

NOAA CoastWatch/OceanWatch Ocean Color Data Dissemination

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²Global Science & Technology, Inc.

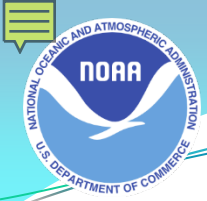
³Data Mind Trust



Lisbon, Portugal, 15-18 May 2017

Outline

- Brief introduction to NOAA CoastWatch/OceanWatch (a.k.a. CoastWatch) program
- NOAA MSL₁₂ VIIRS Ocean Color products through CoastWatch
- Tools to discover and download Ocean Color products



CoastWatch.NOAA.gov

Home Satellite Data Products ▶ Field Observations ▶ Data Quality ▶ Nodes ▶ User Resources ▶ Stories ▶ About



National Oceanic and Atmospheric Administration
U.S. Department of Commerce

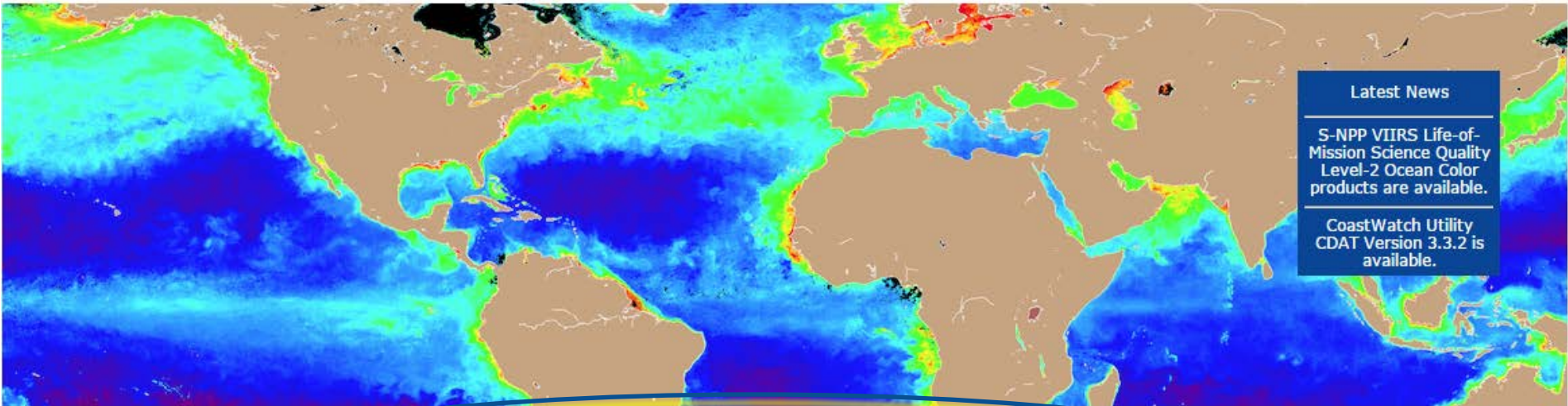
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Search

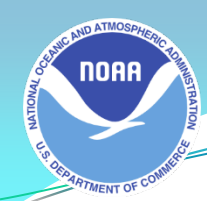
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Need Help?

(301) 683-3335



Satellite data products for understanding and managing our oceans and coasts 



User Driven and Parameter-Based

User “Matrix”

- NOAA and external to NOAA
- Experts and Novices
- Various application domains: e.g., NOAA forecasters, other US agency decision-makers, researchers, commercial product developers/providers, interested citizens, international partners

Environmental Parameters

- Ocean Color
 - Radiances, Chlorophyll, Kd₄₉₀, KdPAR
- Sea Surface Height/Altimetry
 - includes Sea Level Anomalies, etc.
- Sea Surface Salinity
- Sea Surface Temperature
- Winds
 - Ocean Surface Vector Winds
 - SAR Winds
- Sea Surface Roughness
 - SAR radar crossections
 - derived products (such as winds, oil spills, ice, etc.)
- True Color

Data providers to CoastWatch:
NOAA/STAR Ocean Science teams
NOAA/OSPO*
NOAA/NCEI**
EUMETSAT
ESA, & Others
**AND CoastWatch generates
customized products in-house**

*OSPO = NOAA Office of Satellite and Product Operations

**NCEI = National Centers for Environmental Information

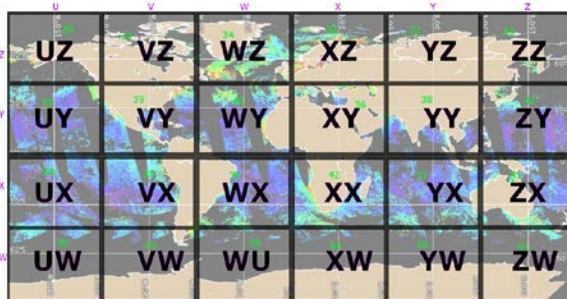
VIIRS MSL12 Ocean Color on CoastWatch

L2 & L3; Global and Regional;
Near Real Time and Science Quality Reprocessed;
Daily Weekly and Monthly Merges

➤ Standard parameters:

- Chlorophyll-a
- $K_d(490)$
- $K_d(\text{PAR})$
- $nL_w(410)$
- $nL_w(443)$
- $nL_w(486)$
- $nL_w(551)$
- $nL_w(671)$

➤ L3 Global in 4 km (1 file) or 750 m by sector (24 files)



➤ Formats:

- Data – NetCDF(v4 CF) and HDF4-CW (phasing out)
- Images PNG & GeoTIFF

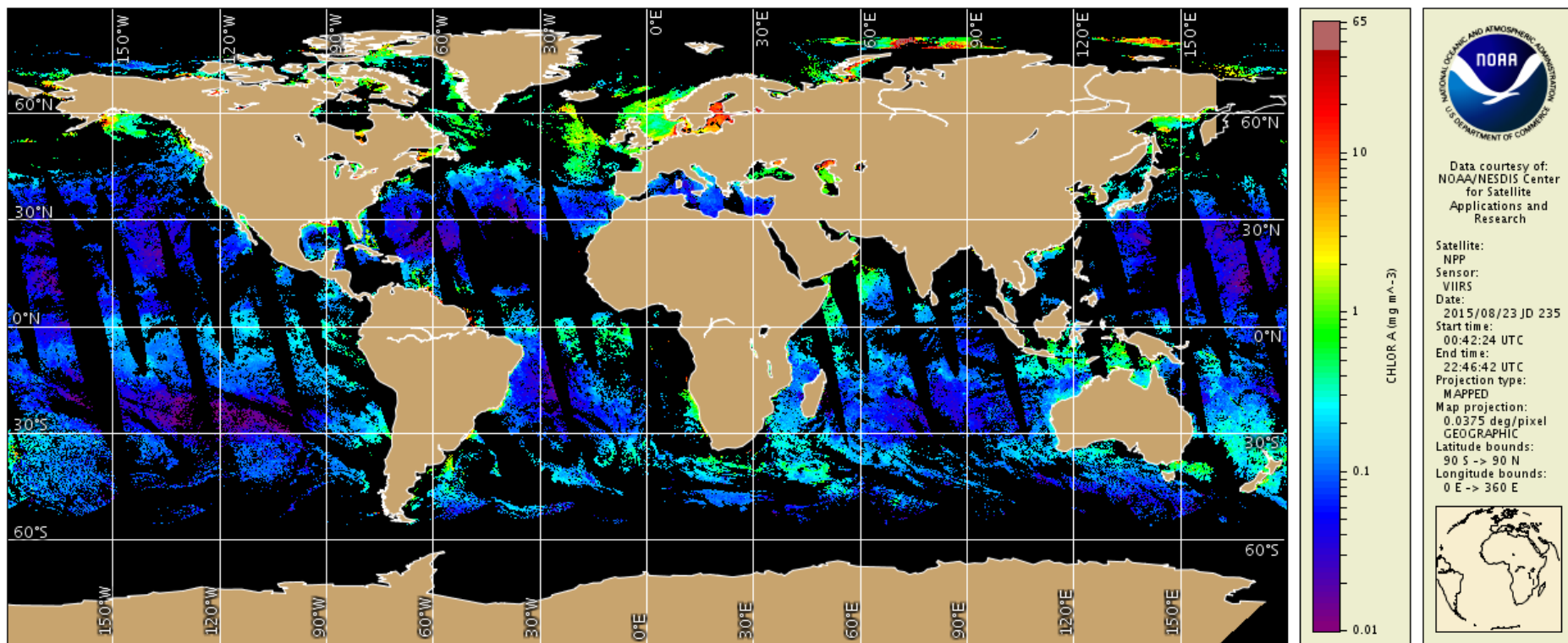
➤ L3 Regional

User-driven “customized” routine production for operational users, e.g.:

- US coastal regions (corresponding with Nodes)
- International partner regions
- HAB anomaly product
- Etc.

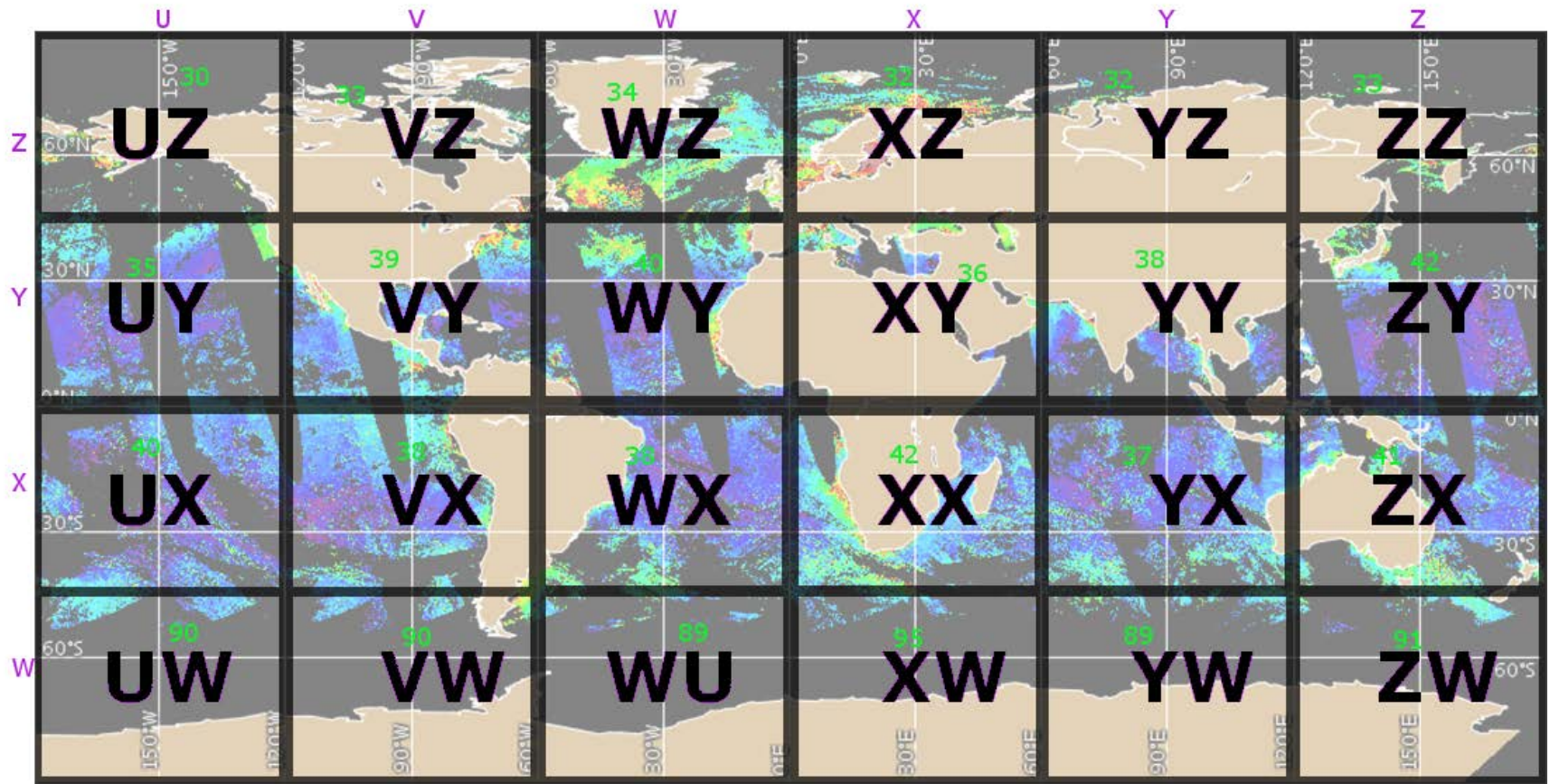
L3 Global 4km

(mapped, daily, weekly monthly)



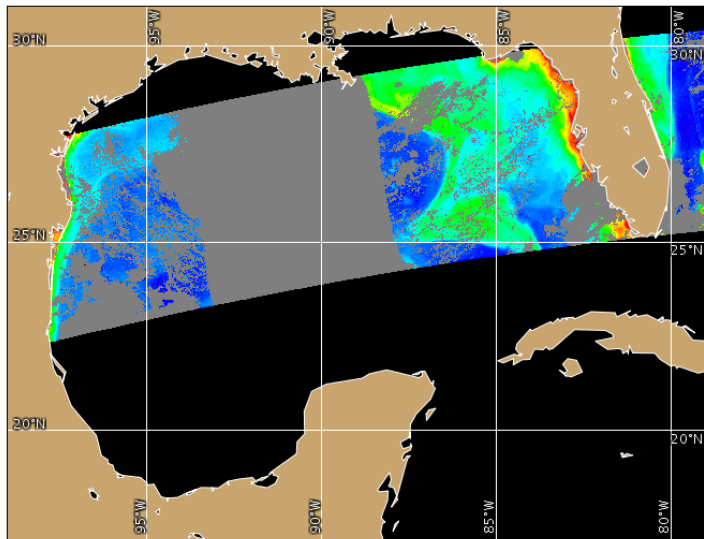
Pictured is daily NRT Chlorophyll-a [mg m⁻³]

L3 Global 750m Sectors

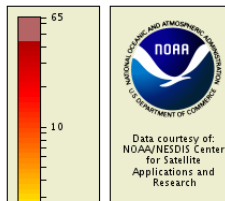


US Regional

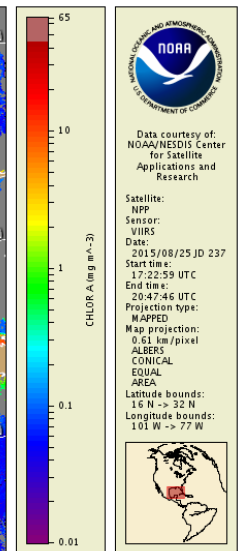
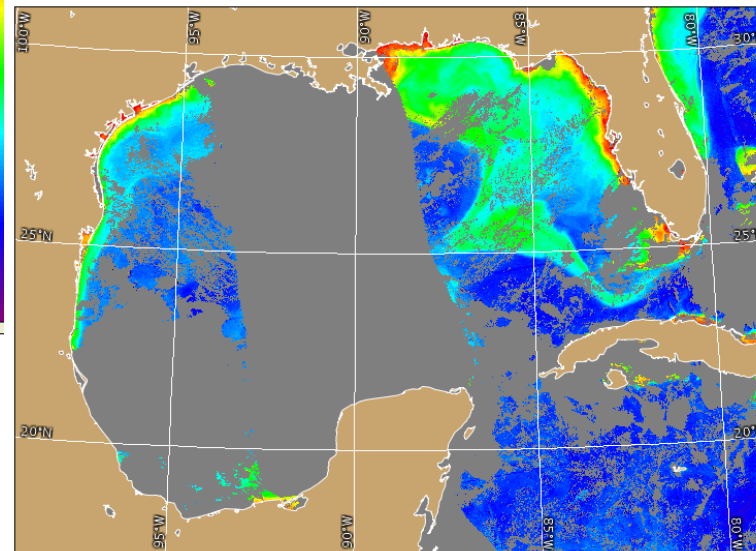
- “CONUS” 750m regions: Hawaii, West Coast, Great Lakes, Northeast, Southeast, Gulf of Mexico, Caribbean



Granule



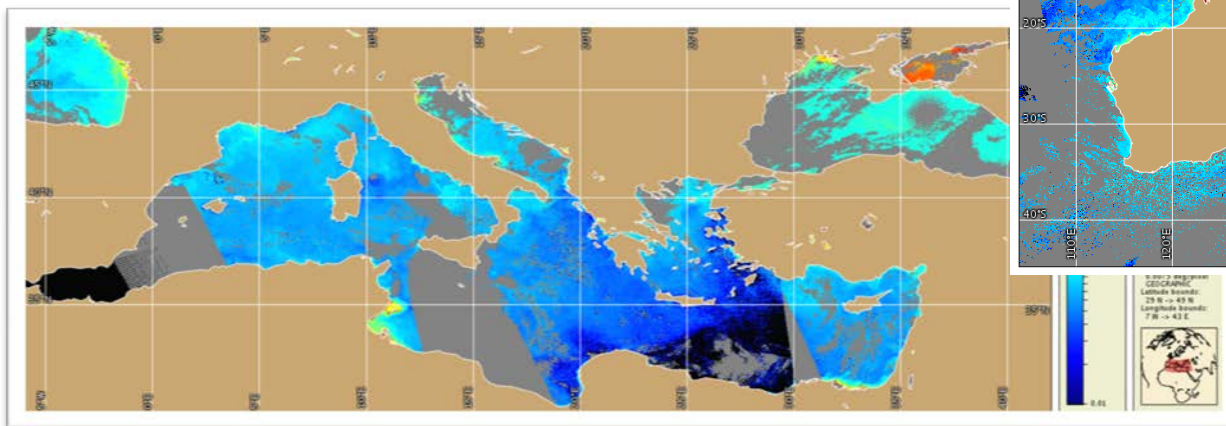
Daily Merge



Regional International Partners

- EUMETSAT

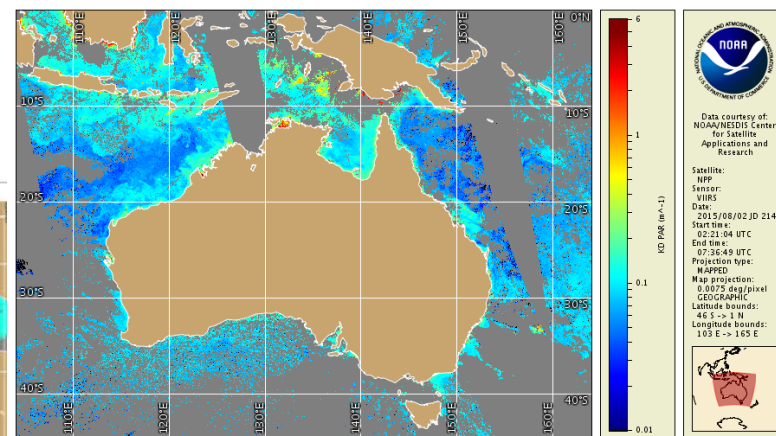
- Processing and staging of L2 750m Mediterranean datasets
- EUMETcast (Copernicus Service) broadcasts VIIRS data to EU



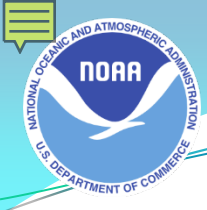
Shown: L3 Daily merge, mapped, $k_d\text{PAR}$ [m^{-1}]

- CSIRO

- Processing and staging of L3 Australia 750m datasets



Daily Merge, mapped, $k_d\text{PAR}$ [m^{-1}]



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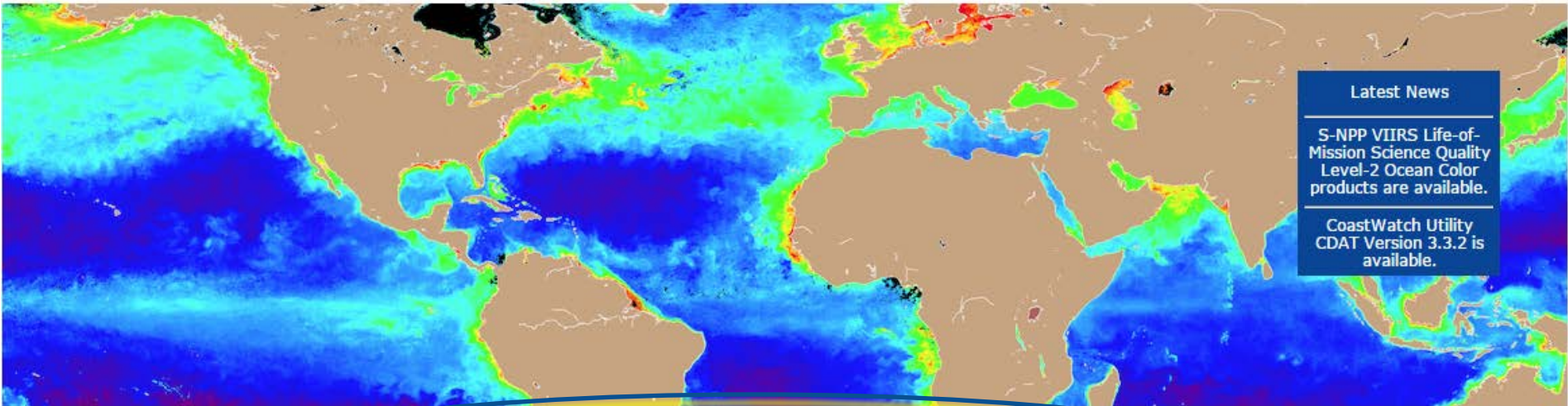
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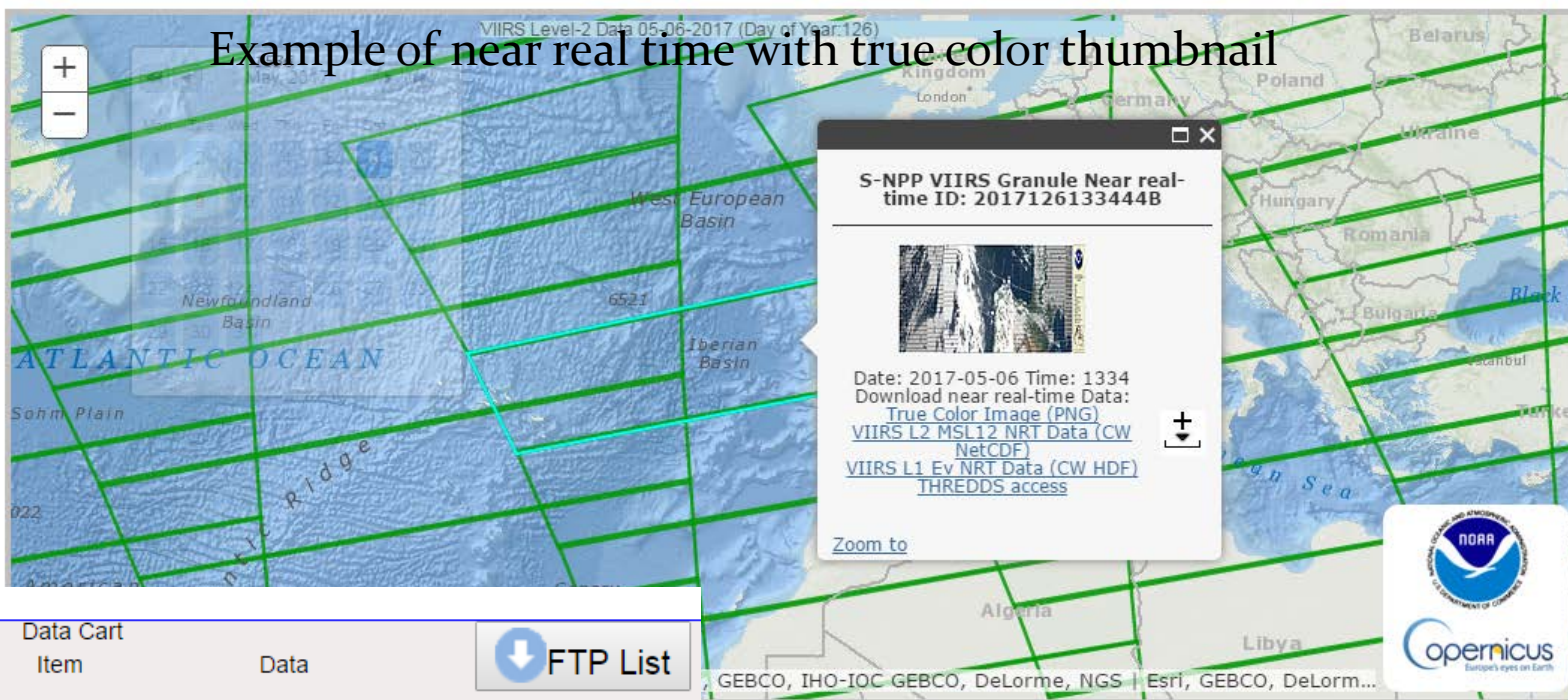


Satellite data products for understanding and managing our oceans and coasts 

L2 VIIRS Granule Selector

(Also works for OLCI-S3 – only L1 currently released)

Sensor: Layers: CoastWatch Regions



Data Cart

Item	Data
1	VRSVCW.B2017126.133444.nc
2	VRSVCW.B2017126.133319.nc

* Removes all items

Data


N.B2017126.133444.nc
N.B2017126.133319.nc

* Removes all items

http://coastwatch.noaa.gov/cw_html/cw_granule_selector.html

L2 VIIRS Space and Time Search

Example of science quality with data thumbnails



National Oceanic and Atmospheric Administration
U.S. Department of Commerce

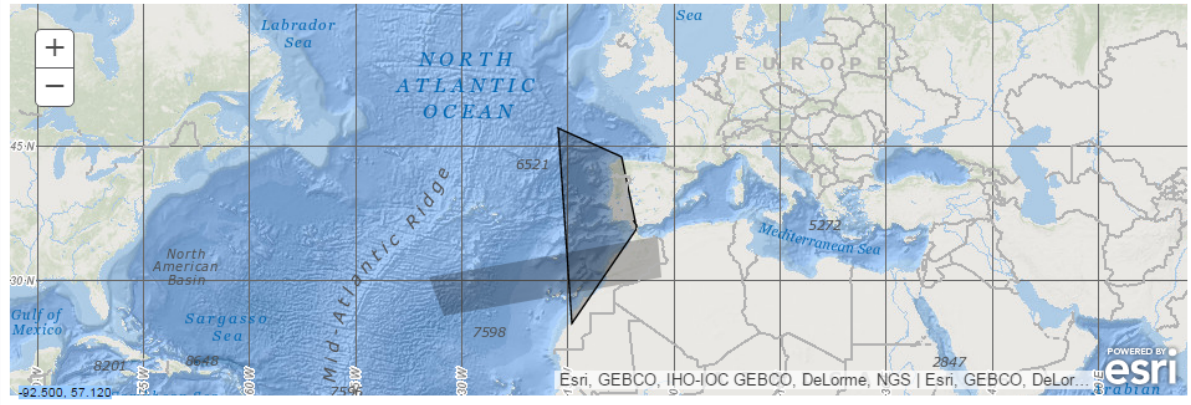
S-NPP VIIRS Science Quality Ocean Color Data (L2)

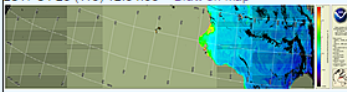
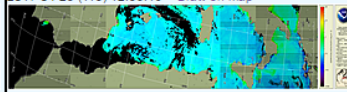
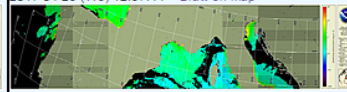
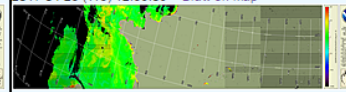
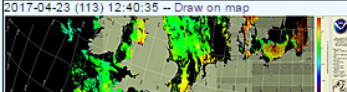
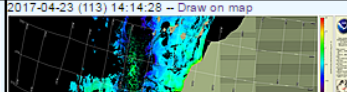
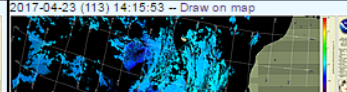
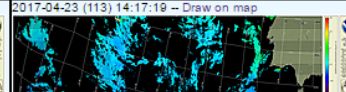

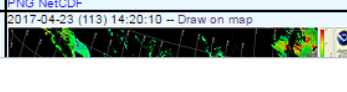
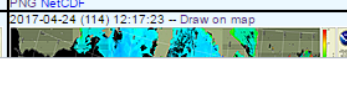

Draw:

Apr 23, 2017 - Apr 25, 2017

Search

Note: Science quality ocean color data from VIIRS is delayed by 15 days. The L2 datasets contain 5 nLw bands, chlorophyll-a, KdPAR, and Kd490. Use the FTP List button to generate a list of URLs for batch downloads.



2017-04-23 (113) 12:34:53 -- Draw on map	2017-04-23 (113) 12:36:19 -- Draw on map	2017-04-23 (113) 12:37:44 -- Draw on map	2017-04-23 (113) 12:39:09 -- Draw on map
			
PNG NetCDF	PNG NetCDF	PNG NetCDF	PNG NetCDF
2017-04-23 (113) 12:40:35 -- Draw on map	2017-04-23 (113) 14:14:28 -- Draw on map	2017-04-23 (113) 14:15:53 -- Draw on map	2017-04-23 (113) 14:17:19 -- Draw on map
			
PNG NetCDF	PNG NetCDF	PNG NetCDF	PNG NetCDF
2017-04-23 (113) 14:18:44 -- Draw on map	2017-04-23 (113) 14:20:10 -- Draw on map	2017-04-24 (114) 12:17:23 -- Draw on map	2017-04-24 (114) 12:18:48 -- Draw on map
			
PNG NetCDF	PNG NetCDF	PNG NetCDF	PNG NetCDF

Region: L2
Sensor: VIIRS_sci
Product: color Output:

L2_wget_list (1).txt - Notepad

File Edit Format View Help

```
ftp://ftp.star.nesdis.noaa.gov/pub
ftp://ftp.star.nesdis.noaa.gov/pub
ftp://ftp.star.nesdis.noaa.gov/pub
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ftp://ftp.star.nesdis.noaa.gov/pub
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https://coastwatch.star.nesdis.noaa.gov/cw_html/cw_polygon_search.html#searchbox

3rd International Ocean Colour Science Meeting,
Lisbon, Portugal, 15-18 May 2017

16 May 2017

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Summary (1)

Both **NRT** and Science Quality VIIRS-SNPP Ocean Color data are now publically available through NOAA CoastWatch/OceanWatch.

Near Real Time

THREDDS OC NRT main page:

http://www.star.nesdis.noaa.gov/thredds/socd/coastwatch/catalog_coastwatch_viirs_global.html

Includes: L2 global granules (swath); L3 global 4km mapped, daily, weekly, monthly merged, and 750m regional sector files

Or, you can interactively select and download data (or get your file list for automated commands) using the Granule Selector Tool here:

http://coastwatch.noaa.gov/cwn/cw_granule_selector.html

Summary (2)

Both NRT and **Science Quality** VIIRS-SNPP Ocean Color data are now publically available through NOAA CoastWatch/OceanWatch.

Science Quality

L2 global, granules:

FTP:

<ftp://ftp.star.nesdis.noaa.gov/pub/socd1/mecb/coastwatch/viirs/science/L2/>

THREDDS:

<http://www.star.nesdis.noaa.gov/thredds/catalog/swathNPPVIIRSSCIENCEL2WW00/catalog.html>

Or, you can interactively select and download data (or get your file list for automated commands) using the Granule Selector Tool here:

http://coastwatch.noaa.gov/cwn/cw_granule_selector.html

L3 global 4km mapped:

FTP:

<ftp://ftp.star.nesdis.noaa.gov/pub/socd2/mecb/coastwatch/viirs/science/L3/global/>



END

Web Site Home:

CoastWatch.NOAA.gov

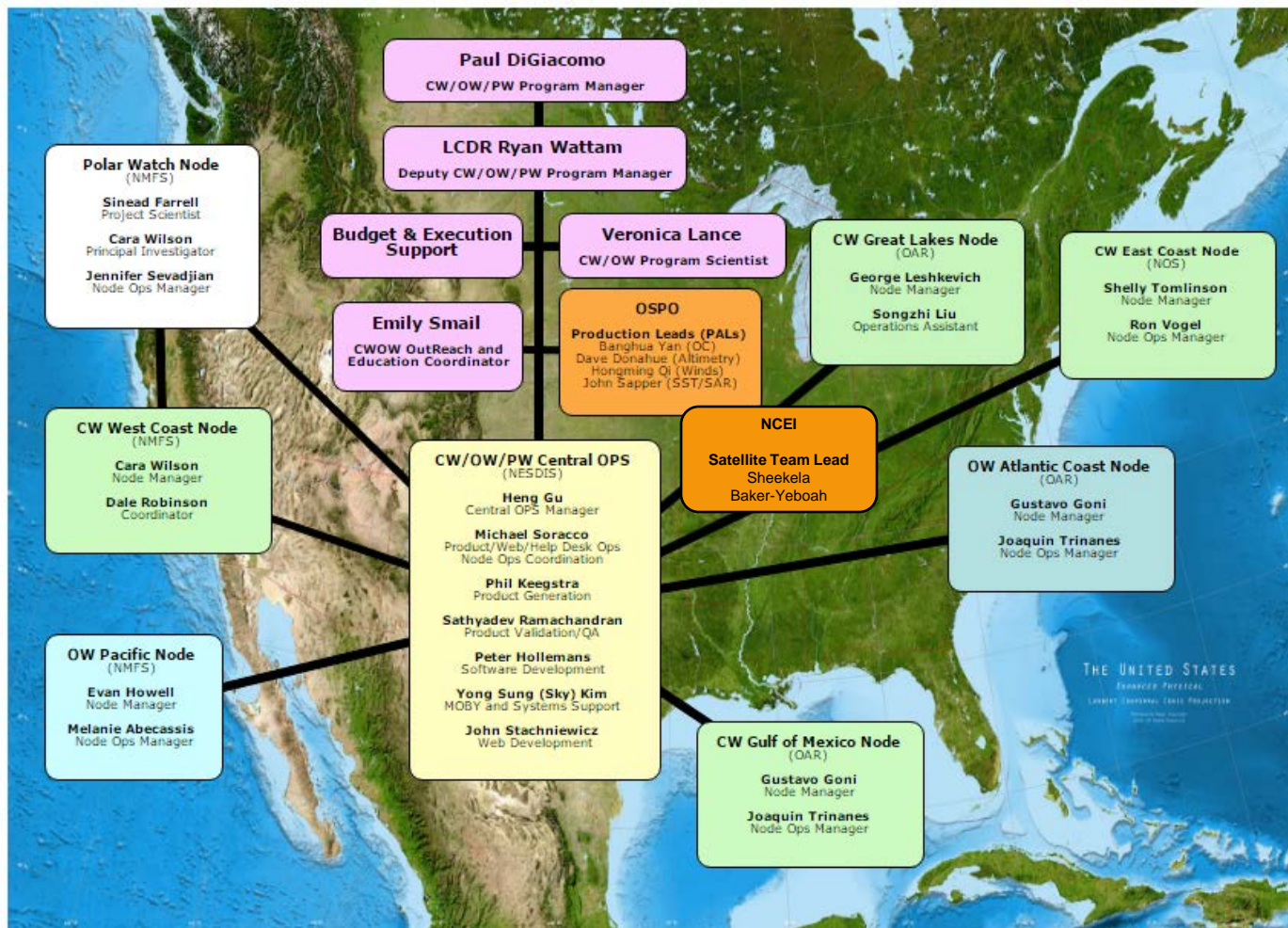
Help Desk:

CoastWatch.Info@NOAA.gov

Additional slides for reference follow

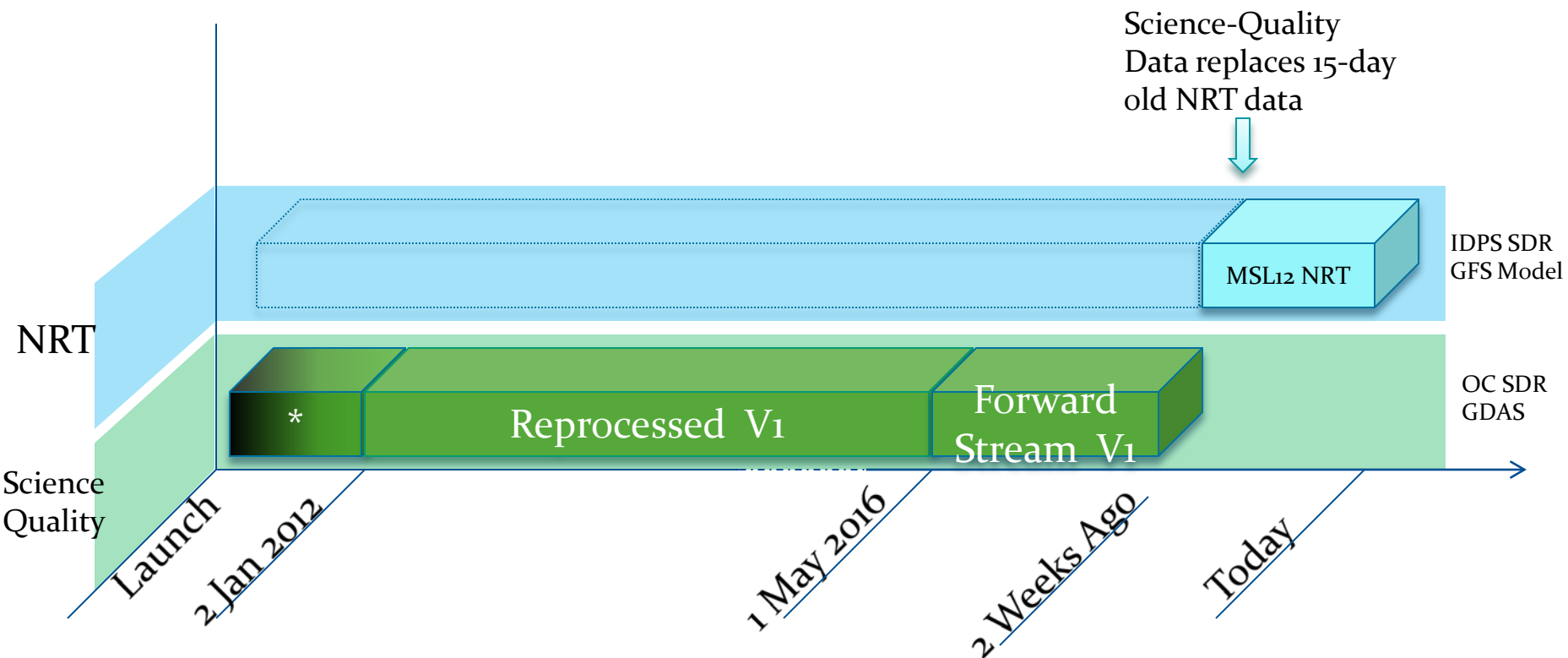
Program Organization

Central, Nodes, OceanWatch, PolarWatch



• (CW) CoastWatch • (NESDIS) National Environmental Satellite, Data, and Information Service • (NMFS) National Marine Fisheries Service • (NOS) National Ocean Service
 • (OAR) Oceanic and Atmospheric Research • (OC) Ocean Color • (OSPO) Office of Satellite and Product Operations • (OW) OceanWatch • (PAL) Product Area Leads • (PW) PolarWatch • (SST) Sea Surface Temperature

Example “Snapshot”



**Early mission data are not publically distributed due to quality issues. They can be specially requested but will come with a quality warning.*

NRT & Science Quality Data

Attribute	Near-Real Time	Delayed-Mode/Science-Quality
Latency:	Best effort, as soon as possible (~12-24h)	Best effort, on a 2-week delay
Processing System:	MSL₁₂	MSL₁₂
SDR:	IDPS Operational SDR	OC-improved SDR
Ancillary Data:	Global Forecast System (GFS) Model	Science quality (assimilated; GDAS) from NCEP
Spatial Coverage:	May be gaps due to various issues	Complete global coverage
Processed by:	CoastWatch, transferring to OSPO (operational) FY16	NOAA/STAR
Distributed by:	CoastWatch , OSPO	CoastWatch, NCEI
Archive Plans:	Yes, from OSPO to NCEI	Yes, from CoastWatch to NCEI
Full Mission Reprocessing:	No	Yes, every ~2-3 years or as needed

VIIRS MSL12 Ocean Color

Description

Information

Data Access

Documentation

Level 2 produced through NOAA Multi-Sensor Level 1 to Level 2 processing system (MSL12) from STAR Ocean Color group improved satellite data record (SDR, Level 1b).

Ocean Color satellite sensors measure visible light at specific wavelengths which leaves the surface of the ocean and arrives at the top of the atmosphere where the sensor is located. nL_w can be calculated. nL_w s are used to derive other ocean properties such as the concentration of chlorophyll-*a* (chlor-*a* or sometimes chl , which is the green pigment responsible for photosynthesis and therefore an indicator of the amount of phytoplankton biomass in the ocean water) and the coefficient of extinction for downwelling irradiance ($K_d(PAR)$ and $K_d(490)$ which are related to water clarity).

The ocean color datasets described here are from the [Visible Infrared Imaging Radiometer Suite \(VIIRS\) sensor aboard the Suomi-NPP satellite \(SNPP\)](#) which was launched in November 2011. The VIIRS SNPP near real time products and the science quality collection differ in several ways (Table 1).

Table 1. Comparison of primary processing differences for VIIRS SNPP near real time versus science quality ocean color data.

Parameter	Near real-time	Science Quality
Latency	~12 hours (best effort)	Delayed 15 days
Sensor Data Record (SDR)	IDPS Operational SDR	NOAA/STAR Ocean Color improved SDR
Ancillary Data	Predicted	Assimilated
Spatial Coverage	May have gaps	Complete

Standard VIIRS SNPP ocean color data Level 2 products (both near real time and science quality) include:

- Normalized water-leaving (nL_w) radiance at five visible bands (nominal center wavelengths)
 - M1 (410nm)
 - M2 (443nm)
 - M3 (486nm)
 - M4 (551nm)
 - M5 (671nm)
- Chlorophyll-*a* concentration
- Diffuse attenuation coefficient at 490 nm ($K_d(490)$), and
- Diffuse attenuation coefficient of photosynthetically active radiation ($K_d(PAR)$)

VIIRS MSL12 Ocean Color

Description

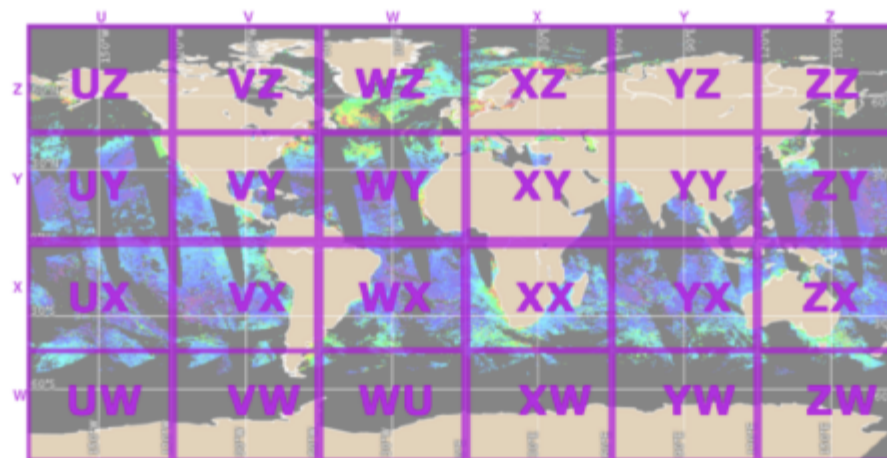
Information

Data Access

Documentation

Data are available through the following servers:

Service	Resource Locator
HTTPS	https://coastwatch.noaa.gov/cwn/cw_granule_selector.html
FTP	ftp://ftp.star.nesdis.noaa.gov/pub/socd1/mecb/coastwatch/viirs/science/L2/
THREDDS	https://www.star.nesdis.noaa.gov/thredds/socd/coastwatch/catalog_MECB_viirs_lom_global.html

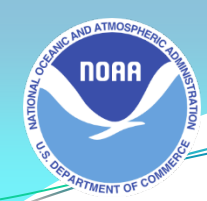


Twenty-four sectors identified for file naming convention. Sectors enable downloads of select subset regions from global high resolution VIIRS ocean color science quality data.

[Please acknowledge "NOAA CoastWatch/OceanWatch" when you use data from our site and cite the particular dataset DOI as appropriate.]

Sentinel-3A

- A Cooperative Arrangement between the United States and the European Commission and technical arrangements between NOAA and EUMETSAT (and NOAA and ESA for S1 and S2) are in place.
- NOAA is primary outlet in US for Sentinel 3 marine data.
- EUMETSAT data transfer via terrestrial multicast to NOAA/STAR is now routine.
- NOAA CoastWatch/OceanWatch to provide near real-time access to global OLCI and SLSTR data products from EUMETSAT. SRAL data also coming into STAR.



Data Stewardship and Long-Term Archive by NCEI

- NOAA CoastWatch/OceanWatch is prepared to deliver MSL12 full mission science quality data (L2 and L3) for data stewardship and long-term archiving by NOAA/NCEI.