Lead Federal Agency Report to the Committee

Zdenka Willis
Director, U.S. IOOS Program Office
2 December 2010

INTEGRATED OCEAN OBSERVING SYSTEM

IOOS®

ICOOS Act §12304(C)(3)(L)

U.S. IOOS Programmatics

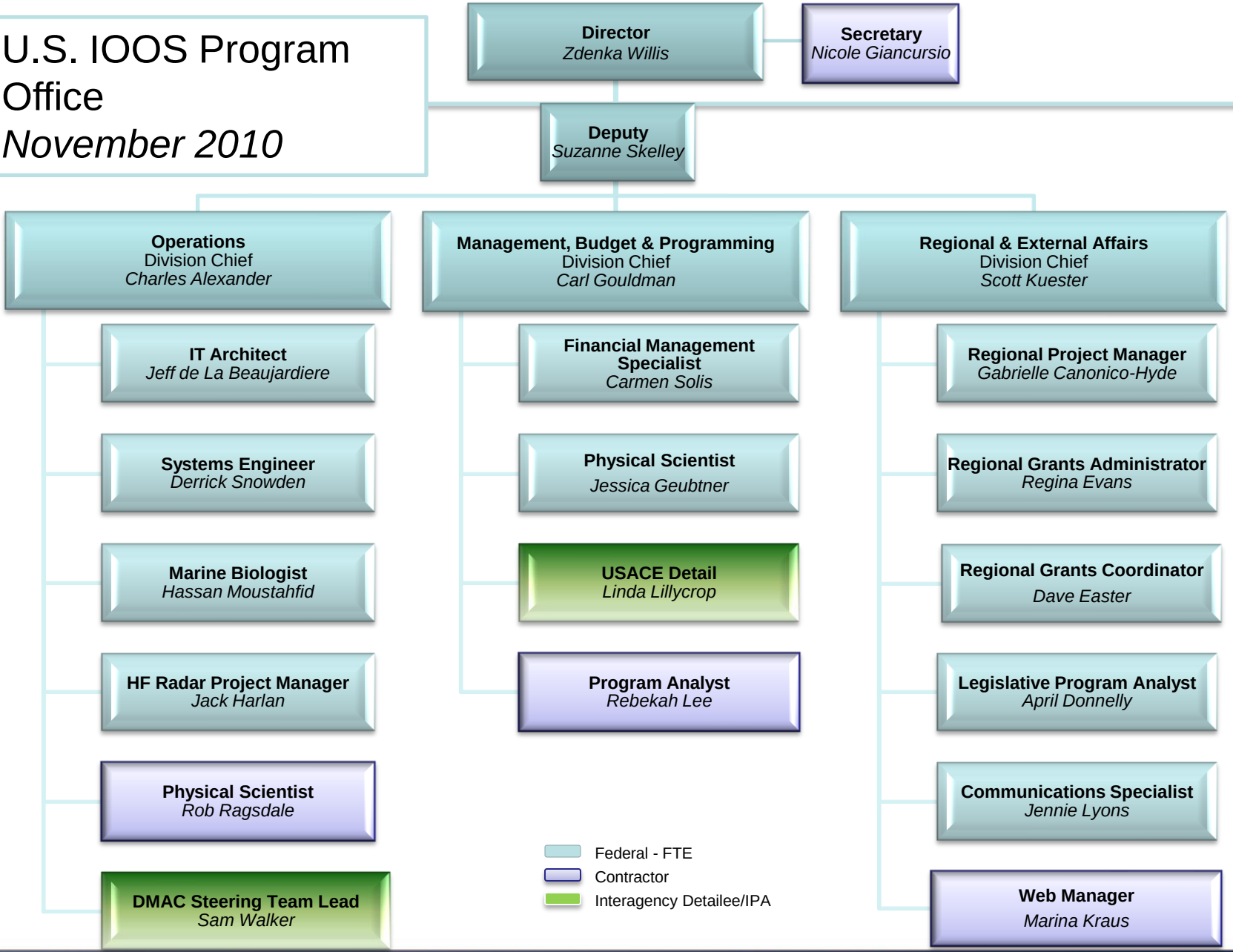
National Component

Regional Component

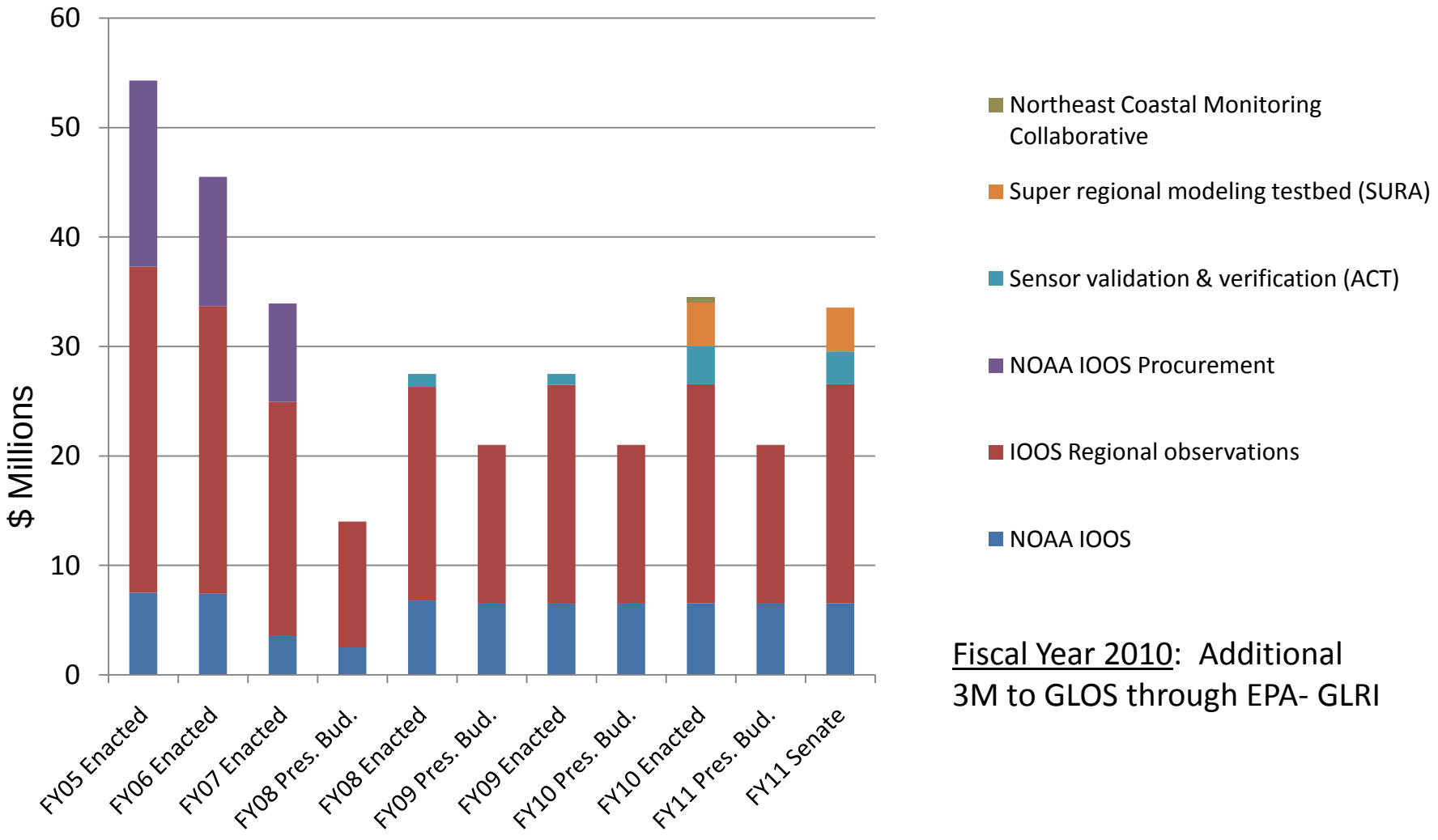
Interagency Collaboration

Challenges

U.S. IOOS Program Office
November 2010

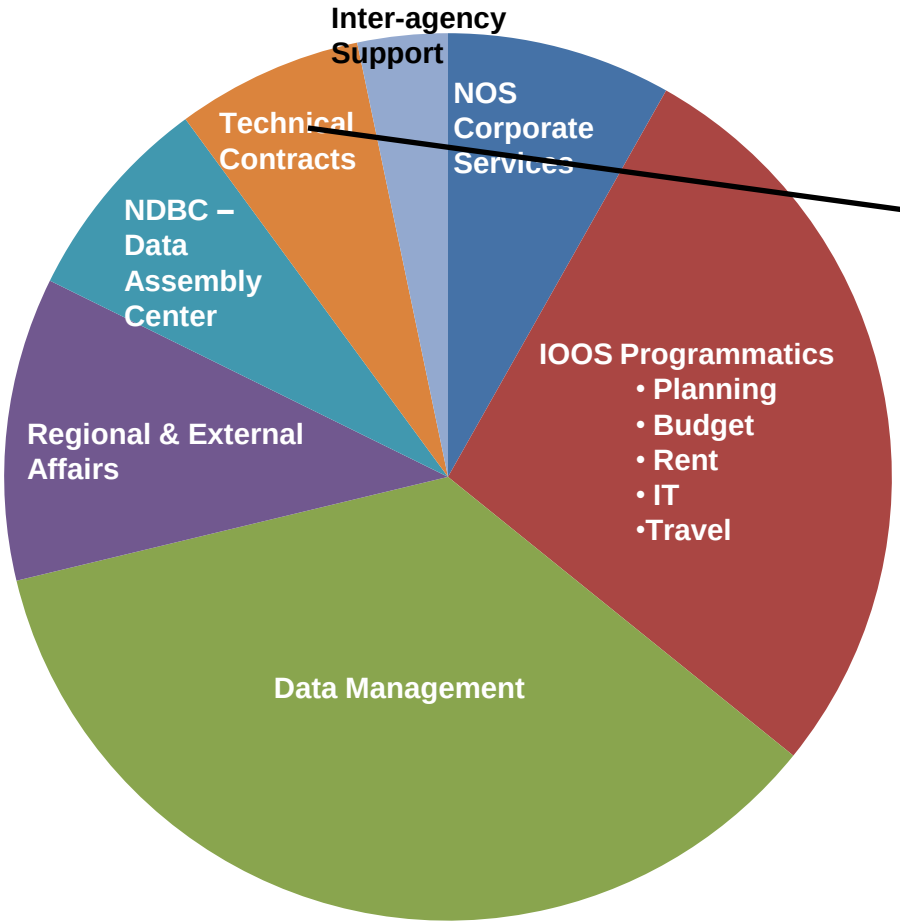


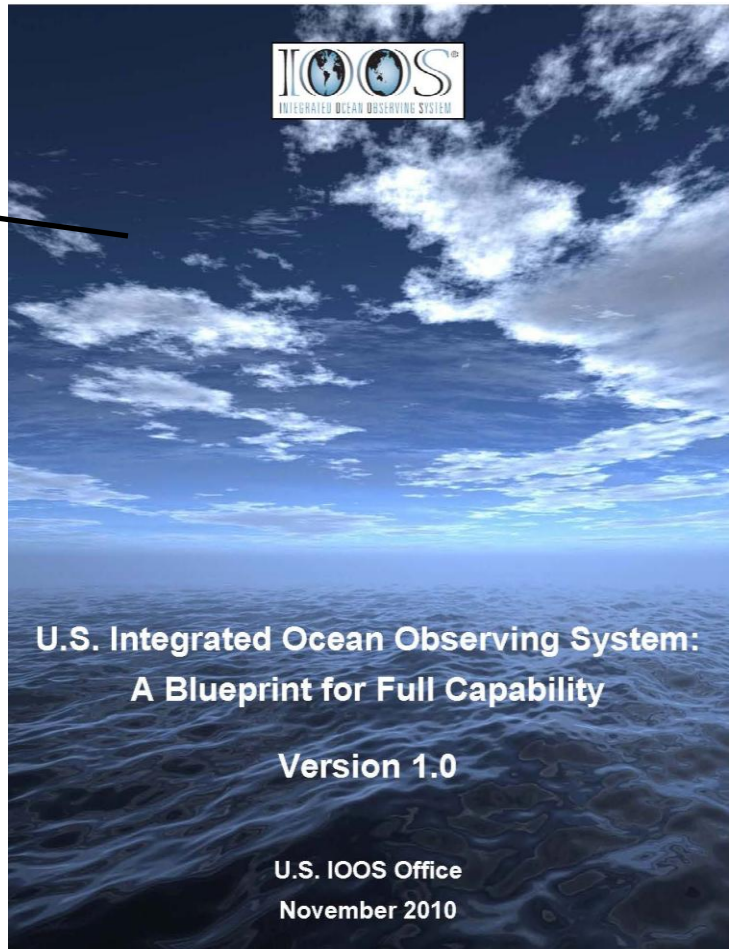
IOOS Funding History



Fiscal Year 2010: Additional 3M to GLOS through EPA- GLRI

National Office Summary





IOOS Programmatics

- Budget Formulation through NOAA, DOC, & OMB
  - New NOAA budgeting process
  - Input to NOAA's new Strategic Plan
- Regional Oversight
  - FY10 limited geography competition
    - Processed 27 awards, 6 supplemental awards
    - Processed 24 administrative changes
  - FY10 FFO to modeling testbed
  - FY11 FFO – includes NASA, DOE, ONR in specific themes
  - Regional Fact Sheets compiled annually; online @ IOOS.gov
  - Coordinate NFRA Annual Meeting and Visits
- Daily Grind: Responds to 5+ taskings a week
  - Congressional member inquiries
  - Questions for the Record for Congressional hearings
  - Talking points for senior officials' travel, as well as Washington meetings by Regional Associations Reps
  - Funding levels or other budgetary information related to IOOS requested by Congressional Members, NOAA, or Department officials

Programmatics: ICOOS Act Implementation

- Establish Program Office
- Implement merit-based competitive funds
- Congressional Report
- System Advisory Committee
- Public/Private Policy Process
- Certification Criteria

ICOOS Act Governance and Required Activities	Council	Committee	Lead Federal Agency	RICEs	Federal Agencies
Establish a National Integrated Coastal and Ocean Observation System	●				
Develop and publish a Public Private Use policy	●				
Develop and transmit annual and long term plans and budgets (pdf, Nov 2010)	●	●			
Establish observation data variables (pdf, Nov 2010)		●			
Develop certification standards, compliance procedures and program guidelines (pdf, Nov 2010)		●	●		
Establish process and observation coverage gaps or capital improvement needs (pdf, Nov 2010)		●	●	●	
Obtain independent cost estimate (pdf, Nov 2010)		●	●		●
Establish an IOOS Program Office within NOAA (pdf, Sept 2010)			●		
Review and evaluate non-federal assets (pdf, Sept 2010)			●		
Implement a merit-based competitive funding process to support non-federal assets (pdf, Sept 2010)			✓		
Establish protocols for and develop a data management and communication system (pdf, Nov 2010)		●	●		
Implement a public education and outreach program (pdf, Sept 2010)			●		
Establish a system advisory committee (pdf, Sept 2010)			●		
Respond to reporting requirements (pdf, Sept 2010)			●		
Demonstrate capable organizational structure and operate under a strategic operational plan				●	
Additional Required Activities (10 items)	Click here for further details				

USACE: 1st Agency

- **Foundational Documents**
- **IOOS Blueprint**
- **Assessment**
- **Negotiations, Plans and Agreements**
- **Implementation**

Involvement in U.S. GEO

White House (OSTP) report to Congress calls out IOOS:
"Achieving and Sustaining Earth Observations: A Preliminary Plan Based on a Strategic Assessment by the U.S. Group on Earth Observations"

- Zdenka Willis is the NOAA rep to US GEO
- Engagement with US GEO agencies
  - Same as IOOC agencies, but
  - Different people at the table
- US GEO drafting new work plan for 2011
- Work plan to reflect need for stronger ocean and coastal representation in GEO

Communications

- IOOS produced 11 background papers

In FY2010:

- Wrote 5 press releases
- Sponsored sessions at:
  - AGU Sciences
  - Oceanology International
  - EU Maritime Stakeholder Conf
  - AGU Americas
  - CA World Ocean Conf
  - MTS Oceans 2010
  - West Coast Ocean Acidification Workshop

IOOS® INTEGRATED OCEAN OBSERVING SYSTEM

Linking IOOS® to the National Water Quality Monitoring Network

Improving Water Quality Nationwide

Overview:
Our inland water systems contribute to the overall health of our oceans, coasts, and Great Lakes. Contaminants and sediments can travel for miles, impacting our watersheds, coasts and oceans. To monitor waters long term - including inland and coastal areas - a new system was needed to better understand water quality status and trends to reduce the impacts people and their activities have on our waters.

What is IOOS?
The Integrated Ocean Observing System (IOOS) is a federal, regional, and private sector partnership providing new tools and forecasts to improve safety, the economy, and our environment. The effort includes 17 federal agencies and 11 regions.

Integrated ocean information is now available in near real time, and retrospectively. Easier and better access to this information is improving our ability to understand and predict ecosystem events such as habitat degradation, harmful algal blooms, and beach closures. This knowledge is used for management decisions such as earlier and more accurate forecasts for harmful contaminants that threaten fish populations and recreational use of our waters.

A national monitoring network will improve management of our waters - from inland to coasts to oceans. The Advisory Committee on Water Information and the National Water Quality Monitoring Council developed the initial design for a National Water Quality Monitoring Network. This photo shows how the Network can track substances such as the algae shown here in Lake Erie.

What is the Network?
The National Water Quality Monitoring Network (the Network) is an integrated approach to addressing a range of resource issues, from upland watersheds to offshore waters.

The nation's coastal bays and estuaries may require beach and shellfish bed closures due to problems such as pathogens, oxygen depletion, nutrient over-enrichment, toxic contamination, sedimentation, habitat degradation, and invasive species.

The Network supports ecosystem-based management by monitoring water quality. This allows better management of aquatic resources to avoid problems like dead zones, intrusion of invasive species, and loss of wetlands.

The Network will coordinate and expand on existing monitoring of both coastal and upland areas and provide scientific information to support management decisions.

The plan is a multi-year effort consisting of four phases: network design; completion

U.S. Department of Commerce
The National Oceanic & Atmospheric Administration
Integrated Ocean Observing System (IOOS®) Program
www.ioos.gov
February 2009

U.S. IOOS Programmatics

National Component

Regional Component

Interagency Collaboration

Challenges

DIF Project: Completed - Results

- 7 IOOS variables, 4 theme areas, IOOS Regions
- Standard data services operating at NOAA's NDBC, CO-OPS, CoastWatch, and 9 of the 11 IOOS Regions
- Successfully operational ocean data into NOAA’s National Center for Environmental Prediction's (NCEP) operational data "tanks.”
- Enhanced understanding of the effect of improved ocean state information on hurricane intensity
- Winds/Water Level integrated into Sea, Lake and Overland Surges from Hurricanes (SLOSH)
- Enhanced operational HAB-FS bulletin software, which integrates IOOS in-situ currents observations to assist analysts in HAB forecasting.

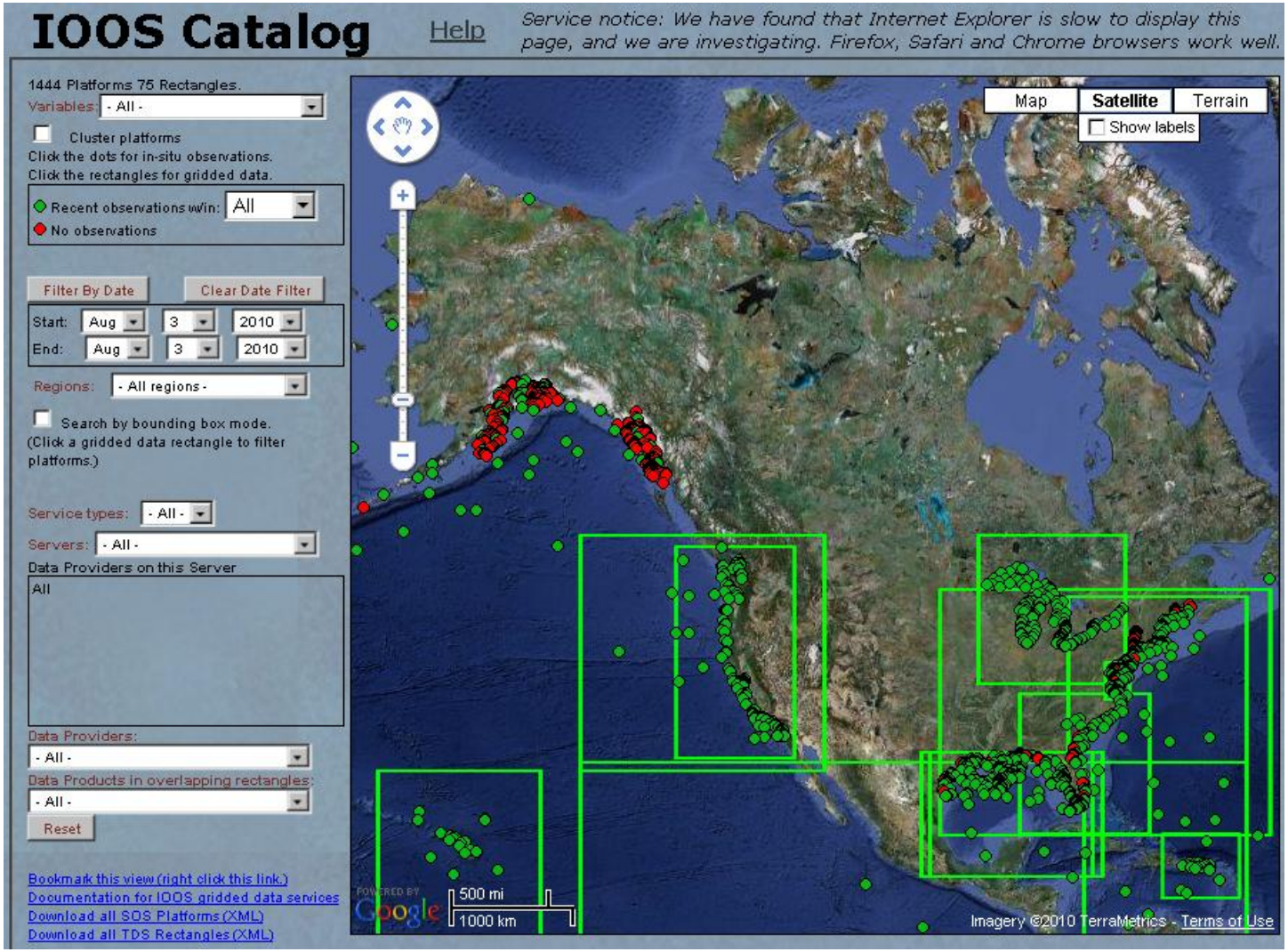
- With completion of the DIF we have transition to U.S. DMAC V 0.9.

IOOS Core Variables

1. **Temperature**
2. **Salinity**
3. **Water level**
4. **Currents**
5. **Surface Waves**
6. **Surface Winds**
7. **Ocean color**
8. **Dissolved oxygen**
9. **pH**
10. **pCO_2**
11. Heat flux
12. Bottom character
13. Pathogens
14. Bathymetry
15. Ice distribution
16. Contaminants
17. Stream flow
18. **Dissolved nutrients**
19. **Optical properties**
20. **Total suspended matter**
21. **Colored dissolved organic matter**
22. **Fish species**
23. **Fish abundance**
24. Zooplankton species
25. Phytoplankton species
26. Zooplankton abundance

2010 (7)
2011 anticipated (8)
2011 maybe (1)

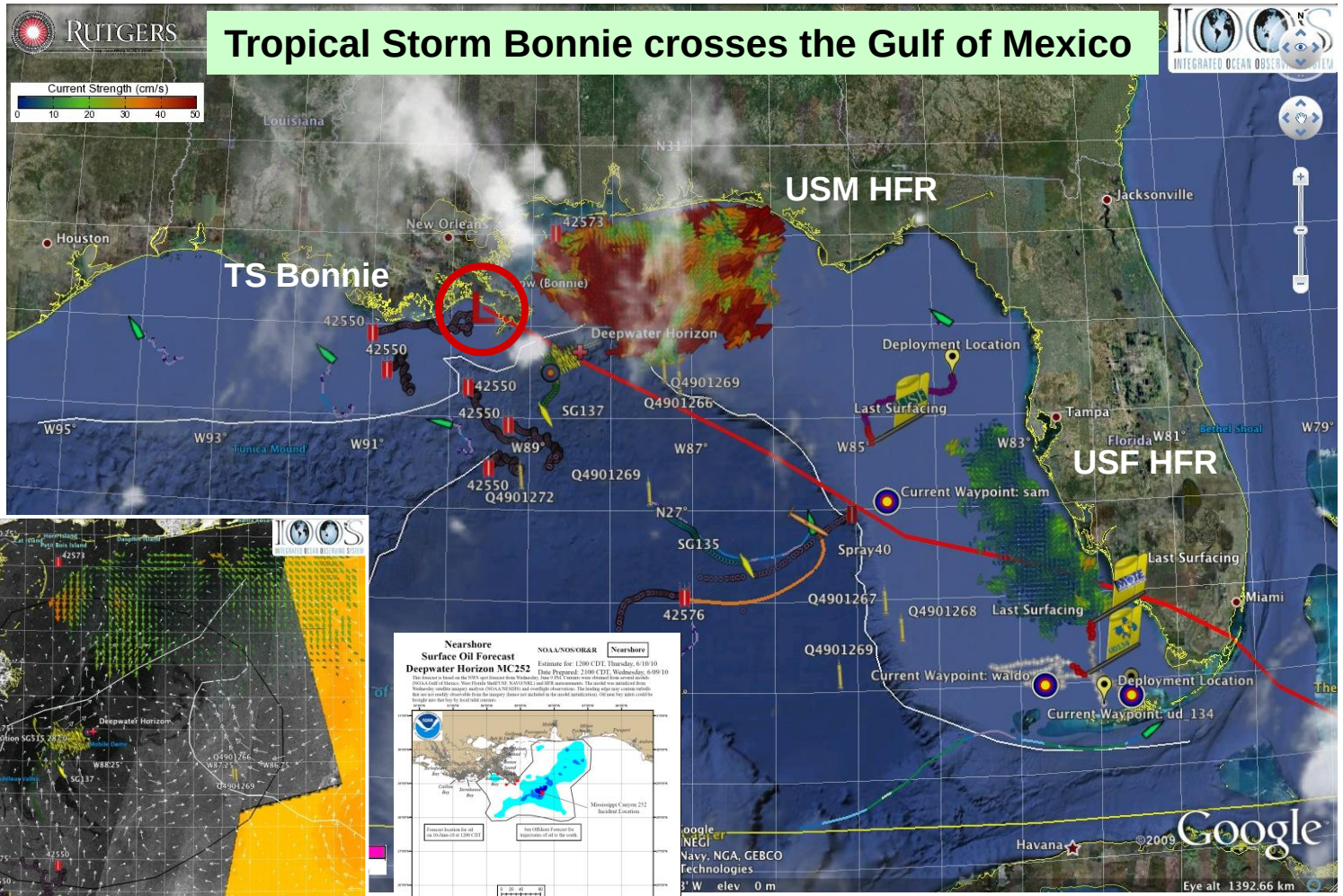
Data Integration – Support National and Regional Needs

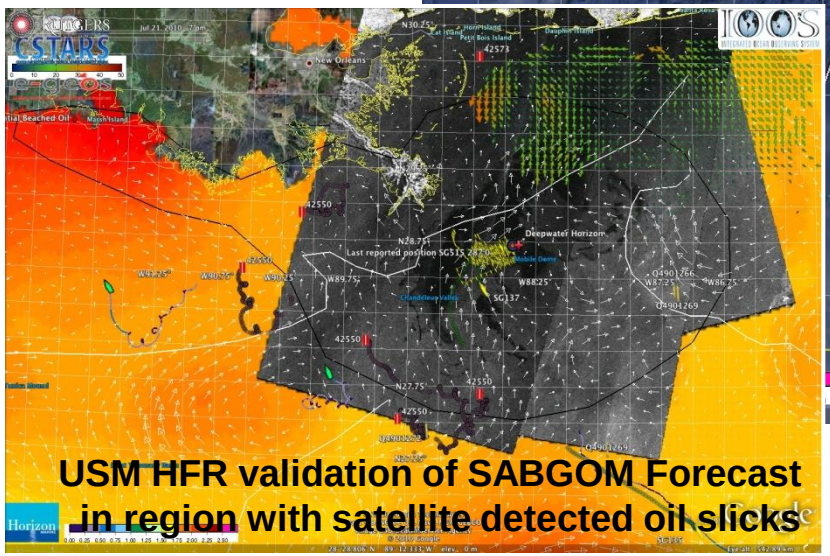


IOOS Coordinated Rapid Response: *Deepwater Horizon Oil Spill*

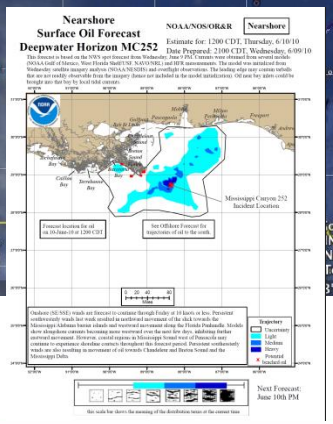
Contributed Assets:

HF Radar Networks
USF, USM
Gliders
iRobot, Mote, Rutgers, SIO/WHOI, UDel, USF
Drifters & Profilers
Horizon Marine, Navy
Satellite Imagery
CSTARS, UDel
Ocean Forecasts
Navy, NCSU
Data/Web Services
ASA, Rutgers, SIO





USM HFR validation of SABGOM Forecast in region with satellite detected oil slicks

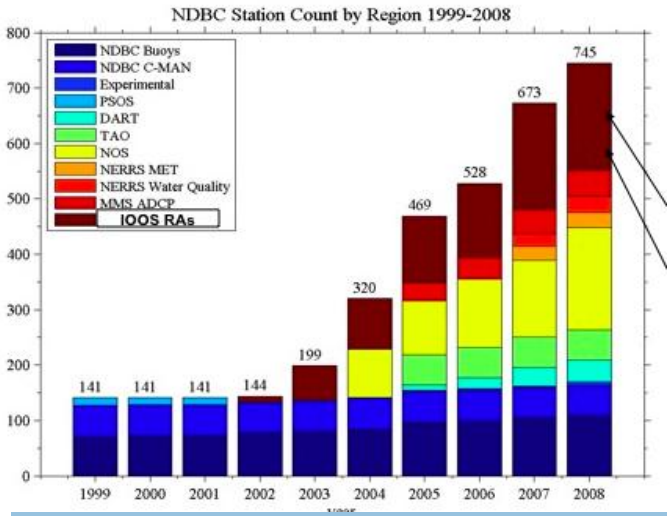


HFR used for Oil Slick Forecasts by NOAA/NOS/OR&R

Biological Data Project

- **Top priority for next IOOS customer project**
- **Regional focus – Pacific/Hawai'i**
- **Portable – viable to other geographies**
- **Customer driven:**
  - Stock assessments
  - Fishery independent data (presence/absence/abundance)
- **Broad community participation**
  - PacIOOS, NOAA NMFS, CoML, OBIS, Univ. of HI , Papahan. Monument
- **Outcomes**
  - Defined set of **data service standards** that pertain to biological observation. Data from reef fish surveys, and also including metadata representation, transport, delivery, discovery, search, and exchange.
  - A **standards-based collection of biological observation data & metadata** easily accessible to the general public that satisfies the needs of the fisheries management community for collation of and comparisons across data gathered from entities across the Pacific.

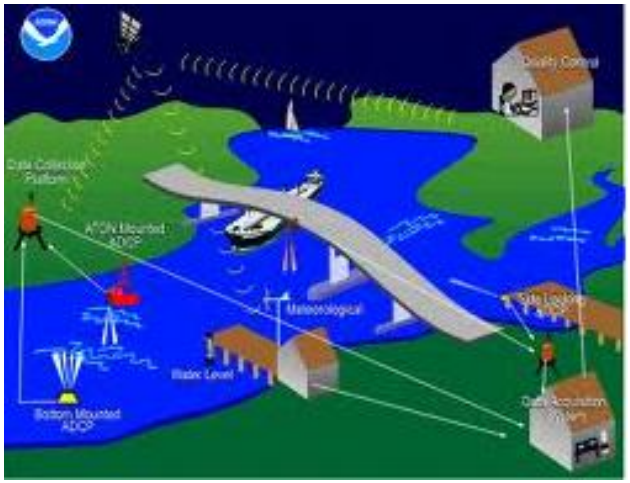
Operational Partnerships Integrating IOOS Data: Multiple Delivery Methods



NDBC Station Count by Region

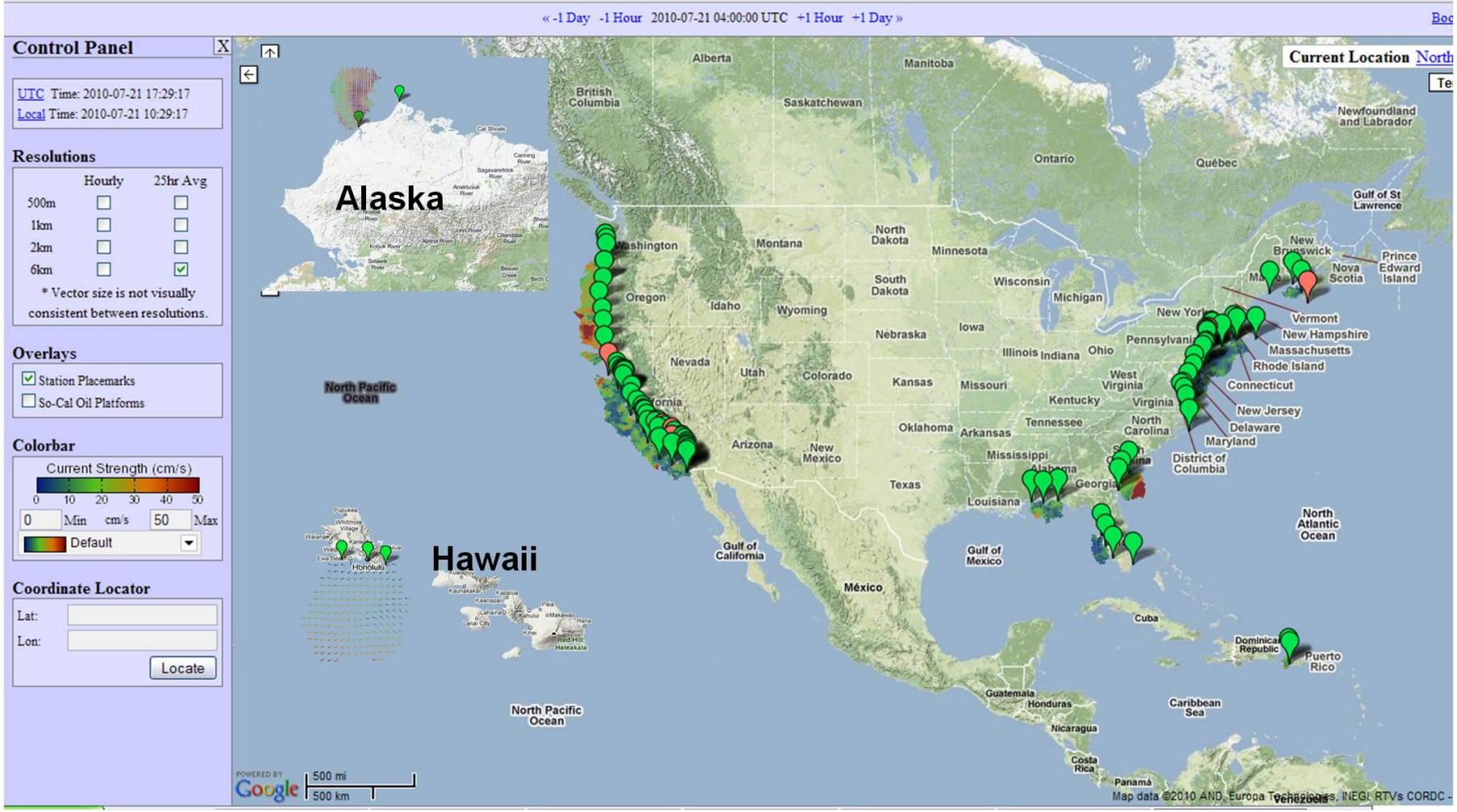
National Data Buoy Center

- Serving non-federal data from RAs
- Over 50% of data served by NDBC is from external partners, enabled by IOOS DMAC



Integrating IOOS data into NOAA's PORTS

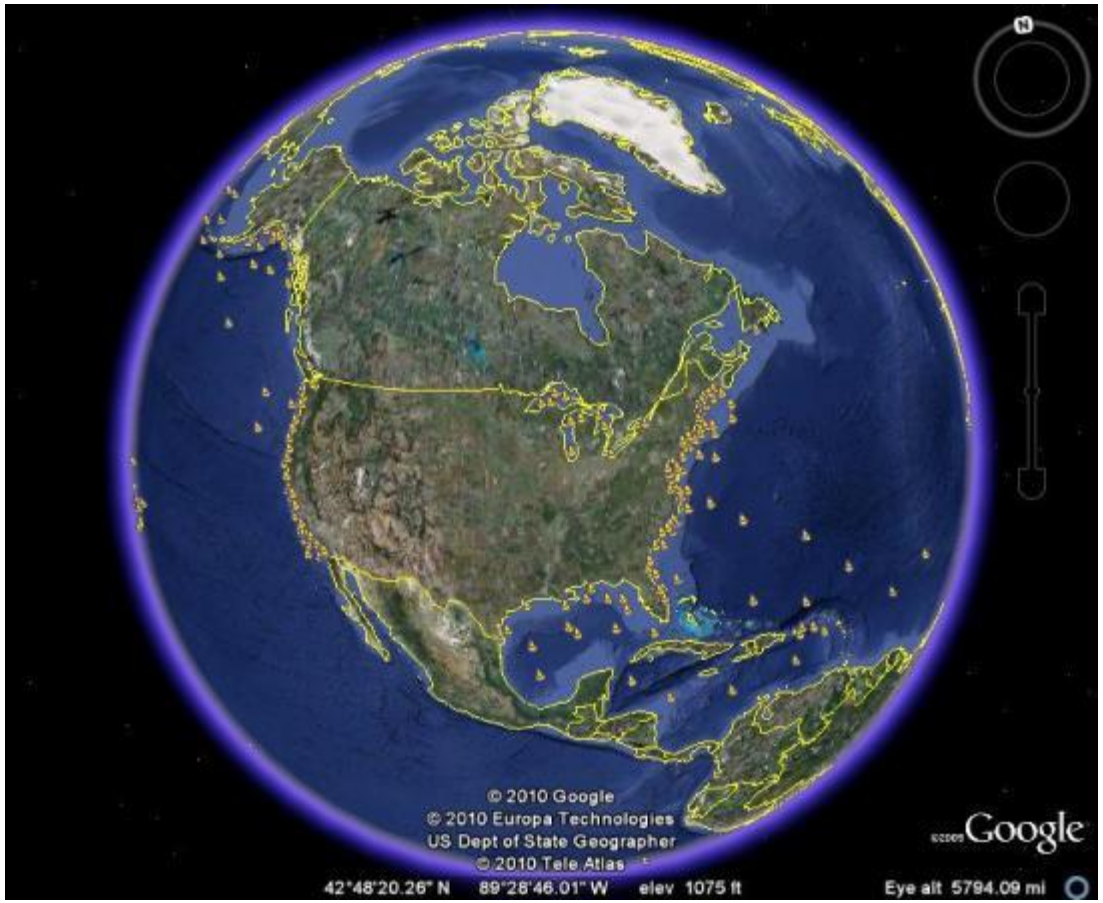
- Waves: Chesapeake, San Francisco, Long Beach/Los Angeles and Mouth of Columbia River (through MOU with USACE & PORTS)
- Currents: Underway for NY/NJ Harbor
- Methodology established that allows for other sites to be incorporated



Current Uses:

Oil Spill Trajectories	Search & Rescue	Navigation	Marine Debris
HAB	Ice Transport	Outfall Monitoring	
Larval/Phytoplankton	Model Validation	Circulation Modeling Input	

Operational Links – Waves Plan



Wave Buoys - All

Plan Results:

- Additional Sensors
- USACE Pres Bud (FY11)
- PacIOOS - O&M
- CDIP served by CO-OPS to PORTS® and NDBC via IOOS Sensor Observation Service

Shellfish Industry Partnership

- Shellfish Industry loss of production from corrosive waters
- Demonstrated value of IOOS real-time data for operational decisions
- Coastal Customer as a partner and advocate
- West Coast Shellfish growers Ocean Acidification (OA) Workshop
  - IOOS and Sea Grant sponsored review of Science, Technologies, & Observing

- Recommendations
  1. West Coast coordination group
  2. West Coast Data exchange integrated with IOOS
  3. Expand West Coast OA observing network including biological data

  (Use Regional IOOS as platforms of opportunity)

U.S. IOOS Programmatics

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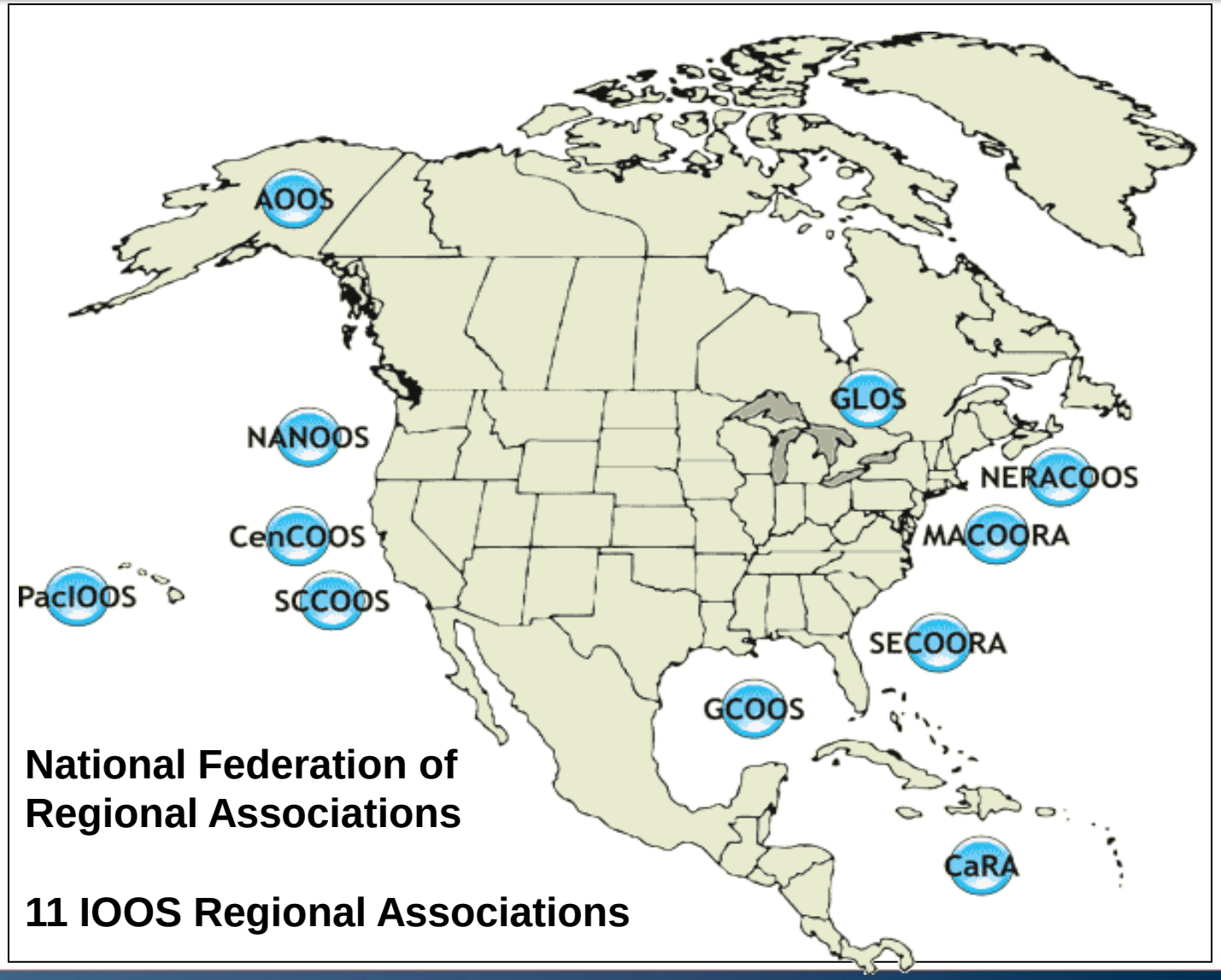
Challenges

Regional Oversight



National Federation of Regional Associations

11 IOOS Regional Associations

Regional Governing Boards

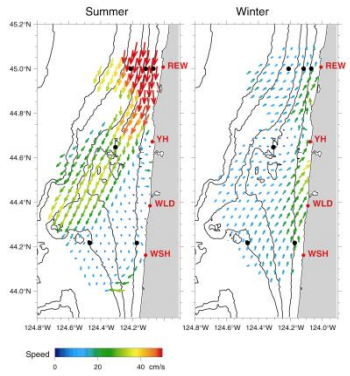
Region	Type of Governance	Total Number of members of Governance board	Government				Research Institute	Industry	NGO[2]	Foreign (all sectors)
			State[1]	Local	Tribal	Federal				
AOOS	MOU	16	4			4	7		1	
CaRA	MOA	12	3				1	6	2	
CeNCOOS	MOU	15	2			2	8		3	
GCOOS	MOU	15	2			2	3	5	3	
GLOS	501C3	10		1		2	2	4		1*
MARACOOS	501C3	15	2			3	8		2	
NANOOS	MOA	15	2		2	2	4	3	2	
NERACOOS	501C3	20	5			2	6	4	1	2
PacIOOS	MOA	14	5			2	1	3	1	2
SCCOOS	MOU	11				1	7		1	2
SECOORA	501C3	25	2			1	13	6	3	
ACT		5					4	1		

[1] includes Sea Grant and territorial governments

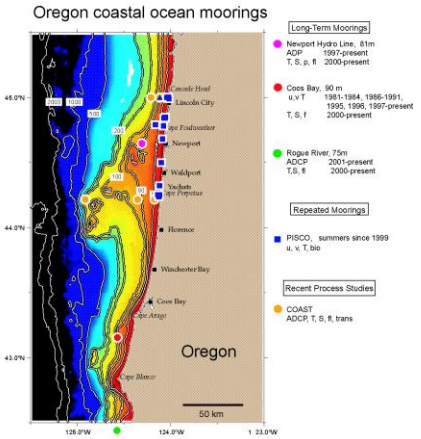
[2] includes Fishery Management Councils

** "bi-national" joint commission*

RCOOS Capabilities



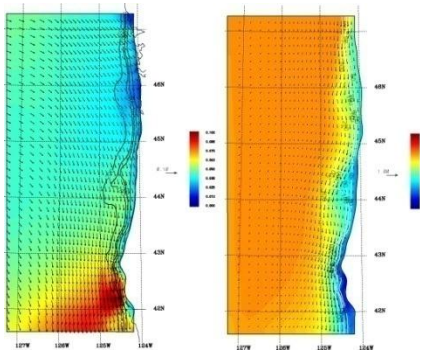
Current mapping



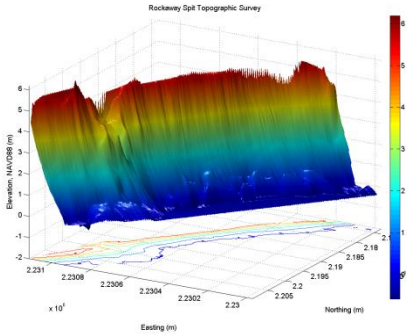
Shelf moorings

Beach/shoreline monitoring

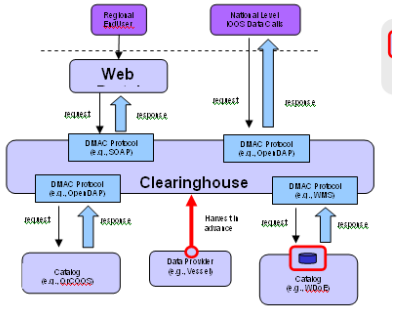
Estuary monitoring



Circulation models



Shoreline change models



Data Management & Communications

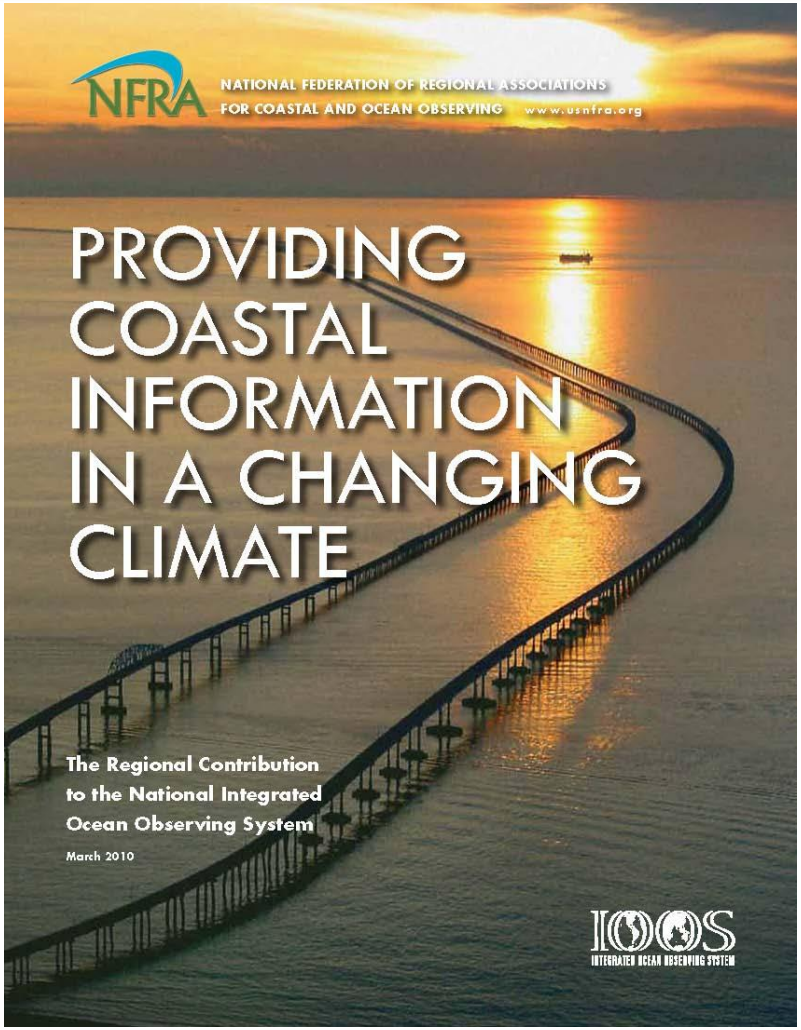
Education/Outreach

Sensor Verification and Validation

ALLIANCE FOR COASTAL TECHNOLOGIES

- A third-party testbed for evaluating sensors and sensor platforms
- Conducted 226 instrument performance tests in the laboratory and the field under a wide range of environmental conditions and different deployment applications
- In 2010, published performance validation tests on fixed location (*in situ*) pCO_2 sensors

Regional Priority Themes



Marine Operations

Climate Variability and Change

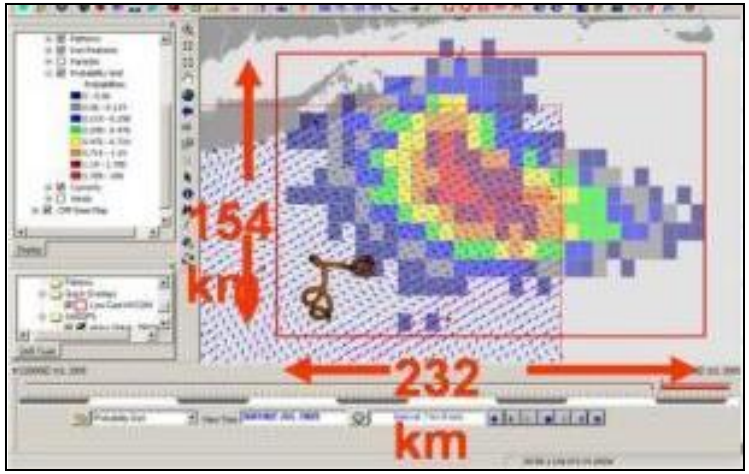
Ecosystems, Fisheries, and Water Quality

Coastal Hazards

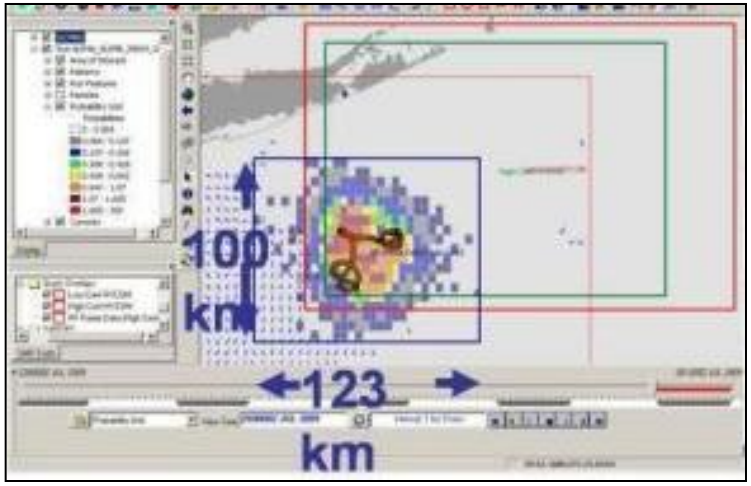
Coastal and Marine Spatial Planning

Search and Rescue (SAR)

- Integrated into USCG Operational SAR in Mid-Atlantic
- Nationwide adoption in 2011
- Refines search zone

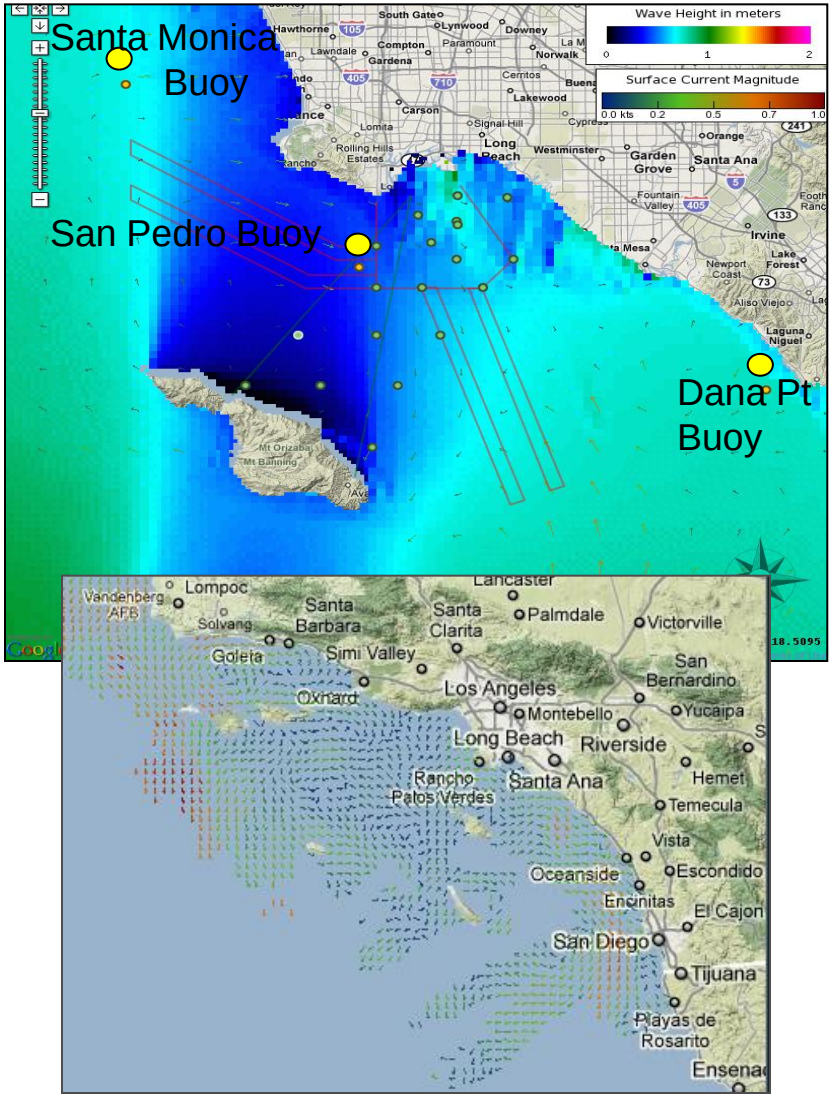


96 hr: Without HFR (36,000 Km^2)

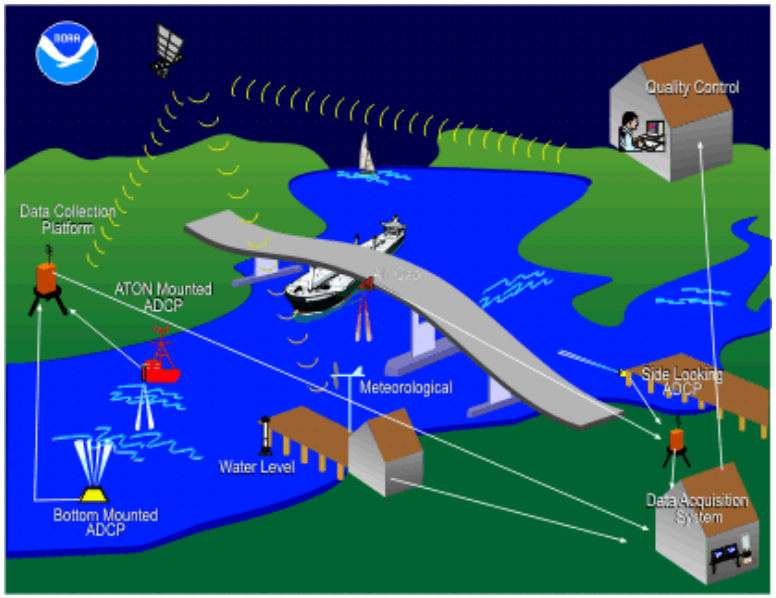


96 hr: With HFR (12,000 Km^2)

Safe and Efficient Navigation



- Coastal Data Information Program (CDIP) providing wave observations, nowcasts, and forecasts.
- SCCOOS providing HF Radar surface currents.
- NOAA Physical Oceanographic Real-Time System (PORTS)

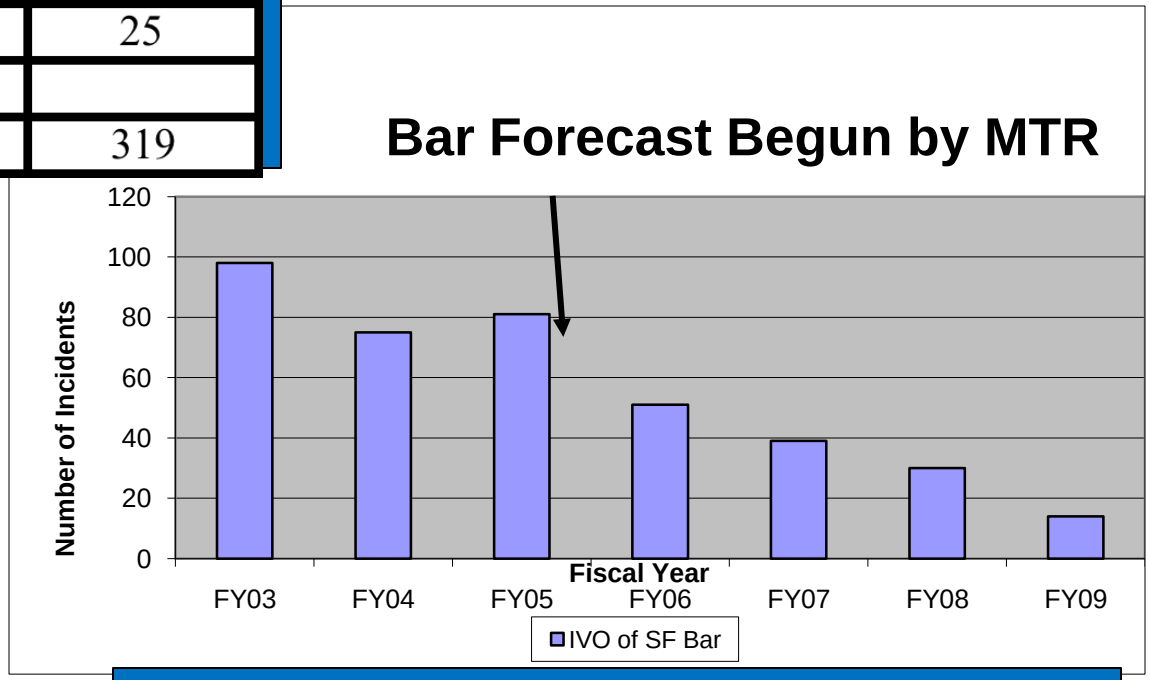


San Francisco - SAFETY

Fiscal Year (FY)	Surf Cases	IVO of SF Bar	Total
FY03	32	98	130
FY04	28	75	103
FY05	29	81	110
FY06	18	51	69
FY07	20	39	59
FY08	19	30	49
FY09	11	14	25
TOTAL:	116	203	319

Marine Incidents (rescues) near SF Bar

Data supplied by the Coast Guard. Assimilated and Disseminated by the SF NWS Office.

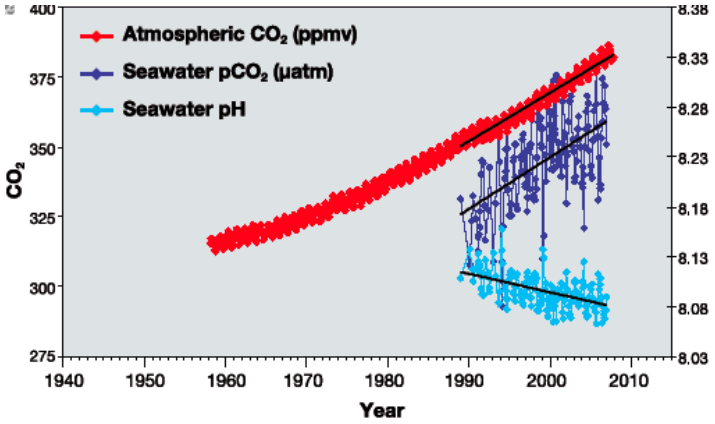


Incidents in the Vicinity of SF Bar (IVO)

IOOS RA Climate Change Activities

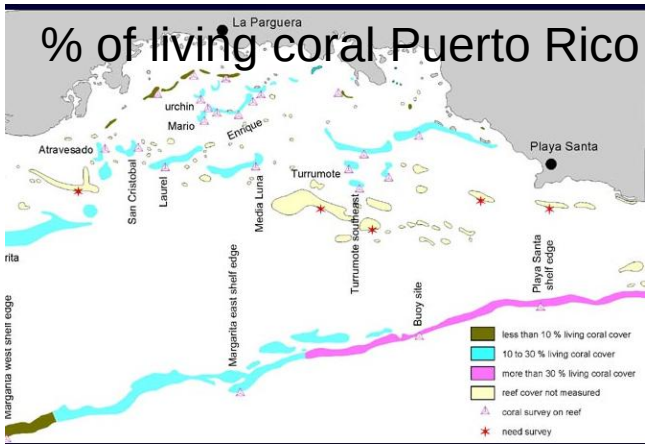
Observations Single system – multiple uses

NOAA PMEL working with RAs to deploy CO2 sensors: NANOOS; PacIOOS; CaRA, NERACOOS, etc.



Data Management

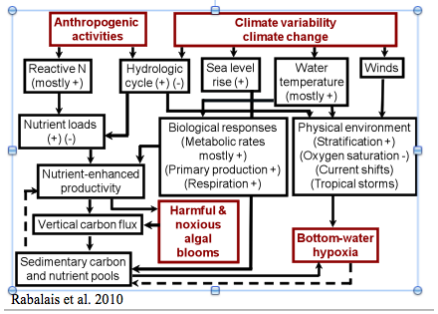
RT, trends, public display



Integrated Coral Reef Monitoring

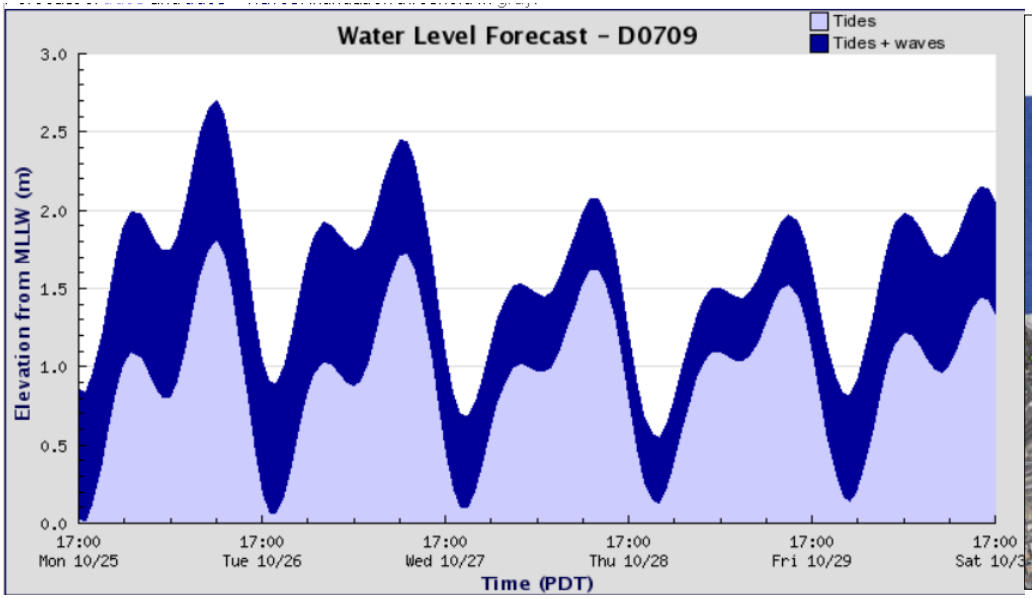
Education/Outreach Materials

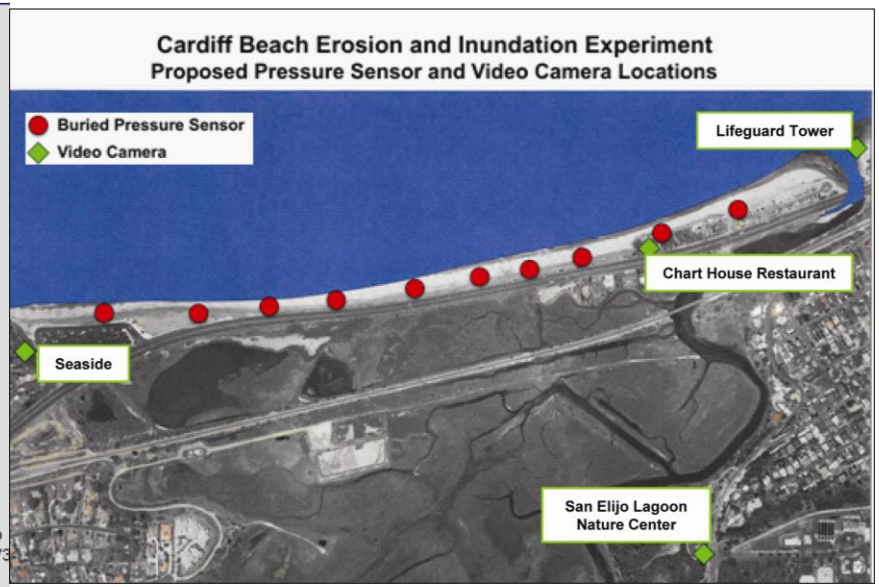
Modeling



Climate Products: Inundation/Sea Level

Most RAs work with users on inundation and SLR

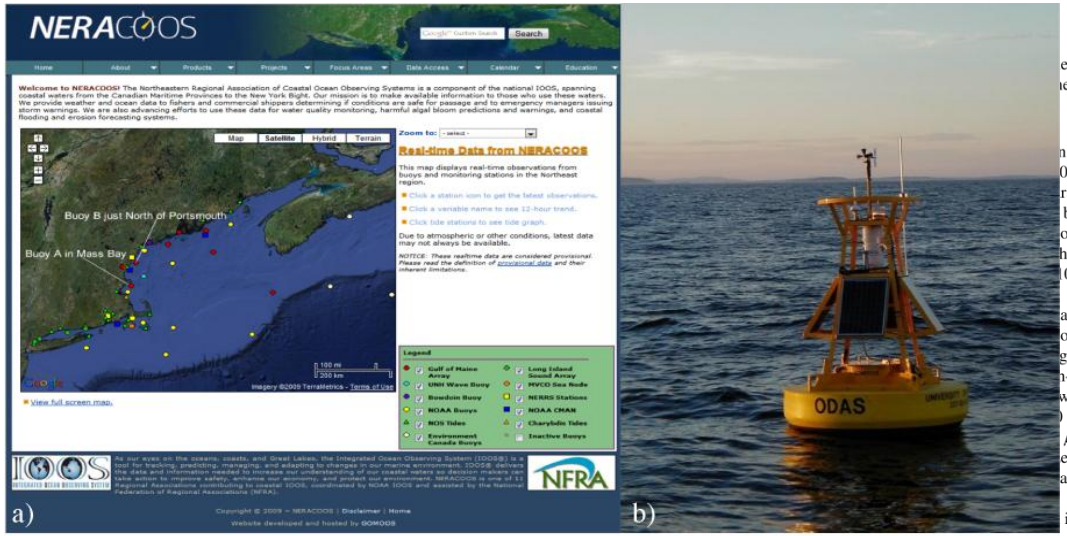




Automated 3-day E-mail warnings of potential inundation sent to City of Encinitas.

Bring it Together- A HAB example

- Priority for IOOS RA and at the Federal Level.
- ACT: 2 workshops on evaluating sensors
- Leveraged with State and Federal Programs



ellas and Sarasota Counties. No
esday, October 14.

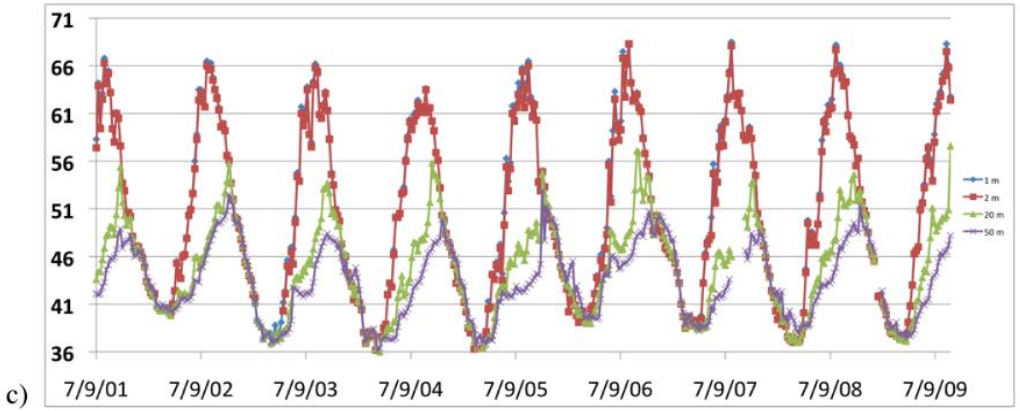
n identified approximately 30 miles
0/4-9). Very Lowa concentrations of
rasota, and Charlotte Counties
been identified approximately 15
onal samples taken alongshore
hern Collier County, and Monroe
0/5-12).

analysis. Imagery (10/8, not shown)
ongshore of Pinellas County. One
g several not present samples
n-harmful blooms of various algal
west Florida. Imagery (10/8, not
) miles offshore Lee and northern
μg/L). This chlorophyll feature is
ee and northern Collier Counties.
ave decreased.

is likely to remain in its present

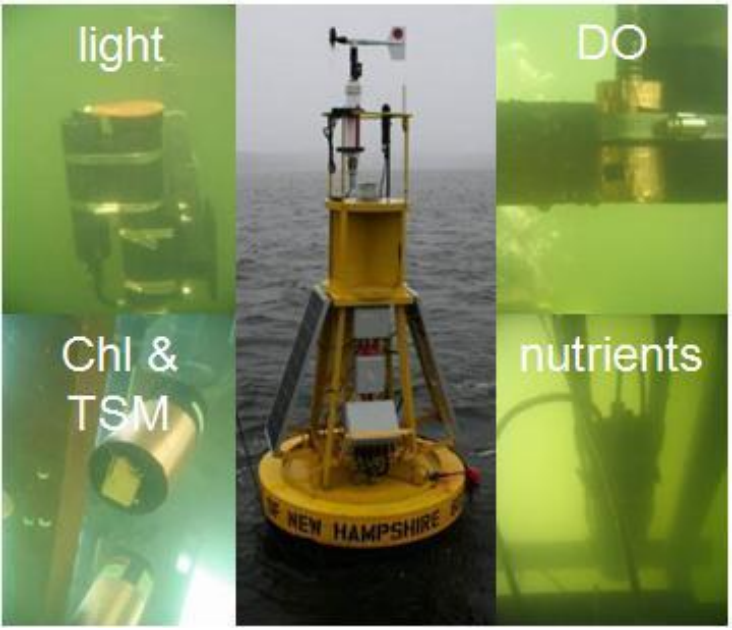
ntly unavailable. MODIS imagery is

will be issued twice weekly on Mon-
algal bloom.



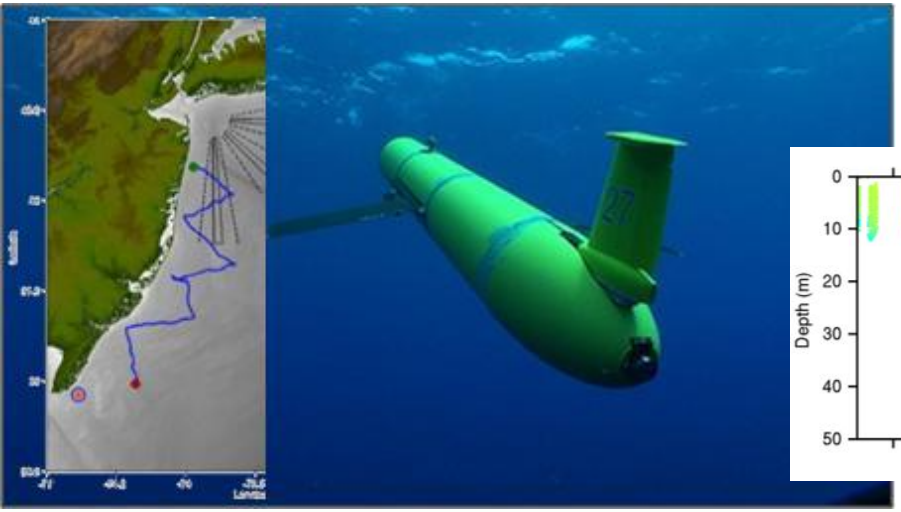
NERACOOS buoys provide data used in modeling for *Alexandrium fundyense.*

Water Quality and Ecosystems



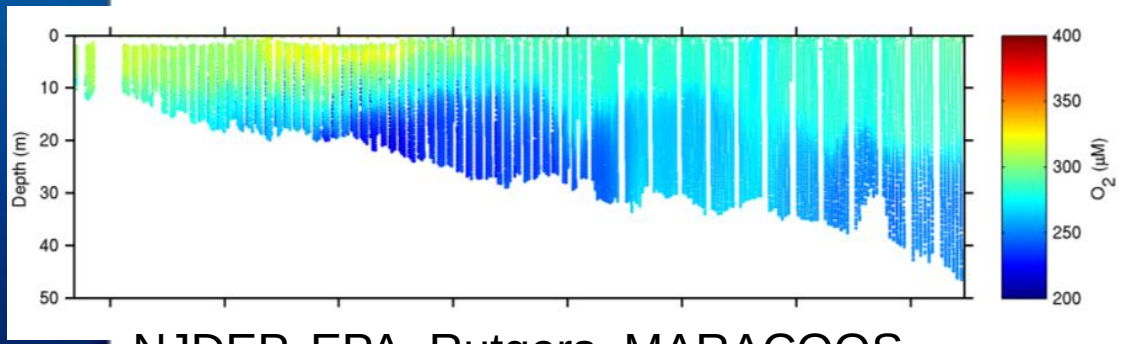
Buoys

- Capture high resolution temporal features
- Unraveled controls of light penetration in Great Bay Estuary, NH helping protect critical eelgrass habitat through developing nutrient criteria
- Unraveled causes and help predict low DO in the Long Island Sound



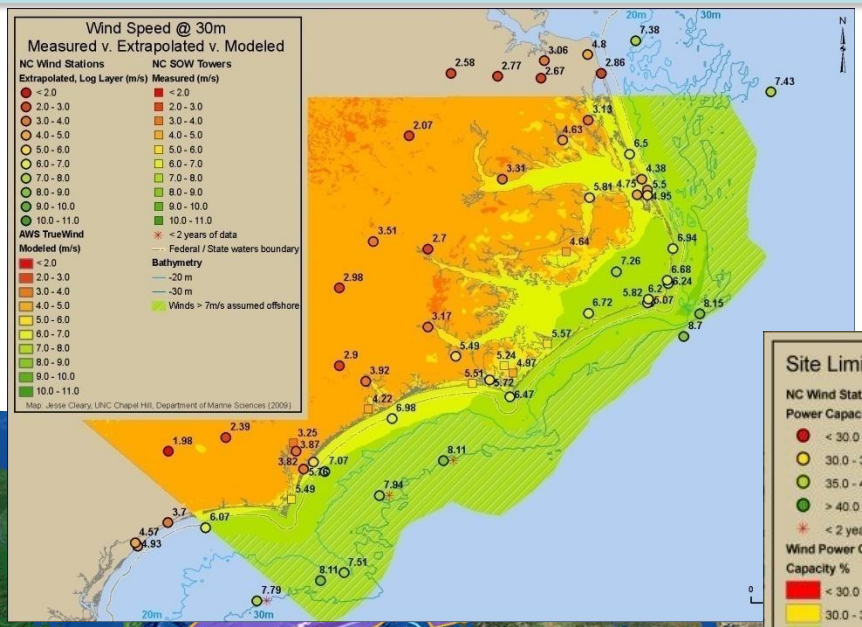
Gliders

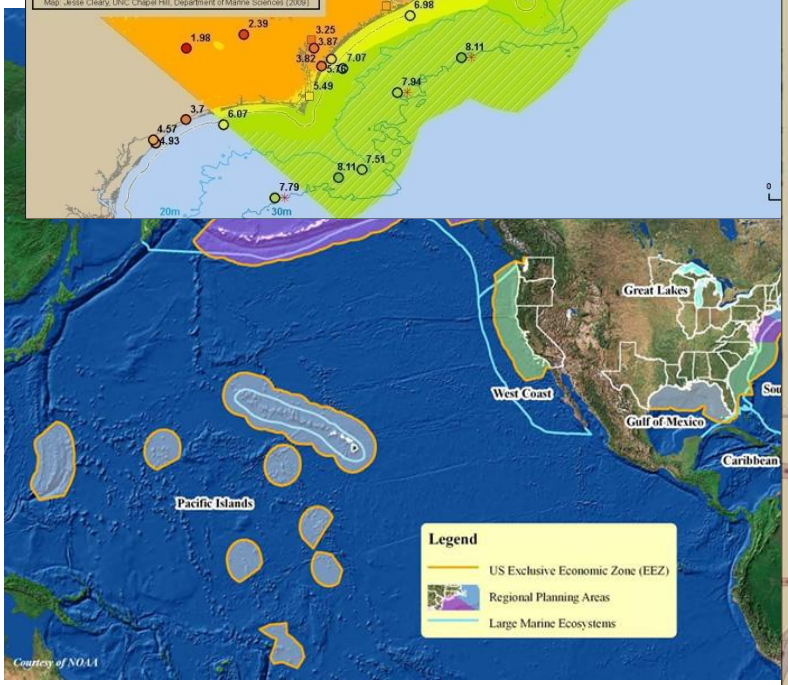
- Capture spatial features
- DO Part of NJ water quality monitoring

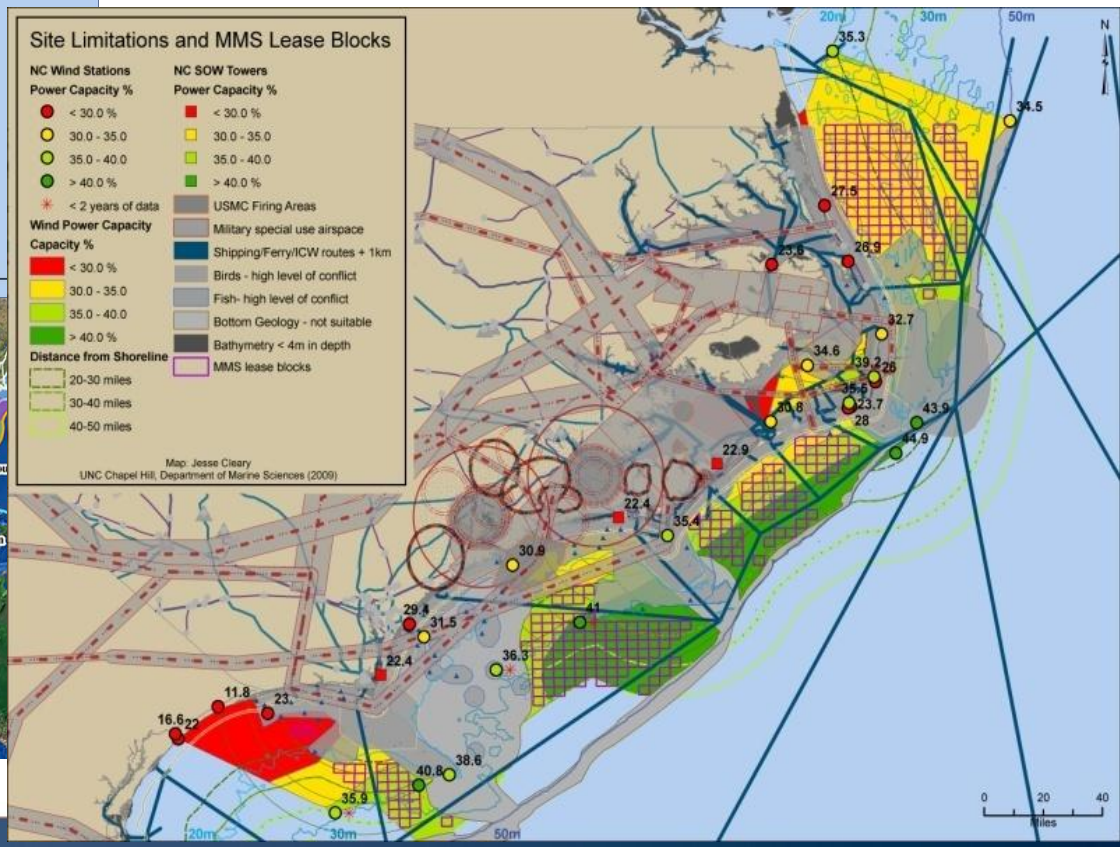


NJDEP, EPA, Rutgers, MARACOOS

CMSP- Regional Approach







IOOS can provide:
Stakeholder engagement, data integration, and monitoring

Follows recommendations from the IOOS Modeling and Analysis Steering Team

- improve cyber infrastructure,
- support development of community models,
- ease the transition of models to operations.

Testbed Advisory Evaluation Group

Cyber Infrastructure

Shelf Hypoxia

Estuarine Hypoxia

Coastal Inundation

ACT Successes in 2010

- Completed pCO2 analyzer Demonstration
  - Benefits for developers and users
  - Addressing climate change and ocean acidification
- Supported development of HAB detection technologies and methodologies
  - Benefits for developers and users
  - Working regionally in California and Florida
- Collaborating with USGS and NWQMC on Methods of Environmental Measurements and Observations (MEMO)
  - Linking ACT technology and NEMI methods databases
  - Searches of environmental parameters resulting in both standard methods and commercial instruments
- Reorganized and initiated program evaluation
  - Board of Directors (5), Advisory Council (11), Partner Institutions (6)

U.S. IOOS Programmatics

National Component

Regional Component

Interagency Collaboration

Challenges

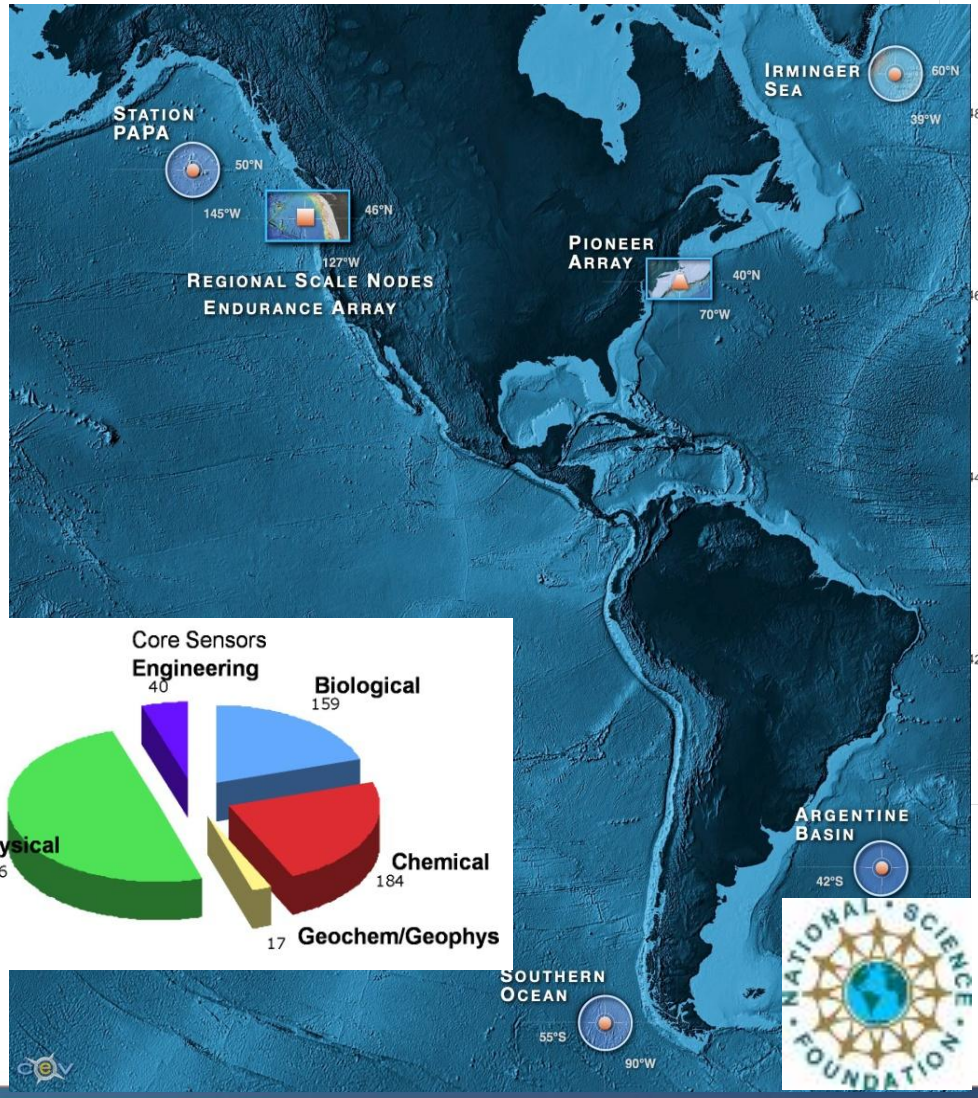
USACE RA Participation

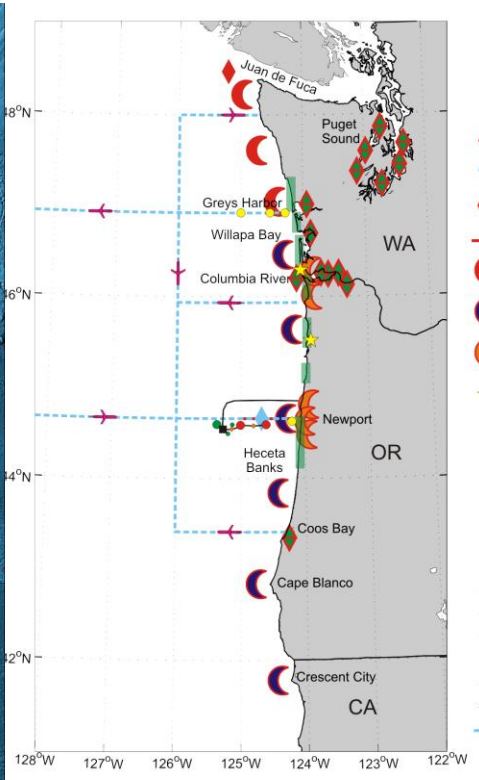
- Board Representative
- Board Representative Identified
- RA Participant

PacIOOS	◆	Todd Barnes, Chief Engineering and Construction Division
POH	◇	Thomas Smith, Jessica Podoski
AOOS	◆	Patricia Opheen, Chief Engineering Division
POA	◇	Ken Eisses, Bruce Sexauer
NANOOS		Doris McKillip, Rod Moritz, David Michalsen
NWS, NWP		
SCCOOS	◆	Richard Leifield, Chief Engineering Division
SPL	◇	Arthur Shak

GCOOS	◆	Jennifer Wozencraft, Director JALBTCX
MVN, SAM, SAJ	◇	Jennifer Colee, Jay Ratcliff, Mathew Schrader, Jason Engle
SECOORA	◇	Kaiser Edmond, Mathew Schrader, Jason Engle, Jeff Hanson
SAD, SAJ, CHL		
MACOORA	◇	Roy Messaros
NAN		
NERACOOS	◇	Roy Messaros, John Winkelman
NAN, NAE		
GLOS	◇	James Selegean, Scott Thieme
LRE		

Interagency Partnerships





Observations, Data Management

U.S. IOOS Programmatics

National Component

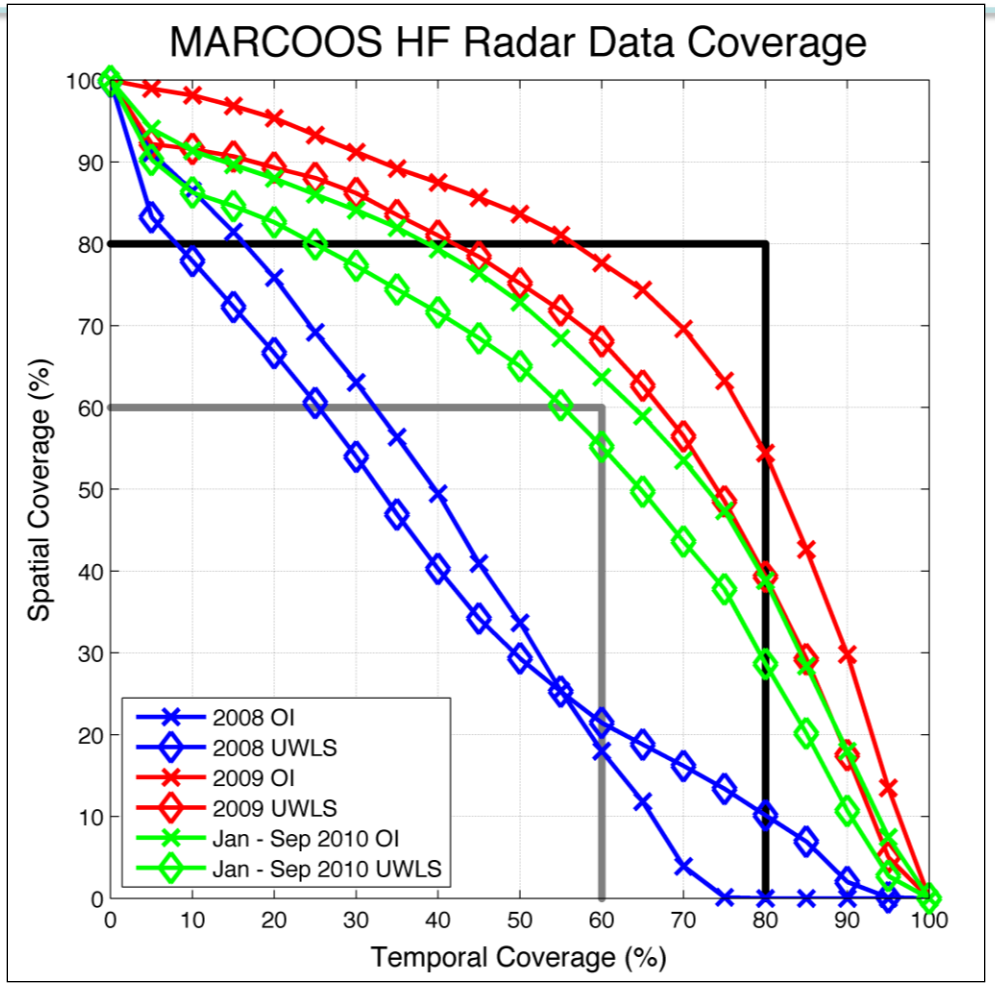
Regional Component

Interagency Collaboration

Challenges

Sustaining Capability

USCG Target:
80% Spatial Coverage
80% of the Time



2008 to 2009 – Increase due to a focus on resiliency
2009 to 2010 – Decrease due to a lack of spares

What we heard from our Regions

- Regional Component Workshop Nov 16-18
- RA raised questions/comments such as:
  - Do other Federal observing agencies recognize and understand the role of the Regional Component as necessary for the success of IOOS?
  - How will the Federal coordinated budget process work?
  - RAs are looking for stronger National engagement at the Regional level.

US IOOS – A National Endeavor

- IOOS is a comprehensive system
- Integration of data is critical
- Sustaining the enterprise requires engagement by all of us