

A Clear View of Tomorrow



We need advanced tools to understand and monitor our coasts and Great Lakes



U.S. Integrated Ocean Observing System (IOOS)

U.S. IOOS[®]

Enables decision making everyday

Fosters advances in science and technology

By:

Linking Federal Agencies with IOOS Regions to increase the # of observations

Leverage information from disparate sources into tailored products

- A national program comprising 17 federal agencies**
- 11 Regional Coastal Ocean Observing Systems**
- Observing, Data management, modeling and analysis**

U.S. IOOS: Program Overview

WHO:



WHAT:

- Observation
- Data Management
- Modeling & Analysis
- Research & Development
- Education
- Management & Governance



WHERE:

Global
Coastal (EEZ to head of tide)

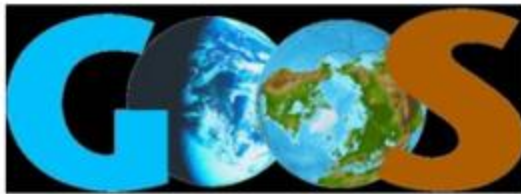
WHY: 7 Societal Goals, 1 System

Predictions of **climate change** and weather
Safety and efficiency of **maritime operations**
Forecasts of **natural hazards**
Improve **homeland security**
Minimize **public health risks**
Protect and restore **healthy coastal ecosystems**
Sustain living marine **resources**

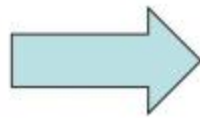


A National Endeavor

But Part of a Global Framework

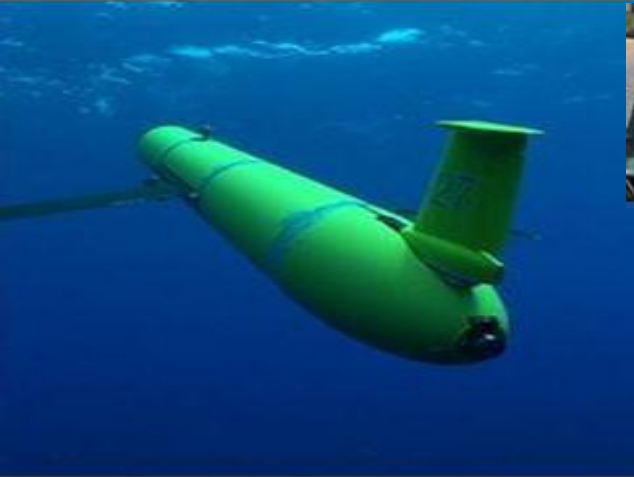
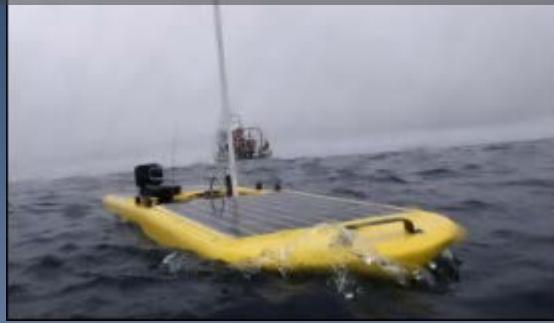


Global Ocean Observing System



Global Earth Observation System of Systems

Eyes on the Oceans, Coasts and Great Lakes

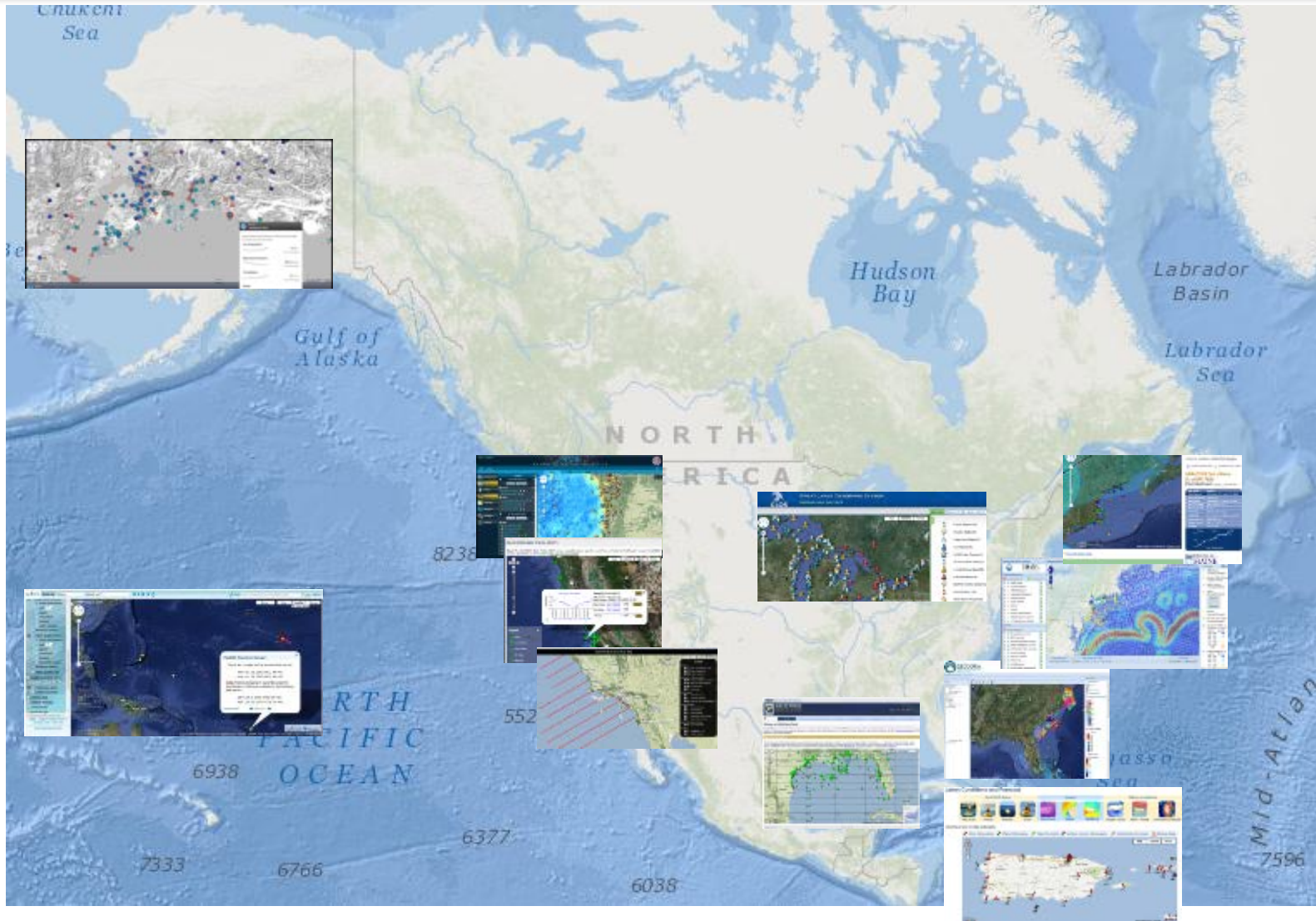


Observing Systems

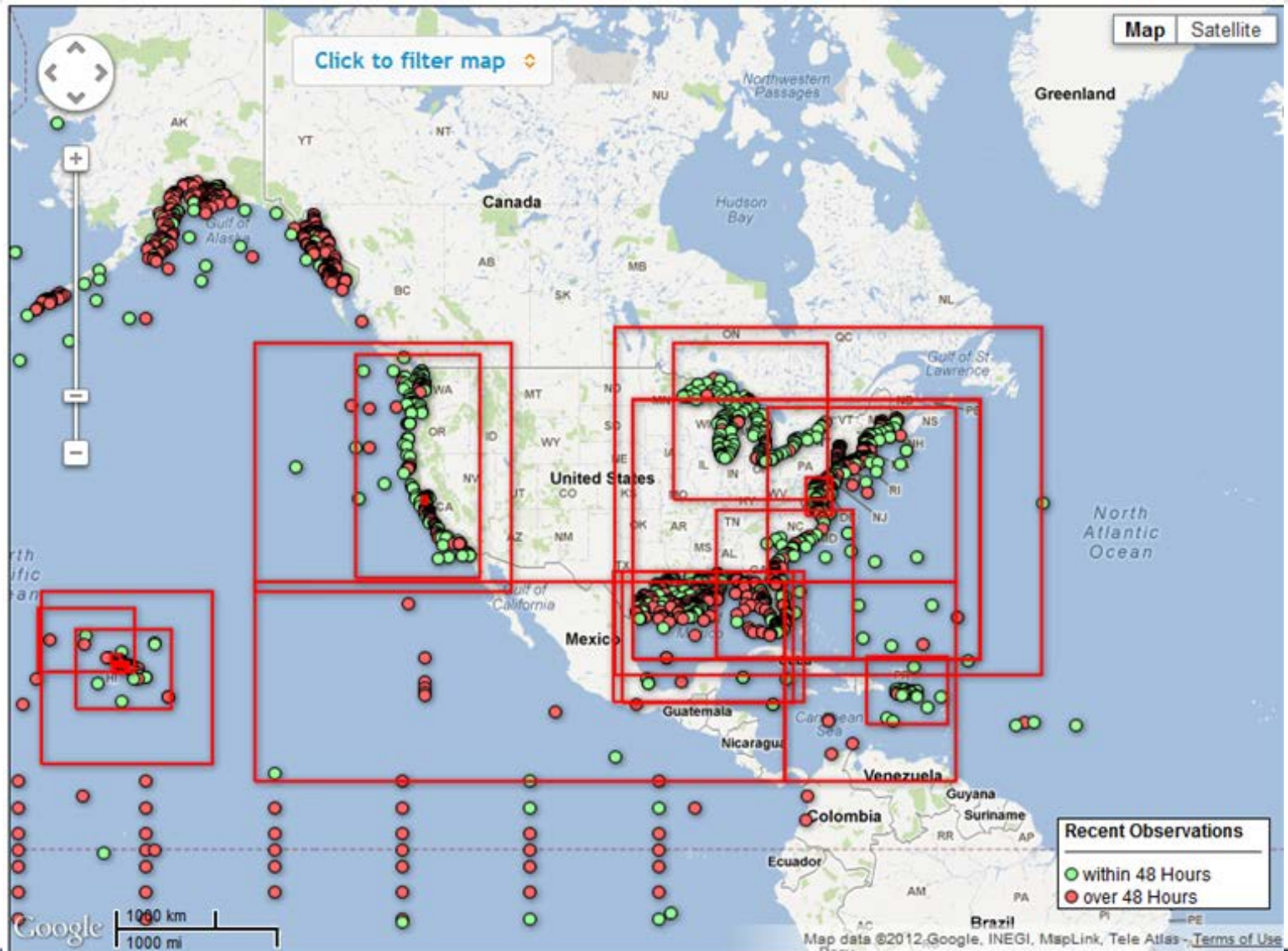


U.S. Integrated Ocean Observing System (IOOS)

Exposing Ocean Information – Regional Scale



At the National Scale



Google Hazard Map



Data Services allow extended reach

Modeling



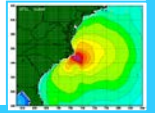
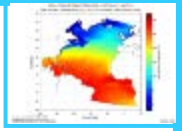
Global Forecast System



Hurricane
GFDL
HWRF

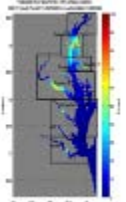
Coupled
↔

Oceans
HYCOM
WaveWatch III

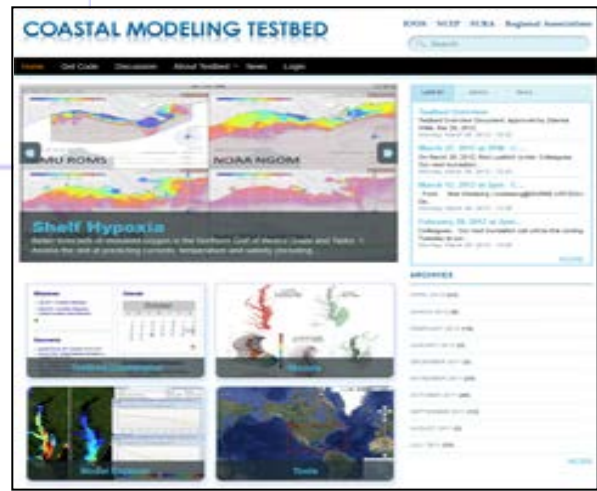
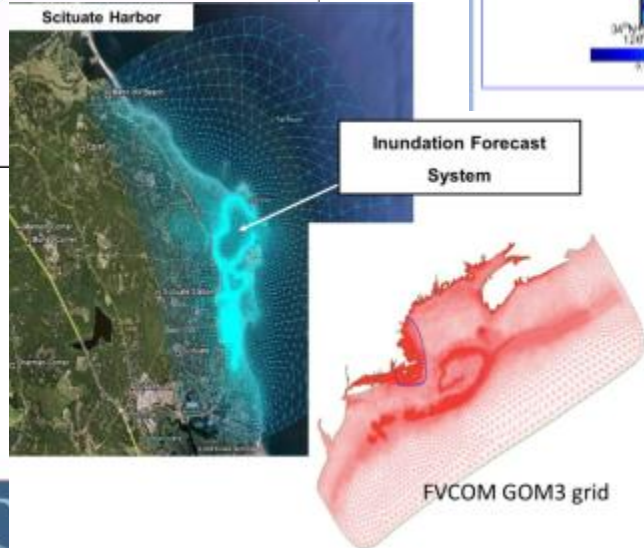
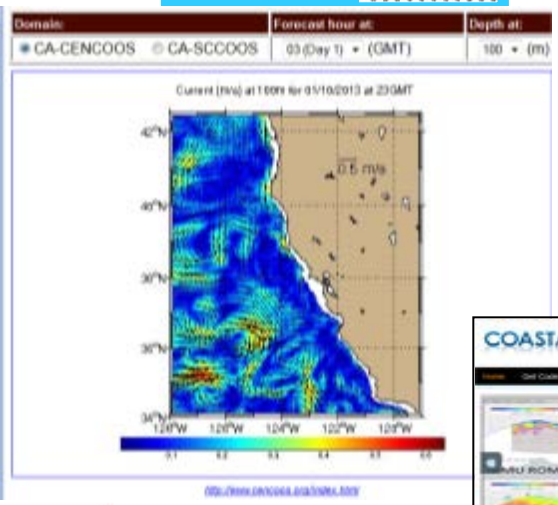
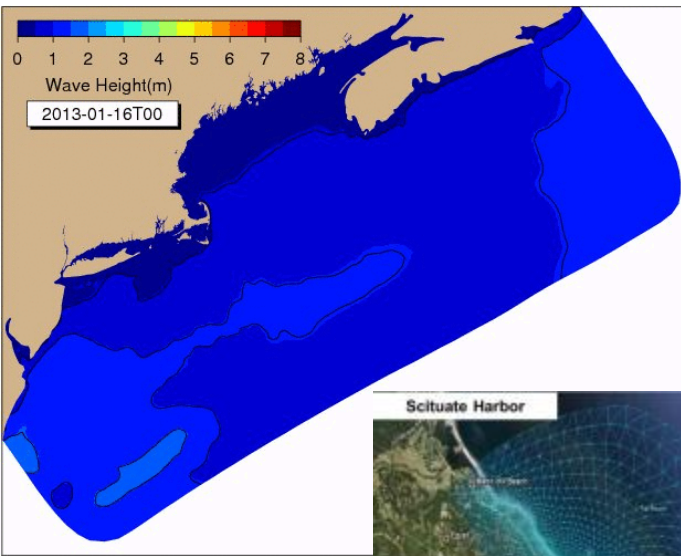


NOS – OFS

- Great Lakes
- Northern Gulf of Mex
- Columbia R. Bays
- Chesapeake
- Tampa
- Delaware

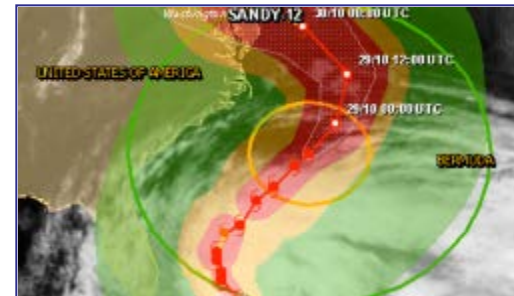


Sea Nettle Forecast



IOOS[®] Response to Sandy

- ❑ IOOS partners' buoys, gliders and other sensors generated hourly updates
 - Wind velocities, wave heights and periods, water levels
 - Air and water temperatures
- ❑ 40+ High Frequency Radars
 - Ocean current data
- ❑ Information shared with National Hurricane Center
- ❑ Generated time critical warnings for local public officials
 - Storm path and flooding updates



IOOS in Motion Everyday



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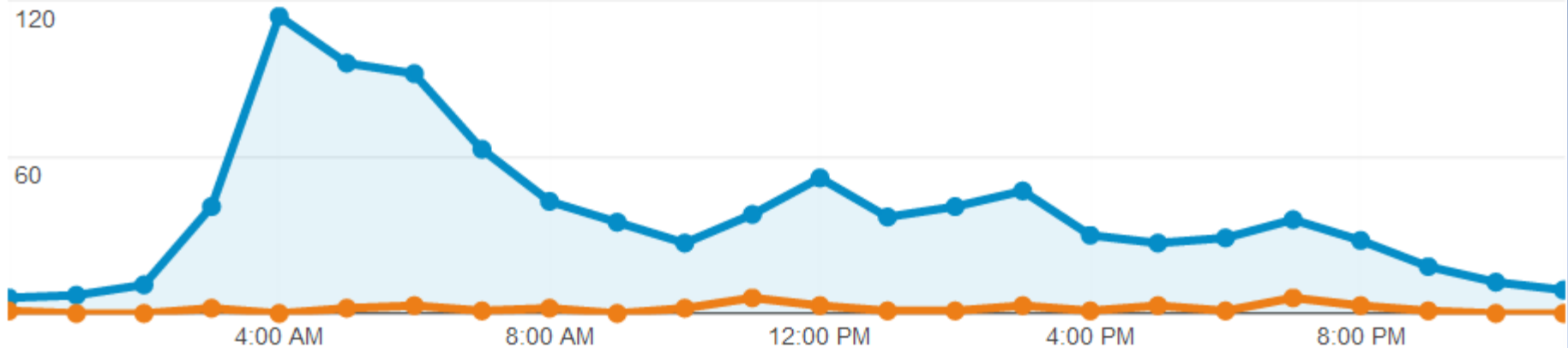


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Dec 3, 2012 - Dec 3, 2012: ● Visits

Dec 3, 2011 - Dec 3, 2011: ● Visits



U.S. Integrated Ocean Observing System (IOOS)

Oysters on the Half Shell



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Little wild set of oysters on US northwest
2008 Whiskey Creek Hatchery lost 100% of oyster larvae
Ocean Acidification was the cause
Real-time Observing System established
By 2010 productivity was back to 70%

U.S. Integrated Ocean Observing System (IOOS)

Maritime Transportation-Southern California

Site SP001 - info
San Pedro Harbor
Site 001

Data Tables
Parameter
9-band energy
9-band direction

Daily & Weekly Plots
Waves - 1 day
Waves - 1 week
Wave forecast

Simulated Time Series
Z displacement values
Z displacement plot

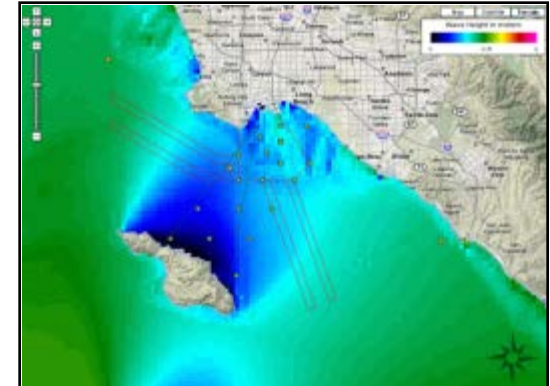
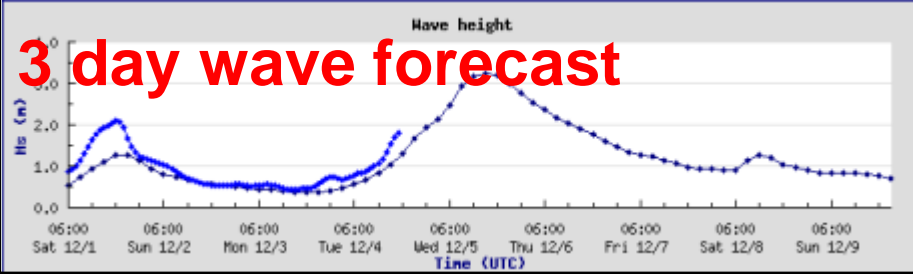

Latest Model Run
9-band plot
Spectral plot
Directional spectrum
Spectral file

Descriptions/Help

Summary Table
Location Map

Site ID: **SP001**

- Location: 33 41.10 N 118 14.22 W (33.6850 - 118.2370)
- Water depth: 999.9 m (3281 ft, 547 fm)
- Modeled parameters: wave energy, wave direction



CDIP provides waves

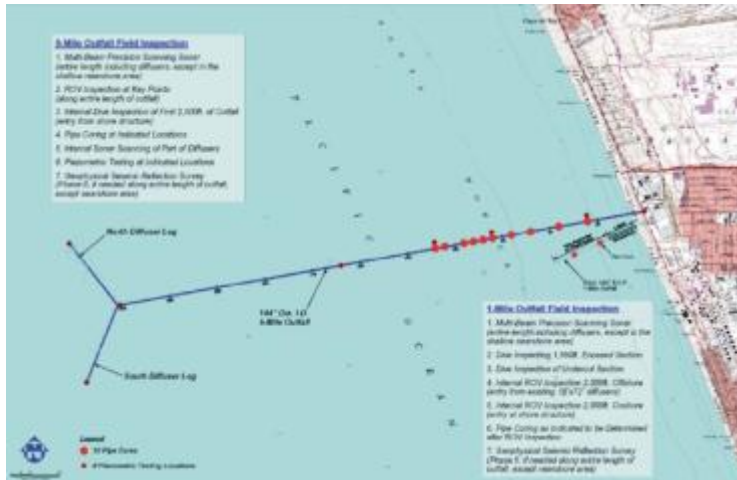


SCCOOS provides currents

Automated notification when thresholds exceeded

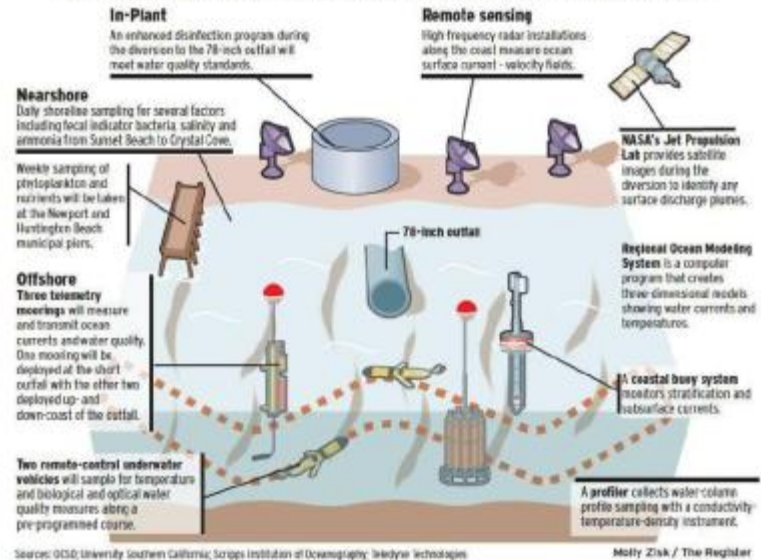
Supporting Sanitation Districts

November 28-30, 2006



Monitoring water from above and below

The Orange County Sanitation District is diverting wastewater discharge from its main outfall pipe, 4 1/2 miles offshore, to a shorter, secondary outfall pipe that extends only a mile offshore. That is giving scientists a chance to measure the effects of the treated effluent on algae and other ocean organisms. Boats towing sensors will be part of the extensive ocean monitoring to track the movement of the wastewater plume.



- Inspection of Hyperion Outfall Pipe - never internally inspected for 50 years
- Serves City of Los Angeles. One of the world's largest coastal populations.
- ~ billion gallons of sewage to be diverted to an in-shore/shallow outfall.
- Concern of extent of impact and public health risk in the Santa Monica Bay

Research Assets Map

What instruments are deployed and what are they collecting?

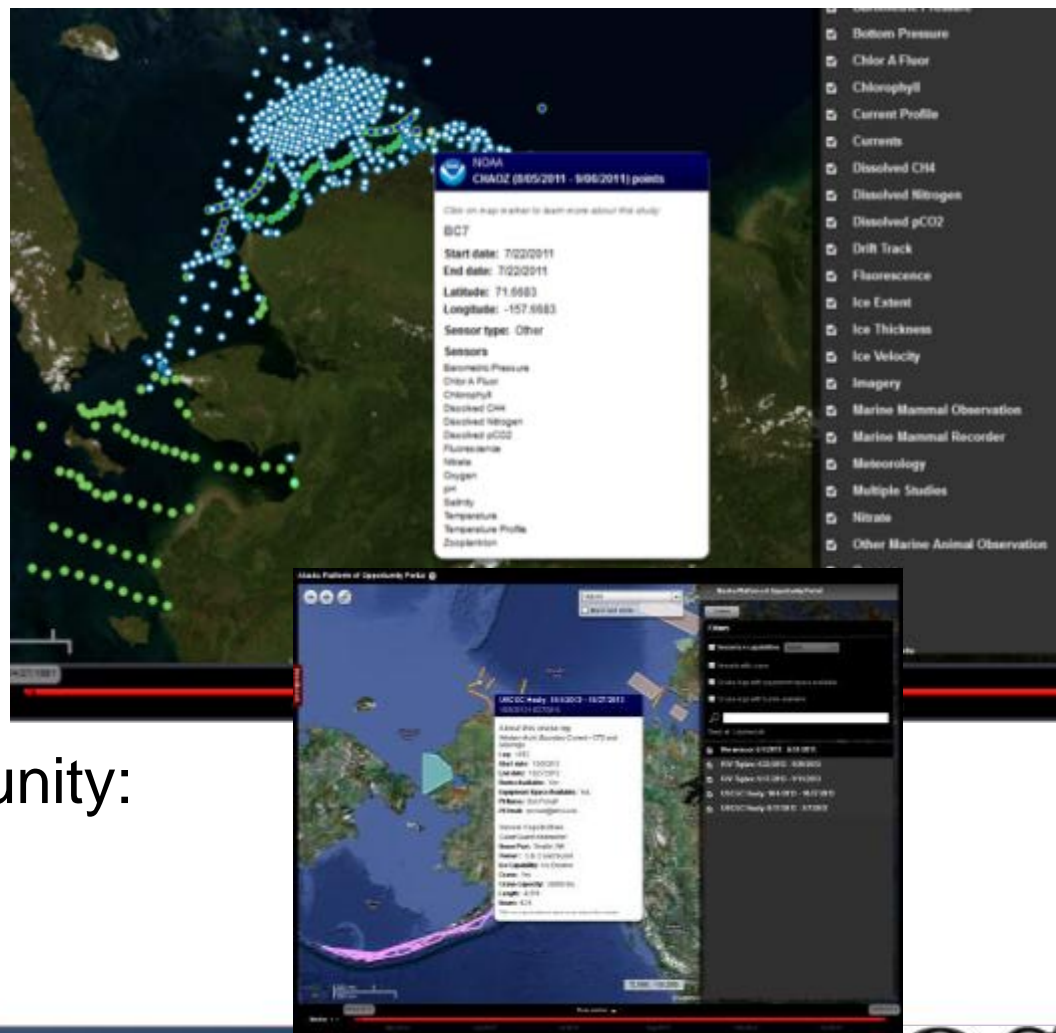
Goals of the map

- Assist research planning
- Reduce duplication of effort
- Avoid collisions
- See holistic picture

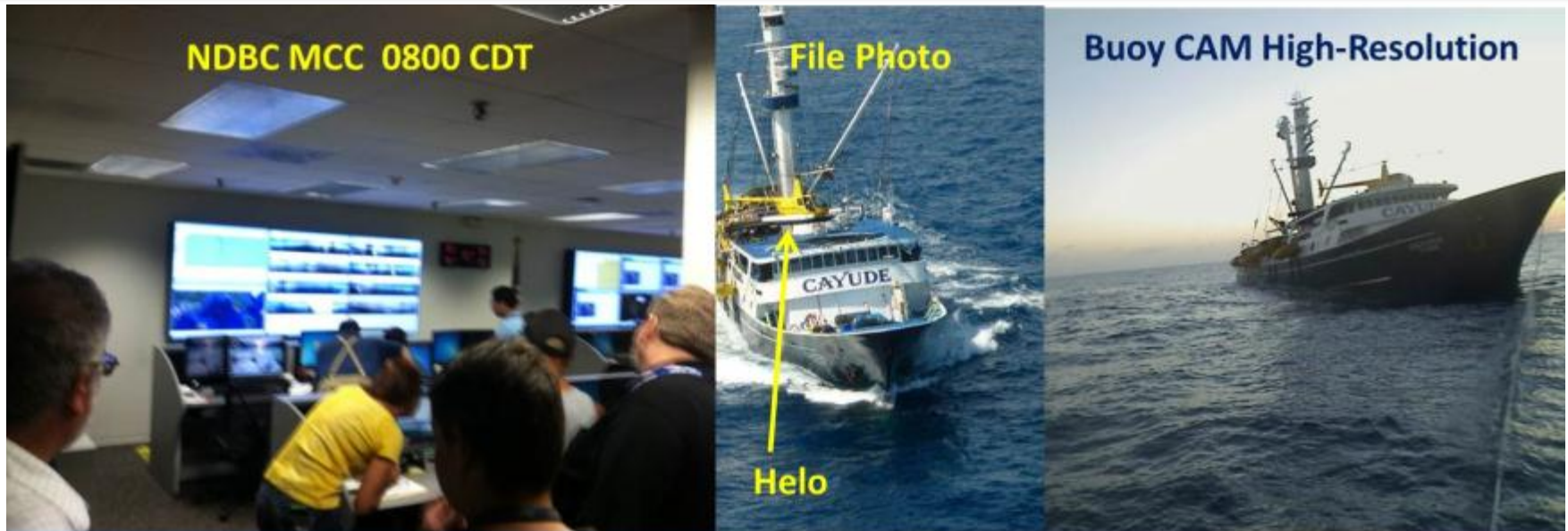
Started in the Arctic,
now expanding statewide

Includes Platform of Opportunity:

- Research vessel schedules & opportunities



NDBC Counter Vandalism Program in Action



May 13 17:41 CDT - Buoy CAM Showing slack "Sling Shot" Line Attached to TAO Buoy



May 14 06:41 CDT - Venezuelan Vessel CAYUDE with Line Attached to TAO Buoy

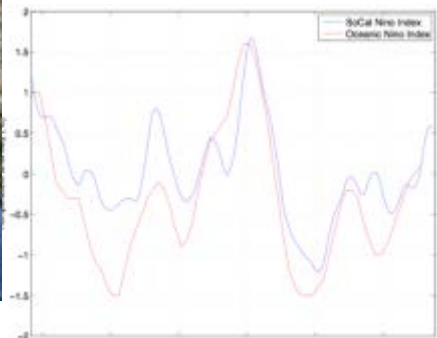


Glider Missions

Climate/Ecosystem/Fisheries Management/Water Quality



CalCOFI



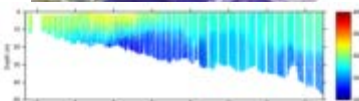
The SoCal Niño Index



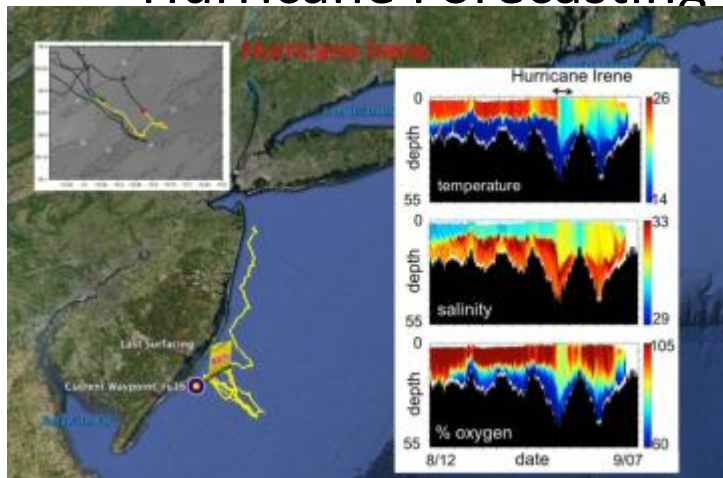
Fish Tracking



HAB



Hurricane Forecasting



Response to Oil Spill

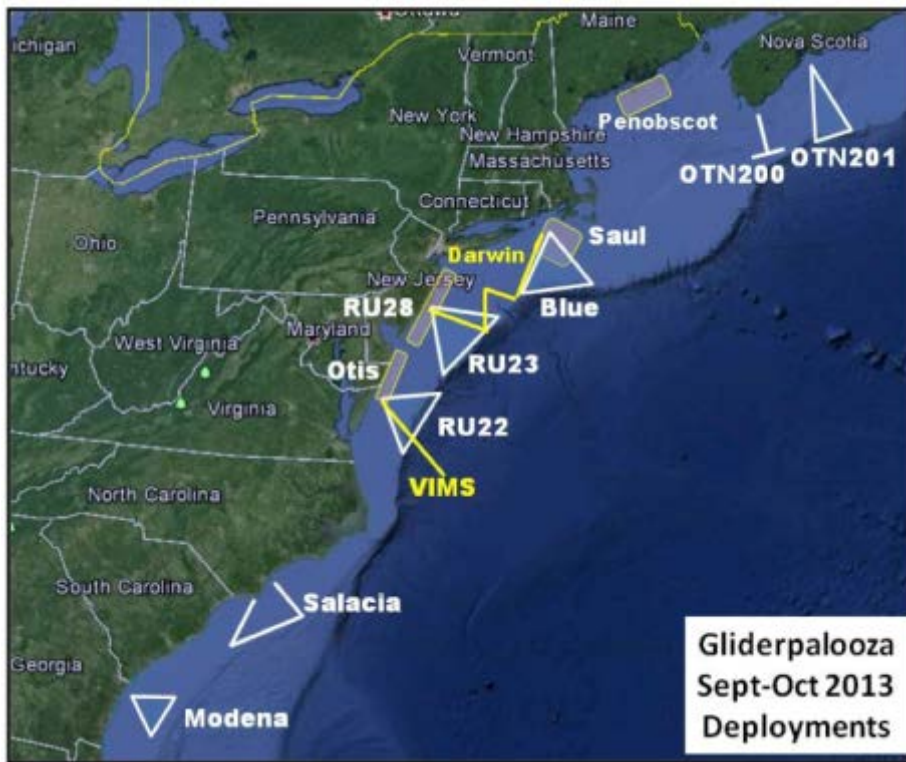


Deep Water Horizon



Alaska

Gliderpalooza



- US IOOS effort
- 15 gliders
- 15 Partners:
 - Ocean Tracking Network, Canada;
 - University of Maine; Woods Hole Oceanographic Institution, University of Massachusetts, Rutgers University, University of Delaware, University of Maryland, College of William and Mary, North Carolina State University, University of Georgia
 - Teledyne Webb Research Corporation
 - New Jersey Department of Environmental Protection
 - IOOS Northeast, Mid-Atlantic, Southeastern Regions
 - NOAA, US Navy, NASA
- >21,000 profiles to date

U.S. IOOS - High Frequency Radar Network

Stakeholders

- > 30 institutions operate HF Radars; used by >40 government/private entities

Who Depends on it

- USCG Search and Rescue: Oil spill response
- Water quality; Criminal forensics
- Commercial marine navigation
- Offshore energy; Harmful algal blooms
- Marine fisheries
- Emerging - Maritime Domain Awareness
- Emerging – Tsuna



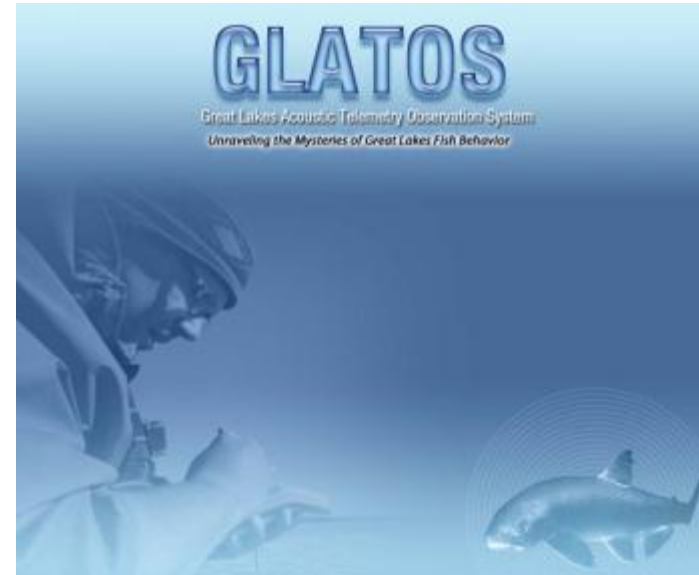
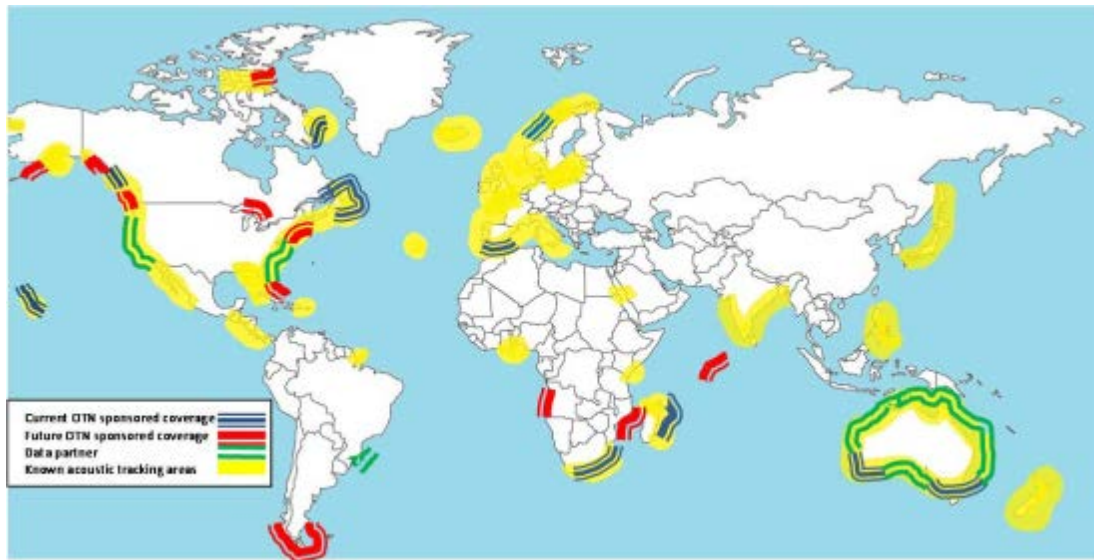
Decreases search area by 66% in 96 hours

HF Radar - International



- **Global HF Radar Network**
- **Under the Group Earth Observations (GEO)**
 - 88 Member governments and the European Commission, 61 Participating Organizations
- **GEO work plan 2012-2015**
- **2012: Oceanology International & 1st Ocean Radar Conference for Asia**
- **Goals:**
 - Transform individual HF Radar networks into a global system where we can provide high quality HF Radar for a range of used.
 - Development of easy to use standard products
 - Assimilate HF Radar data into models
 - Development of easy to use standard products

Animal Telemetry Network

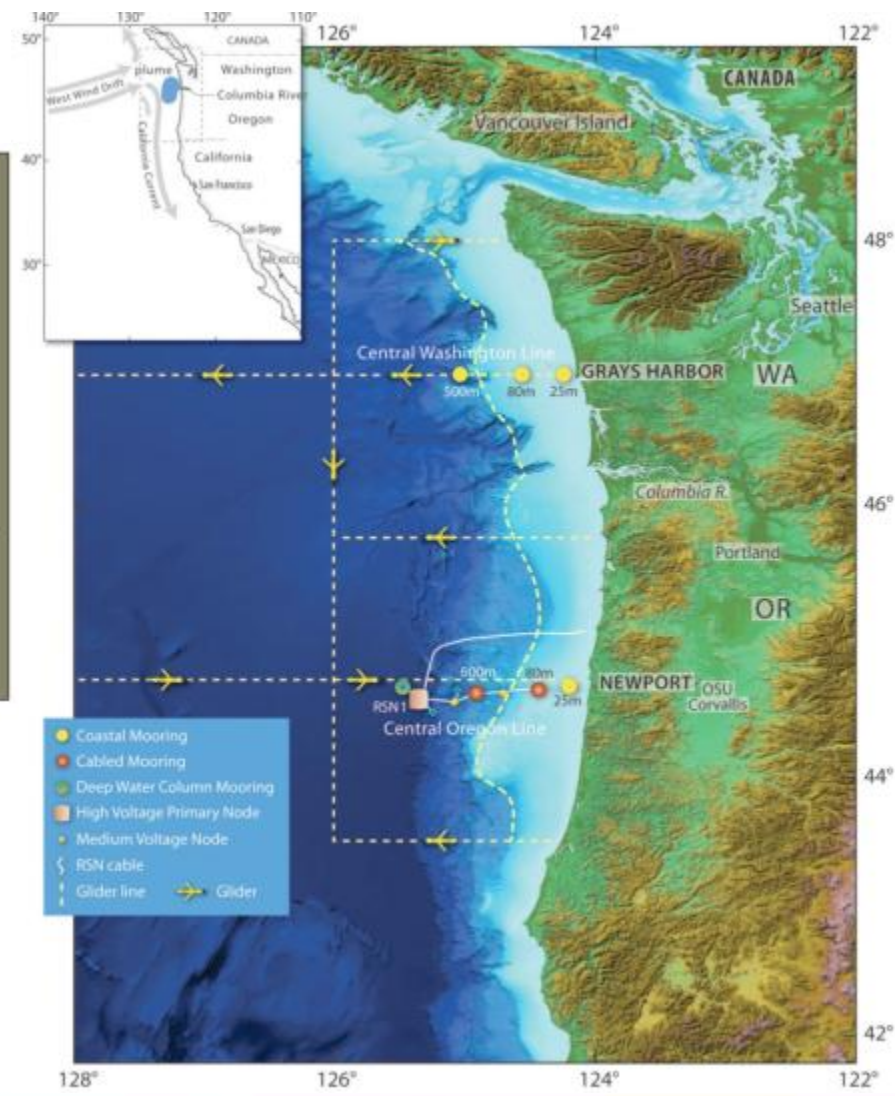
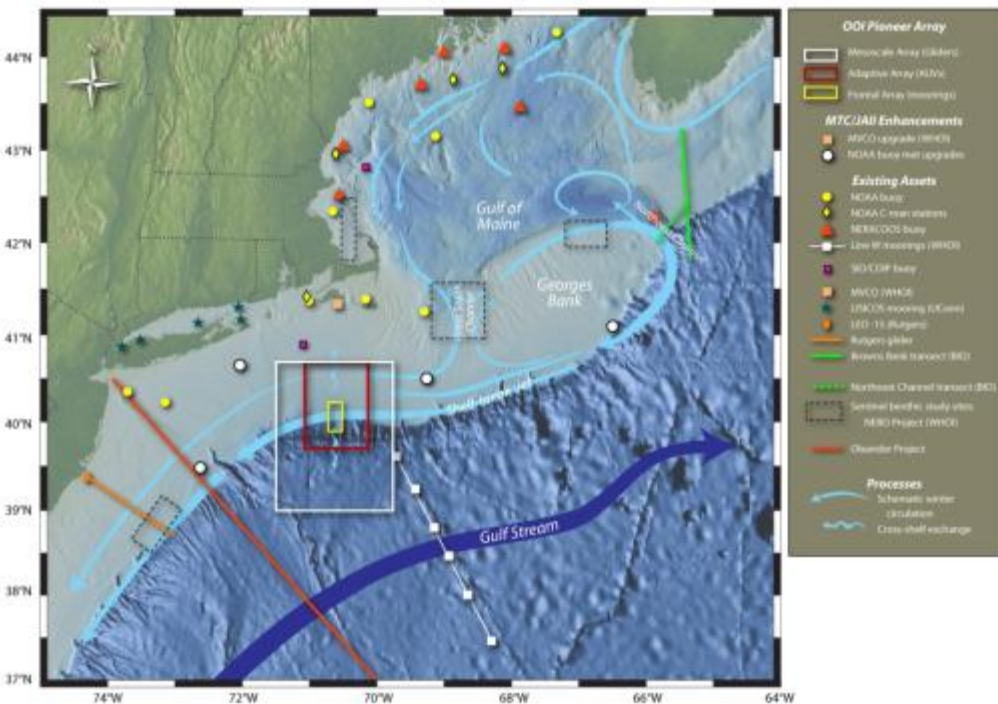


Ocean Tracking Network, current and proposed deployments

- US IOOS
 - Focused on data management
 - Biological definitions and metadata for satellite and acoustic tags
 - Info: http://www.ioos.noaa.gov/biological_observations/welcome.html
- Partner with Ocean Tracking Network - global

National Science Foundation – Ocean Observatories Initiative

Coastal Node

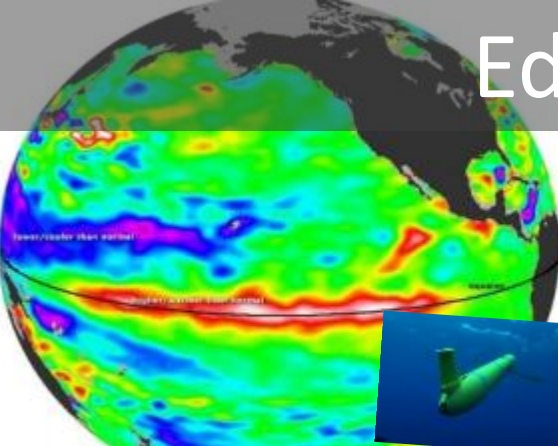


Marine Sensor Innovation Project

- Began in FY13
- Three elements
 - Alliance for Coastal Technologies (ACT)
 - Sensor Evaluation
 - U.S. IOOS Coastal Ocean Modeling Testbed (COMT)
 - Continuing efforts to advance research to operations
 - Marine sensor and other advanced observing technologies
 - Transition to Operations: Environmental Sample Processor
 - Ocean Acidification: Support for West Coast Shellfish Industry
- FY14 Funding Opportunity
 - Focused on technologies ready to transition
 - Partnership with operational customers; IOOS Regions and Industry

Education and Outreach

Graduate and Undergraduate students are integrated – good for IOOS now and good for industry for future employees



Teaching the next generation – Puerto Rico Weather Camp 2012



Basic Observational Buoy (BOB)
Educational project for universities and high schools to address STEM disciplines



Marine Technology Industry Study

- ERISS Corporation and The Maritime Alliance
- Baseline inventory of companies classified as providers and intermediaries
- Narratives by companies on how IOOS has helped their operations, planning, and growth, and perceived potential for future growth and investment



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Welcome to the US IOOS® Impact Study of the Marine Technology Sector

DOES YOUR COMPANY PROVIDE TECHNOLOGY TO THE US IOOS OR HAVE A PRODUCT THAT UTILIZES US IOOS DATA? WE WOULD LIKE TO HEAR FROM YOU.

The U.S. Integrated Ocean Observing System (IOOS, www.ioos.gov) has awarded ERISS Corporation the funds to work with [The Maritime Alliance](http://www.maritimealliance.org) on a study that will articulate the economic impact of the ocean observation sector in the U.S. This nationally-focused study will inventory companies classified as providers of technology to US IOOS and intermediate users of US IOOS information that sell it to end users. The study will address items such as: number of companies in each category (provider and intermediate user), size of these companies, volume of activity, volume of exports, and number of employees. The study will include narratives by companies on how US IOOS has helped their operations, planning, and growth, as well as perceived potential for future growth and investment. The study began September 2013.

U.S. IOOS is comprised of 17 federal agencies, 11 regional associations (RAs), and a technology verification and validation organization (the Alliance for Coastal Technologies (ACT)). Additional partners include a large and growing number of organizations including industry, academia, state, local, and tribal governments, and other federal and non-federal organizations.

[Click HERE to tell us about your experiences with the IOOS or to opt in to the study.](#)

Your participation is critical in order to assess the impact of this valuable system.

For further information on this study, please contact The Maritime Alliance Executive Director Bill Riedy at briedy@TheMaritimeAlliance.org / (619) 450-4600 x182 or the President Michael Jones at mjones@TheMaritimeAlliance.org / x142.

<http://www.usworks.com/usioos/>

Thank You

Please Visit the U.S. IOOS Website

ioos.noaa.gov

