

Near-Real Time SNPP VIIRS Ocean Color Products from NOAA Okeanos Operational Production System

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OUTLINE

- Who Are We?
- NOAA Okeanos Ocean Color Operational Production System
- Near-Real Time (NRT) Operational Ocean Color Products
- Product Access Information

National Oceanic and Atmospheric Administration (NOAA) Line Offices

- National Environmental Satellite, Data, and Information Service (NESDIS)
 - Office of Satellite and Product Operations (OSPO)
 - Center for Satellite Applications and Research (STAR)
 - Joint Polar Satellite System (JPSS)
 - Office of Satellite Ground Services (OSGS)
 - Geostationary Operational Environmental Satellite R-Series (GOES-R)
 - International and Interagency Affairs Division (IIAD)
 - Office of System Architecture & Advanced Planning (OSAAP)
 - National Centers for Environmental Information (NCEI)
 - Office of Space Commerce (OSC)
- National Marine Fisheries Service
- National Ocean Service
- National Weather Service
- Office of Oceanic and Atmospheric Research
- Office of Marine & Aviation Operations

(Reference: <http://www.noaa.gov/about/organization>)

Office of Satellite and Product Operations (OSPO)

- Locations at four facilities housing about 700 OSPO staff
- NOAA Satellite Operations Facility (NSOF) in Suitland, MD
 - **Mission Operations Division (MOD)**
- NOAA Center for Weather & Climate Prediction (NCWCP) in College Park, MD
 - **Satellite Product and Services Division (SPSD)**
- Command and Data Acquisition (CDA) in AK and VA
- NOAA Ice Center (NIC)

NSOF



Fairbanks CDA



NCWCP

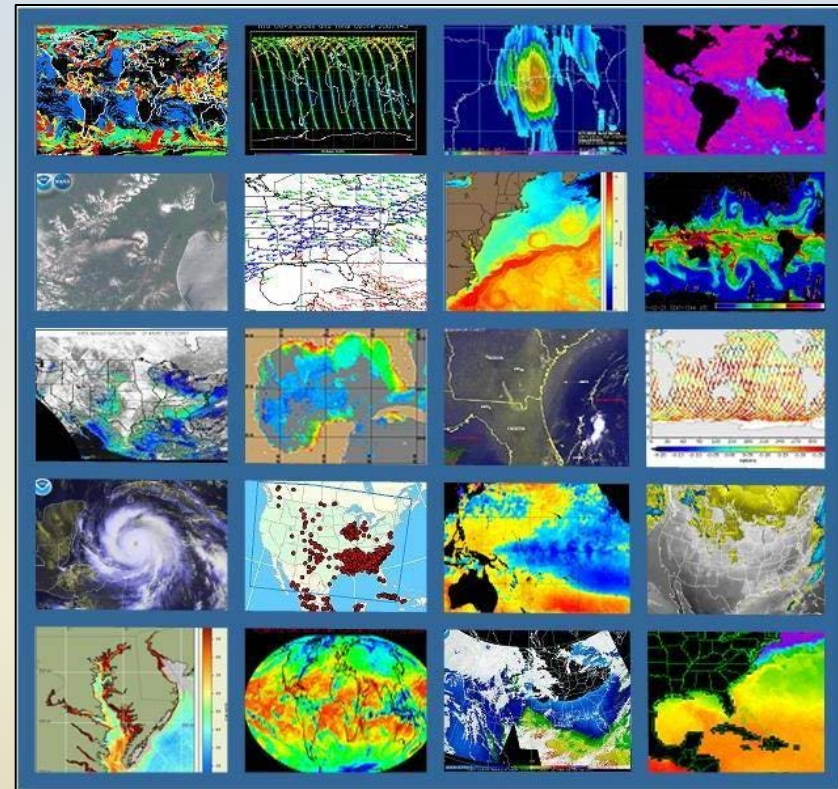


Wallops CDA

Supporting Products in SPSPD Satellite Products Branch

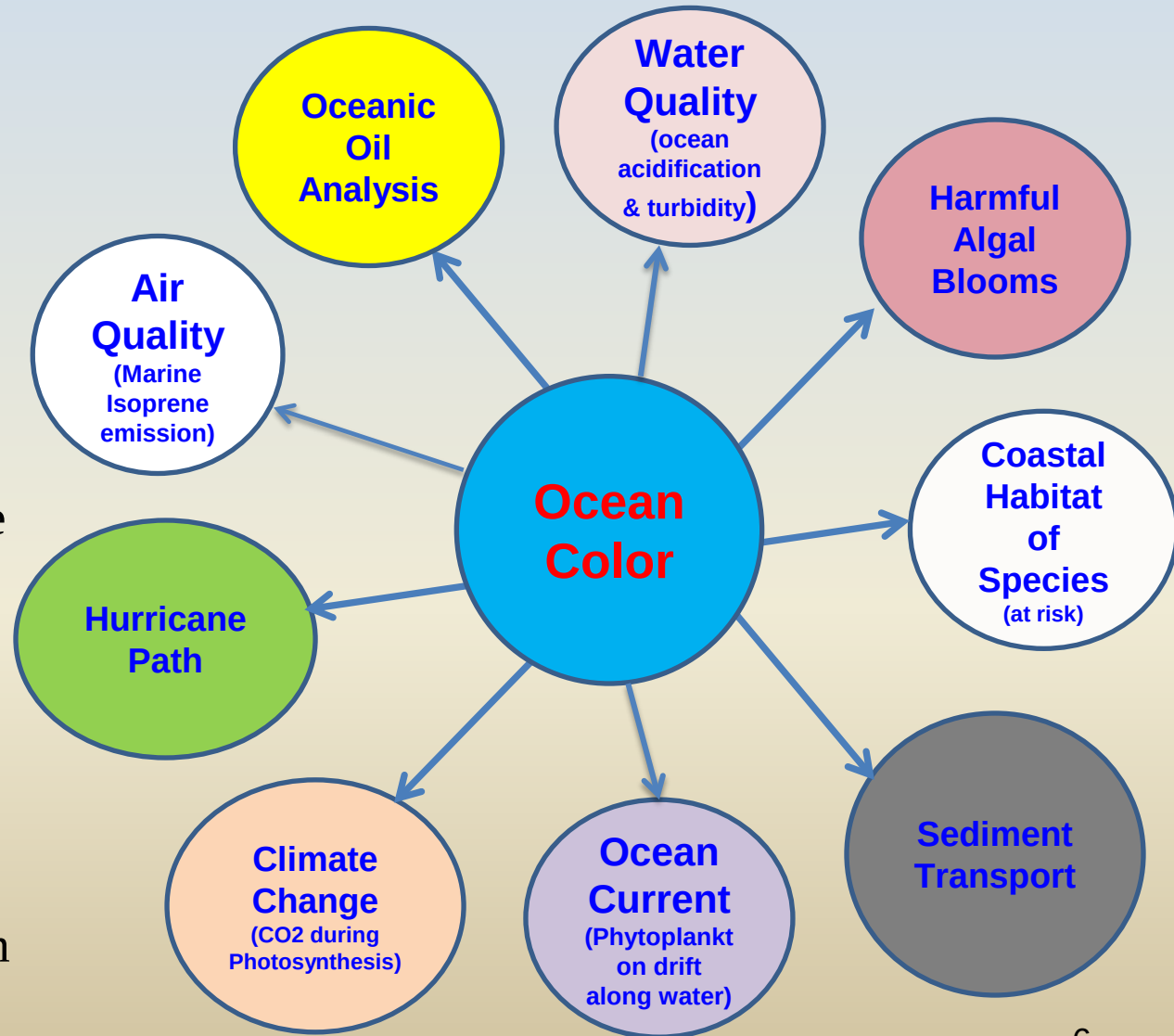
Ocean Color

Arctic composite imagery
Ocean Heat Content
Coral Bleaching
Sea Lake Ice
Sea Surface Temperature
Ozone & Atmospheric Chemistry
Precipitation (Rain & Snow)
Fire and Smoke
Hurricane Intensity and Position
Volcanic Ash
And many more



Why Is Ocean Color So Important?

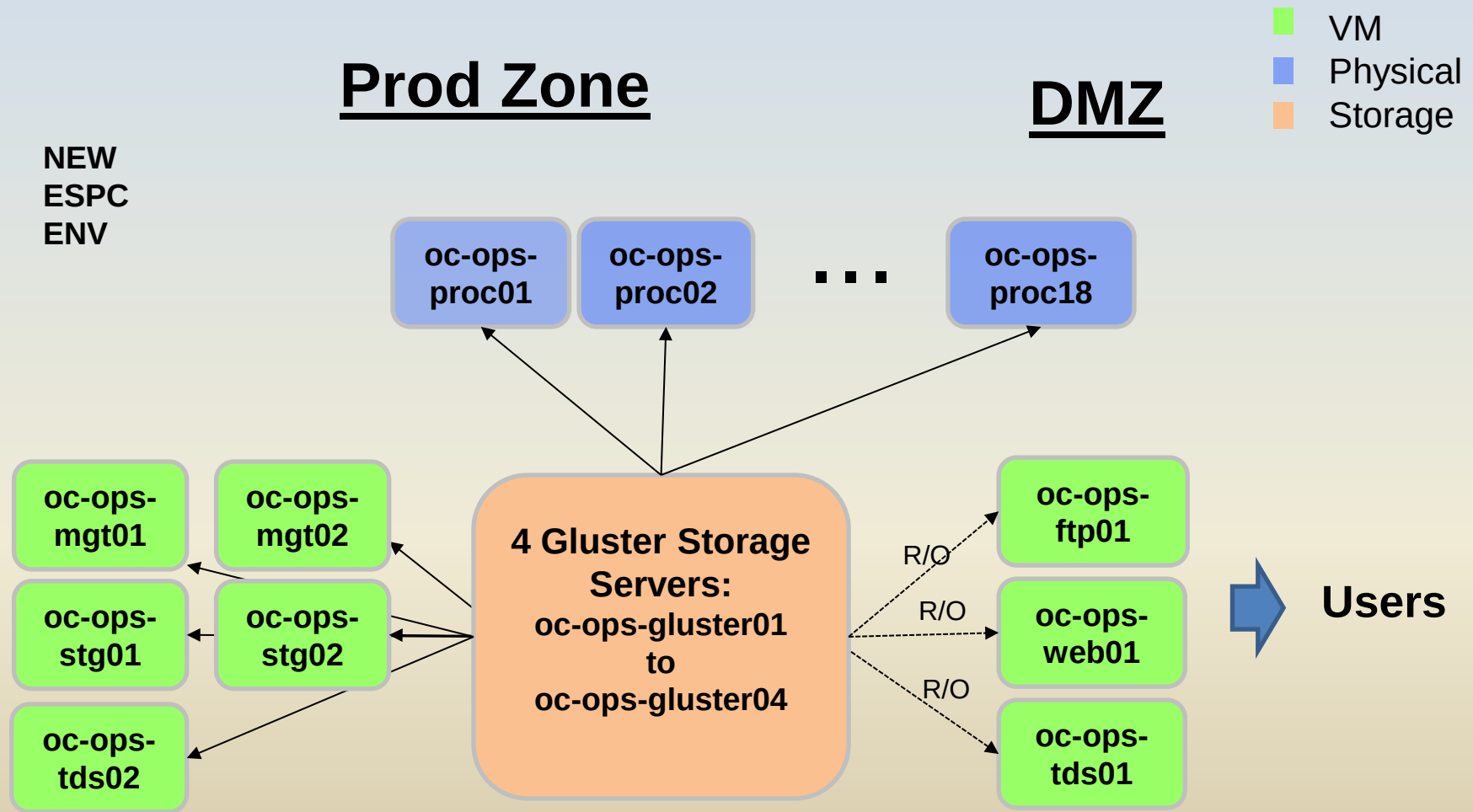
- Retrieve chlorophyll concentration from satellite observation of ocean color;
- Estimate the amount and general type of phytoplankton from chlorophyll;
- Phytoplankton, the base of the oceanic food web, use sunlight and carbon dioxide to produce organic carbon (photosynthesis);
- Monitor health of oceanic ecosystem from phytoplankton, etc.



NOAA Okeanos System Concept

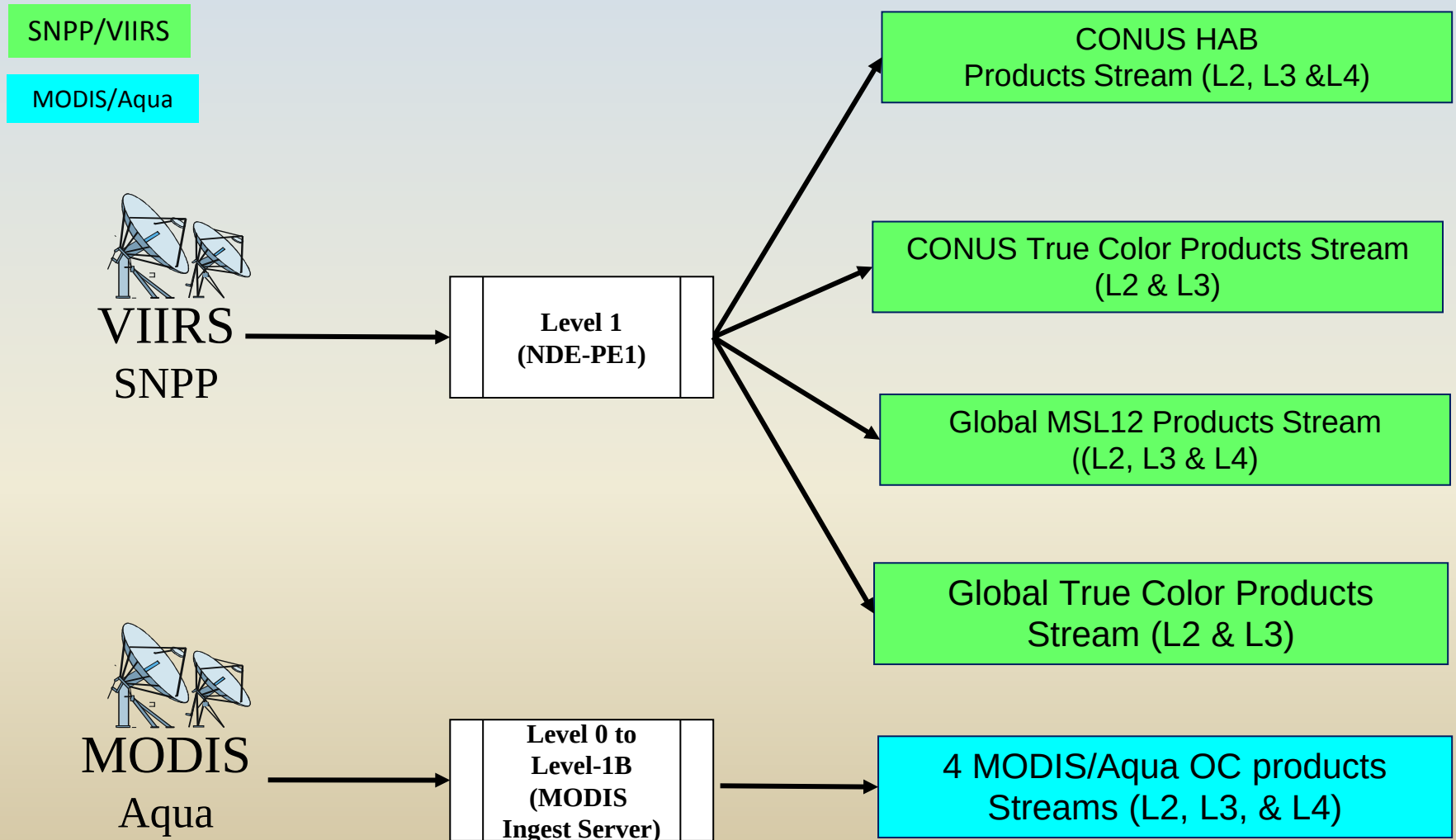
- The Okeanos system is a flexible, expandable Linux-based system capable of processing **multiple satellite streams** to produce multiple types of ocean color products.
 - **Ocean Color Product Software Component**
 - NOAA Ocean Color CoastWatch Automatic Processing Software (CWAPS) package (P. DiGiacomo et al., NOAA/STAR) including MSL12 algorithm (M.H., Wang et al., NOAA/STAR) and BOA Chl frontal algorithm (I. Belkin, URI)
 - **Hardware Configuration Components:**
 - Process manager nodes
 - Update and stage nodes
 - Processor nodes
 - Shared data storage
 - FTP servers
 - Thredds servers
 - **NRT QA Monitoring Tools**
 - GUI tool
 - Web-based QA tool

NOAA Okeanos Operational Production System (OPS) IT Architecture



NOAA Okeanos OPS

NRT OC Products Processing Streams



NOAA Okeanos NRT Operational Ocean Color Product Specifications

- **Satellites:** SNPP and Aqua
- **Instruments:** VIIRS and MODIS
- **Product Specifications**
 - **Product Parameter Name:** Chl-a, Chl-a fronts, K490, Kpar, and Rrs
 - **Coverage:**
 - VIIRS: CONUS (Caribbean, Hawaii, Great Lakes, Gulf of Mexico, North East, Southeast, West Coast) + Global (24 sectors)
 - MODIS: CONUS
 - **Format:** netcdf, HDF, Tif, PNG
 - **Horizontal Resolution:**
 - VIIRS: 750 m (CONUS + Global Sectors) + 4 km (Global Merged)
 - MODIS: 1 km
 - **Timeliness:** 12 hours
 - **Data Latency:** 12 hours
 - **Algorithms:**
 - VIIRS: NOAA MSL12 + BOASNRA
 - MODIS: NASA l2gen + NOAA SWIR +BOASNRA
- **Distribution:** new ftps and Thredds servers (DAR submission and approval are required)
- **Backup Distribution:** <ftp://cw-okeanos.noaa.gov/pub/> (anonymous ftp)

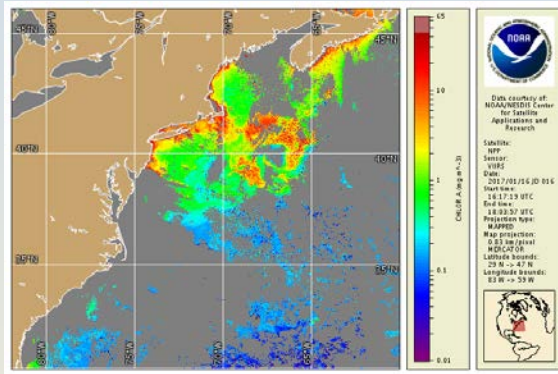
NOAA NRT Operational SNPP/VIIRS

Ocean Color Products List

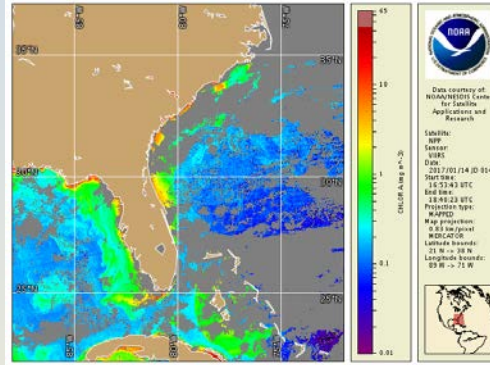
	Daily Merged CW regions @ 750m	Daily Merged single Global @ 4km	Daily Merged sectorised Global@ 750m	*61 day Merged CW regions @ 750m	Anomaly for CW region @ 750m	Granule Global @750m	*7 Day Merged single Global @ 4km	*7 Day Merged sectorised Global@ 750m	*True month Merged single Global @ 4km	*True Month Merged sectorised Global@ 750m
Chl-a	X	X	X	X	X	X	X	X	X	X
nLws		X	X			X	X	X	X	X
Kd_{par}	X	X	X			X	X	X	X	X
Kd₄₉₀	X	X	X			X	X	X	X	X
Rrs₆₇₂	X			X	X	X				
Fronts			X (3 sectors)							
True Color	X					X				

NOAA NRT Operational SNPP VIIRS OC Products: CONUS Coverage

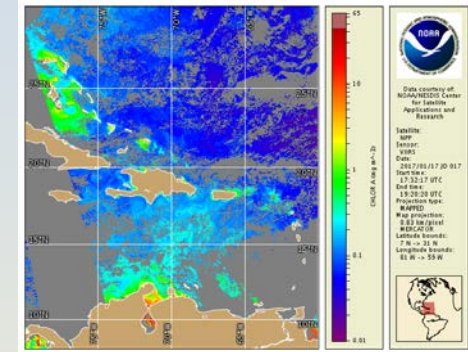
Northeast



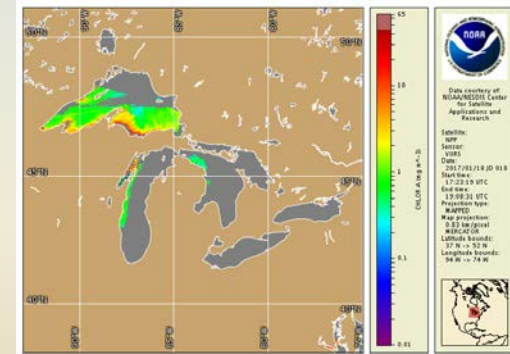
Southeast



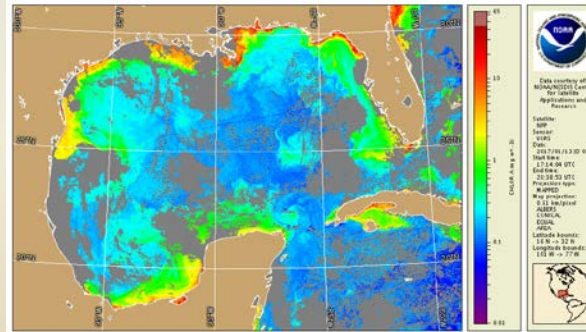
Caribbean



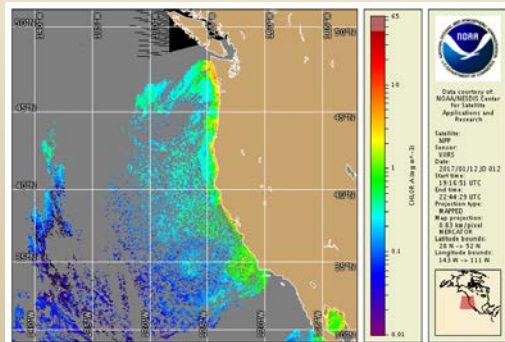
Great Lakes



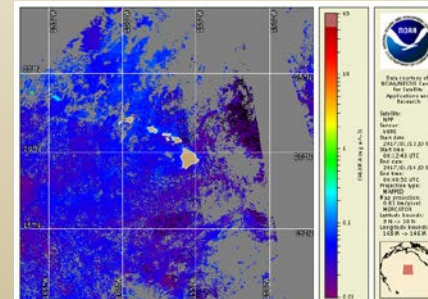
Gulf of Mexico



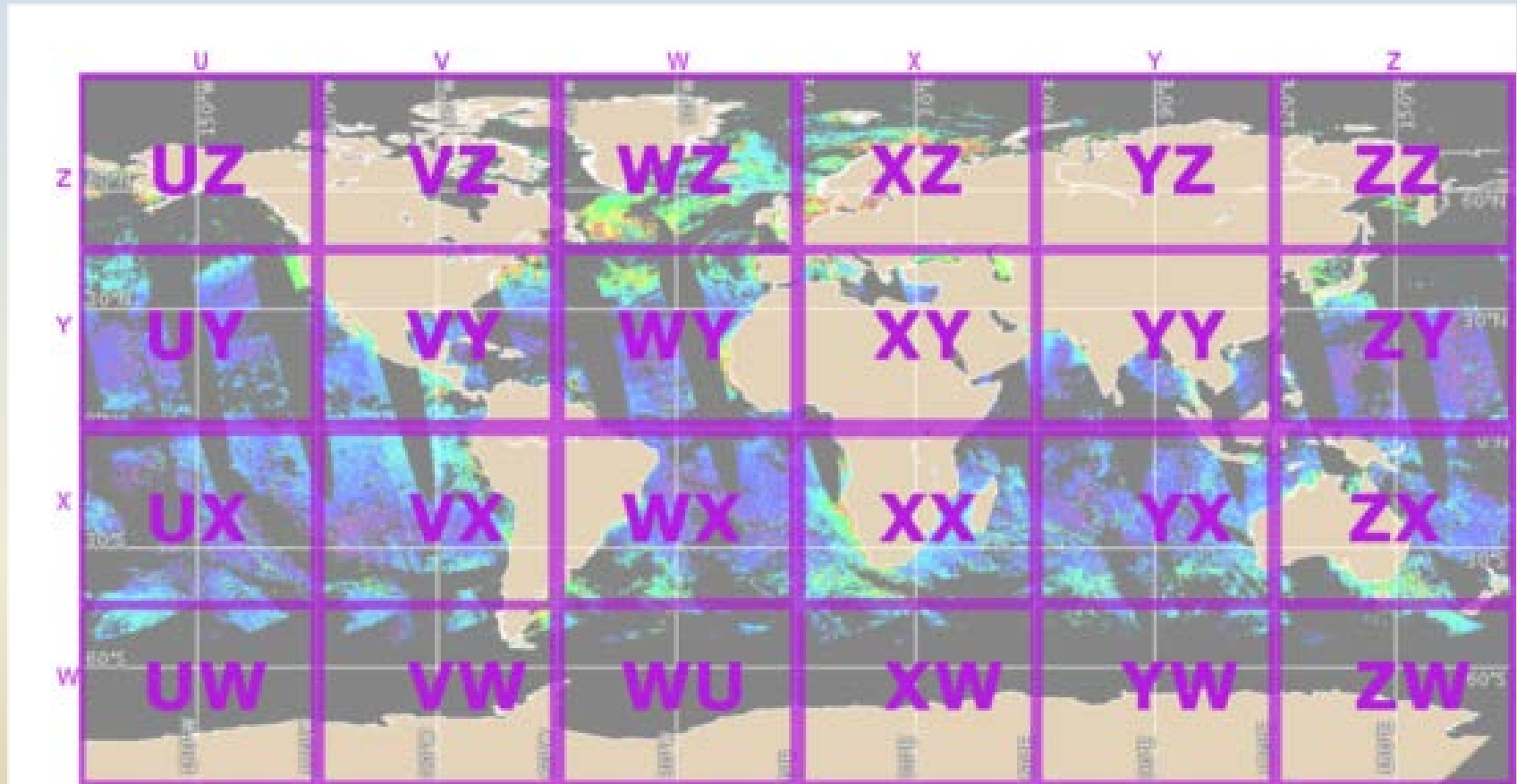
West Coast



Hawaii



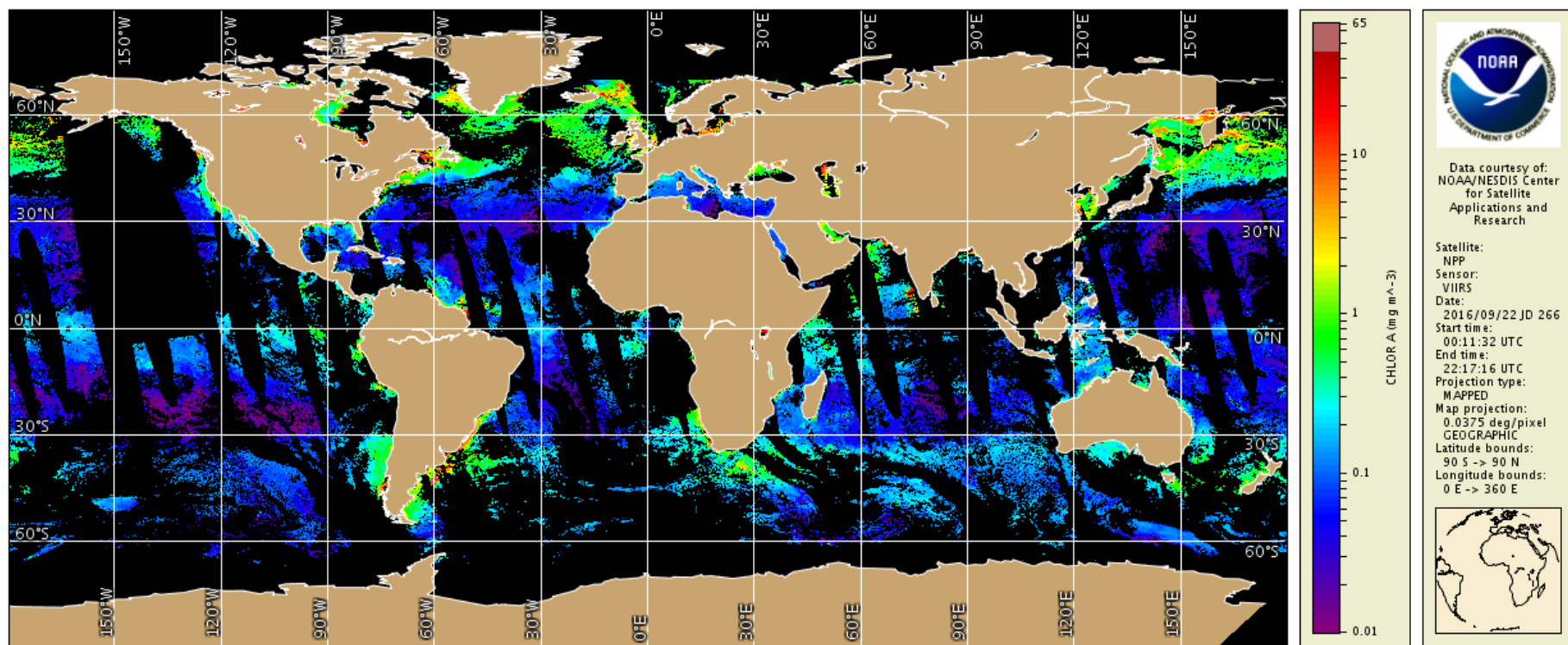
24 Sectors of Global VIIRS OC Products



* Chl-a frontal Regions: UY, VY, and WY

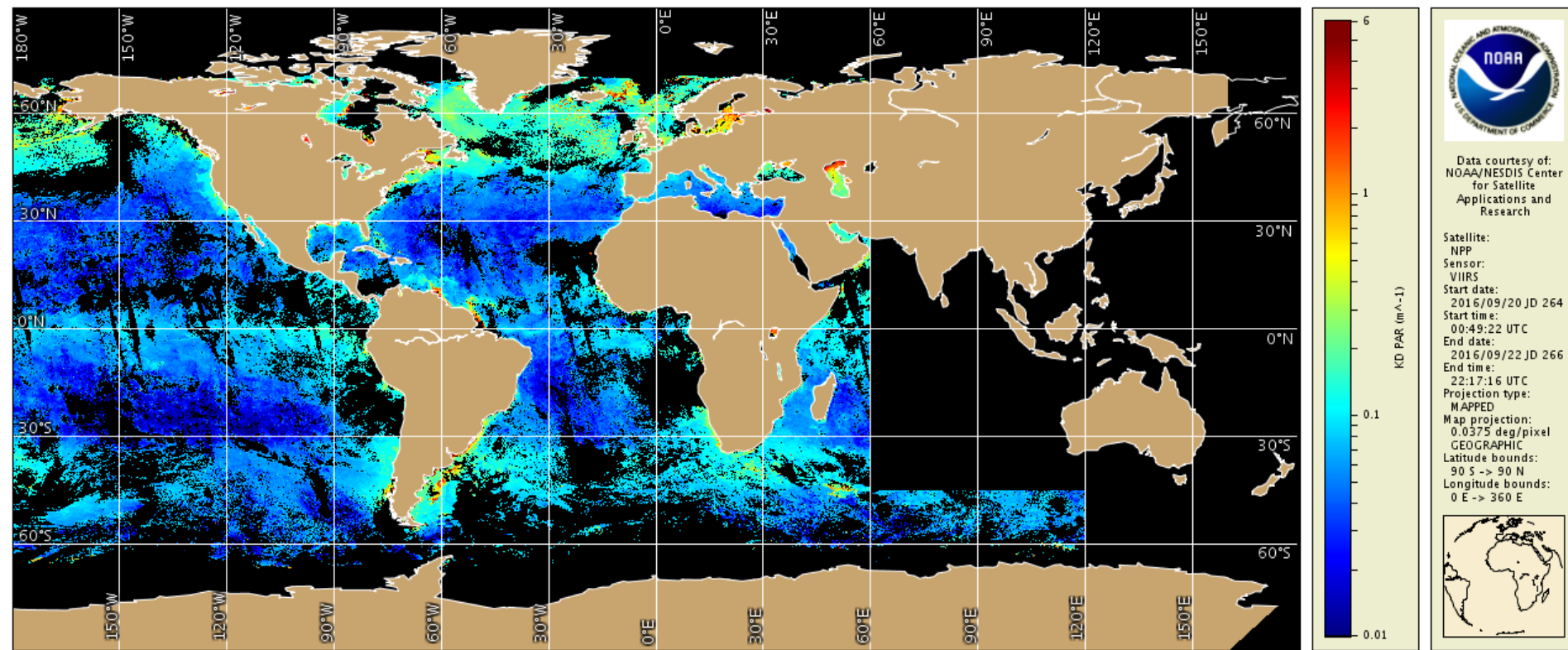
NOAA NRT SNPP VIIRS OC Products:

Example1 – Global Chl-a



NOAA NRT SNPP VIIRS OC Products:

Example2 – Global KPAR



Okeanos Web-based QA Imagery & Statistics

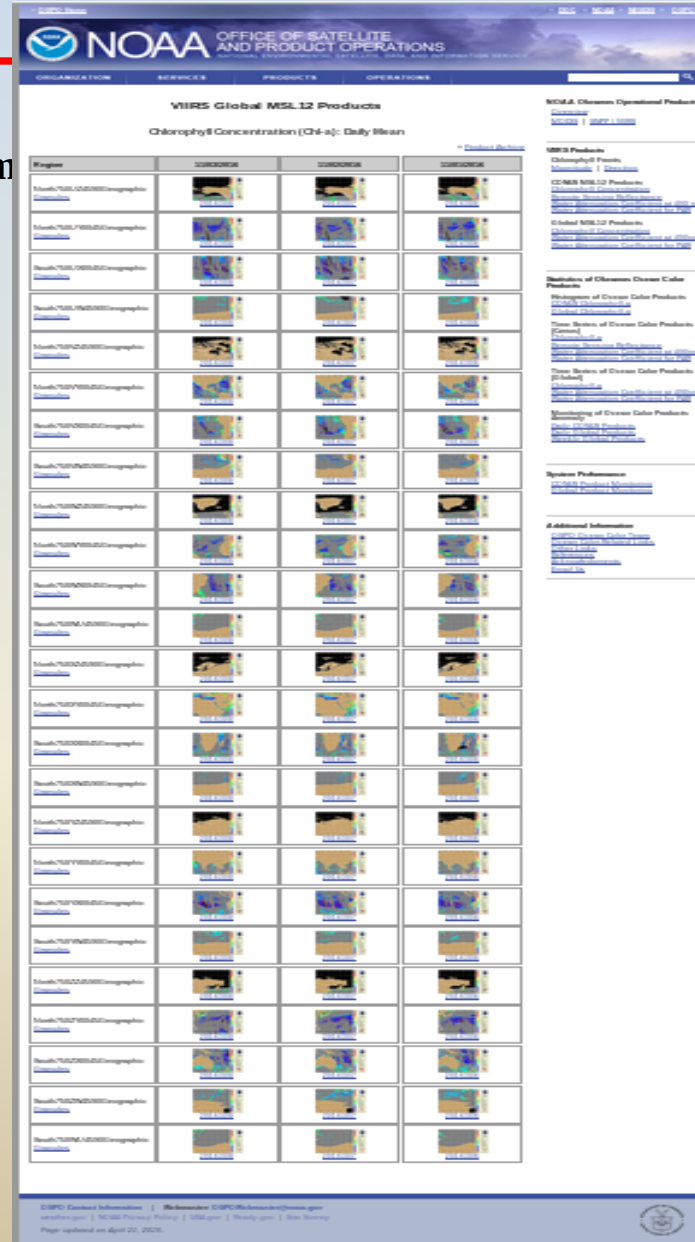
Okeanos Images and Statistics are provided from the main page.

(Statistics for Chl-a, K490 and KPAR)

MODIS Regions

- Northeast (NE)
- Southeast (SE)
- Gulf of Mexico (GM)
- Albers Projection
- Gulf of Mexico (GM)
- Mercator Projection
- Carribbean (CB)
- West Coast (WC)
- Alaska (AK)
- East Tropical Pacific (EP)
- Equatorial Atlantic (EA)
- Great Lakes (GL)
- Hawaii (HI)
- North Atlantic (NA)
- Pacific Basin (PB)
- Chesapeake Bay (CY)

[Visit the link](#)



VIIRS CONUS Regions

- Northeast (NE)
- Southeast (SE)
- Gulf of Mexico (GM)
- Carribbean (CB)
- West Coast (WC)
- Great Lakes (GL)
- Hawaii (HI)

VIIRS Global Regions

- 24 Sectors
- Global

Products (images)

- Chlorophyll Concentration
- Remote Sensing Reflectance
- Chlorophyll Front
- Kpar
- K490

Products (Statistics)

Time Series and Histograms

- Chlorophyll
- Kpar
- K490

Products Quality Anomaly Monitoring -
Chlorophyll

Products Count Monitoring

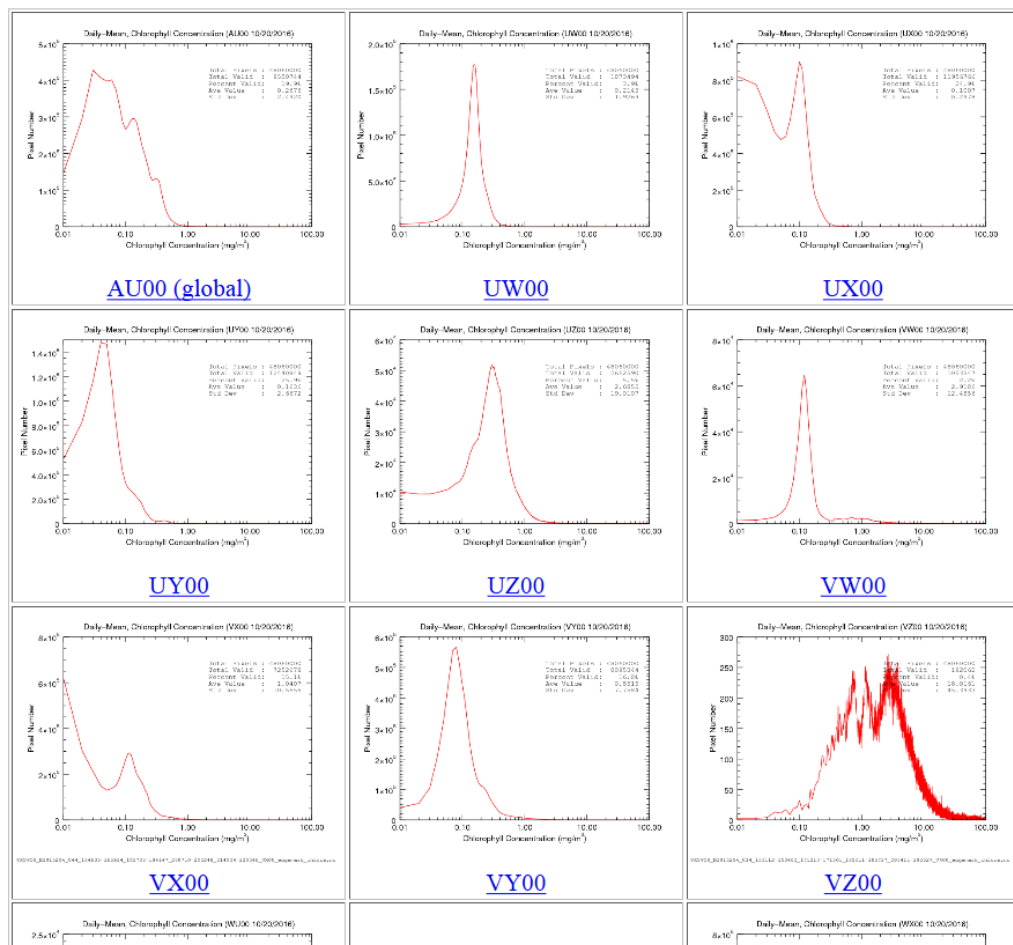
- Chlorophyll
- Kpar
- K490

Global SNPP VIIRS OC Products Histogram Tables

VIIRS Chlorophyll-a Histogram -- Global

Select Date:

< 10-20-2016 >



NOAA Okeanos Operational Products

[Overview](#)

[MODIS](#) | [SNPP / VIIRS](#)

VIIRS Products

Chlorophyll Fronts

[Magnitude](#) | [Direction](#)

CONUS MSL12 Products

[Chlorophyll Concentration](#)

[Remote Sensing Reflectance](#)

[Water Attenuation Coefficient at 490 nm](#)

[Water Attenuation Coefficient for PAR](#)

Global MSL12 Products

[Chlorophyll Concentration](#)

[Water Attenuation Coefficient at 490nm](#)

[Water Attenuation Coefficient for PAR](#)

Statistics of Okeanos Ocean Color Products

Histogram of Ocean Color Products

[CONUS Chlorophyll-a](#)

[Global Chlorophyll-a](#)

Time Series of Ocean Color Products (Conus)

[Chlorophyll-a](#)

[Remote Sensing Reflectance](#)

[Water Attenuation Coefficient at 490nm](#)

[Water Attenuation Coefficient for PAR](#)

Time Series of Ocean Color Products (Global)

[Chlorophyll-a](#)

[Water Attenuation Coefficient at 490nm](#)

[Water Attenuation Coefficient for PAR](#)

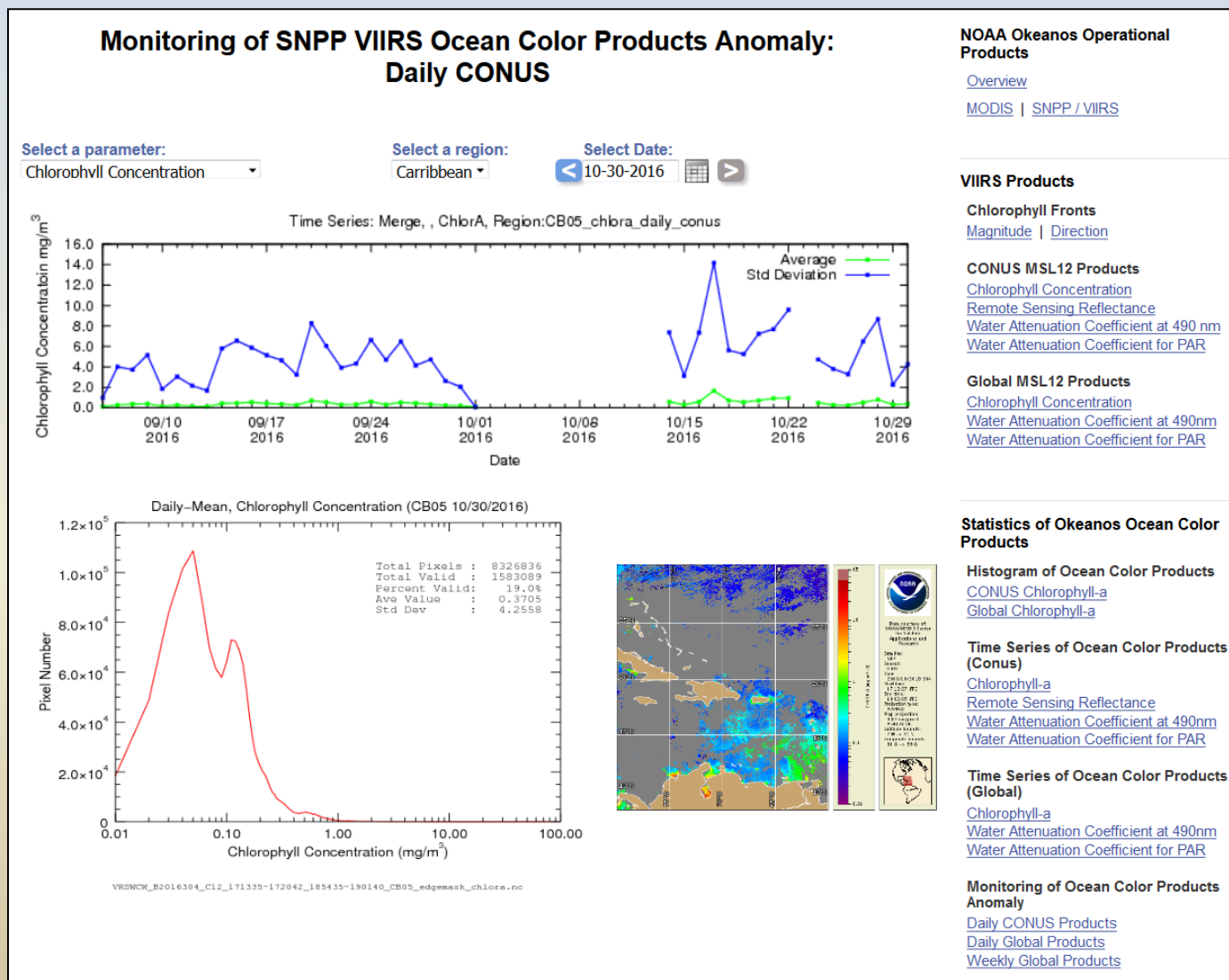
Monitoring of Ocean Color Products Anomaly

[Daily CONUS Products](#)

[Daily Global Products](#)

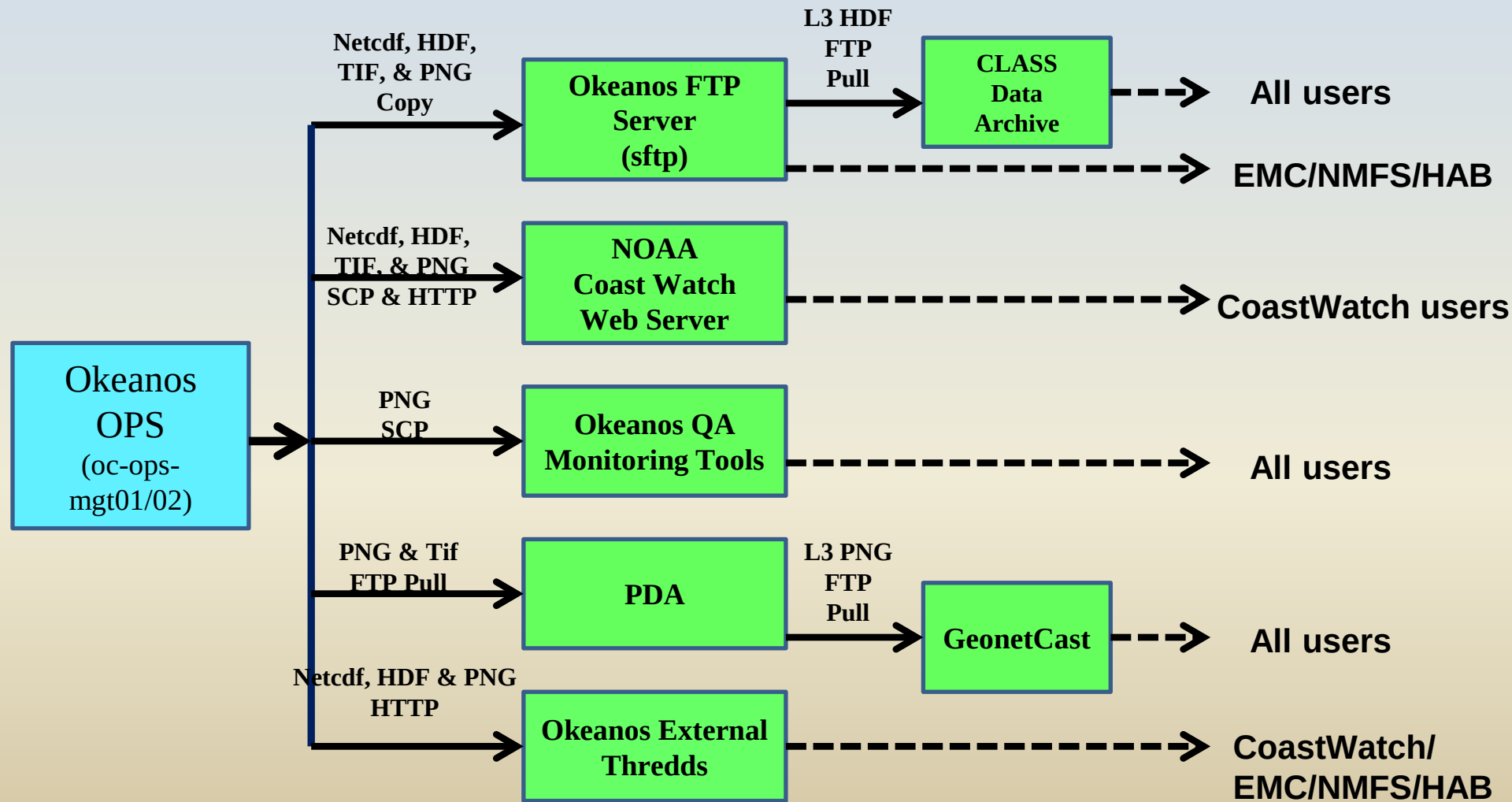
[Weekly Global Products](#)

Monitor VIIRS OC Products Quality Anomaly



NOAA NRT Ocean Color Products

Data Dissemination Flow



NRT MODIS/Aqua and VIIRS Ocean Color Operational Products Access

- **MODIS/Aqua Ocean Color Products**

- <ftp://cw-oceanos.noaa.gov/pub/data1/modis/>

- **SNPP VIIRS OC products**

- Short-term (by 2017)
 - ftp://cw-oceanos.noaa.gov/pub/data1/VIIRS_test/
(netcdf, hdf, tiff, and png formats)
- Long-term:
 - External Thredds server
 - New Okeanos ftp server
 - PDA

(Submit a Data Access Request (DAR) form to nesdis.data.access@noaa.gov for approval)