Integrated Ocean Observing System (IOOS)

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IOOS: An interagency network of subsystems

The IOOS is a coordinated national and international network of observations and data transmission, data management and communications (DMAC), and data analyses and modeling that systematically and efficiently acquires and disseminates data and information on past, present and future states of the oceans and U.S. coastal waters to the head of tide.

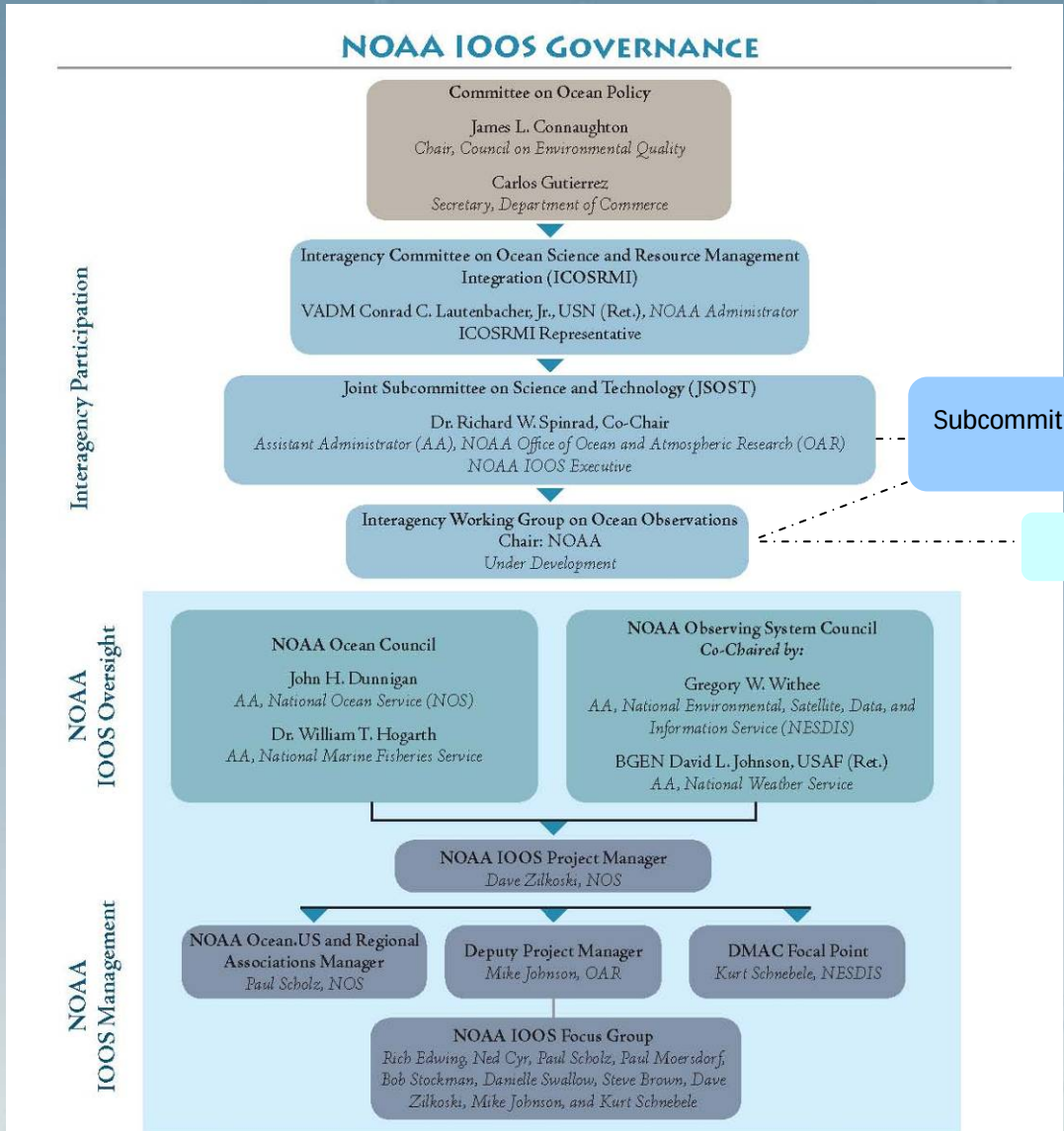
- From the IOOS Development Plan

[Approved by the Interagency Committee on Ocean Science and Resource Management Integration (ICOSRMI)]

Joint Subcommittee on Ocean Science & Technology (JSOST) Agencies

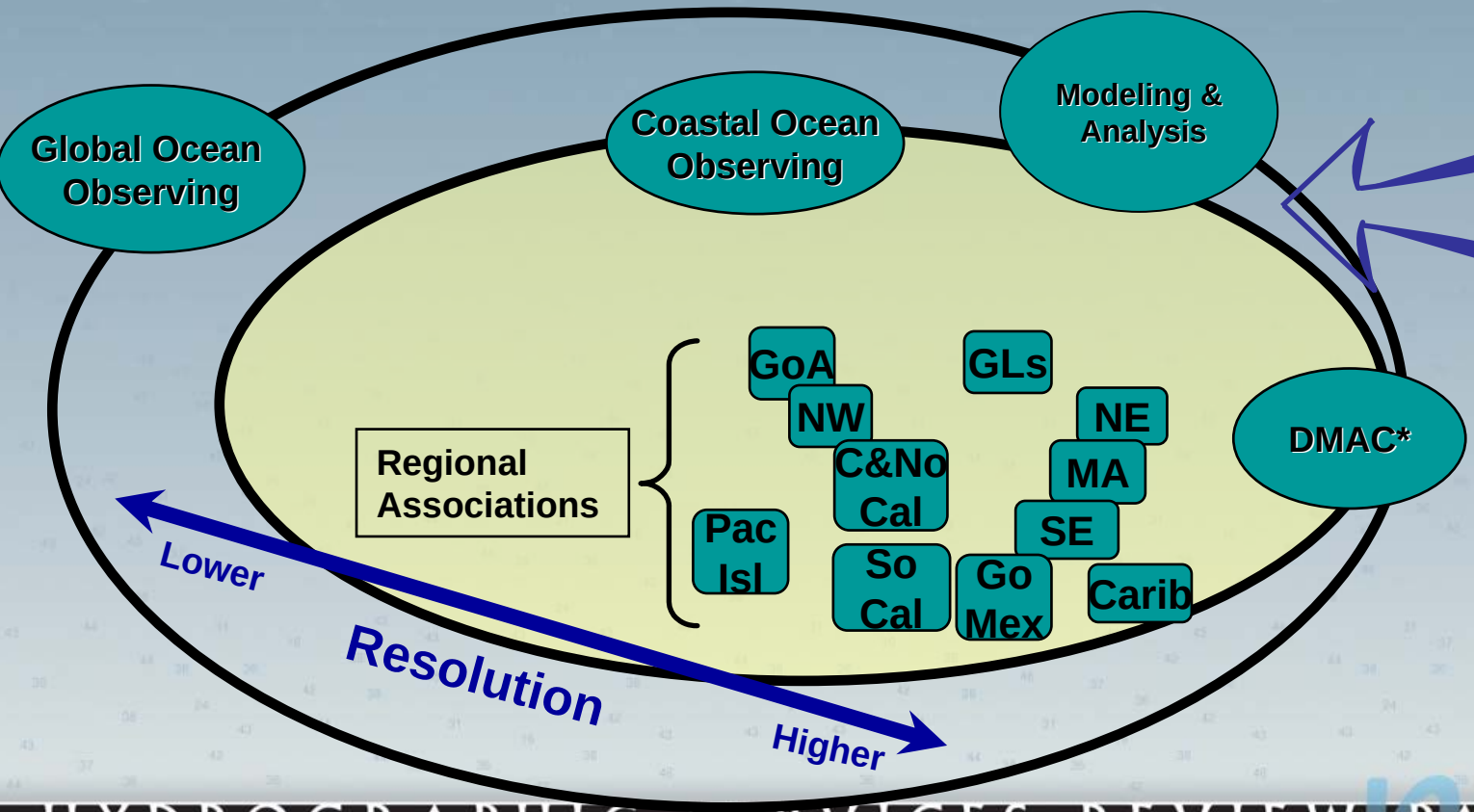
EXCOM Agencies

NOAA IOOS Governance



IOOS Components

- IOOS has three interdependent subsystems:
  - Observing (Global and Coastal components)
  - Data Management & Communication (DMAC)
  - Modeling and Analysis



Partners:

Federal Agencies
- NOAA
- NSF
- Navy
- NASA
- EPA
- USGS
- MMS
- USACE

Regional Associations

State Agencies

WMO

IOC

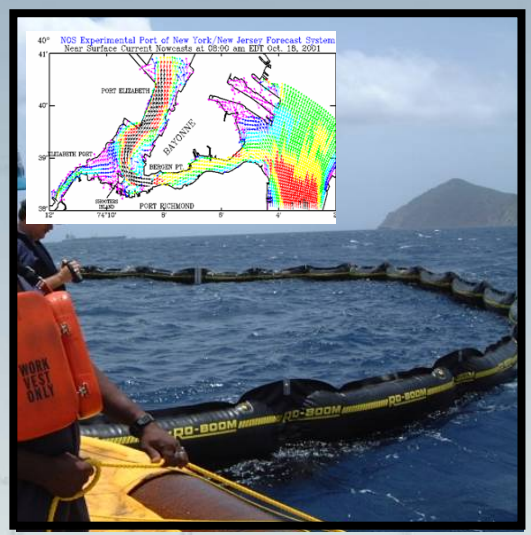
Industry

* Ocean Component of NOAA GEO IDE

Reasons for the Integrated Ocean Observing System (IOOS)

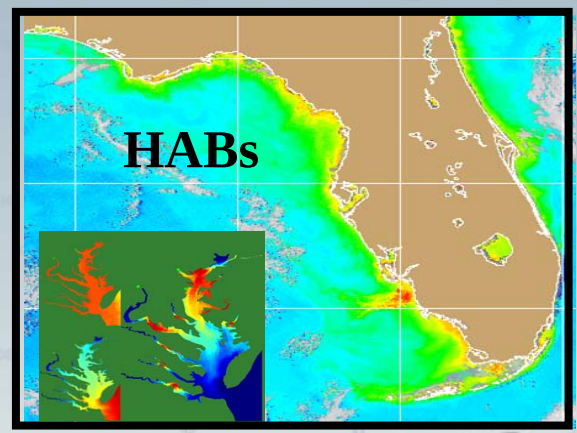
SAFE AND EFFICIENT NAVIGATION
avoid groundings
avoid collisions
Increase throughput

PUBLIC HEALTH



NATURAL HAZARDS
warnings for
high winds/waves
rip currents/storm surge

ECOLOGICAL FORECASTING



PROTECTION OF OCEAN & COASTAL RESOURCES

NOAA's IOOS Observing Systems

By NOAA Mission Goal (As in NOAA Observing System Architecture)

Global
Total Systems: 8

Coastal
Total Systems: 22

Climate

- IOOS Arctic Observing System
- IOOS Argo Profiling Floats*
- IOOS Drifting Buoys
- IOOS Ocean Carbon Networks*
- IOOS Ocean Reference Station*
- IOOS Ships of Opportunity
- IOOS Tide Gauge Stations
- IOOS Tropical Moored Buoys

Commerce & Transportation

- Hydrographic Surveys (includes bathymetry)
- National Current Observations
- National Water Level Observation Network (NWLON)
- Physical Oceanographic Real Time System (PORTS®)
- Shoreline Surveys

Weather & Water

- Coastal Marine Automated Network (C-MAN)
- DART
- Voluntary Observing Ships
- Weather Buoys

Ecosystems

- Coastal Change Analysis Program (C-CAP)*
- Coral Reef Ecosystem Integrated Observing System (CREIOS)
- Commercial Fisheries-Dependent Data
- Economic/ Sociocultural Observing System*
- Ecosystem Surveys
- Fish Surveys
- National Observer Program
- Protected Resource Surveys
- Recreational Fisheries-Dependent Data
- System-Wide Monitoring Program (SwiM) for Marine Sanctuaries*
- System-Wide Monitoring Program (SWMP) for National Estuarine Research Reserves
- Passive Acoustics Observing System*
- National Status and Trends Program*

Mission Support

- NOAA Ships
- NOAA Aircraft*
- NOAA Satellite (managed outside of IOOS)

* - NOAA is working to update Interagency IOOS documentation

National Water Level Program

Providing Water Level Information for:

- **Marine Transportation**
- **Nautical Charting and Shoreline Mapping**
- **Recreational Boating**
- **Hazardous Material Response**
- **Storm Surge and Coastal Flooding**
- **Tidal Datums and Sea Level Determination**

National Water Level Program

IOOS enhancements in fiscal year 2005

Upgrades to:

- USGS water level stations in Chesapeake Bay to NOAA standards
- USCOE water level stations in Gulf to NOAA standards
- National Estuarine Research Reserve Station to NOAA water level standards in Wells, Maine
- Florida Dept. of Environmental Protection (FDEP) water level stations to NOAA standards
- 12 COMPS (U. So. FL) water level stations to NOAA standard

Integrating – Ocean Observing Systems

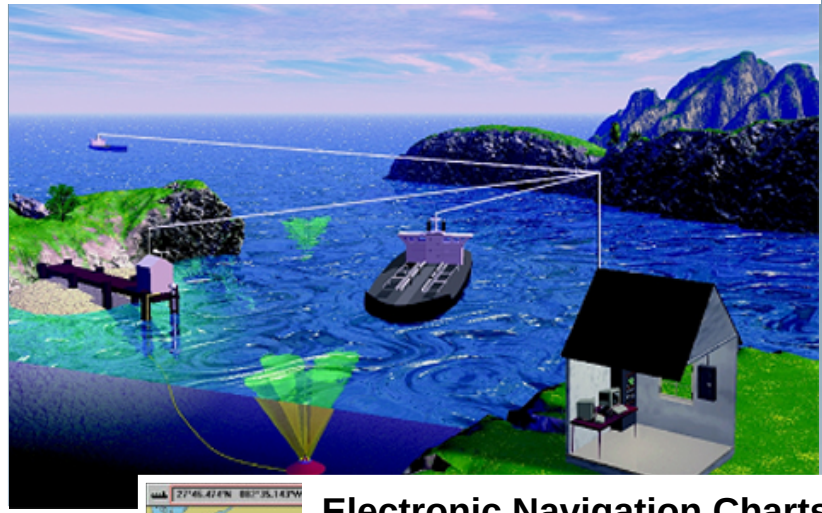
FY 2006 Integrating projects

- IOOS Data Assembly Center at NDBC
- Linking Global and Regional Capabilities
- High Frequency Radar: Real-Time Tidal Velocity Product Demo for NY Harbor
- Ocean Observing Systems DMAC Interoperability Plans
- Community Modeling Pilot Project
  - USCG/NOAA enhancing model availability for search and rescue
  - NOAA support for regional models
- Next Generation Storm Surge Modeling
- NERRS System Wide Monitoring Program Water Quality and Weather to Near Real-Time

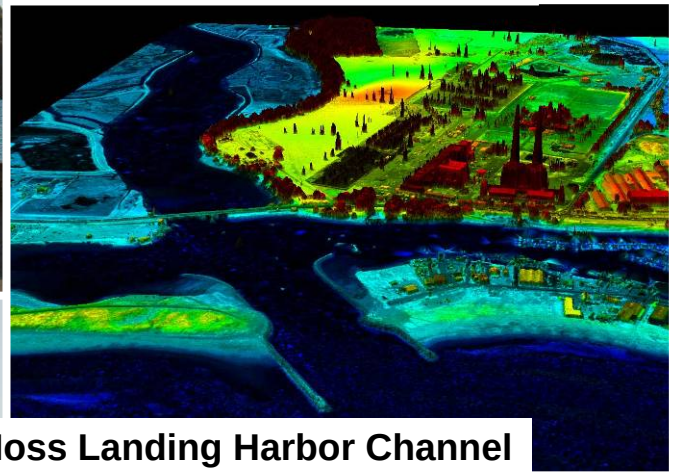
IOOS – Improving Technology and Tools

Autonomous Underwater Vehicle

Physical Oceanographic Real Time System®

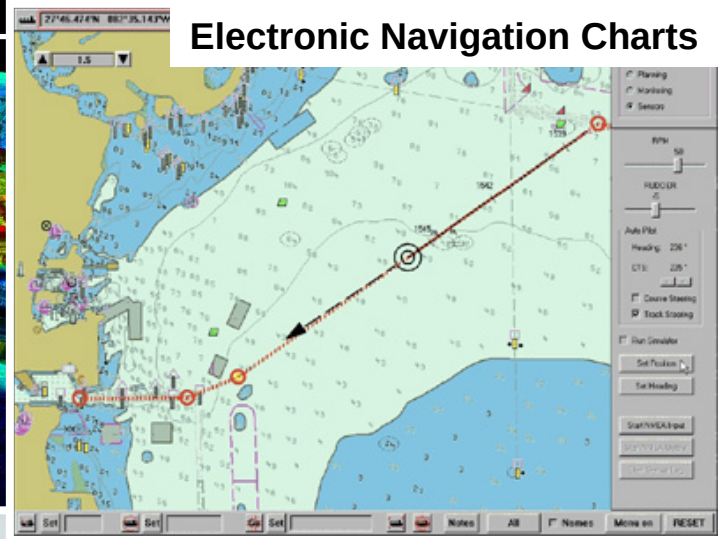


Tide Gauge



LiDAR Image of Moss Landing Harbor Channel

Electronic Navigation Charts

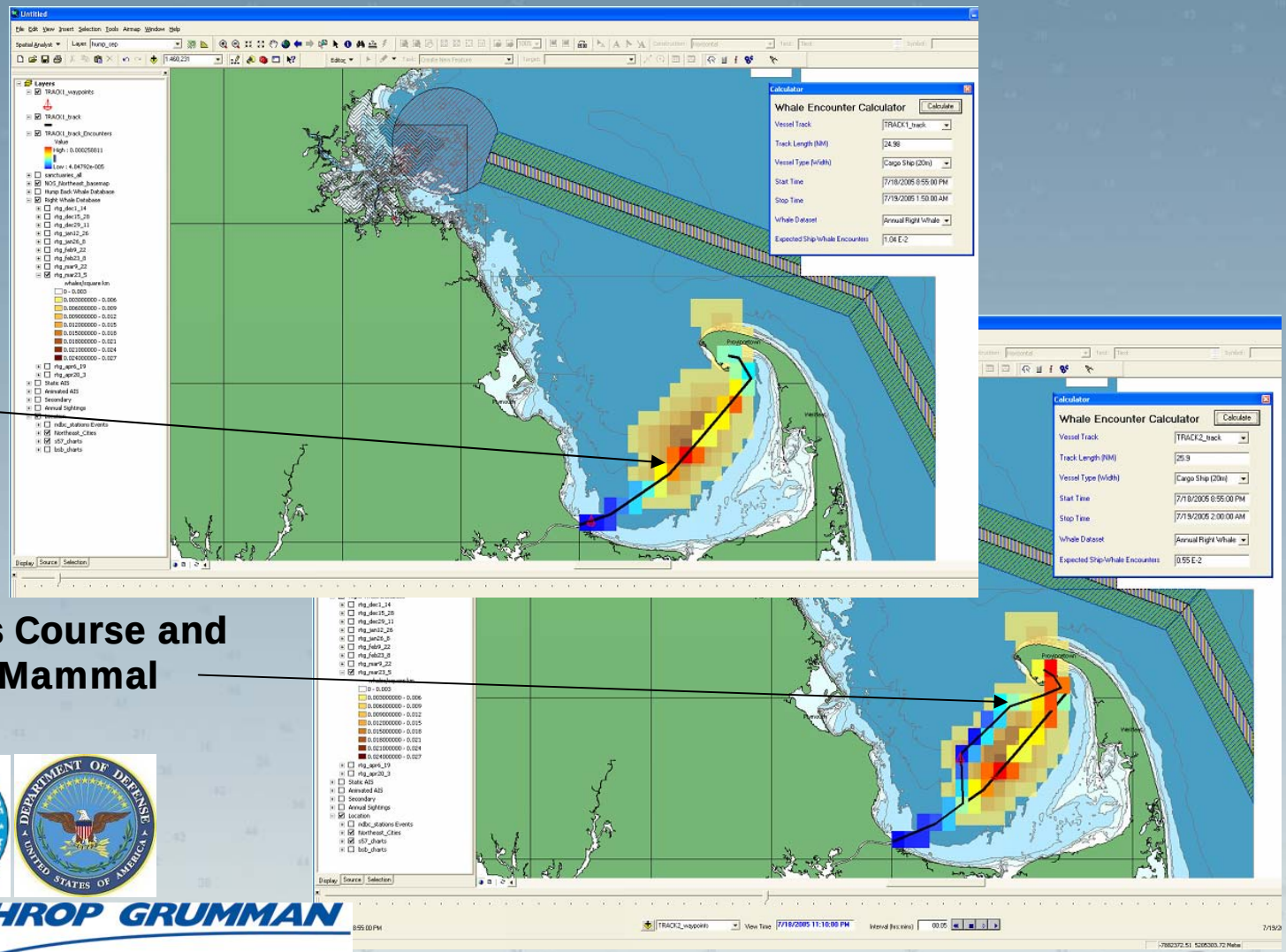


IOOS Future Applications

NOAA/ NAVY Demonstration

Ship's Course and Expected Marine Mammal Encounters

Alternative Ship's Course and Expected Marine Mammal Encounters



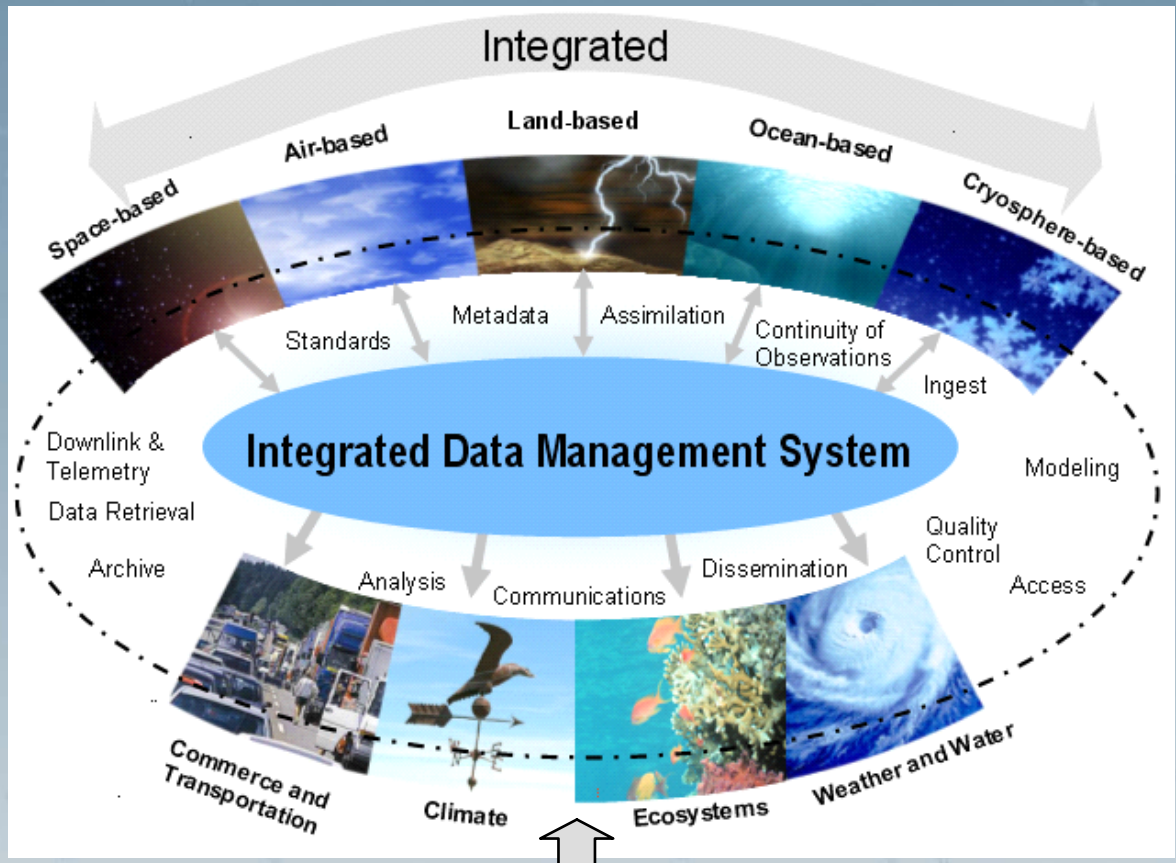
APPLIED SCIENCE ASSOCIATES

NORTHROP GRUMMAN
DEFINING THE FUTURE™

NOAA's Observation System Target Architecture

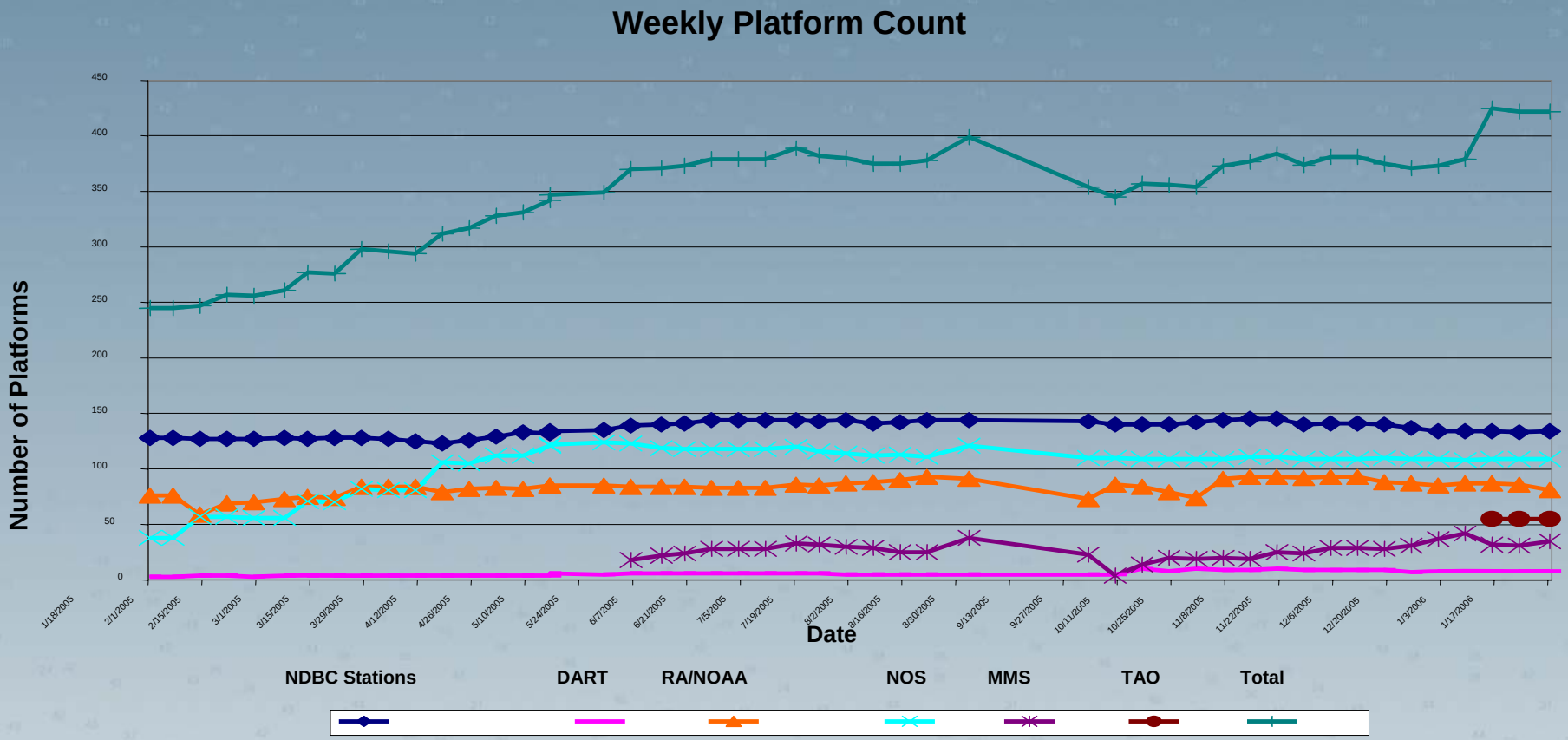
Target Architecture Principles:

- **Utility**
  - **Focus on societal benefits**
  - **Requirements-based**
  - **All data archived and accessible**
- **Interoperability**
  - **Full and open data sharing**
  - **Standards-based**
- **Flexibility**
  - **Leverages new technology**
- **Sustainability**
  - **Build on existing systems**
- **Affordability**
  - **Effectively use non-NOAA systems**



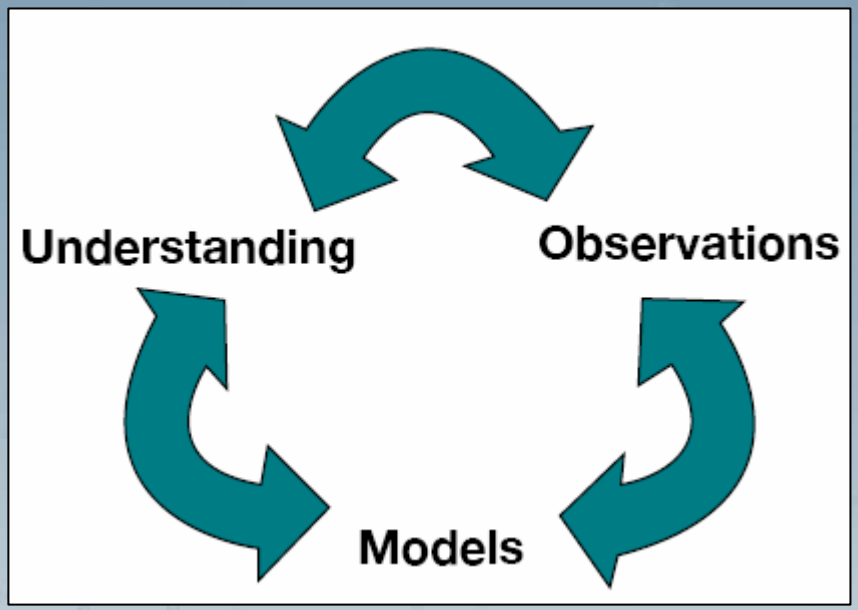
Partnerships
National International

National Data Buoy Center: IOOS Data Assembly Center



NDBC's weekly platform count from January 18, 2005 through January 17, 2006. The green line (crosses) shows the total number of platforms that NDBC manages. The dark blue line (diamonds) is the NDBC platforms. The light blue line (x) is the NOAA's National Ocean Service (NOS) platforms. The orange line (triangles) is the IOOS partner's platforms. The red line (circles) is the Tropical Ocean Atmosphere (TAO) platforms. The dark purple line (stars) is the oil and gas platforms. The light purple line is the Deep-ocean Assessment and Reporting of Tsunami buoys.

Role of Modeling & Analysis



Mechanism to

- Optimize observations
- Generate products

Includes

- Observing System Simulation Experiments (OSSE)
- Data assimilation
- Coupled ocean models

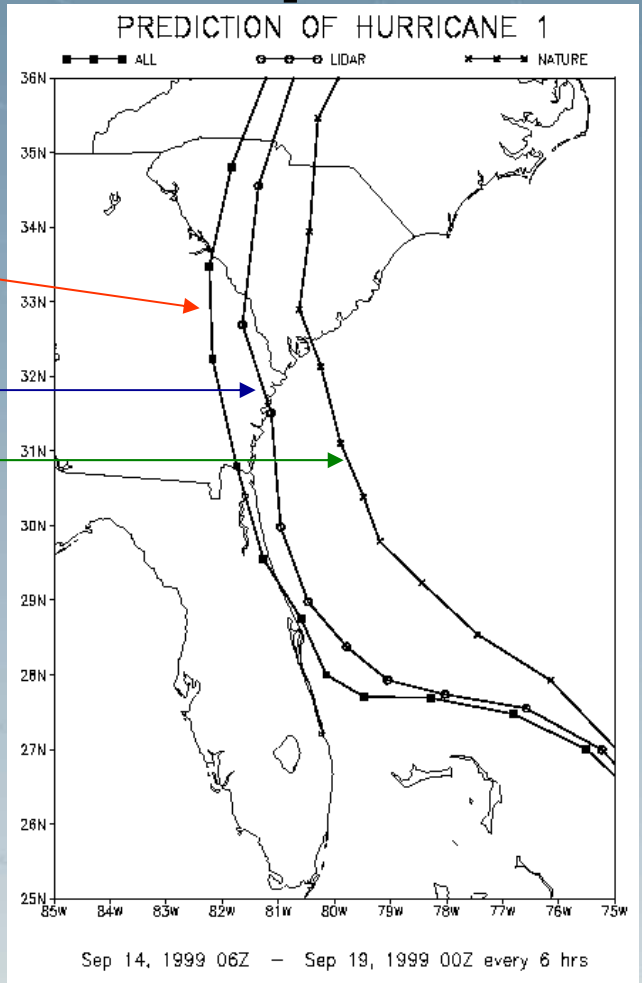
Observing System Simulation Experiments (OSSE)

Predicted path:

Without LIDAR Wind Profile

With LIDAR Wind Profile

Actual Path



Observing System Simulation Experiments (OSSEs) provide an effective means to:

- **Evaluate the potential impact of proposed observing systems**
- **Determine tradeoffs in their design**
- **Evaluate new data assimilation methodology**

Provide quantitative information on observing system impacts

- **New instrumentation**
- **Alternate configuration of existing instrumentation**
- **Data assimilation system diagnosis and improvement**

X nature track
■ forecast beginning 63 h before landfall using current data
● circles denote the improved forecast for same period using simulated lidar data.

GEOSS and IOOS Societal Goals Match NOAA's Mission Goals

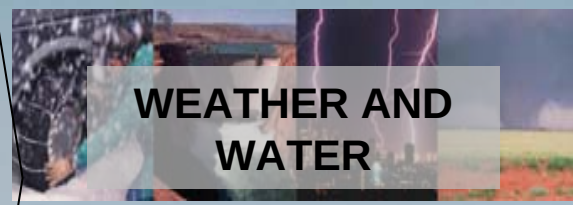
GEOSS Goals

1) Improve Weather Forecasting
2) Reduce Loss of Life and Property from disasters
3) Protect and Monitor our ocean resources
4) Understand, Assess, predict, mitigate, and adapt to climate variability and change
5) Support Sustainable Agriculture and Combat Land Degradation
6) Understand the effects of environmental factors on human health and well-being
7) Develop the capacity to make ecological forecasts
8) Protect and monitor water resources
9) Monitor and manage energy resources

IOOS Societal Goals

1) Improve predictions of climate change and weather and their effects on coastal communities and the nation;
2) Improve the safety and efficiency of marine operations;
3) Mitigate the effects of natural hazards;
4) Improve national and homeland security;
5) Reduce public health risks;
6) Protect and restore healthy coastal marine ecosystems; and
7) Enable the sustained use of marine resources.

NOAA Mission Goals



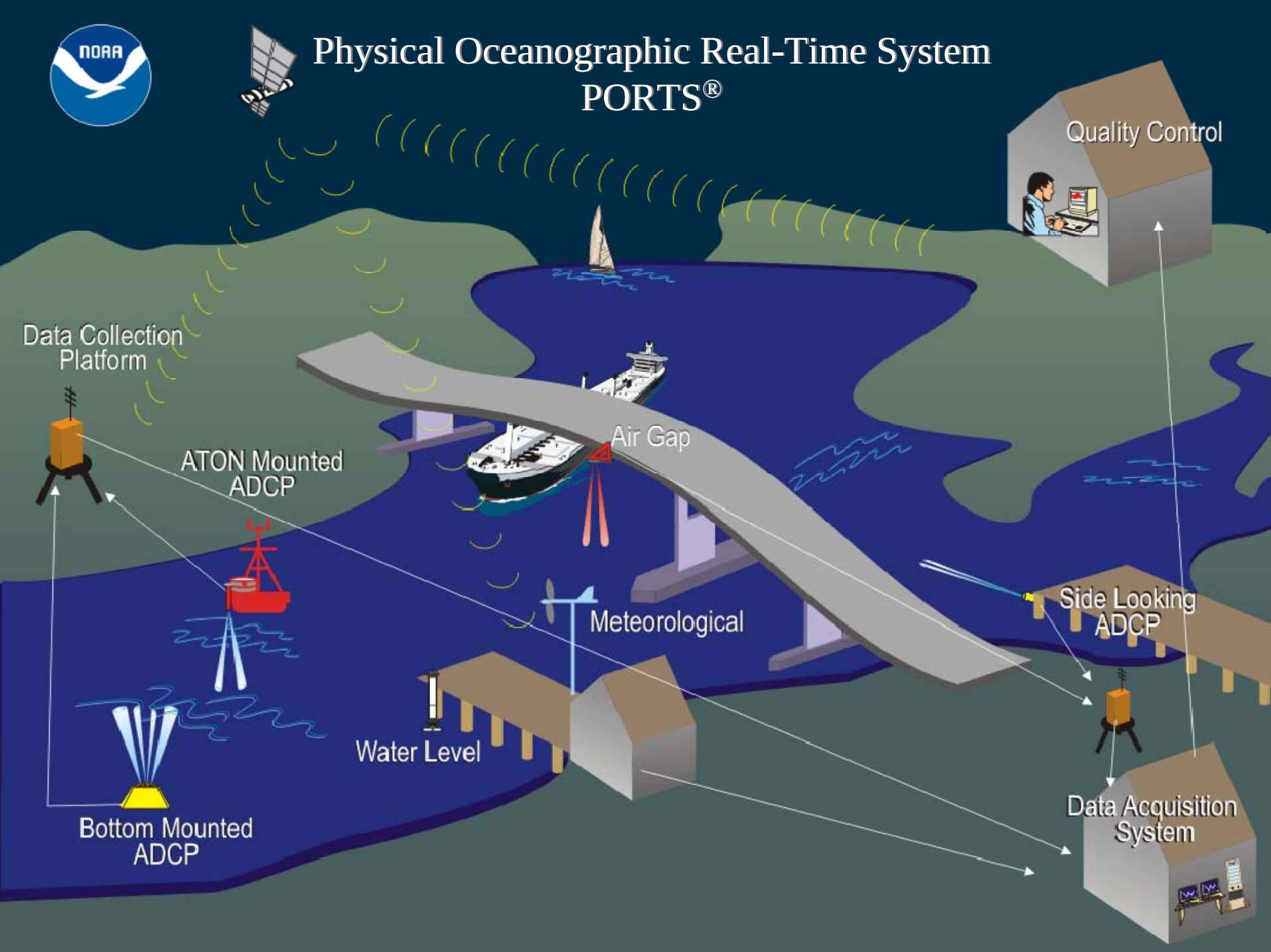
IOOS Near-term Priorities

1. Creating interoperability among NOAA's high priority data sets (via DMAC process)
2. Establish Regional Associations and support Ocean.US
3. Increase effectiveness of current Interagency Planning Office (Ocean.US)
4. Utilize and optimize ocean observations through a modeling & analysis subsystem
5. Utilize IOOS conceptual design and cost estimates in NOAA IOOS and GEOSS plans
6. Continue expansion of global component

IOOS Next Steps

- Via NOC and NOSC
  - Develop a project plan (NOAA IOOS schedules, cost estimates, performance metrics, etc) using the established Major Project designation process
  - Develop a project management plan
  - Continue use of existing IOOS Focus Group with inclusion of IOOS duties in their performance plan
  - Support for NOAA Integrated Observations Team that works in concert with NOAA Earth Observation activities
- Via Interagency Working Group on Ocean Observations (IWGOO)
  - Develop certification and accreditation process for regional associations
  - Develop system design blueprint for initial IOOS operations by utilizing conceptual design output

- Questions?


Physical Oceanographic Real-Time System
PORTS®
Quality Control
Data Collection Platform
ATON Mounted ADCP
Air Gap
Meteorological
Side Looking ADCP
Water Level
Bottom Mounted ADCP
Data Acquisition System

WHY PUT CURRENT METERS ON ATONs?

Maritime community requires current information within navigation channels

Current meter placement until now was limited by cable length and staying out of channel