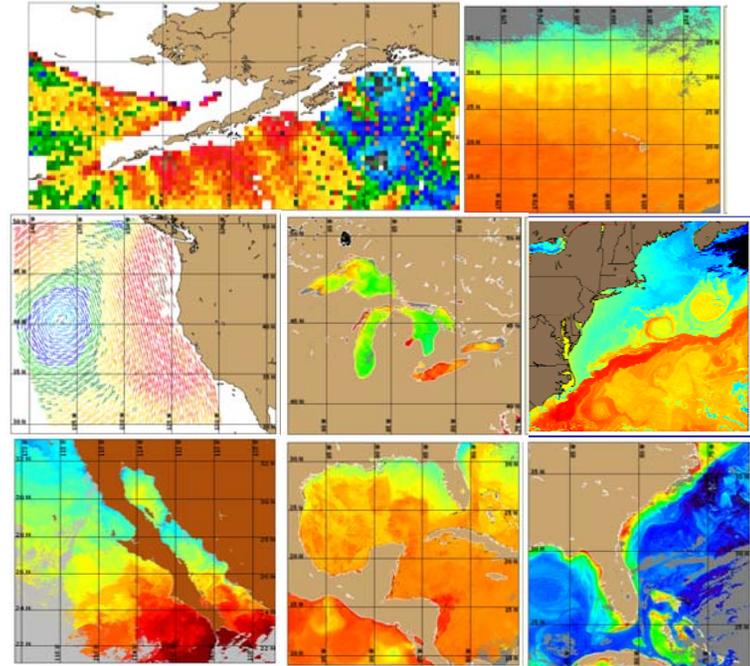
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NOAA CoastWatch Program

MISSION STATEMENT:

to provide and ensure timely access to near real-time satellite data to protect, restore, and manage U.S. coastal ocean resources, and understand climate variability and change to further enhance society's quality of life. Our primary users include Federal, State, and local marine scientists, coastal resource managers, and the general public.



Numerous satellite ocean remote sensing products served, including:

- Ocean Color: GeoEye/SeaWiFS; NASA Aqua/MODIS.
- Sea Surface Temperature: POES/AVHRR and GOES/Imager; NASA Aqua and Terra/MODIS.
- Ocean Surface Winds: DMSP SSM/I and NASA QuikSCAT/SeaWinds.

**National distribution:
Central operations &
six regional nodes**



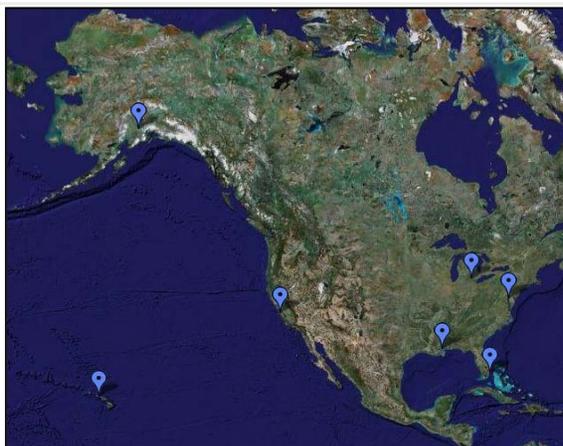
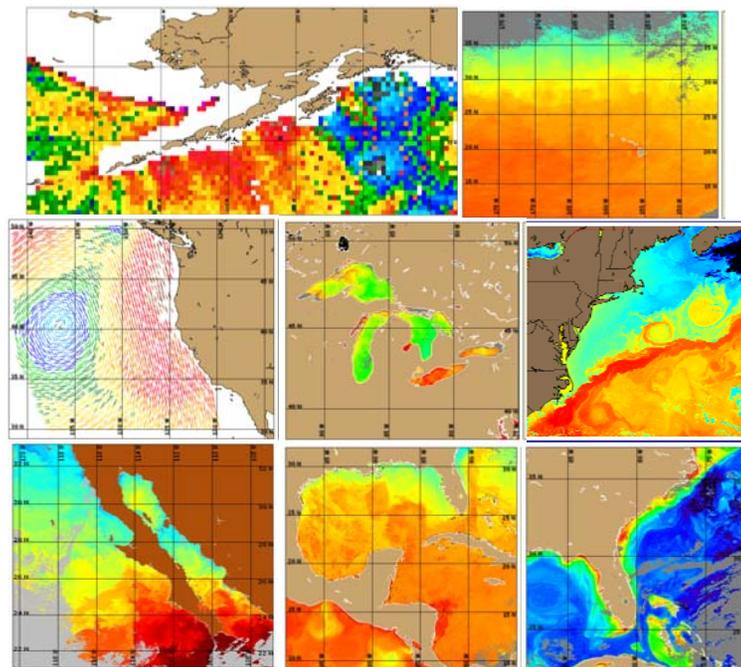
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Ocean Color Processing Overview

- OSDPD runs Okeanos, a computational cluster for operational Ocean Color processing.
 - Aqua MODIS
 - SeaWiFS
- STAR develops major enhancements for Okeanos on their oceanographic computer cluster, Tethys (R2O).



Limitations

- Okeanos on Tethys is set up very differently from Okeanos in OSDPD because of policy differences.
- Current practice has code migrate directly from Tethys to Okeanos production.
- This has led to difficulties and confusion over whose responsibility it is to compensate for configuration differences.



Need for Okeanos Parallel Test

- An Okeanos Parallel Test system would have great value in addressing the limitations just described.
- Such a system would be configured identically with production Okeanos.
- It would provide a place to adjust delivered code to the production configuration and perform final testing without risking disruption of operational processing.



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Representative SATB Case Studies

- NASA Standard Ocean Color Community Algorithms; NOAA-tailored Modifications
- Regionally tailored ocean color algorithms – partnership of local researchers & users
- STAR internal R&D efforts, R2O Transition
- Use of Foreign Ocean Colour Data Streams



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Standard MODIS and SeaWiFS Chlorophyll Products

- The Harmful Algal Bloom (HAB) group at NOS is a key customer.
- NASA standard chlorophyll algorithm for all regions we process, both MODIS and SeaWiFS.
- NOAA unique Rick Stumpf (NOS) chlorophyll algorithm for SeaWiFS, for Gulf of Mexico and nearby regions.
- NOAA unique 61 day mean merge and chlorophyll anomaly product to support NOS HAB.



Standard MODIS and SeaWiFS (Cont.)

- Processing became operational June, 2006.
- Gathering and interpreting enhancement requests is an ongoing effort.



Region-Specific Chlorophyll Algorithm

- Presently active only for Chesapeake Bay.
- Request is from a consortium of various interested regional users (Federal, State DNR, Academia).
- Remote sensing of blooms & water clarity is a major interest of many of these users.
- Algorithm presently selected is subject to change should this consortium identify one which better meets its needs.
- NOAA PSDI project to make operational



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SWIR Algorithm Development

- Both SeaWiFS and MODIS have been providing high quality ocean color products in the global **open oceans**.
- In **coastal regions**, however, there are often significant errors in the derived products due frequent to the complex turbid waters.
- The data processing using the **MODIS shortwave infrared (SWIR) bands** have been developed in NESDIS/STAR, and demonstrated significant improved ocean color products in the coastal turbid waters.
- **NOAA PSDI Project:** The SWIR algorithm will be implemented into the NOAA Okeanos system for producing operational MODIS ocean color products in the coastal regions (**Research to Operations**).
- **NPOESS/VIIRS:** The SWIR algorithm can also be used to provide improved ocean color products in coastal regions ¹ for future sensors, e.g., **VIIRS** on NPP/NPOESS.



MODIS-Aqua Climatological Monthly Chl-a Images in CB (April)

Standard

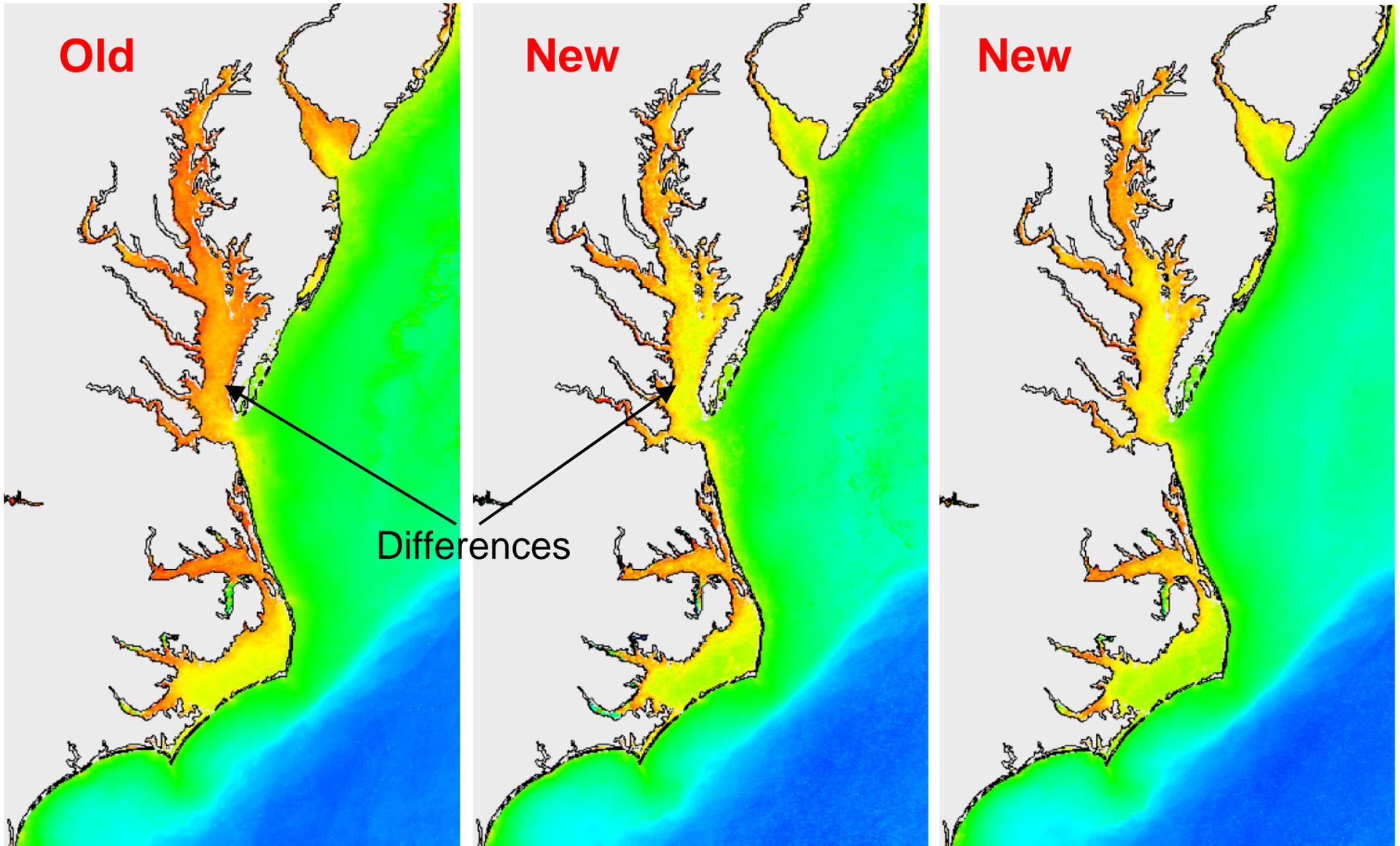
SWIR

BLEND

Old

New

New

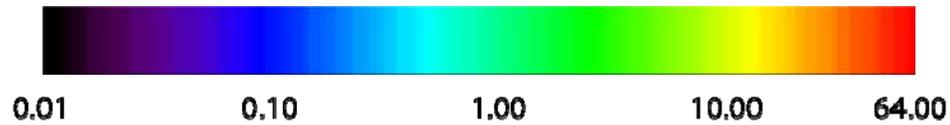


Differences



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Chl-a



Foreign Ocean Colour Data: MERIS

- Requested by HAB and other users of MODIS and SeaWiFS.
- Motivated by advanced age of SeaWiFS and MODIS Aqua sensors.
- For now CW uses the ESA chlorophyll product as processed at ESA.
- Swath processing should go live any day now; merge processing should go live this summer.
- Expect to be declared operational in December.



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