What is IOOS®?

**COASTAL COMPONENT**  
(Regional and Federal)

- **REGIONAL**
  - National Federation of Regional Associations (NFRA)
  - 11 Regional Associations (RAs)/ Regional Coastal Ocean Observing Systems

- **NATIONAL**
  - Council on Environmental Quality (CEQ): Committee on Ocean Policy
  - Interagency Working Group on Ocean Observations (IWGOO)

- **GLOBAL**
  - National Science and Technology Council (NSTC): U.S. Group on Earth Observations

**GLOBAL COMPONENT**

- WMO IOC: Joint Technical Commission for Oceanography and Marine Meteorology (JCOMM)
- Intergovernmental Group on Earth Observations (GEO)

**NOAA (Wayne Ave)**

- Spans the Coastal to the Global
- NOS/ NOAA IOOS Program
- OAR/ CPO/Climate Observation Division

- Leveraging existing NOAA-wide capabilities
  - Observations
  - Data Management & Communications (DMAC)
  - Modeling & Analysis
  - Research
  - Education
IOOS®: Global Component

Total *in situ* networks 60%  

February 2008

- **87%** Surface measurements from volunteer ships (VOSclim)  
  - 200 ships in pilot project

- **100%** Global drifting surface buoy array  
  - 5° resolution array: 1250 floats

- **62%** Tide gauge network (GCOS subset of GLOSS core network)  
  - 170 real-time reporting gauges

- **81%** XBT sub-surface temperature section network  
  - 51 lines occupied

- **100%** Profiling float network (Argo)  
  - 3° resolution array: 3000 floats

- **43%** Repeat hydrography and carbon inventory  
  - Full ocean survey in 10 years

**Reference time series** 24%  
- 58 sites

**Global reference mooring network** 48%  
- 29 moorings planned

**Global tropical moored buoy network** 79%  
- 119 moorings planned
IOOS Office in NOAA

• Onboard Feb 09: 11 FTE; 5.5 onsite contractors; funds DMAC ST position located at NOAA/CSC

• Primary functions of the NOAA IOOS Program
  – Planning, Programming Budgeting and Execution (PPBES): IOOS Program Manager; includes NOAA’s National Data Buoy Center
  – Executing Data Management: Data Integration Framework (DIF)
  – Planning for Data Management and Communications (DMAC)
  – Leading Regional Enterprise
  – Execute current year budget/plans and administer an office
  – Respond to Congressional, FACA, NOAA tasking
  – Provide Communications and Outreach
  – Provide International support: GOOS Regional Alliance and support I-GOOS Vice Chair
## Stimulus Breakout

### American Recovery & Reinvestment Act of 2009

<table>
<thead>
<tr>
<th></th>
<th>House Bill</th>
<th>Senate Bill</th>
<th>Final Bill</th>
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<tbody>
<tr>
<td>NSF</td>
<td></td>
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<tr>
<td>Research &amp; Related Activities</td>
<td>$2,500</td>
<td>$1,000</td>
<td>$2,500</td>
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<tr>
<td>NSF is directed to support all research divisions and support advancements in supercomputing technology</td>
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<tr>
<td>Major Research Instrumentation</td>
<td>$300</td>
<td>$200</td>
<td>$300</td>
</tr>
<tr>
<td>Academic Facilities Modernization</td>
<td>$400</td>
<td>$200</td>
<td>$400</td>
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<tr>
<td>MREFC</td>
<td>$400</td>
<td>$150</td>
<td>$400</td>
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<tr>
<td>Education</td>
<td>$100</td>
<td>$50</td>
<td>$100</td>
</tr>
<tr>
<td>NOAA</td>
<td></td>
<td></td>
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<tr>
<td>Operations, Research &amp; Facilities</td>
<td>$400</td>
<td>$227</td>
<td>$230</td>
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<tr>
<td>Backlog of research, restoration, navigation and conservation and management activities</td>
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<tr>
<td>Procurement, Acquisition and Construction</td>
<td>$600</td>
<td>$795</td>
<td>$600</td>
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<tr>
<td>Construction and repair of facilities, ships and equipment, to improve weather forecasting and to support satellite development (including $170 million to address critical gaps in climate modeling and establish a climate data records for continuing research into the cause, effects and ways to mitigate climate change)</td>
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<tr>
<td>NASA</td>
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<tr>
<td>Science – to accelerate the development of the tier1 Earth science climate research missions recommended by the NAS Decadal Survey and to increase the agency’s supercomputing</td>
<td>$400</td>
<td>$300</td>
<td>$400</td>
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<tr>
<td>Department of Energy</td>
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<tr>
<td>Energy Efficiency &amp; Renewable Energy Program</td>
<td>$18,500</td>
<td>$14,398</td>
<td>$16,800</td>
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<tr>
<td>R&amp;D, develop, demonstration, &amp; deployment</td>
<td>$2,500</td>
<td>$2,648</td>
<td>$2,500</td>
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<tr>
<td>Department of Interior</td>
<td></td>
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<tr>
<td>USGS – Surveys, Investigations &amp; Research backlog</td>
<td>$200</td>
<td>$135</td>
<td>$0</td>
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</table>
NOAA IOOS Funding

• 2 Budget Lines in NOAA Budget: NOAA IOOS and Regional IOOS
• ACT earmark in FY08; FY09 House Mark & Conference Report

Earmarks

- FY05 = $55M
- FY06 = $45M
- FY07 = $35M
- FY08 = $27M
- FY09, House = $29M
- FY09, Senate = $38M
- FY09, Conf. = $27.5M
Programming Planning Budgeting Execution System (PPBES) - Phases Over Time
Regional Partnership

- FY09: No FFO. Funding allocation philosophy:
  - Fully fund RA planning agreements
  - Fund to FY08 levels
  - If any additional funding:
    - FY07 Awards, Focus Areas 2&3
    - RCOOOS/ACT
- FY10: Limited geographical FFO
- FY11: Define core capabilities for national competition
- Alliance for Coastal Technology
# Data Integration Framework (DIF)

<table>
<thead>
<tr>
<th>Months 0-12</th>
<th>Month 18</th>
<th>Month 24</th>
<th>Month 36</th>
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<tbody>
<tr>
<td>Integration</td>
<td>Model Ingest</td>
<td>Benchmark</td>
<td>Performance Assessment</td>
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</table>

- Temperature
- Salinity
- Water Level
- Currents
- Winds
- Waves
- Ocean Color

- **Completed**
- **In Progress**

- **Regional Implementation of the DIF**
- **Interagency/GEOSS data management collaborations**
- **Documents at** [www.ioos.noaa.gov](http://www.ioos.noaa.gov)

- Coastal Inundation
- Harmful Algal Bloom Forecast
- Hurricane Intensity Forecast
- Integrated Ecosystem Assessment
DIF Data Provider Status – end of CY08

NDBC Data Assembly Centers (DACs)
- NDBC DAC - buoys, C-MAN, VOS, NOS NERRS, etc.
- IOOS DAC - Regional observations
- TAO DAC - Tropical Atmosphere Ocean
- DART DAC - Deep-Ocean Assessment and Reporting of Tsunamis

Web Coverage Service & OPeNDAP
- High-Frequency Radar (HFR) surface currents

Sensor Observation Service
- Data Content & Encoding Standards

CO-OPS
- Sensor Observation Service
- Data Content & Encoding Standards
- National Water Level Observation Network
- PORTS®

SECOORA
- Sensor Observation Service
- Data Content & Encoding Standards
- Federal, State, Local, and Industry data

CoastWatch
- Sensor Observation Service
- Data Content & Encoding Standards
- Web Coverage Service & OPeNDAP
- Data Content & Encoding Standards
- Satellite Ocean Color (Aqua MODIS, Terra MODIS, SeaWiFS)

IOOS Variables: temperature, salinity, currents, water level, winds, waves, ocean color (chlorophyll)

User Requests

Data Integrated from One Provider
National Data Management and Communications View

Overview

- Distributed Regional & Federal Data Assembly Centers
- Develops and manages technical design & standards
- Leverages existing Federal and Non-Federal technologies

Functionality

- Integrated data #1 request
- Standardize, integrate, and simplify delivery of data from multiple sources
- Access to broader data resources to understand impacts of climate change and improved management decisions

DMAC Functions and Interfaces

Ocean Observations

Receiving, quality control transformation, Work flow

Long-term Archives

Within DMAC or existing NOAA resources

Storage & Access

Portal Services including modeling & analysis tools

Queries & data access by modeling activities

Data Discovery Tools

Data modeling and products

Public and other Users
DMAC Path Forward

**Develop & Deploy**

- **Detailed Requirements**
- **Conduct Acquisition**
- **Develop Detailed Requirements**
- **Add Additional Projects**
- **Implement Grant Support**
- **DIF to DMAC Initial Operating Capability (IOC)**
- **Develop & Deploy**
- **DMAC Full Operating Capability (FOC)**

**Initial DIF Development**
- 4 projects

**Initial Regional Projects**

**We are here**

**Timeline:**
- **FY08:** Develop & Socialize Concept Docs, Initial DIF Development 4 projects, Initial Regional Projects
- **FY09:** Partner Input, Market Research, Alts Analysis & Acquisition Strategy, Add Additional Projects
- **FY10:** Develop Detailed Requirements, Conduct Acquisition, DIF to DMAC Initial Operating Capability (IOC)
- **FY11:** Develop & Deploy
- **FY12-15:** DMAC Full Operating Capability (FOC)
Market Research and “Industry Day”

- **IOOS Industry Day – Provide IOOS status update**
  - March 12, 2009, 9:00am - 1:00pm, NOAA Auditorium
  - FedBizOps announcement at:
  - Facilitated by NOAA Acquisition and Grants Office
  - IOOS DMAC briefs from:
  - 50-100 attendees expected

- “Request for Information” (RFI) published soon thereafter

- Meet with candidate vendors as needed for more information
IOOS® DMAC Standards

- Strong DIF-DMAC connection; Interagency buy-in critical to successful development of national DMAC
- Interagency & non-Federal, community-based process
  - Approach: Adopt, Adapt, Build new
  - Multiple standards per variable increases complexity
- 1 Oct 2007, DMAC Steering Team: Re-initiated and resourced by NOAA: <http://ioosdmac.fedworx.org>
  - Developed web-based, collaborative tools
  - 270 day review process; 2 formal cycles per year
- **STATUS:** 3 Recommended; 9 “submitted”
Interagency/Partnership

- National Operational Waves Plan: At print for publication
- National HFR Plan: First Round of Comments collected
- Model Standards: Rich Signell (USGS) – on detail
- IOOS and National Water Quality Monitoring Network
  - Discrete measurements/sensor network
  - Regional Pilots
- IOOS and Marine Protected Area (MPA) FACA: White paper written, interagency group being formed; NOAA, EPA on the IOOS side
- IOOS and IOCM: working with IWG-IOCM for RA activities and requirements
- IWGOO: April 14, 2009 Industry Workshop
- Coastal Inundation Meeting: FL 10-12 Feb – bringing Federal and Regional together on end to end plan
Interagency/Partnership - cont

• IOOS and Ocean Biogeographic Information System (OBIS): Sharing data standards; in monitoring mode with departure of key staff member
• IOOS and Hydrographic Services Review Panel:
  – Waves (Army Corps/CDIP) into PORTS® – MOU in work
  – Working to get IOOS Regional data/models into PORTS
• IOOS and OOI
• Google
• EPA: support to NERACOOS – through USGEO
• DMAC ST
• West Coast Governors Agreement on Ocean Health – HAB summit: NOAA IOOS, 3 RAs participated
• Ocean Energy meeting 2 Feb
### IOOS Regions Supporting IOOS Missions

<table>
<thead>
<tr>
<th><strong>Transportation/ Homeland Security</strong></th>
<th><strong>Ecosystems and Oceans Human Health</strong></th>
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<tbody>
<tr>
<td>• Surface current data from &gt;100 High Frequency Radar stations</td>
<td>• Larval Sampling</td>
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<td>• Improved tools for port pilots and ships entering major harbors</td>
<td>• Harmful Algal Bloom monitoring: 4 RAs</td>
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<tr>
<td>• High-resolution coastal mapping (funded by CA and Pacific NW) to NOAA standards</td>
<td>• IEA data collection and support: 4 RAs</td>
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<tr>
<td>• Oil spill trajectory tracking (Cosco Busan)</td>
<td>• Benthic habitat and species mapping (NEBO)</td>
</tr>
<tr>
<td>• Delivering models of nearshore waves</td>
<td>• Extension of CalCOFI transects</td>
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<tr>
<th><strong>Climate</strong></th>
<th><strong>Natural Hazards/Weather Prediction</strong></th>
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<tr>
<td>• Coastal observations to monitor local impacts of global climate change</td>
<td>• SE Marine Weather Portal – <strong>single</strong> site for marine weather data</td>
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<tr>
<td>• Observations and data support state/CZM climate change adaptation plans:</td>
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<tr>
<td>• LiDAR collection for hi-res topography</td>
<td>• Providing data and products to WFOs:</td>
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<tr>
<td>• State Sea Level Rise plans (2 RAs)</td>
<td>• New York City; Philadelphia; Boston; Wakefield, VA; Newport &amp; Wilmington, NC; Honolulu, HI; and San Juan, PR</td>
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<tr>
<td>• Lead PI for 5-year NSF climate project</td>
<td>• Water Quality projects: 4 RAs</td>
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<tr>
<td>• Coastal Inundation modeling projects (4)</td>
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**Sensor Validation and Verification Services**
Questions?

“Providing information needed to improve safety, enhance our economy and protect our environment”

http://ioos.noaa.gov