

TRANSITIONING STATE-OF-THE-ART NUTRIENT SENSING TECHNOLOGY TO DEVELOP AN OPERATIONAL NUTRIENT OBSERVATORY FOR NERACOOS

Goal: To develop an integrated nutrient observatory within NERACOOS capable of resolving nutrient dynamics at temporal and spatial scales necessary to address critical needs of stakeholders throughout the Northeast region.



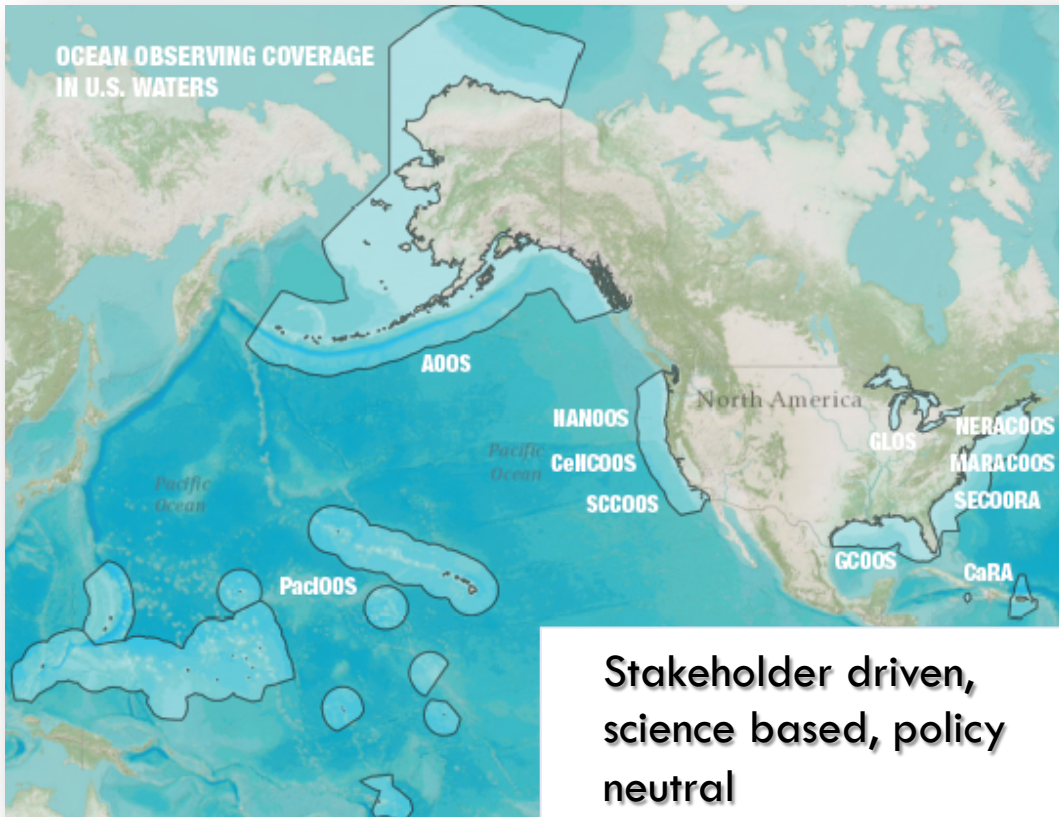
THE INTEGRATED OCEAN OBSERVING SYSTEM (IOOS)



Operated By:
Federal Component:



Regional Component:

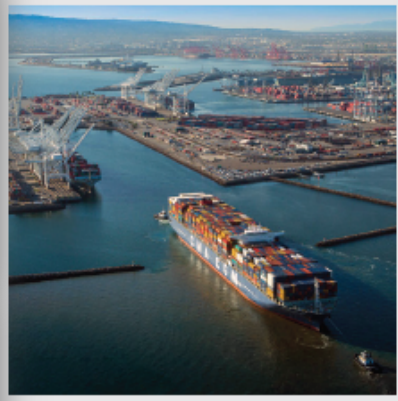


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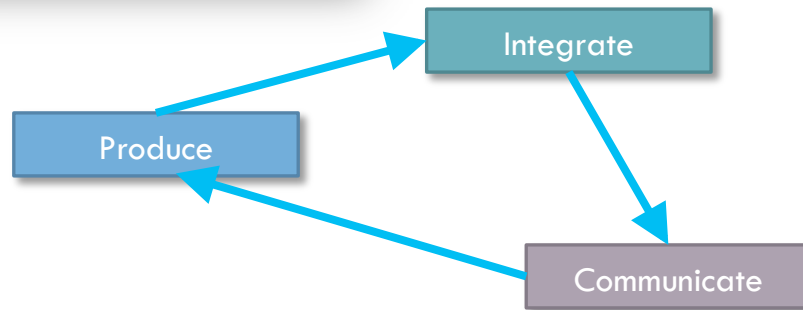
WATER QUALITY, FISHERIES AND ECOSYSTEMS



SAFE COMMERCE



COASTAL HAZARDS, OIL SPILLS, FLOODING, EXTREME STORMS

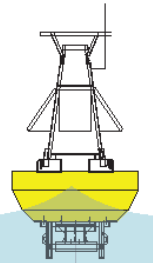


Below: Approximate percentage of all publicly available, realtime and continuous ocean measurements in the region conducted by NERACOOS.

50% of SURFACE MEASUREMENTS

85% of SUBSURFACE MEASUREMENTS

100% of SUBSURFACE MEASUREMENTS DEEPER THAN 15 METERS



BUOYS F SCIENCE

“ This deployment is a critical step towards our long-term dream of having a network of instruments moored along the coast of the Gulf of Maine, routinely providing data on the distribution and abundance of HAB cells and toxins. The technology will greatly enhance management capabilities and protection of public health in the region. ”

Don Anderson, Project Lead and
WHOI Senior Scientist



Bruce Keafer

DELIVERING INFORMATION TO SUPPORT THE COAST GUARD

U.S Coast Guard personnel regularly rely on NERACOOS data to improve the safety and effectiveness of their operations.

- Ocean forecasts: Narrowing of search and rescue areas
- Wind observations: Inspection of aids to navigation
- Wave observations: Heavy weather training and vessel selection
- Air temperature: Prediction of icing on vessels



“ Not a day goes by where we don't use NERACOOS data. Without it we'd be sending our Coast Guard crews out uninformed and at greater risk. ”

CAPT Brian Gilda, Sector Commander
U.S. Coast Guard Sector Northern New England

USCG crews conducting heavy-weather training off of Jonesport, Maine.





OCEAN TECHNOLOGY TRANSITION PROJECT

The IOOS Ocean Technology Transition project sponsors the transition of emerging marine observing technologies, for which there is an existing operational requirement and a demonstrated commitment to integration and use by the ocean observing community, to operational mode.

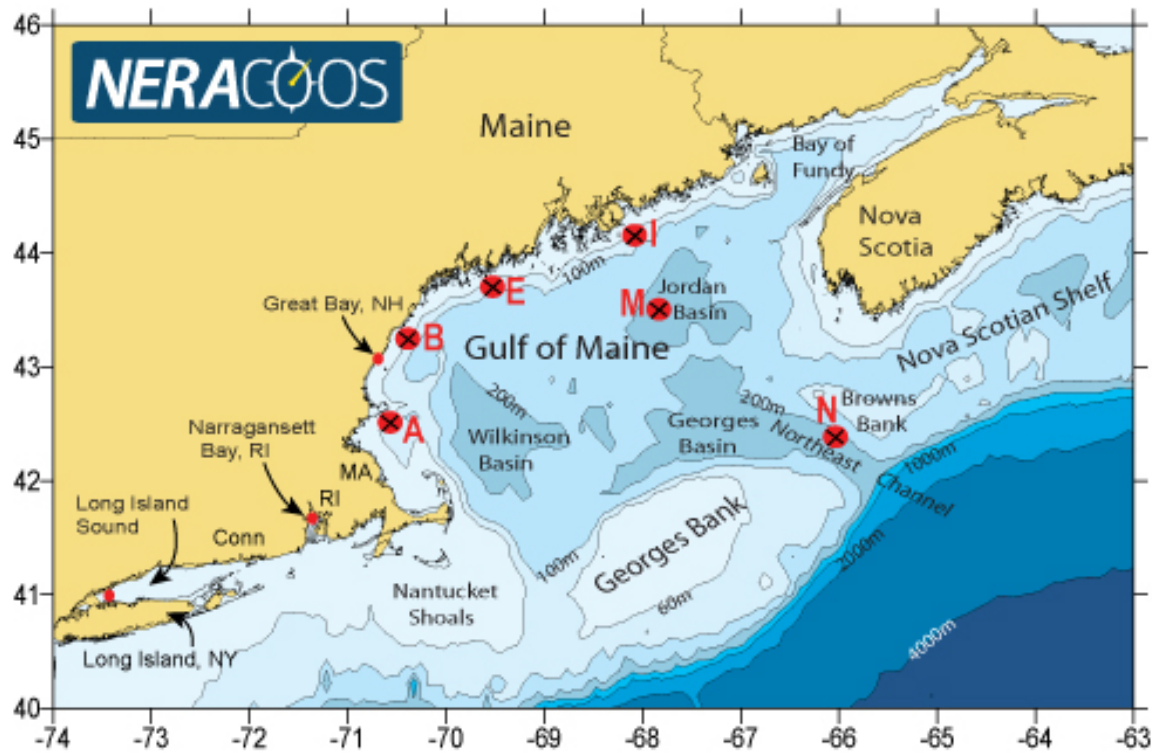
Transitioning marine observing technology to operations will result in improved ocean, coastal, and Great Lakes observing capabilities that are critical for helping us understand our ocean, coastal, and marine environments and improve environmental intelligence for environmental decision making.



OCEAN TECHNOLOGY TRANSITION PROJECT: FY14

- Integrate the Imaging Flow CytoBot (IFCB)
- Operational Ecological Forecasting of Harmful Algal Blooms in the Pacific Northwest using an Environmental Sample Processor
- A Real-Time Sensor System for Detecting Freeze-up on Arctic Shelves
- ***Transitioning State-of-the-Art Nutrient Sensing Technology to Develop an Operational Nutrient Observatory for NERACOOS***
 - *This system of automated nutrient sensors will deliver high-frequency, quality-controlled nutrient data to scientists, managers, and policy makers to help understand natural and anthropogenic influenced coastal nutrient dynamics throughout the region.*
- Improving an Ocean Acidification Observing System in Support of Pacific Coast Shell Fish Growers

NERACOOS INTEGRATED NUTRIENT OBSERVATORY 2015-2017*



The red dots show the approximate location of buoys that will carry nutrient sensors.

NERACOOS will deploy WET Lab's PO₄ (phosphate), NH₄ (ammonium), and Satlantic NO₃ (nitrate) sensors on buoys in Great Bay, NH, Narragansett Bay, and in Long Island Sound.

Satlantic NO₃ (nitrate) sensors will be deployed at multiple depths on a number of buoys in the Gulf of Maine.

NERACOOS INTEGRATED NUTRIENT OBSERVATORY 2015



April 2015:

Great Bay Deployment, University of New Hampshire

May 2015:

Great Bay Estuary Stakeholder workshop

June 2015:

Buoy E and I Deployment, University of Maine

July 2015:

Long Island Sound Deployment, University of Connecticut

September 2015:

Buoy M and N Deployment, University of Maine

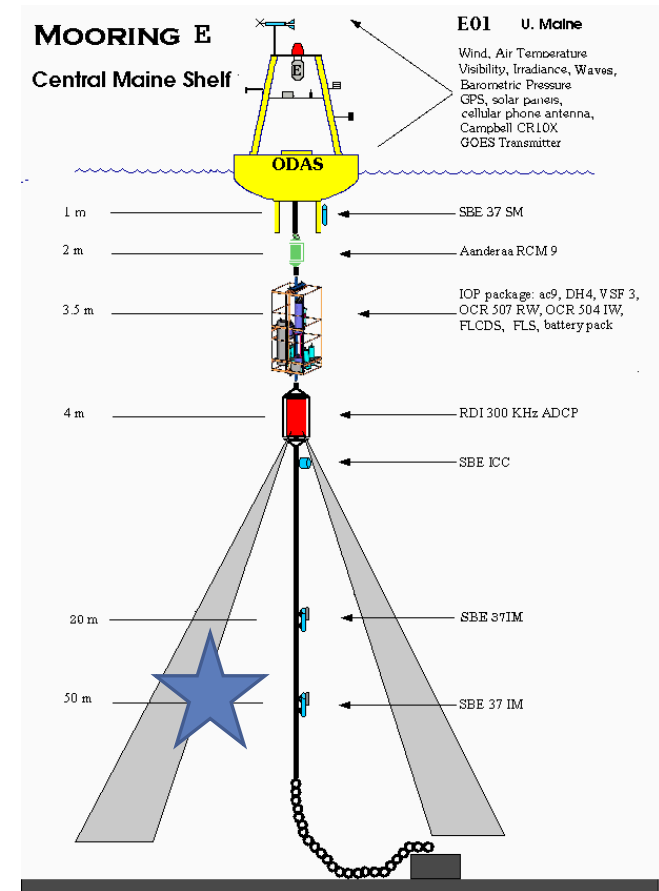
OFFSHORE DEPLOYMENTS IN 2015

June: SUNA nitrates on buoy E (@50m) and I (@50m)

Sept: SUNA nitrates on buoy M (@50m, 100m, 150m, 250m) and N (@50m, 100m, 150m, 180m)

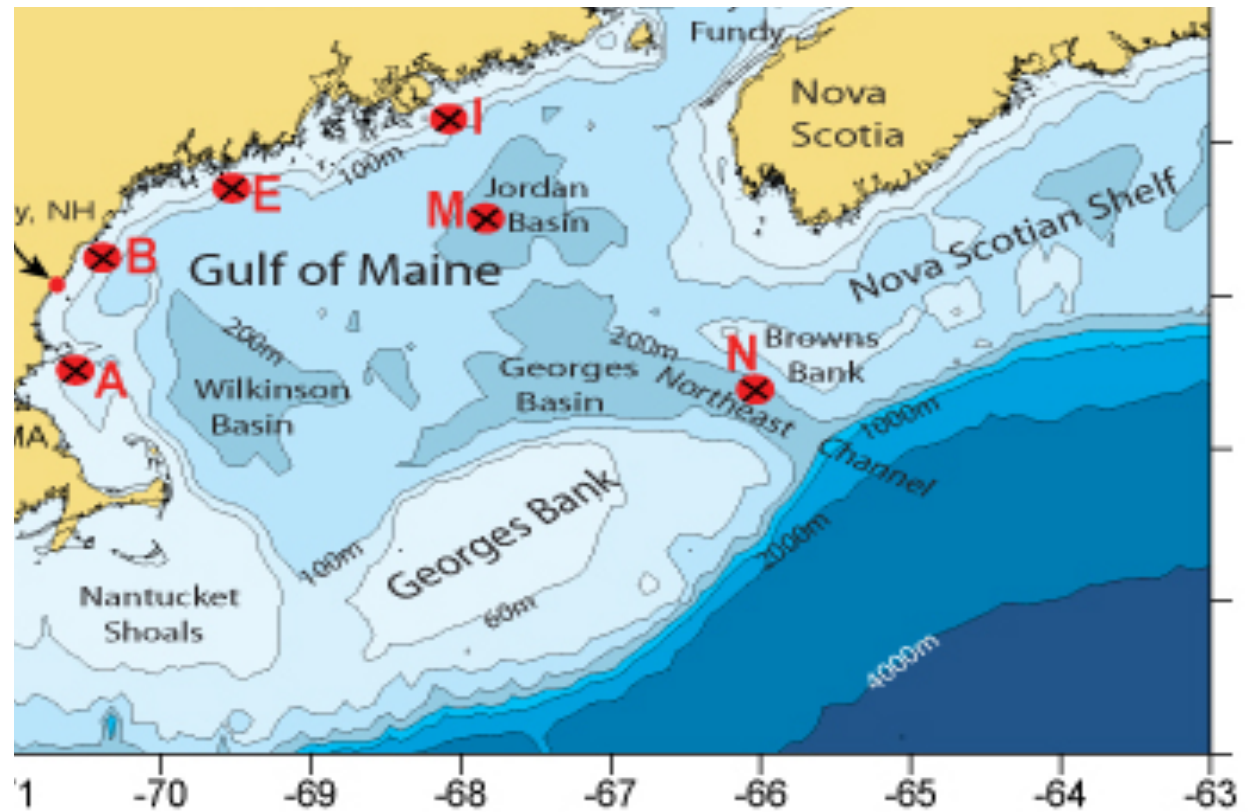
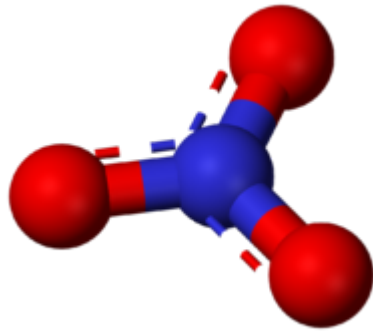


- **Sensor acquisition**
- **Calibration**
- **Preparation**
- **Deployment**
- **Data availability**

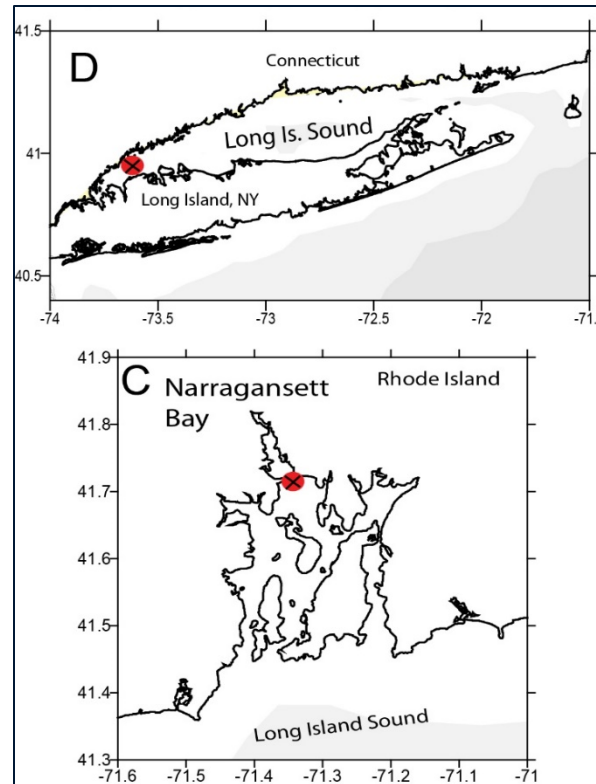


OFFSHORE DEPLOYMENTS 2016-2017

SUNA nitrates on
buoys E, I, M, N, B,
and A



NEARSHORE DEPLOYMENTS



Great Bay- 2015
Long Island Sound- 2016
Narragansett Bay- 2017

- **Sensor acquisition**
- **Calibration**
- **Preparation**
- **Staff training**
- **QA/QC development**
- **Deployment**
- **Data availability**

NEARSHORE DEPLOYMENT: GREAT BAY



Deployed April 23 with
SUNA nitrate and Cycle
Phosphate

Cycle Ammonium will
follow in the summer

NERACOOS Gulf of Maine Great Bay, NH

Lat: 43.07 Lon: -70.86

Latest Observation: 05/22 7:05 PM EDT

Variable	Value
Wind speed	12 knots (14 mph, 23 kph)
Wind direction	N (2°) True
Wind gust	17 knots (20 mph, 32 kph)
Air temp	63 ° F (17.2 ° C)
Air pressure	1011.89 mb
Water temp	59 ° F (14.9 ° C)
Salinity	25.97 psu
Dissolved Oxygen	7.10 ml/l
Turbidity	5.110 ntu
PAR	140.24uE/m ² /sec
CO ₂ pressure in water	822.850 µATM
N03 in water	8.64 µM



Owned/Operated by:

UNIVERSITY
of NEW HAMPSHIRE
Dr. Doug Vandemark COOA

DATA ACCESS

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Dr. Doug Vandemark COOA



ERDDAP
Easier access to realtime and historic NERACOOS buoy observations

Brought to you by NOAA IOOS NERACOOS

ERDDAP > List of All Datasets

Pick a Dataset

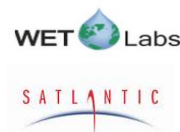
100 matching datasets, listed in alphabetical order.

Grid DAP Data	Sub-set	Table DAP Data	Make A Graph	W M S	Title	Summary	FGDC, ISO, Metadata	Background Info	RSS	E mail	Institution	Dataset ID
	set	data	graph		A01 Aanderaa - Historic Surface Currents		F I M	background	RSS		Univ. of Maine	A01_aanderaa_hist
	set	data	graph		A01 Accelerometer - Waves		F I M	background	RSS		Univ. of Maine	A01_accelerometer_all
	set	data	graph		A01 Met - Meteorology		F I M	background	RSS		Univ. of Maine	A01_met_all
	set	data	graph		A01 Optics - Chlorophyll / Turbidity		F I M	background	RSS		Univ. of Maine	A01_optics_s_all
	set	data	graph		A01 Optode - Oxygen		F I M	background	RSS		Univ. of Maine	A01_optode_all
	set	data	graph		A01 SBE16 - CTD Transmissivity		F I M	background	RSS		U.S. Geological ...	A01_sbe16_trans_all
	set	data	graph		A01 SBE16 Oxygen		F I M	background	RSS		Univ. of Maine	A01_sbe16_disox_all
	set	data	graph		A01 Sbe37 - CTD		F I M	background	RSS		Univ. of Maine	A01_sbe37_all
	set	data	graph		B01 Aanderaa - Historic Surface Currents		F I M	background	RSS		Univ. of Maine	B01_aanderaa_hist
	set	data	graph		B01 Aanderaa - Realtime Surface Currents		F I M	background	RSS		Univ. of Maine	B01_aanderaa_rt
	set	data	graph		B01 Accelerometer - Waves		F I M	background	RSS		Univ. of Maine	B01_accelerometer_all
	set	data	graph		B01 Met - Meteorology		F I M	background	RSS		Univ. of Maine	B01_met_all
	set	data	graph		B01 Optics		F I M	background	RSS		Univ. of Maine	B01_optics_hist

Or, Do a Full Text Search for Datasets: Search

Or, Search for Datasets by Category:
[cdm_data_type](#), [institution](#), [ioos_category](#), [keywords](#),
[long_name](#), [standard_name](#), [variableName](#)

Or, Search for Datasets with [Advanced Search](#)



STAKEHOLDER ENGAGEMENT AND OUTREACH

To develop a clear understanding of stakeholder needs with regard to nutrient information and to ensure that the design and operation of the observatory delivers data that can be effectively used by key stakeholders.

- *Stakeholder workshops*
- *Interviews*
- *Listserv*
- *Website*

www.neracoos.org/nutrientobservatory



LEADER ENGAGE MENT AND OUTREAC H

Users	How Observatory Results Will be Used
Long Island Sound Study	Monitor impact of nutrient reduction management practices
CT Dept. of Energy and Environment	Complement monthly nutrient monitoring
RI Dept. of Environmental Services	Characterize water quality conditions
Massachusetts Water Resource Authority	Improve the boundary conditions for modeling
MA Office of Coastal Zone Management	Help to determine what background nutrients
WHOI Northeast PSP program	Interpreted nutrient fields for predictive HAB models
NH Dept. Environmental Services	Monitor permit compliance, support numeric nutrient criteria development, and asses management actions
NH Piscataqua Region Estuaries Partnership	Support research to develop a better understanding of nutrients
ME Dept. of Marine Resources	Increase understanding of critical environmental factors
ME Coastal Program	Assist managers in forecasting future HAB events
ME Dept. of Environmental Services	Support assessment of water quality standards
EPA Region 1	Evaluating the response of coastal waters to nutrient reductions from waste water treatment plants
EPA's Atlantic Ecology Division	Incorporation of data into tools for diagnosing and predicting the effects of human activity
NOAA's Northeast Fisheries Science Center	Understanding the driving force for regional primary production in the ecosystem
Northeast Regional Ocean Council	Nutrient monitoring would become part of the Integrated Sentinel Monitoring Program

THANK YOU!

