NOAA Remote Sensing Training Course

Viewing and Analyzing Ocean/Coastal Events and Water Quality Using Satellites

Course Introduction

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[3] RIVA Solutions, Inc

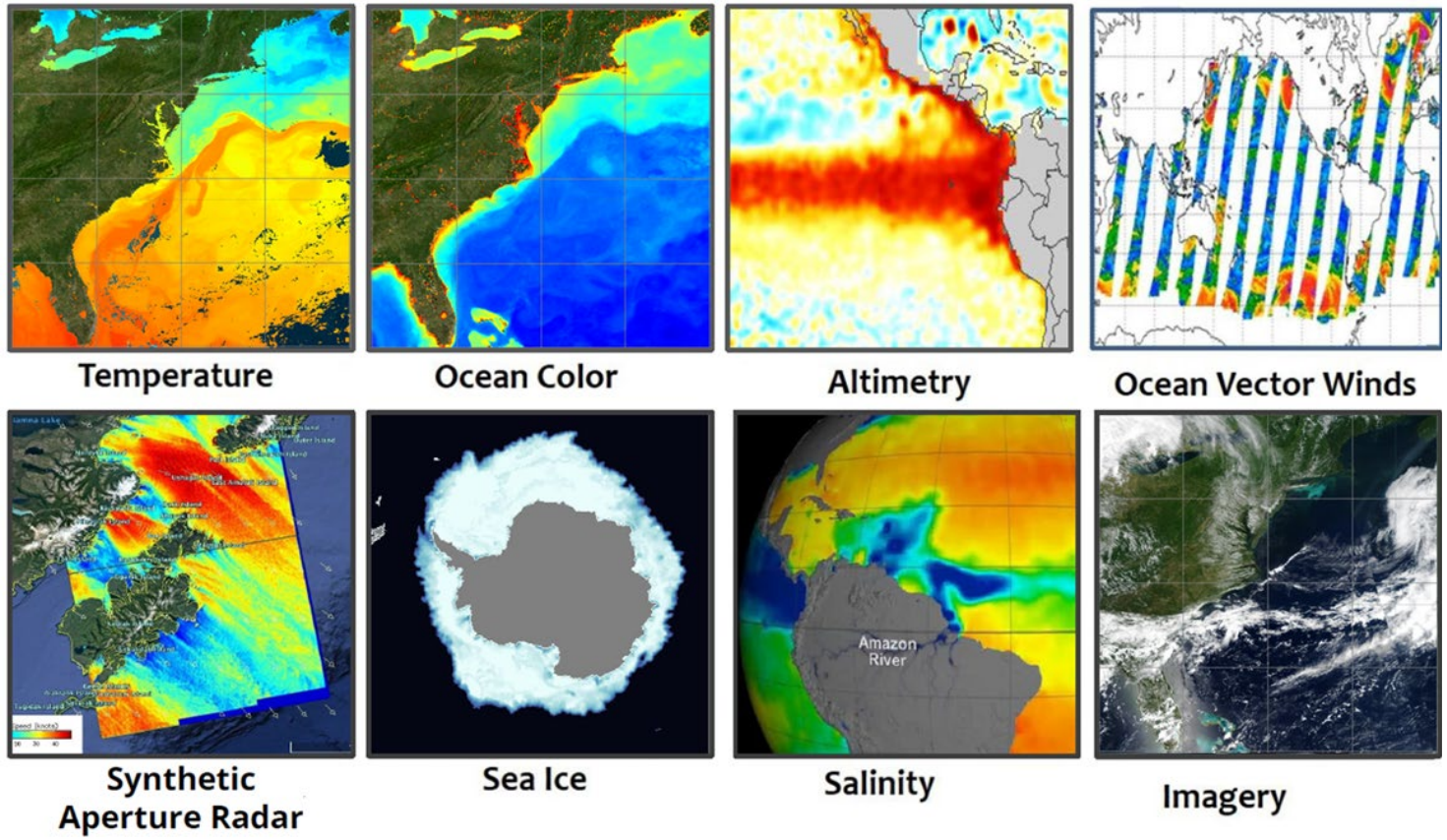
[4] University of Maryland, Earth System Science Interdisciplinary Center

[5] National Ocean Service, Center for Coastal Monitoring and Assessment

[6] Florida Sea Grant College Program

National Environmental Satellite, Data, and Information Service

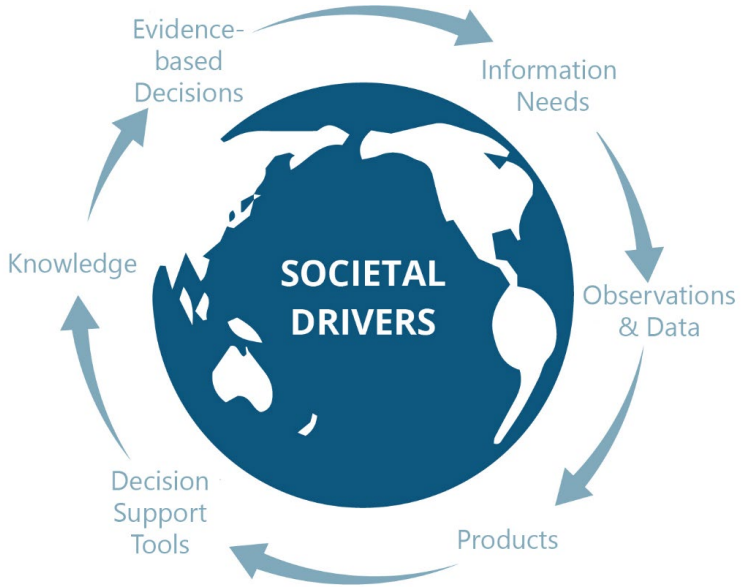
March 31 – April 4, 2025

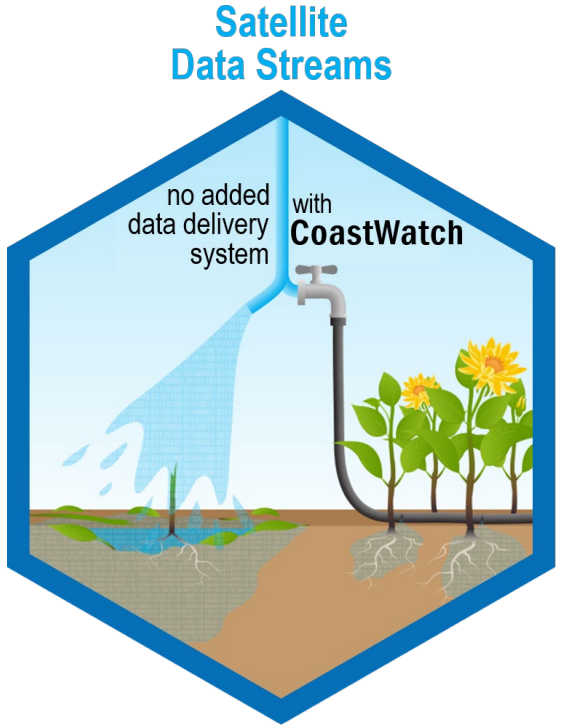


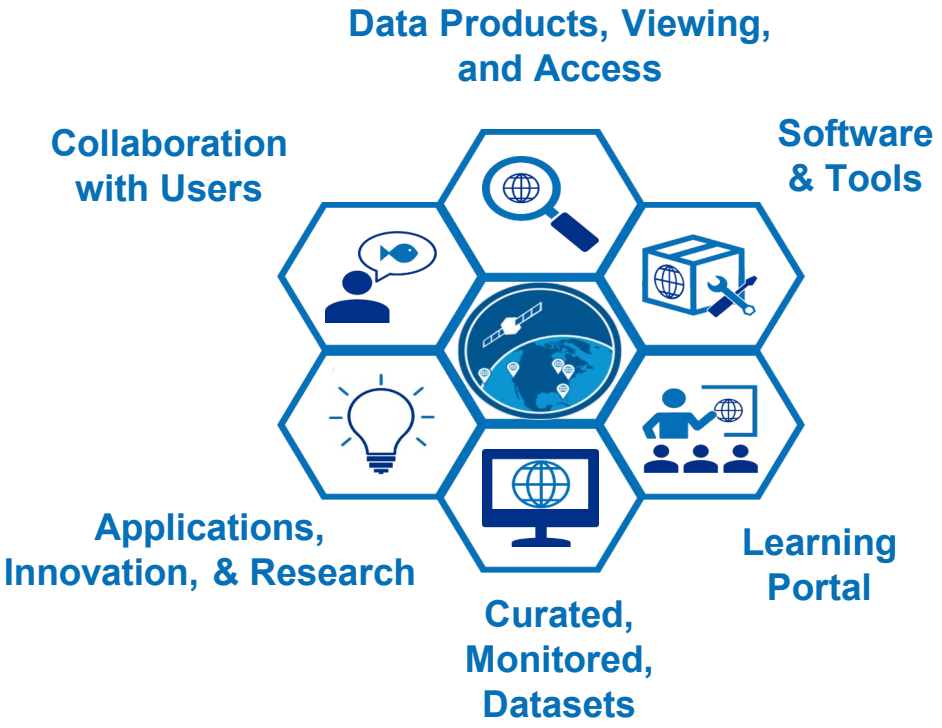
We are in a “golden age” of satellite remote sensing, with unprecedented access to global ocean observations. However, growing volume and complexity can make it overwhelming to utilize effectively

- Massive volumes of satellite data products are available
- Diverse sensor capabilities and limitations
- Multiple data sources and file formats
- Increasing need for specialized knowledge to interpret results, derivations, and errors

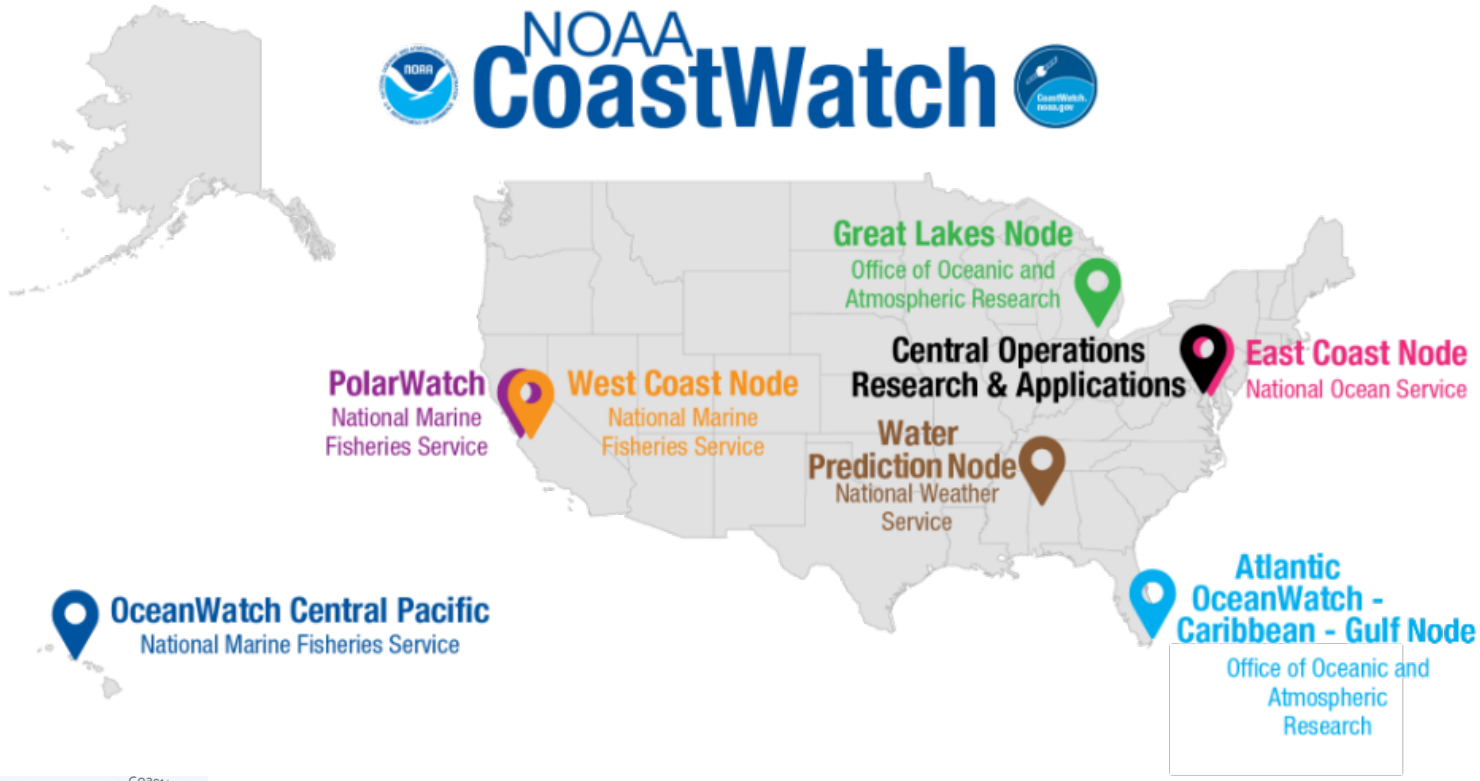
NOAA CoastWatch serves as a **value chain**, linking "upstream" satellite data and products with "downstream" research, applications, and decisions-making related to oceans, coasts, and fresh water.







The NOAA CoastWatch organization is housed in NESDIS/STAR and extends across NOAA.



NOAA CoastWatch EAST COAST NODE
Providing Oceanographic Satellite Data for the U.S. East Coast

https://eastcoast.coastwatch.noaa.gov

Node Manager: Shelly Tomlinson
Operations Coordinator: Ron Vogel

CoastWatch offers several levels of service to help users with satellite data

Provide access to datasets with data servers

Develop tools and tutorials to help users

Interact with the server and use the data

Provide training and hands-on assistance

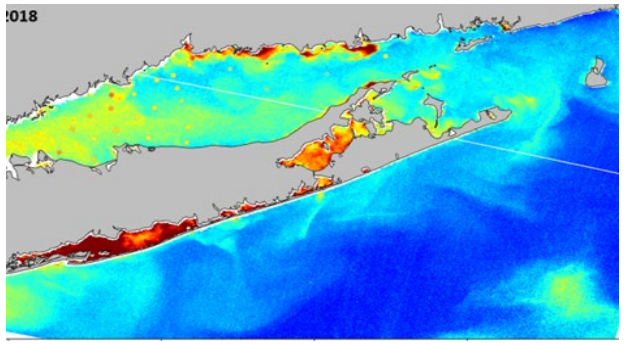
Find or create products and tools to address users needs

Work directly with users on projects

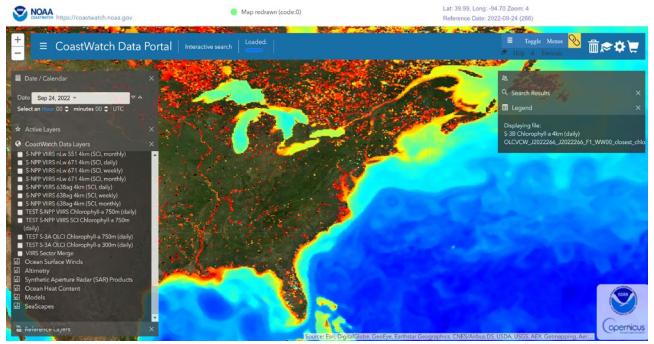
NY / CT Sea Grant funded project to establish a partnership between university researchers and city, state and federal agencies to:

- Improve understanding of **the impacts of key environmental stressors** – eutrophication, acidification, and hypoxia– on LIS water quality and ecological health
- **Co-produce satellite products** relevant to water quality and HABs.
- Integrate results into NOAA's CoastWatch Program for **open, free, easy, and wide distribution** of information, for **inclusive management** of LIS resources (i.e., WQ, shellfisheries operations).

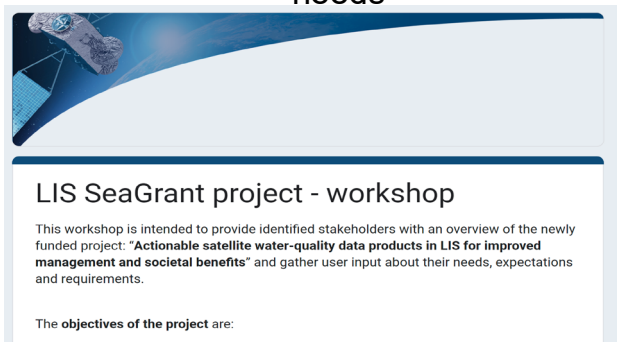
Optimized satellite retrievals
Pigments, HAB indices, CDOM, DOC, Chla, Turb



Advanced data portal/visualization
Open, easy, wide distribution of optimized products



Stakeholder Engagement
Co-production of datasets relevant to user needs



Existing datasets

Long-term data records (>40 yrs) for retrospective data analysis

(i) to examine impact of past episodic events (e.g., storms) on phytoplankton and DOM dynamics and HAB development, and

(ii) for the development and evaluation of bio-optical algorithms applied to more than two decades of satellite ocean color imagery

Satellite imagery

Multi- and hyper-spectral imagery at different resolution (30 -300 m)

- **Chlorophyll a** concentration
- Other **phytoplankton pigments**
- **CDOM** absorption (including absorption magnitude and spectral slope)
- **DOC concentration**
- TSS/**turbidity**

New Field Measurements and Laboratory Experiments

In collaboration with NYC DEP, CT-DEEP, CT-DABA, NYS-DEC, Gobler Lab

- **Physicochemical properties** - Temp, Sal, turb, DO, pH, fCDOM, fChl a
- **Biogeochemical variables** - DOC, POC, SPM, DIC
- **Optical measurements** – Chla, CDOM, NAP, fDOM, fChla, radiometry, HPLC
- **Phytoplankton community structure** (diatoms, dinoflagellates, cyanobacteria and cryptophytes), using the FlowCAM approach/flow imaging microscopy
- **Photosynthetic and physiological characteristics of photosynthetic organisms**, using the Fluorescence Induction and Relaxation (FIRe) technique.
- Continuous, underway flow-through measurements of **CDOM, Chl a and cryptophytes, cyanobacteria** (Wet Labs Advanced Laser Fluorometer Analyzer)
- **Phytoplankton growth Lab** exps (under various pH, nutrient, DO conditions)
- Photo-physiological performance of native phytoplankton species in LIS

- **Interaction with stakeholders** for development of satellite products **relevant to water quality and HABs**
- **Integration of results into NOAA's CoastWatch Program** for open, easy, wide distribution **of optimized products** that support federal, state, and local environmental justice initiatives, and CCMP priorities for inclusive management of LIS resources.

“Viewing and Analyzing Ocean/Coastal Events and Water Quality Using Satellites”

Two tier format:

Tier I (1 Day): Learn to use GUI tools to create images and maps of ocean or coastal features in your area of interest. Tools taught: CoastWatch Data Portal, ArcGIS, ERDDAP visualization server, and more.

Tier II : Work more analytically and programmatically with oceanographic satellite data. Learn R and/or Python techniques to access data on ERDDAP data servers, data analysis and visualization. Work on a mini research project incorporating remote sensing data.

The course instructors are:

- Shelly Tomlinson - East Coast Node Manager
- Ron Vogel - East Coast Node Operations manager
- Michael Soracco - CoastWatch Central Operations
- Betty Staugler - NOAA HAB Liaison
- Jonathan Sherman – CoastWatch Research and Applications

“The journey of a thousand miles begins with one step" Lao Tzu

This course is by no means all inclusive. We encourage you to use this day / week to explore ways you can capitalize on what remote sensing has to offer.

NOAA CoastWatch exists to support stakeholders wanting just that. Our help is not limited to this week

Monday - March 31		Tier I and Tier II	
	9:00 - 9:15	Presentation 1: Overview – SeaGrant-funded Satellite Project	Jonathan Sherman
	9:15 - 9:45	Presentation 2: Data Portal	Michael Soracco
	9:45 - 10:15	Presentation 3: ArcGIS	Michael Soracco
	10:15 - 10:30	Break	
	10:30 - 11:15	Presentation 4: CoastWatch Utilities - CDAT Files	Ron Vogel
	11:15 - 11:30	Q & A	
	11:30 - 12:15	Participant Exercise 1: Choose a tool and make a map ArcGIS files, CDAT files	
	12:15 - 1:15	**Lunch break**	
	1:15 - 1:45	Presentation 5: Choosing a Dataset	Jonathan Sherman
	1:45 - 2:45	Presentation 6: ERDDAP	Ron Vogel
	2:45 - 3:00	Break	
	3:00 - 3:30	Q & A and Resources for Participants	
	3:30 - 4:30	Participant Exercise 2: Choose a dataset from ERDDAP, download, make a map and a time series Sample data list	

https://coastwatch-training.github.io/CoastWatch-Workshops/courses/longislandsound25.html