







NORTHEASTERN REGIONAL ASSOCIATION of COASTAL OCEAN OBSERVING SYSTEMS



OCEAN INFORMATION for PLANNING. SAFETY and STEWARDSHIP

2013: A year in review



ADDRESSING SOCIETAL PRIORITIES in the NORTHEAST

NERACOOS focuses on priority themes:

MARITIME OPERATIONS

Helping to improve efficiency and safety of shipping and other maritime industries, and enhancing search-andrescue and spill response efforts.

COASTAL HAZARDS RESILIENCY

Equipping managers and property owners with forecasts and observations to help save lives and property.

OCEAN AND COASTAL ECOSYSTEM HEALTH

Providing critical information for forecasting and management of red tides, beach closures, and water quality.

 OCEAN ENERGY PLANNING AND MANAGEMENT Delivering essential data for energy development.

CLIMATE VARIABILITY

Detecting and predicting changes in key ocean properties such as sea level and ocean acidity.

- COASTAL AND MARINE SPATIAL PLANNING Supplying critical ocean and weather data for more effective coastal and marine spatial planning.
- EDUCATION AND OUTREACH

Contributing to increased knowledge and understanding of the ocean.

US Integrated Ocean Observing System (IOOS)

 A tool that enables the Nation to track, predict, manage and adapt to changes in our marine environment and delivers critical information to decision makers to...

Improve safety

Enhance our

Protect our







Global: Global Ocean Observing System

National: Integrated Ocean Observing System

Regional: NERACOOS







Four Components of the National IOOS







US Integrated Ocean Observing System (IOOS)

The purpose of **Regional Associations** is to gather "required System observation data, supporting and integrating all aspects of coastal and ocean observing and information programs within a region and that reflects the needs of" stakeholders and users (ICOOS Act, 2009).



Regional Observation Network

A partnership of federal and non-federal organizations, including industry, academia, state, local and tribal governments





This is NERACOOS

- NERACOOS is the trusted source of regional ocean weather and information from Long Island Sound to the Gulf of Maine.
- We are one of eleven regions, the northeast Integrated Ocean Observing System (IOOS)
- We are a network of observers, modelers, forecasters, data managers, and tool developers.
- With our partners we produce practical solutions to real-world problems.
- These protect and enhance peoples' lives, livelihoods, and quality of life.





Building a Region-Wide Information System from the Bottom Up

NERACOOS Works

NERACOOS measures ~<u>50%</u> (65-76%) of the continuous real-time surface variables in the region and ~<u>95%</u> of the subsurface variables.

The Northeast Coastal Ocean Forecast System (NECOFS) and WW3 provide 3 day forecasts including inundation in Scituate MA and Hampton NH.



How do we know it works? NERACOOS Survey 2013 - Decision Making

"We decide which boat we can take out for missions and what type of survival equipment we can wear" – USCG

"go/no go decisions for moving large commercial ships and tug/barge combinations in Penobscot Bay" – Pilot

"to decide when to go to sea and how long we might be able to stay, as well as what areas might be best to go. Its not just for fishing info but safety too. I also use it to verify the forecast to see if weather maybe unexpectedly changing." – Commercial Fishermen

"Oil spill trajectory analysis" – NOAA Spill Response

"I use this data to discuss data with my middle school students. When there are big storms or other major events we look at the data and make our own predictions." – Educator

"Developing water quality assessments, understanding the effects of climate change, looking at extreme event effects" – Environmental Manager







NERACOOS 2013 Survey Results

What data is used

- 87% use neracoos.org to access real-time data

 wind, waves, water and air temperature data used
 most often
- 57% use neracoos.org to access forecasts
 - wind, wave and water temperature forecasts used most often

Importance of NERACOOS

 62% indicated that it would be a serious loss – it would be essential to find it elsewhere if data not available through NERACOOS



How do we know it works? People use it!

NERACOOS and NDBC Pageviews







2013 – A year of Change



NERACOOS Turns 5 years old and leaves home New Digs – 195 New Hampshire Ave, Ste 240 Portsmouth NH 03801





2013 – A year of Change

- Additional FY13 Funds
 - \$257k Sandy Supplemental
 - \$104k IOOS program general
 - \$340k HAB ESP work with WHOI
 - \$75k LISS EPA for UConn mooring

\$776k Total additional Federal funds in FY2013 -But much of this directed to specific projects

 Loosing LNG Mitigation funds which contributed \$120k / year





Become a Member of NERACOOS

Why should I become a member?

- With your Membership NERACOOS can:
- Maintain and repair infrastructure, ensuring observations and forecasts continue
- Develop new tools to make it easier for people to access and understand the information

 Advocate for the national IOOS program to continue base support.

Become a Member of NERACOOS

What benefits do I receive?

- Participate in research and development of ocean information products
- Leverage and enhance existing monitoring/observation activities
- Easily deliver data and information to target audiences
- Discover collaborative project opportunities and networking events
- Determine the direction of NERACOOS activities





NERACOOS Membership

We want to thank the following members for their support that will help critical information get to the people who need it.

Sustaining Members:







Supporting Members:







Associate Members:

- Casco Bay Estuary Partnership
- Connecticut Department of Energy and Environmental Protection
- Fisheries and Oceans Canada
- Maine Department of Marine Resources
- Maine Coastal Program
- Marine & Oceanographic Technology Network
- Massachusetts Lobstermen's Association
- Ru Morrison

Affiliates:

- New Hampshire Department of Environmental Services
- U.S. Environmental Protection Agency
- Gulf of Maine Council
- MA Coastal Zone Management

Thank you to our Inaugural Members



NERACOOS Gulf of Maine A - Massachusetts Bay

Lat: 42.52 Lon: -70.56

Latest Observation: 12/05 5:00 AM EST Variable Value

Wind speed	6 knots (7 mph, 11 kph)
Wind direction	ESE (113°) True
Wind gust	7 knots (8 mph, 14 kph)
Wave height	0.8 ft (0.2 m)
Wave period	10.7 sec
Air temp	46 ° F (7.5 ° C)
Visibility	1.6 nm (1.8 miles, 3.0 km)
Air pressure	1021.57 mb
Water temp	47 ° F (8.5 ° C)
Salinity	32.67 psu
Dissolved Oxygen	5.78 ml/l
Turbidity	0.435 ntu
Chiorophyli	2.09mg chi/m ^{\$}



owned/Operated by: The UNIVERSITY OF MAINE

Dr. Neal Pettigrew University of Maine

F Like

Data returns historically in excess of 90% But dropping today!

NERACOOS supports

- Buoys
 - 6+1 Gulf of Maine UMaine
 - 1 CDIP UNH
 - 1 CO2 UNH
 - 1 Estuarine UNH
 - 3 Long Island Sound UConn
 - HFR Surface Currents UMaine
- Shore-stations
 - 2 water quality UNH & URI
 - 3 Water Level
- Forecasts
 - Northeast Coastal Ocean
 Forecast System (NECOFS) UMassD
 - Inundation forecasts
 - Wave Watch III BIO
- Data Management and Communications - GMRI









SUPPORTING SAFETY and EFFICIENCY





"I trust the weather buoys with my life. Thank you." - Maine Fisherman; "Love your service...I believe your service is a lifesaver. Thanks!" -Dave, Pilot; and "I would like you to know that information you are providing us not only aids us in our work, it almost certainly has saved lives." -Roy Atkinson, Fisherman.



Data for Safe and Efficient Commerce



Surface Currents Universities of Maine and Connecticut



"The forecasts are instrumental in planning both training and routine operations, especially in winter... I cannot imagine operating without this buoy. We check it constantly throughout the day." - USCG







S COASTAL HAZARDS RESILIENCY IPPORTING PLANNING and SAFETY

Hurricane Sandy follow up

- MTS Techsurge
- Sandy Supplemental
- Army Corps Wave Study
- CINAR
- Inundation product for NWS and emergency managers



Bob Thompson from the Taunton, Massachusetts office noted that "the IOOS buoy data were invaluable for Sandy,"





NERACOOS Sandy Supplemental effort

Did not make it before shutdown \$257k total

- Tasks
 - Replace damaged sensors at UConn
 - Harden Modeling Infrastructure
 - Move NECOFS to the cloud
 - Harden observation data streams



Annua²²Meeting, December 5, 2013





COASTAL HAZARDS RESILIENCY



Boston, MA

Mass Bay (up to 10 m)

Data SIO, NOAA U SINAN, NGA GEBOO mage U SI Geological Survey Imagery Date: 6/18/2010 42º20'47.64" NI 71º00'06.06" Wileley









Wave Overwash Scituate, MA February 2013 Blizzard



SCITUATE AVE & OTIS







2/9/2013 12:05

- NERACOS-NWS Storm weather Webinars
- Piping forecasts directly to NWS

Photo courtesy of Jason Burtner, MA CZM







OCEAN and COASTAL ECOSYSTEM HEALTH TING SCIENCE and MANAGEMENT

Harmful Algal Blooms

- Bedford Institute of Oceanography
 - Monitoring *Alexandrium* in Bay of Fundy
 - Finalizing Satellite Based HAB warning system
- Woods Hole Oceanographic Initiation

 Environmental Sample Processors (ESP)
 - Transitioning forecast system to NOAA







- Important for determining water masses affecting Harmful Algal Blooms
- D. Townsend, N. Pettigrew, J. O'Donnell
- Satlantic Isus





COCEAN and COASTAL ECOSYSTEM HEALTH SUPPORTING SCIENCE and MANAGEMENT

Water Quality

- University of Connecticut
 - Hypoxia monitoring and modeling in Long Island
 Sound for NY and CT waste load allocations
- University of Rhode Island
 - Testing autonomous sampling technology
 - Incorporating Narragansett Bay Fixed Site Monitoring Network
- Bedford Institute of Oceanography
 - Monitoring nutrients at entrance to Gulf of Maine
- University of New Hampshire
 - Informing NH DES nutrient criteria work









OCEAN and COASTAL ECOSYSTEM HEALTH SUPPORTING SCIENCE and MANAGEMENT

Integrated Sentinel Monitoring for Climate Change in Northeastern Coastal Ecosystems

Goal: To develop a science and implementation plan for an adaptive sentinel monitoring program in the Northeast coastal region that integrates existing regional monitoring efforts, assets, and resources to assess the status and trends of key indicators at select sites and geographic sub regions.



Participating Organizations:

Bigelow Laboratory for Ocean Sciences Casco Bay Estuary Partnership Connecticut Department of Energy and **Environmental Protection** Fisheries and Ocean Canada Great Bay National Estuarine Research Reserve Gulf of Maine Council Ecosystem Indicator Partnership Gulf of Maine Research Institute Maine Department of Marine Resources Maine Geological Survey Massachusetts Bays National Estuary Program Massachusetts Department of Marine **Fisheries** Massachusetts Office of Coastal Zone Management Massachusetts Water Resources Authority Massachusetts Institute of Technology Sea Grant National Oceanic and Atmospheric Administration, National Marine Fisheries Service NERACOOS New England Interstate Water Pollution **Control Commission** New Haven University Northeastern University Northeast Regional Ocean Council Provincetown Center for Coastal Studies Rhode Island Department of Environmental Management Stellwagen Bank National Marine Sanctuary The Nature Conservancy U.S. Army Corps of Engineers U.S. Environmental Protection Agency U.S. Geological Survey University of Connecticut University of Maine University of Massachusetts Boston University of New Hampshire University of Rhode Island Wells National Estuarine Woods Hole Oceanogra







Northeast Coastal Acidification Network (NE-CAN)





NE Regional Assoc. of Coastal and Ocean Observing Systems

Sustainable Fisheries Partnership





NE-CAN is a nexus of scientists, federal and state agencies, and industry partners that works to coordinate regional observing and research to identify and communicate critical vulnerabilities to ocean acidification in the Northeast Atlantic











OCEAN ENERGY PLANNING and MANAGEMENT

Leveraging Biological Monitoring on Buoys

- University of Maine
 - Fish telemetry since 2005, NMFS
 - Bats since 2011, Stantec

"If the marine environment is not sufficiently characterized, developers will not risk starting offshore wind projects in the Gulf of Maine. These buoys and model information will improve the viability of the Gulf of Maine as a strong candidate for offshore wind farm developments ... We look forward to working with NERACOOS on sharing monitoring information". DeepCwind Consortium

Data for Ocean Planning

NORTHEAST OCEAN DATA

Search this site... 🖇

DATA VIEWER HOME DATA » ABOUT » CONTACT NFWS **INTERACTIVE MAPS** Northeast Ocean Data provides maps and data for ocean planning in the northeastern U.S. Easy-to-use interactive maps provide information on selected topics. The Data Viewer and Data pages provide ØØ 1000000000 more types of data and downloadable data files. DATA VIEWER FISH REG: Coming soon: COMMERCIAL FISHING Launch

The Northeast Ocean Data Working Group is developing an interactive atlas of human and environmental aspects of the ocean in New England. The maps listed above are preliminary components of the atlas. We release new maps on an ongoing basis, and we continually improve and revise the existing maps to present the best available information in a useful format. We are working closely with many public- and private-sector organizations to identify information needs, data sources, and the most effective ways to present information in these maps.

NEWS

- Reader-friendly Data Descriptions Added to Viewer
- New Data on Shipping Activity, Boating, Energy Infrastructure, and Navigation
- Upgrades to Interactive Maps Are in the Works

ERACÓ

OF COASTAL OCEAN OBSERVING



NERACOOS Informing Regional Climate Monitoring



Decadal Time-series from Models and Observations



Annual Meeting, December 5, 2013



5 0.1 0.15 0.2 0.25 0.3 0.35 0.4 Rate of change of water temperature (°C/yr)

250

0 0.05

Temperature Anomaly at 1 m



Data Management

NECODP





NFRAC

Data Management Framework Goals:

- Data accessibility
- Provide highest QA/QC data
- Utilizing IOOS/OGC standards for data services and metadata





New website and products

• 2013

- New tide gauges online
- NBFSWQMN buoys online
- Mobile NERACOOS
- Climatology
- More satellite data
- Gliderpalooza
- Wind direction added
- Data Management Framework
- 2014 – Model viewer
 - Historical data access
 - Acoustic Telemetry Data
 - Inundation product







Climatologies

http://www.neracoos.org/datatools/climatologies

Mean Water Temperature 1 meter depth at B01 for 2001 thru 2013

Daily Means for 2013







Delegation Engagement



"NERACOOS is collecting critical ocean data and providing valuable tools that will help us understand changes in our ocean and their impact on our coasts, fisheries and climate. Their buoy system is the workhouse that drives many important decisions made by fishermen, regulators, offshore wind developers, and recreational users of the Gulf of Maine and beyond" –Senator Angus King (Maine)









Newsletters – Keeping You Informed

- Member and general subscriber newsletters
- Newsletters had 30-40% open rate, industry average is 22%
- 7-9% click rate, industry average 3%
- Stories used by other media and IOOS national communications

NERACOOS News: July 2013

View this email in your browser

NERACOOS News

NORTHEASTERN REGIONAL ASSOCIATION of COASTAL OCEAN OBSERVING SYSTEMS

Delivering ocean information in the Northeast

This Issue: Year 3 Funding New Buoy NERACOOS Fun World Oceans Day Sentinel Monitoring Renewable Energy Right Whales Maritime Day Upcoming Events

NERACOOS Receives \$2.4M in Federal Funding

The US Integrated Ocean Observing System (IOOS) program has awarded NERACOOS \$2.4 million for the third



year of a five year award. The majority of the funds will go to our observing system partners to help maintain and operate the critical ocean observing system infrastructure that many rely on. Funds are also being awarded to NERACOOS for ocean acidification work through the University of New Hampshire and for expanded monitoring of Harmful Algal Blooms through the Woods Hole Oceanographic Institution.

New Buoy in Long Island Sound

Every summer, parts of Long Island Sound experience hypoxia or low oxygen conditions that can be harmful to marine life. Last year the NERACOOS funded buoys in the Sound recorded one of the earliest occurrences of hypoxia in the last 20 years. The buoy array was expanded this year when the EPA funded the University of Connecticut to deploy the ARTG buoy in a part of the Sound that is not as severely impacted by hypoxia. The site of this important new addition to the NERACOOS array was chosen by scientists and managers so that it will be the first to detect the improvements to water quality we expect from regulations adopted by New York and Connecticut. For more information visit the LISICOS or Long Island Sound Study websites.







World Ocean Day Celebration







DATA and RESOURCES for EDUCATORS

onnected to us and e are connected to it. la

The ocean is largely unexplored.

- Continued partnership with NEOSEC
- Created exhibit to highlight Right Whale Research in Stellwagen Bank National Marine Sanctuary
- Finished work as science and technology partner to Families by the Seaside grant
- Integrated drifter program into NERACOOS, sponsored a drifter, lead workshops
- World Oceans Day Celebration focused on Ocean Acidification
- In 2014, look for details on the NEOSEC Ocean Literacy Summit













Drifters

MME and NERACOOS Drifter Building Workshop A Success

MME co-hosted a workshop on March 9 where several educators from around New England built a total of five drifters. The Massachusetts Marine Educators, NERACOOS (Northeastern Regional Association of Coastal and Ocean Observing Systems), and the Northeast Fisheries Science Center hosted the workshop.



Students from the Global Learning Charter Public School (GLCPS) in New Bedford, Massachusetts deployed an ocean drifter this month thanks to NERACOOS. The GLCPS class spent their first semester studying sea surface currents, tides, and waves.

This semester they are learning about marine biology and ecosystems. The drifter data will be used to make connections between the physical and biological components of the ocean. Assembling, deploying, and tracking the drifter will prove how the GLCPS capitalizes on the exceptional resources of our region and tie these resources to their curriculum and instruction.

Student-built, fishermen-deployed, satellite-tracked

"drifters" provide a low-cost way to monitor oceancurrents off the New England coast and beyond. These instruments are constructed according to oceanographic standards to move with the current and report their positions on a regular basis.

Why drifters? One of the primary motivations for drifter deployments is to help validate circulation models. Over the past decade, funding has increased in support of using surface drifters for environmental monitoring that far exceeds the study of surface currents and circulation. Research using drifters has included investigations into plankton dispersal, movement of harmful algal blooms, oil spills, and tidal power assessments.

Drifters are equipped with a beacon that transmits its location to an end-user via satellite, although other environmental sensors may be attached. Teachers work with a local mariner to have the drifter deployed offshore and, in some cases, to retrieve the drifter on remote islands. Shore-based deployments may also be possible.

To learn more about the drifter program, and to see the other schools who built and deployed drifters this year visit http://neracoos.org/drifters and http://www.nefsc.noaa.gov/drifter/.



Students from the GLCPS traveled to the docks in New Bedford to hand off their drifter to a local fishermen on April 3. Credit: Yacheng Wang a student from China working on the project















Recent IOOS related FFOs

- Sensor Technology Innovation
 - Approximately 7 proposals from the Northeast with NERACOOS (I lost count)
- Marine Biodiversity
 Observing Network (MBON)
 - 4 proposal with NERACOOS involvement









This is NERACOOS

- NERACOOS is the trusted source of regional ocean weather and information from Long Island Sound to the Gulf of Maine.
- We are one of eleven regions, the northeast Integrated Ocean Observing System (IOOS)
- We are a network of observers, modelers, forecasters, data managers, and tool developers.
- With our partners we produce practical solutions to real-world problems.
- These protect and enhance peoples' lives, livelihoods, and quality of life.



KEEP MOVING FORWARD

"Around here, however, we don't look backwards for very long. We keep moving forward, opening new doors and doing new things ... and curiosity keeps leading us down new paths."











NERACOOS Membership

We want to thank the following members for their support that will help critical information get to the people who need it.

Sustaining Members:







Supporting Members:







Associate Members:

- Casco Bay Estuary Partnership
- Connecticut Department of Energy and Environmental Protection
- Fisheries and Oceans Canada
- Maine Department of Marine Resources
- Maine Coastal Program
- Marine & Oceanographic Technology Network
- Massachusetts Lobstermen's Association
- Ru Morrison

Affiliates:

- New Hampshire Department of Environmental Services
- U.S. Environmental Protection Agency
- Gulf of Maine Council
- MA Coastal Zone Management

Thank you to our Inaugural Members

