STAR JPSS Oceans

Satellite Oceanography & Climatology Division (STAR/SOCD) and JPSS Ocean EDRs:

A sea of activity

Paul M. DiGiacomo and Veronica P. Lance
With contributions from: Mark Eakin, Daniel Tong, Avichal Mehra, Eric Bayler, Cara Wilson, Eileen Maturi, Sasha Ignatov, Menghua Wang, Michael Soracco

2016 STAR/JPSS Annual Science Meeting
College Park, MD, 8-12 August 2016

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Outline

- Users & Applications – representation from NOS, NMFS, NWS, OAR and NESDIS
- Highlights from VIIRS SST and Ocean Color EDR Teams
- Reprocessing (Oceans) at STAR
- Non-NOAA data at STAR

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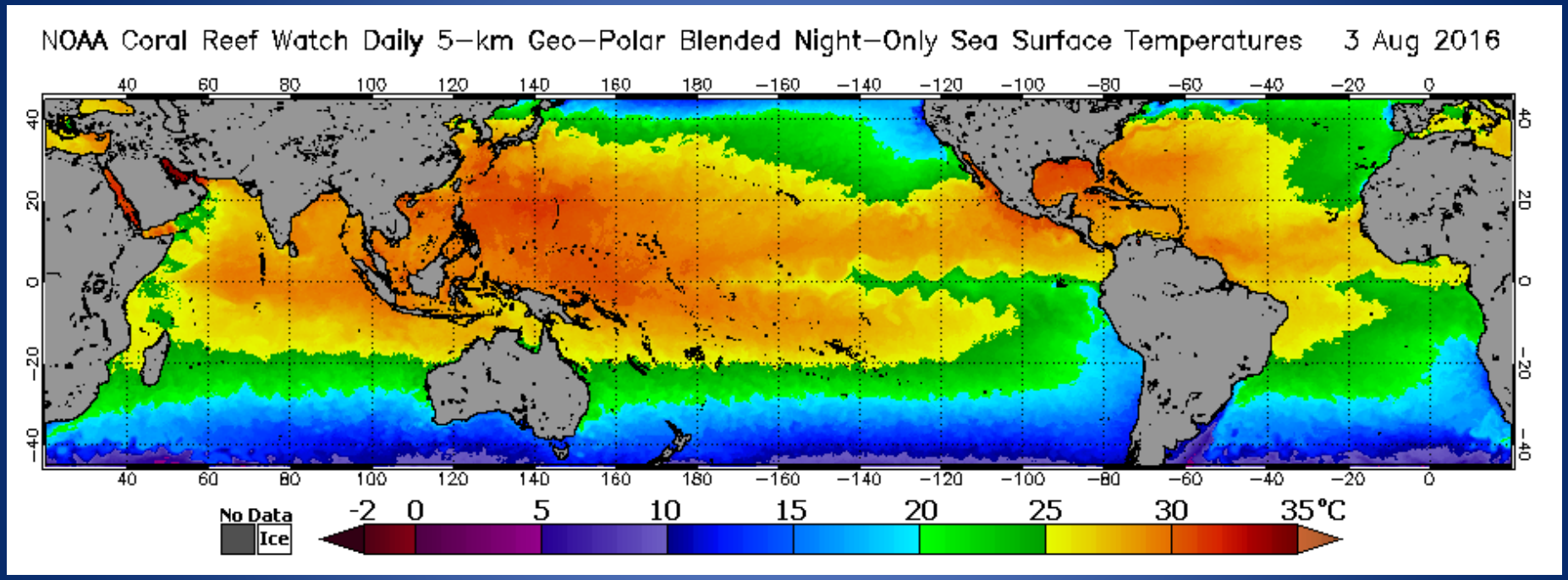
VIIRS SST User: NESDIS & NOAA Coral Reef Conversation Program



Coral Reef Watch uses the latest 5 km global blended GOES-POES Sea Surface Temperature (SST) product …

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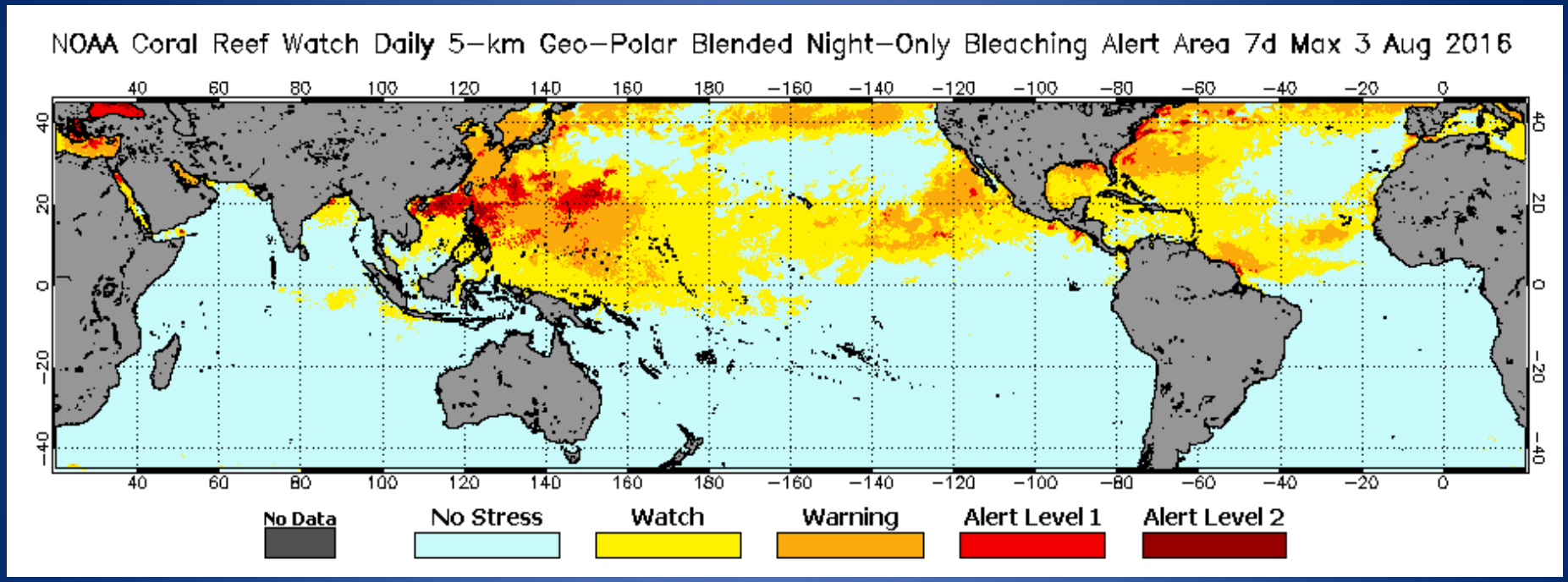

… to generate a new climatology for their bleaching alert and monitoring products for coral reef managers around the globe.

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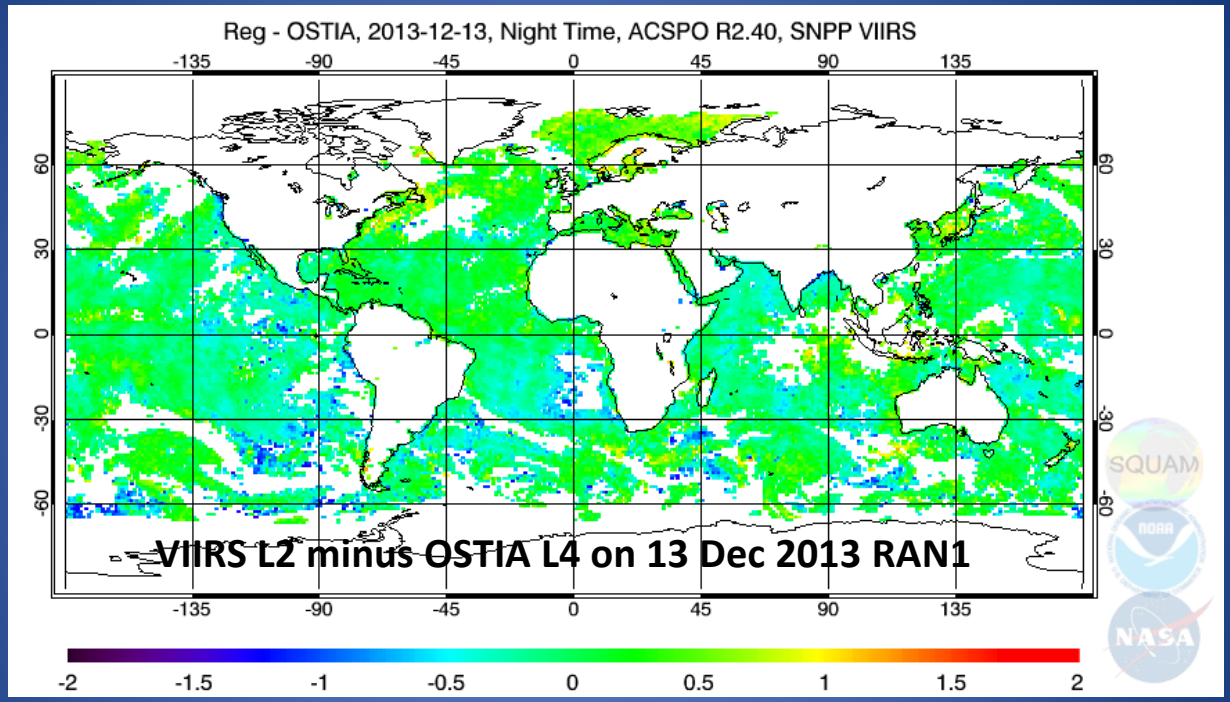
VIIRS SST Users: GHRSST and International Met Offices



GHRSST, UK Met office, Canada Met Office,
BoM of Australia, Japanese Met Agency
and other agencies, academics, etc.

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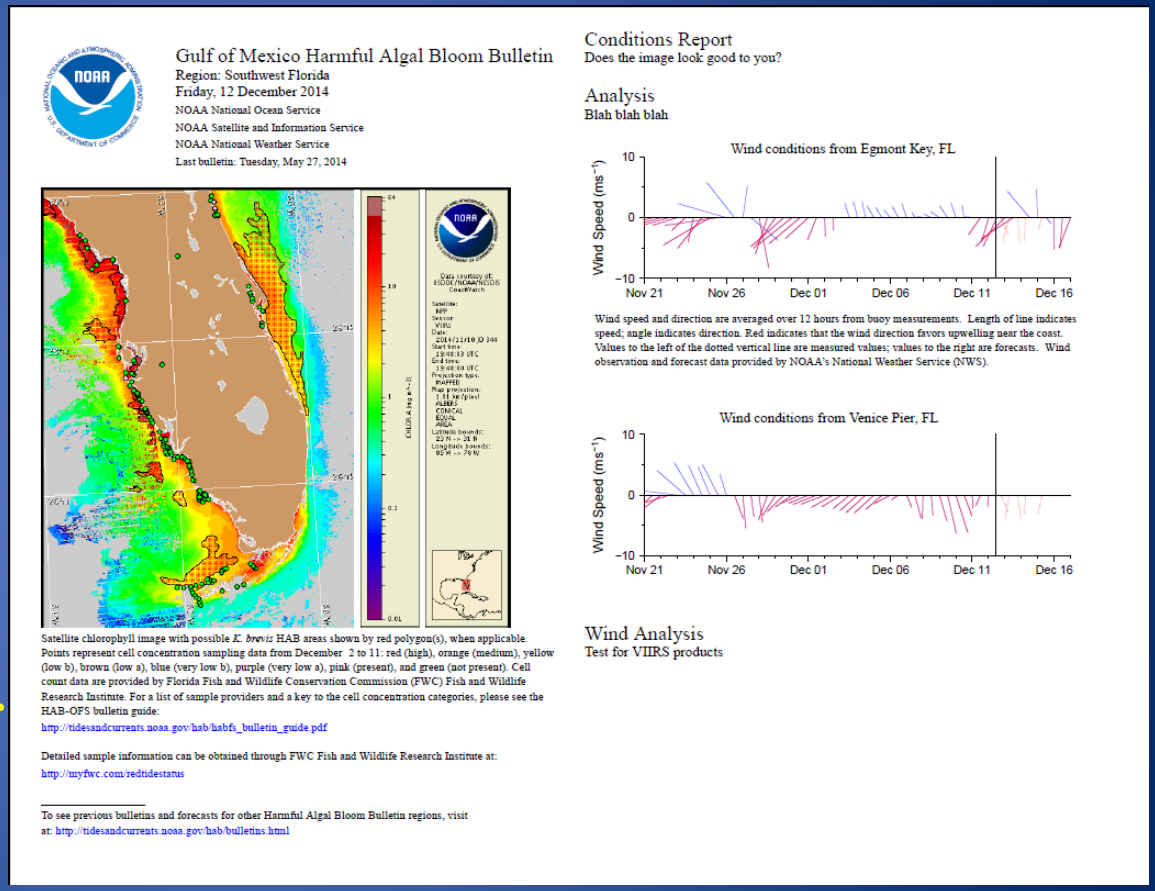
VIIRS Ocean Color User: NOS

- JPSS PGRR Program has supported integration of VIIRS ocean color data into NOS HAB bulletins.
- Currently testing Science Quality dataset to better interpret NRT data stream.



Gulf of Mexico Harmful Algal Bloom Bulletin
Region: Southwest Florida
Friday, 12 December 2014
NOAA National Ocean Service
NOAA Satellite and Information Service
NOAA National Weather Service
Last bulletin: Tuesday, May 27, 2014

Satellite chlorophyll image with possible *K. brevis* HAB areas shown by red polygon(s), when applicable. Points represent cell concentration sampling data from December 2 to 11: red (high), orange (medium), yellow (low b), brown (low a), blue (very low b), purple (very low a), pink (present), and green (not present). Cell count data are provided by Florida Fish and Wildlife Conservation Commission (FWC) Fish and Wildlife Research Institute. For a list of sample providers and a key to the cell concentration categories, please see the HAB-OFS bulletin guide:
http://tidesandcurrents.noaa.gov/hab/habfs_bulletin_guide.pdf

Detailed sample information can be obtained through FWC Fish and Wildlife Research Institute at:
http://myfwc.com/redtidestatus

To see previous bulletins and forecasts for other Harmful Algal Bloom Bulletin regions, visit at: http://tidesandcurrents.noaa.gov/hab/bulletins.html

Conditions Report
Does the image look good to you?

Analysis
Blah blah blah

Wind conditions from Egmont Key, FL

Wind Speed (ms⁻¹)
10
0
−10
Nov 21 Nov 26 Dec 01 Dec 06 Dec 11 Dec 16

Wind speed and direction are averaged over 12 hours from buoy measurements. Length of line indicates speed; angle indicates direction. Red indicates that the wind direction favors upwelling near the coast. Values to the left of the dotted vertical line are measured values; values to the right are forecasts. Wind observation and forecast data provided by NOAA's National Weather Service (NWS).

Wind conditions from Venice Pier, FL

Wind Speed (ms⁻¹)
10
0
−10
Nov 21 Nov 26 Dec 01 Dec 06 Dec 11 Dec 16

Wind Analysis
Test for VIIRS products

NOAA CoastWatch is working with NOS as part of the NOAA Ecological Forecasting Initiative

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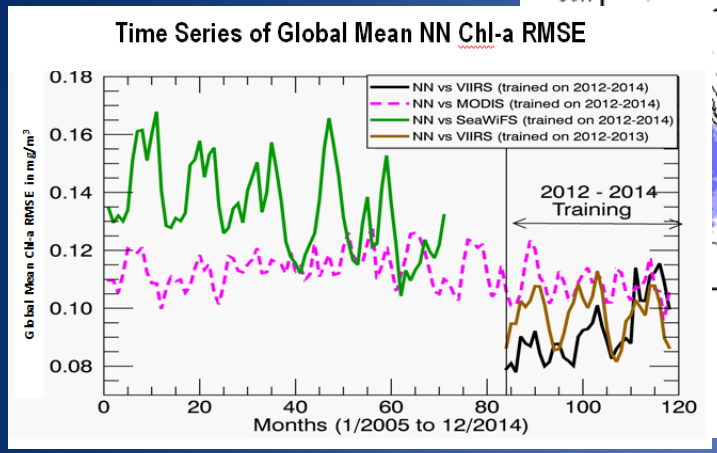
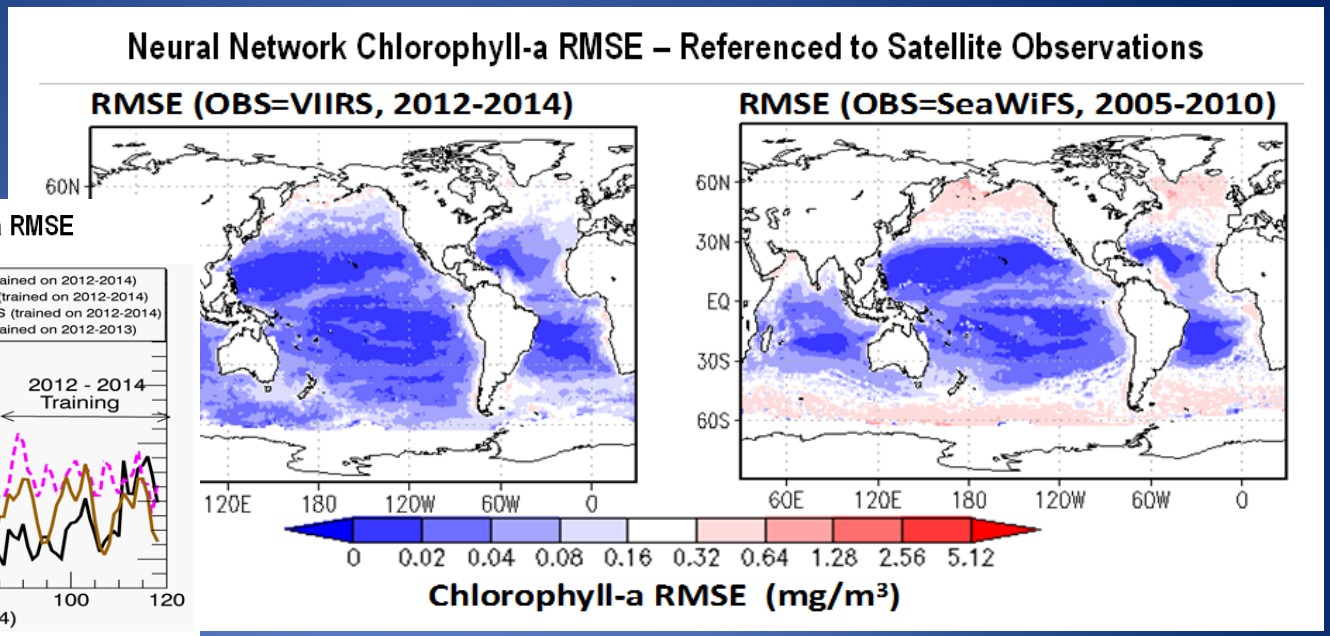
VIIRS Ocean Color
User: NWS





NWS/NCEP/EMC is using VIIRS Ocean Color to train a neural network to estimate gap-free, consistent ocean color fields (e.g., chlorophyll-a) to be assimilated into a pre-operational environment for NOAA's operational ocean models (HYCOM, MOM4).
(And see Kim et al. at OC Breakout, Wednesday afternoon.)

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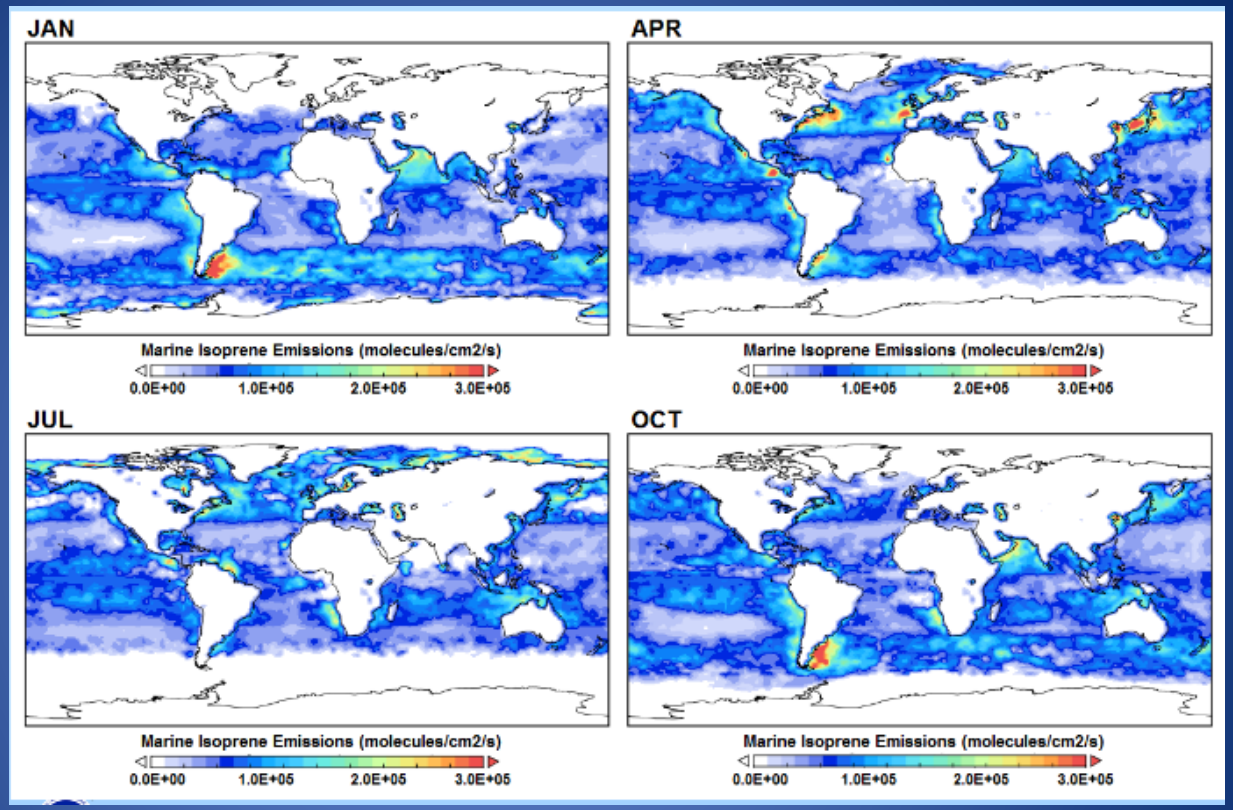
VIIRS Ocean Color User: OAR



The **NOAA Air Resources Laboratory** (OAR) derives the global distribution of marine isoprene which is then incorporated into emission models for the National Air Quality Forecasting Capability (NAQFC).

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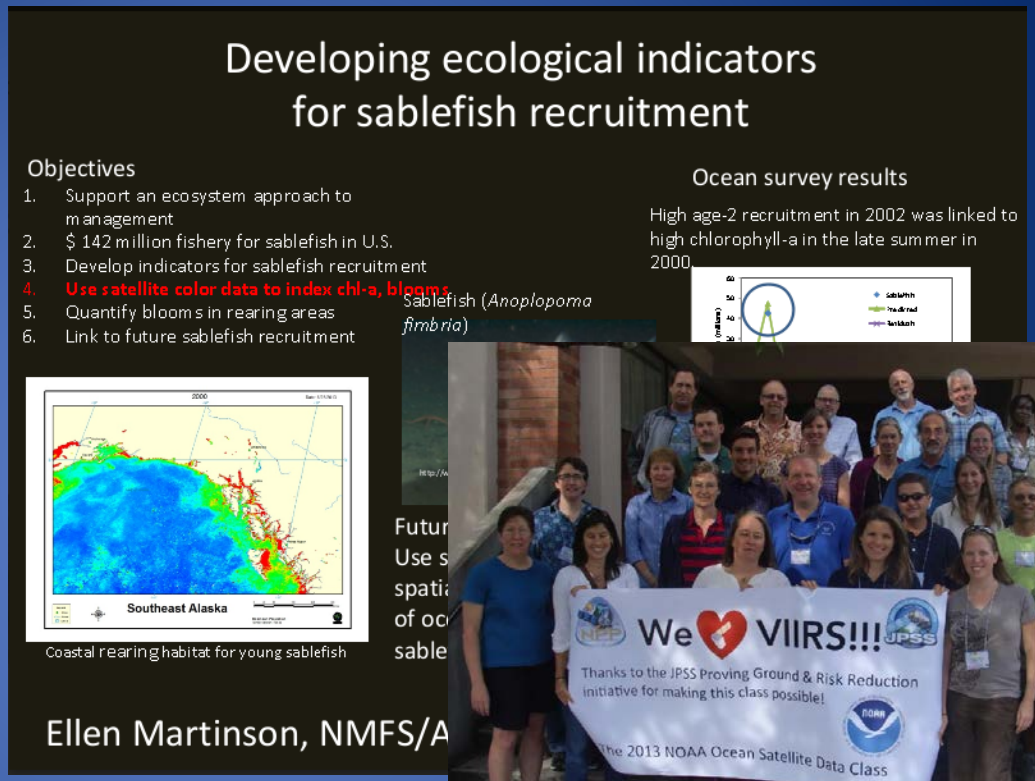
VIIRS Ocean Color & SST Data Users: NMFS

The **Satellite Data Training Course** conducted by Cara Wilson of **NMFS/SEFSC** is enabling fisheries research &operational applications.



High quality, long term time series satellite data are essential to an "Integrated Ecosystem Assessment" approach to fisheries management at NMFS.

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Highlights from VIIRS SST

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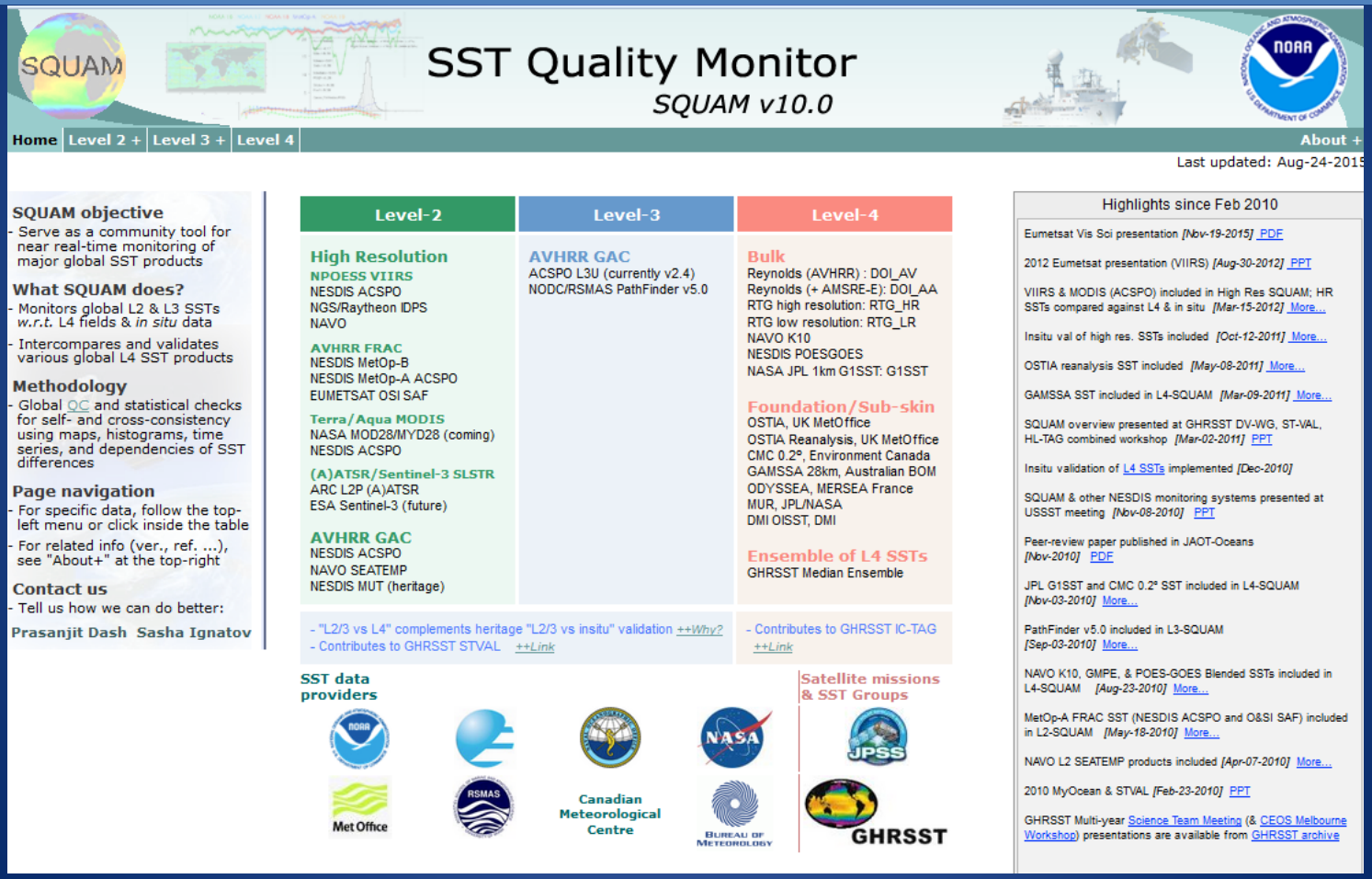
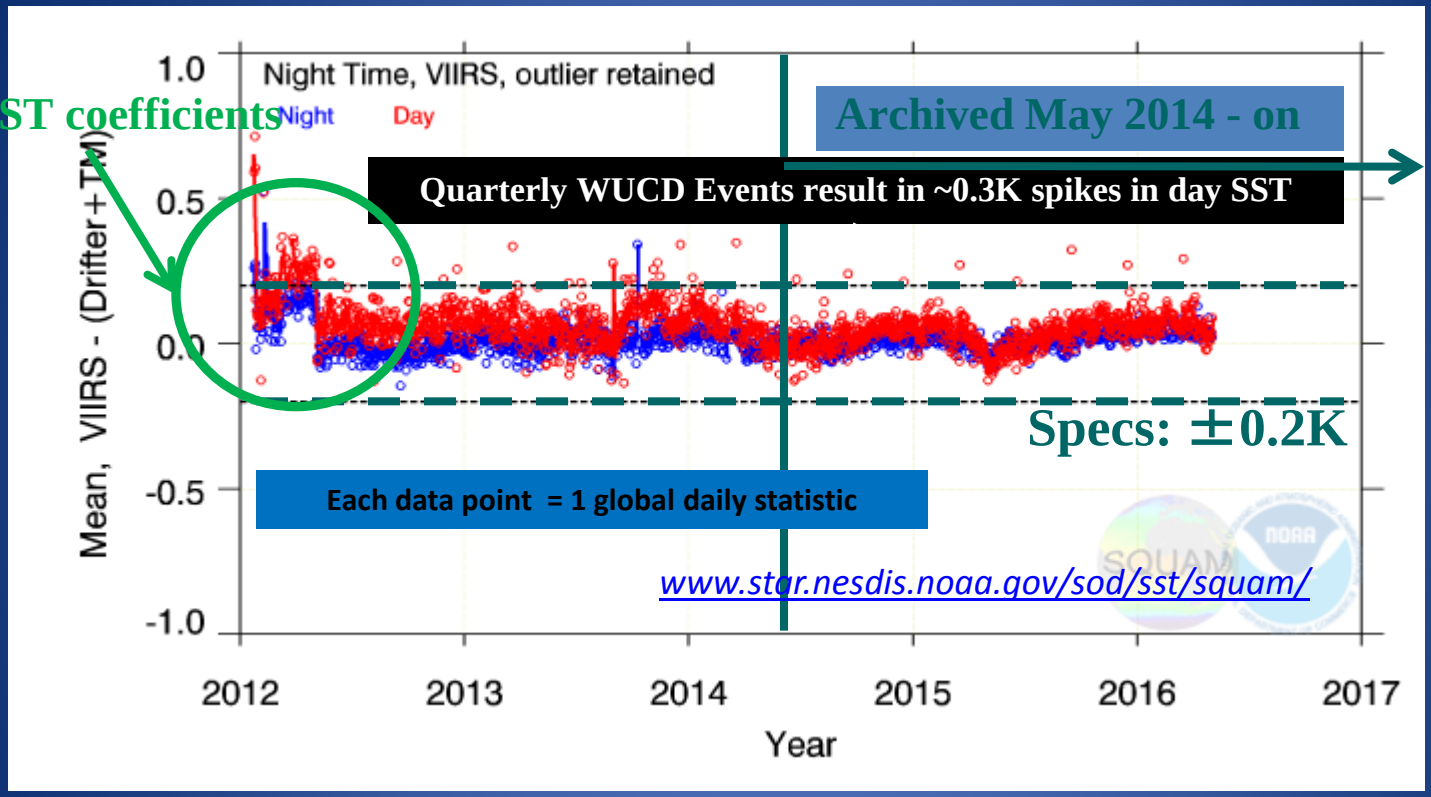
Redesigned SQUAM AVHRR GAC page and updated ACSPO AVHRR RAN1 in SQUAM



Global VAL BIAS VIIRS L2 vs. *i*Quam *in situ* SSTs
Real Time

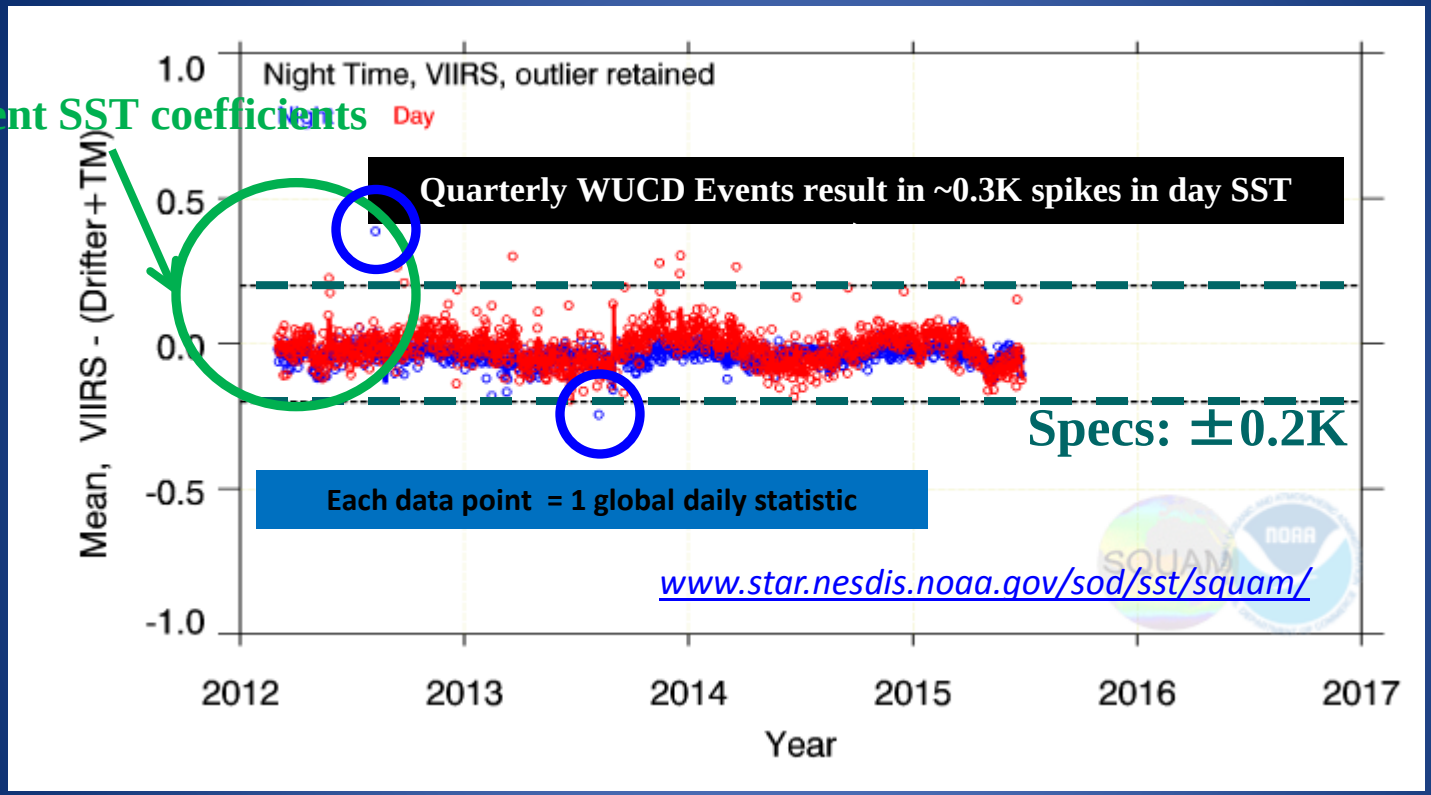


Advanced Clear-Sky Processor for Oceans (ACSPO)
Near real time data

Global VAL BIAS VIIRS L2 vs. *i*Quam *in situ* SSTs

RAN1

Consistent SST coefficients



Day

Night

Advanced Clear-Sky Processor for Oceans (ACSPO) reprocessed long term science quality data

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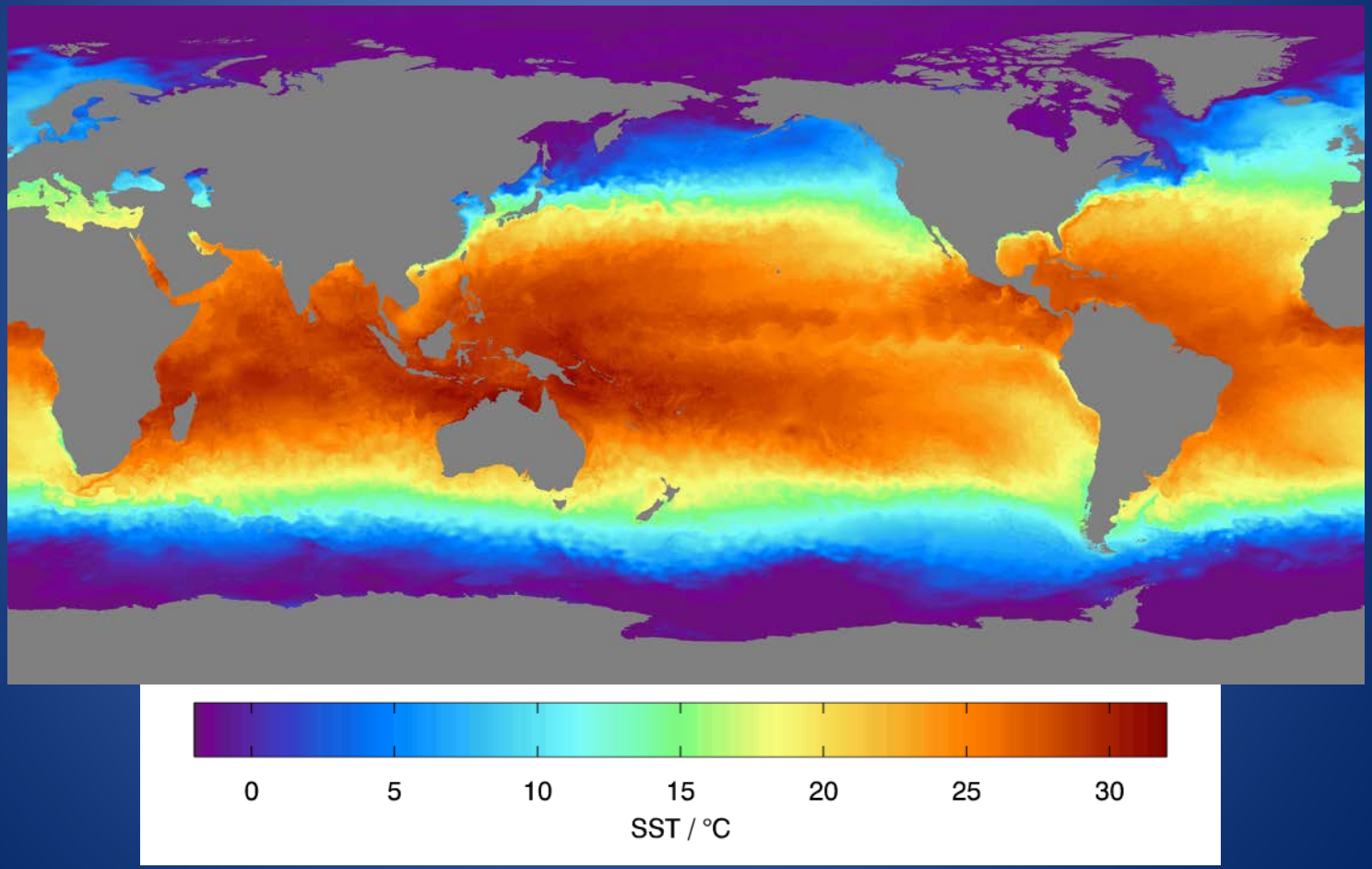
5-km Global Blended SST Analysis (includes VIIRS)



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Highlights from VIIRS Ocean Color

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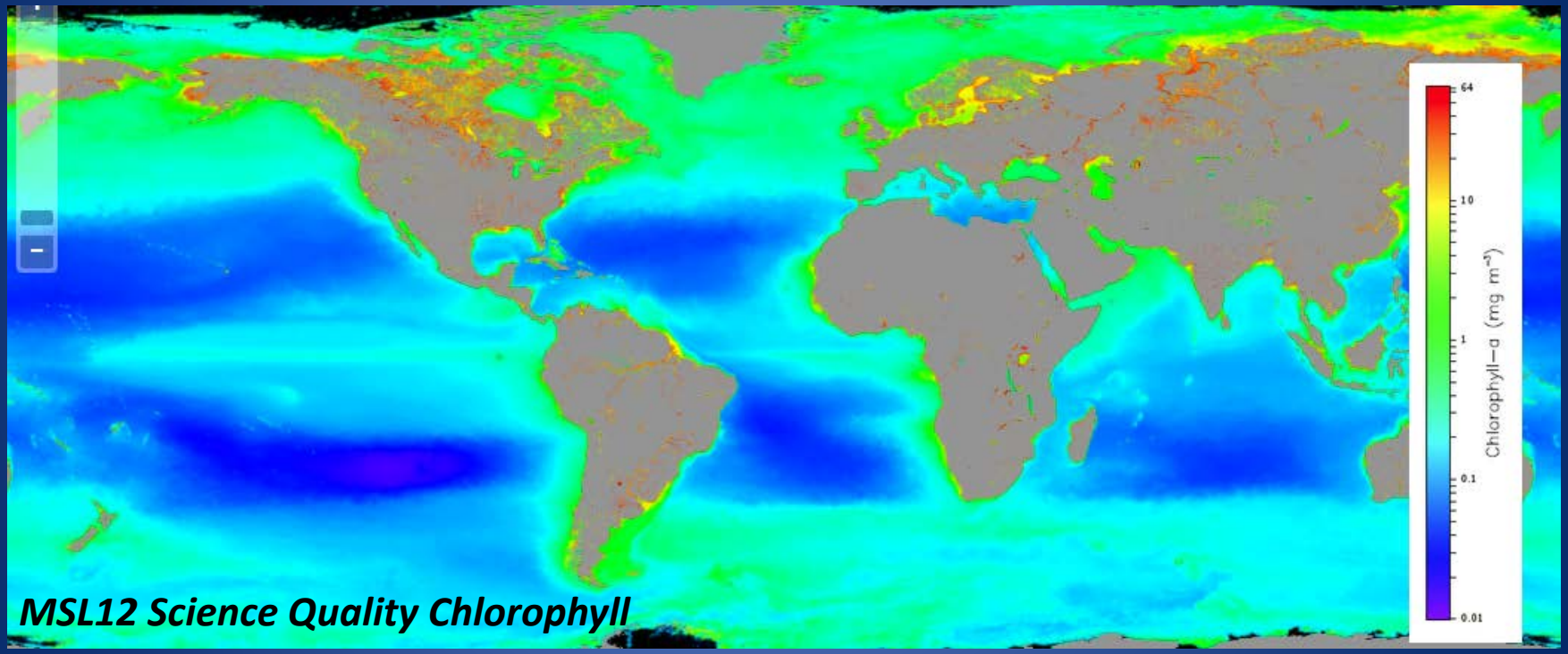
VIIRS SNPP MSL12 mission-long science quality climatology



MSL12 Science Quality Chlorophyll

Including greatly improved retrievals for high altitude lakes

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Multi-Sensor Level 1 to Level 2 Processing System (MSL12) Both NRT and mission -long science quality data

Attribute	Near-Real Time	Science Quality Delayed Mode
Processing System	MSL12	MSL12
Latency:	Best effort, as soon as possible (~12-24h)	Best effort, ~1-2 week delay
SDR:	IDPS Operational SDR	OC-improved IDPS SDR
Ancillary Data:	Global Forecast System (predicted)	Science quality (assimilated)
Spatial Coverage:	May be gaps due to various issues	Complete global coverage
Processed by:	CoastWatch, transferring to OSPO	NOAA/STAR
Distributed by:	CoastWatch	CoastWatch, NCEI
Archive Plans:	Yes, NCEI, via OSPO	Yes, NCEI, via CoastWatch
Reprocessing:	No	Yes, ~2-3 years or as needed

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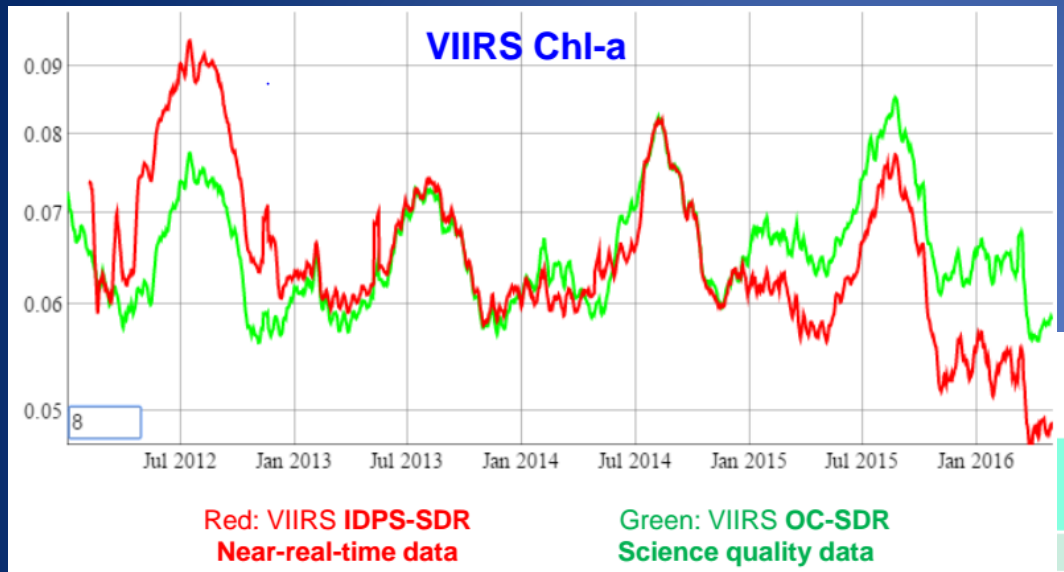
Global Oligotrophic Waters



Both data are reprocessed using the same MSL12!

Statistics of VIIRS Data vs. In Situ (MOBY)

(2012-01-01 ~ 2016-04-27)

	IDPS-SDR MSL12 (ver. 1.10) (Near-Real-Time Data)				OC-SDR MSL12 (ver. 1.10) (Science Quality Data)			
	AVG	MED	STD	No	AVG	MED	STD	No
	1.0083	1.0065	0.0961	463	**1.0164**	1.0157	0.0956	509
	1.0191	1.0005	0.1733	475	**1.0083**	1.0062	0.0899	509
nL_w(480)	**1.0258**	0.9991	0.1861	475	**1.0110**	1.0103	0.0846	509
nL_w(551)	**1.0604**	0.9809	0.4910	475	**1.0148**	1.0004	0.1338	509
nL_w(671)	**1.3366**	1.0059	2.1345	487	**1.1762**	1.1053	0.5393	505
Chl-a	**1.0508**	0.9764	0.4254	468	**1.0141**	1.0041	0.1647	509
K_d(490)	**1.0135**	0.9826	0.2437	471	**0.9842**	0.9760	0.1007	505

MOBY

NIR Gain 8 = [0.979954, 0.974892, 0.974685, 0.965832, 0.979042, 0.982065, 1.00000, 1.01812, 0.994676, 1.20252]

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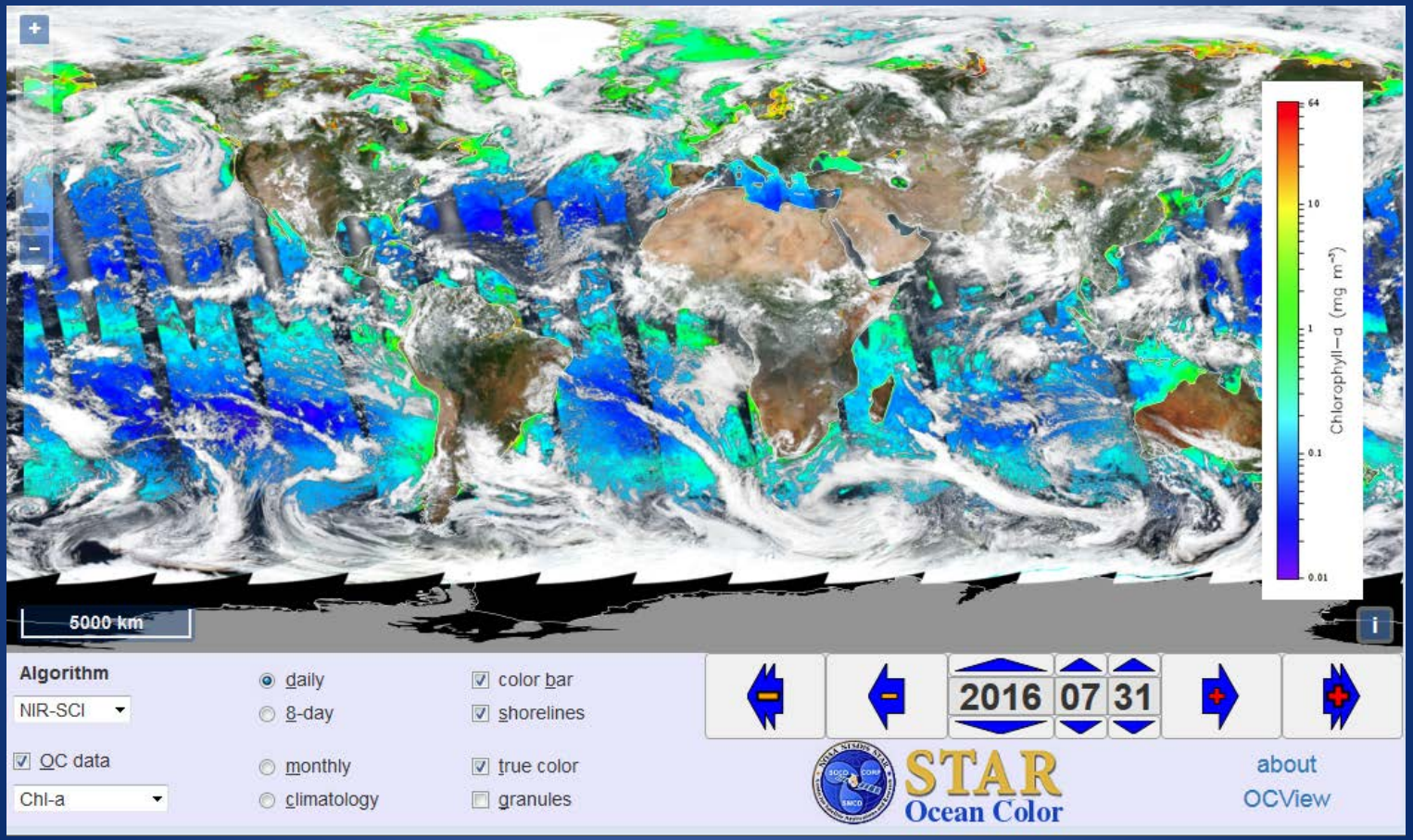
VIIRS Ocean color EDR Team: Introduced OCView tool for easy, interactive image monitoring



http://www.star.nesdis.noaa.gov/sod/mecb/color/

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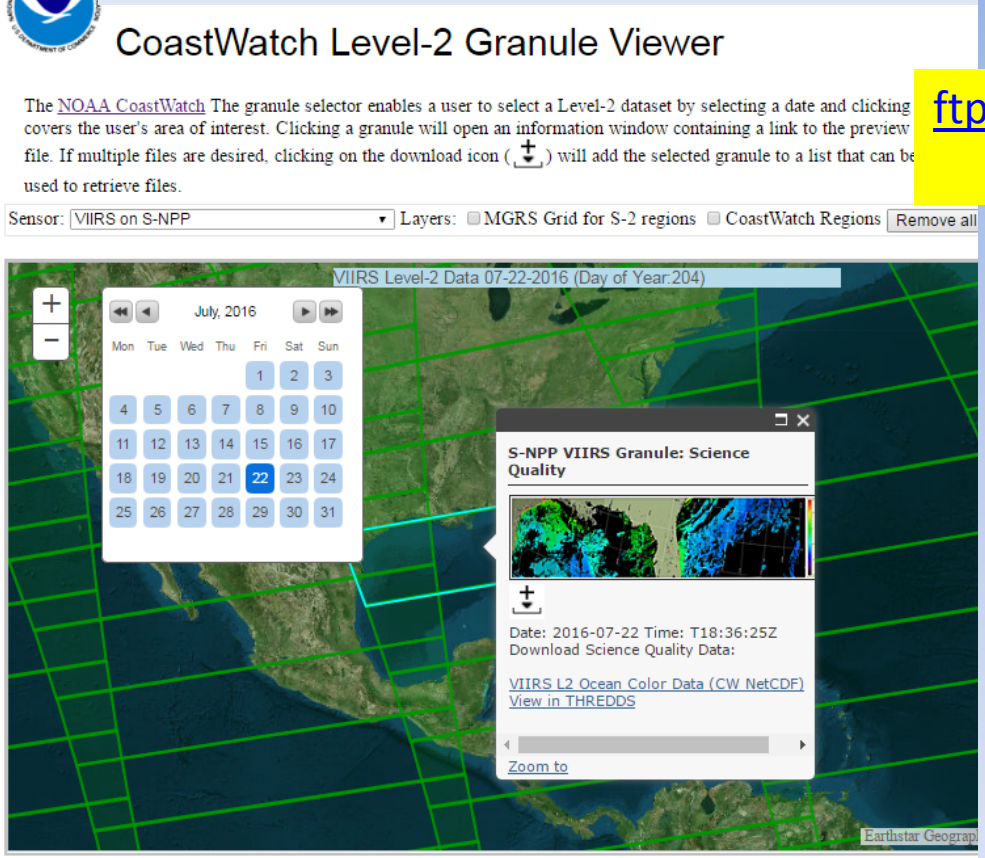
NOAA CoastWatch/OceanWatch
Data Dissemination of
VIIRS Ocean Color and SST

Science Quality 'Life-of-Mission'



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

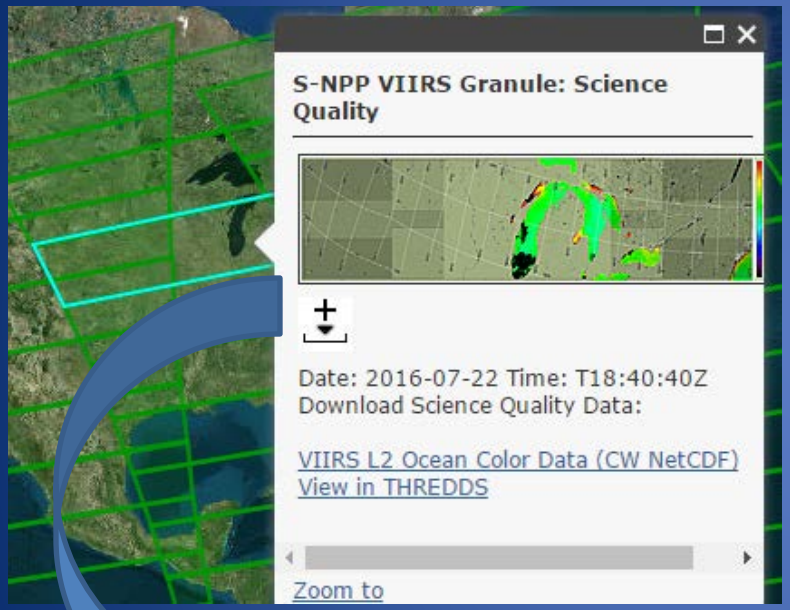
- FTP OC 2012 to [Present – 15 days]:

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

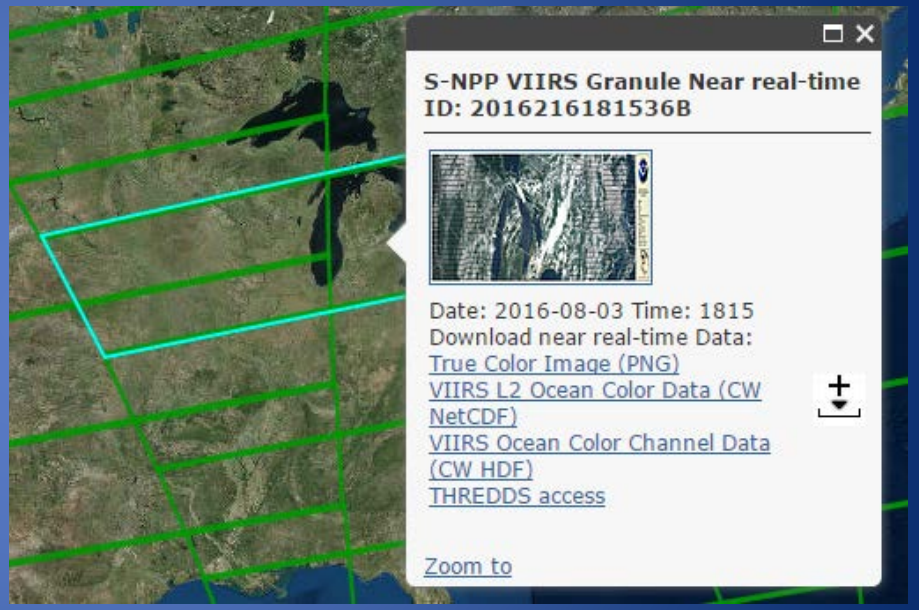
- Integrated with the same L2 Granule Selector tool
  - Present – 15 days: NRT Granules
  - 15 days old and prior: Science Quality
  - Includes data preview and data cart
- VIIRS SST Science Quality will be included when ready

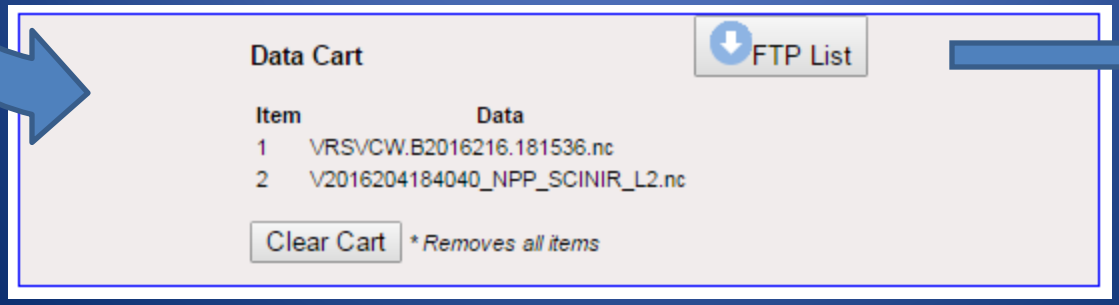
Example of VIIRS OC Data Cart

Science Quality (forward processing)

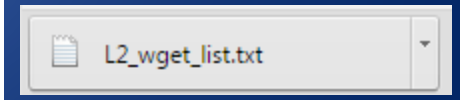


Near real-time





For batch download



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The case for Reprocessing

- **WHY"? ALL NOAA Line Offices** have expressed a need for consistent, fit-for-purpose quality, long-term time series ocean satellite observations to do their part in support of the NOAA Mission.

- **Reprocessing is essential** for the production of science quality time series data for earth and ocean observations and is expected by satellite data product user communities both within and external to NOAA.

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- **Operational:**
- **Science:**
- **Requirements:**
- **Measurement-Based:**
- **Integrated:**

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- **Operational:** Redefine
  Not just Near Real Time
- Science:
- Requirements:
- Measurement-Based:
- Integrated:

STAR JPSS Oceans

- **Operational:** Redefine
  Not just Near Real Time
- **Science:** Crucial at every step
  Not just product development
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- **Integrated:**

STAR JPSS Oceans

- **Operational:** Redefine
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- **Requirements:** Allow to Evolve
  Not etched in stone tablets
- **Measurement-Based:**
- **Integrated:**

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- **Operational:** Redefine
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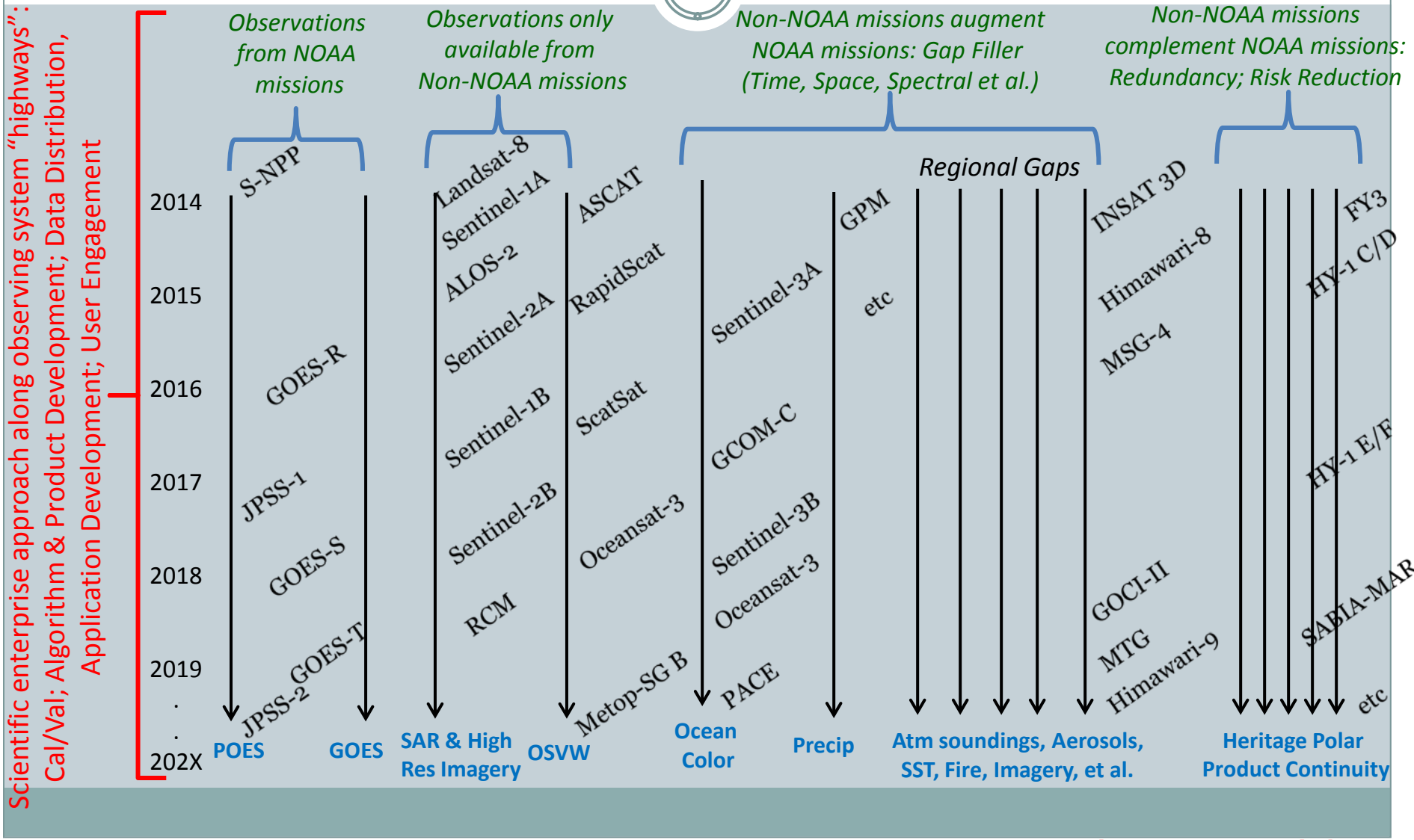
- **Measurement-Based:** Mission agnostic approach
- **Integrated:**

Measurement-based approach in support of users: Ensuring continuity & coverage

Observing System Highways: Utilize satellite data from NOAA & non-NOAA missions

Leverages existing science, technical, programmatic et al. infrastructure in NESDIS



Courtesy: Paul DiGiacomo & Paul Chang

STAR JPSS Oceans

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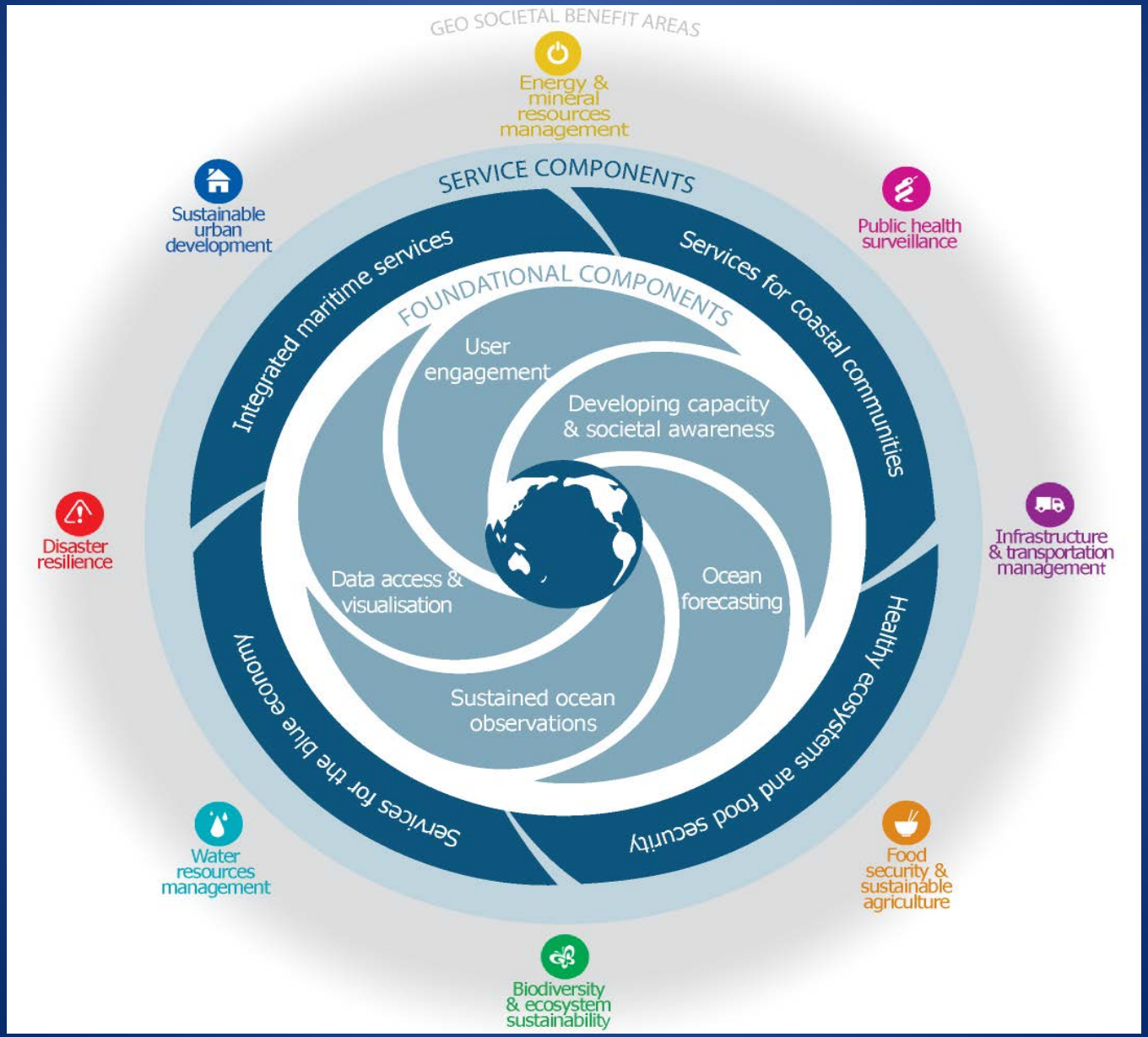
GEO Blue Planet Initiative



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Thank you - Questions?

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