

National Data Buoy Center

Overview for MIST Small Business Summit

April 11, 2017



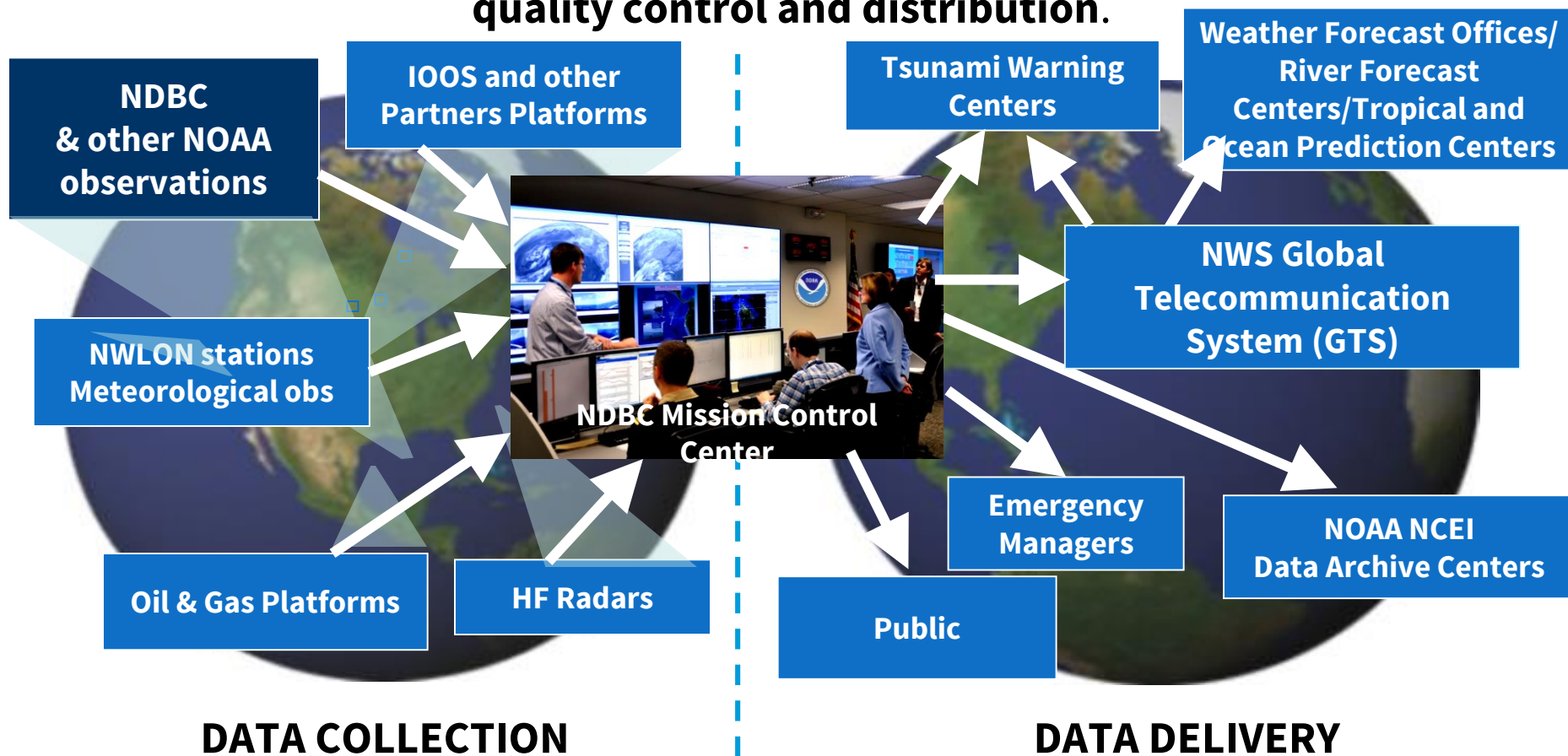


National Data Buoy Center



Stennis Space Center, Mississippi Gulf Coast

To provide a **real-time**, end-to-end capability beginning with the **collection** of marine atmospheric and oceanographic data and ending with its transmission, **quality control and distribution**.





NDBC Staff

NDBC Federal staff - 40 FTE's

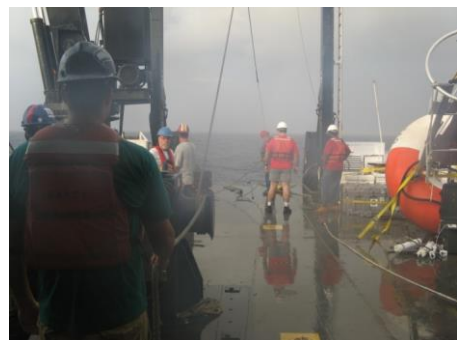
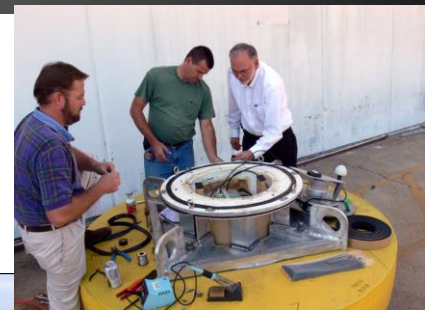
USCG Liaison Office - 5 Officers

NOAA Corps Officer

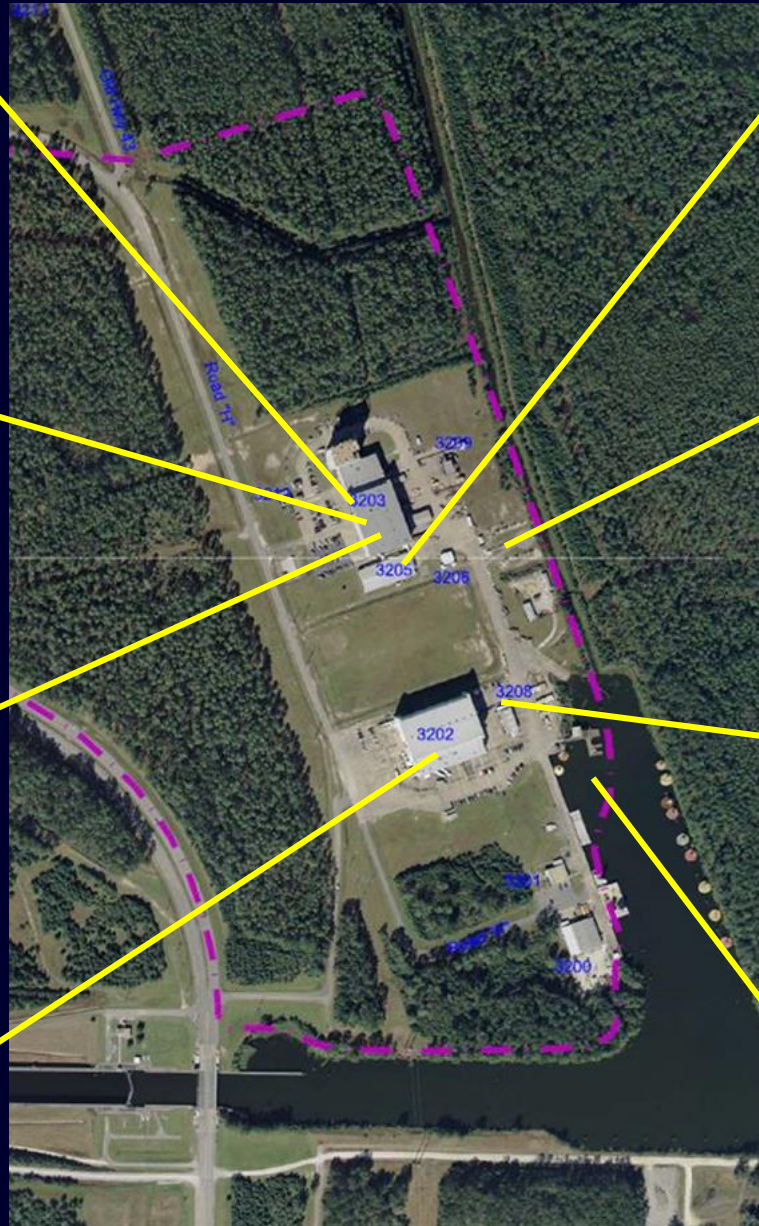
Tech Services Contract currently with PAE (through April 30, 2018)

Broad SOW across all NDBC activities

Level of Effort is about 120 FTE's including subcontractors



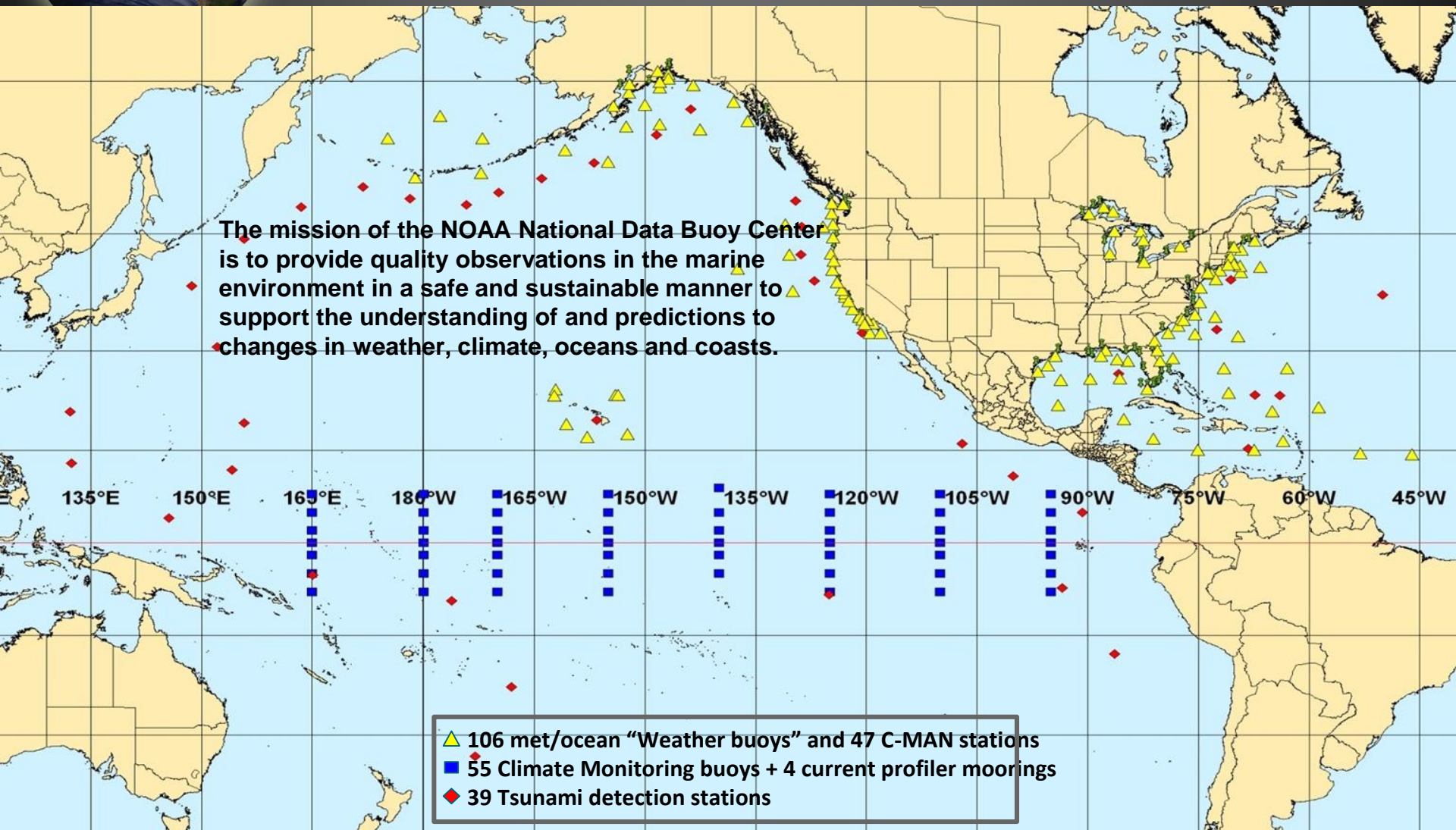
National Data Buoy Center Facilities at SSC, MS





NDBC Observing Platforms

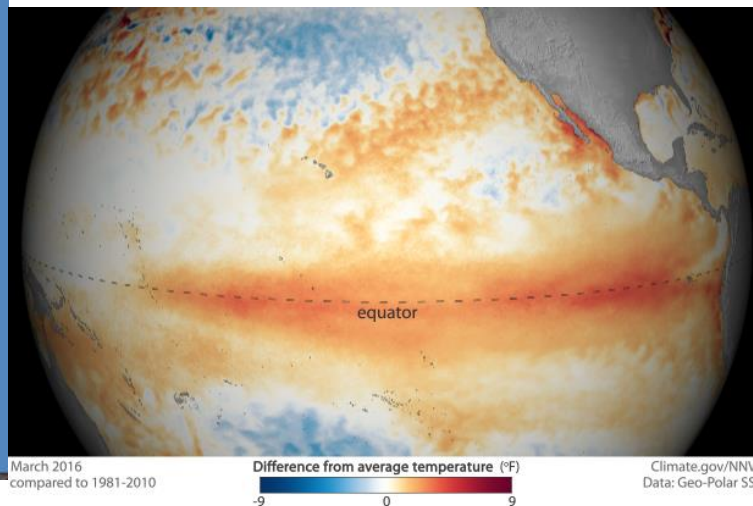
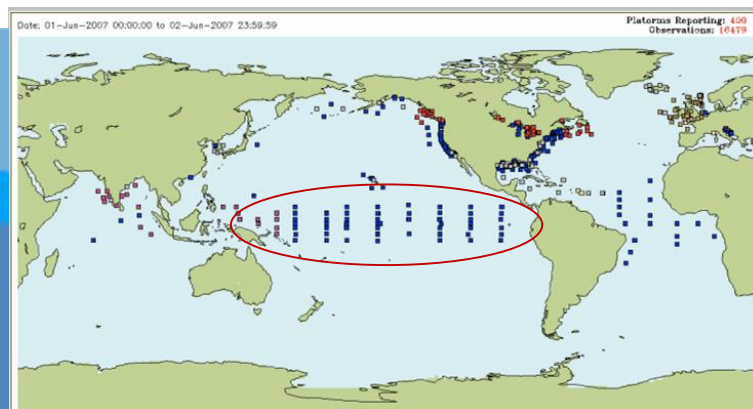
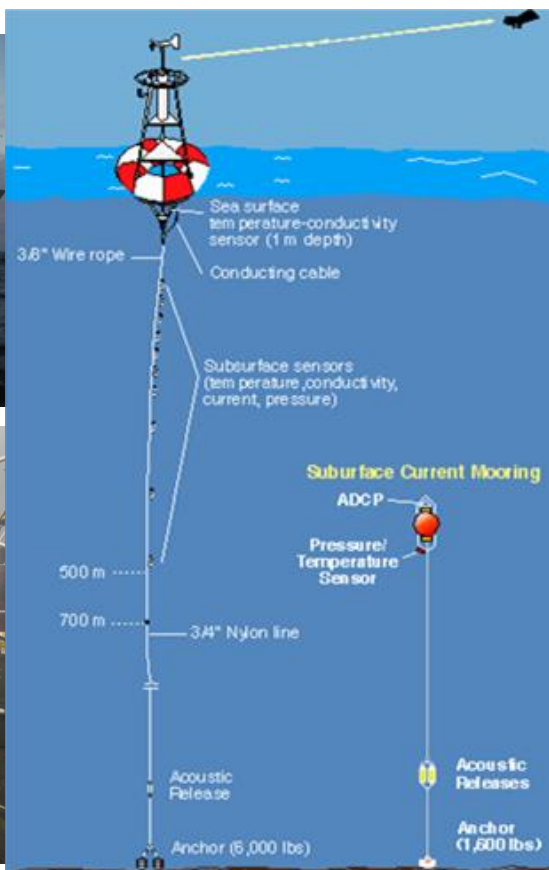
The mission of the NOAA National Data Buoy Center is to provide quality observations in the marine environment in a safe and sustainable manner to support the understanding of and predictions to changes in weather, climate, oceans and coasts.





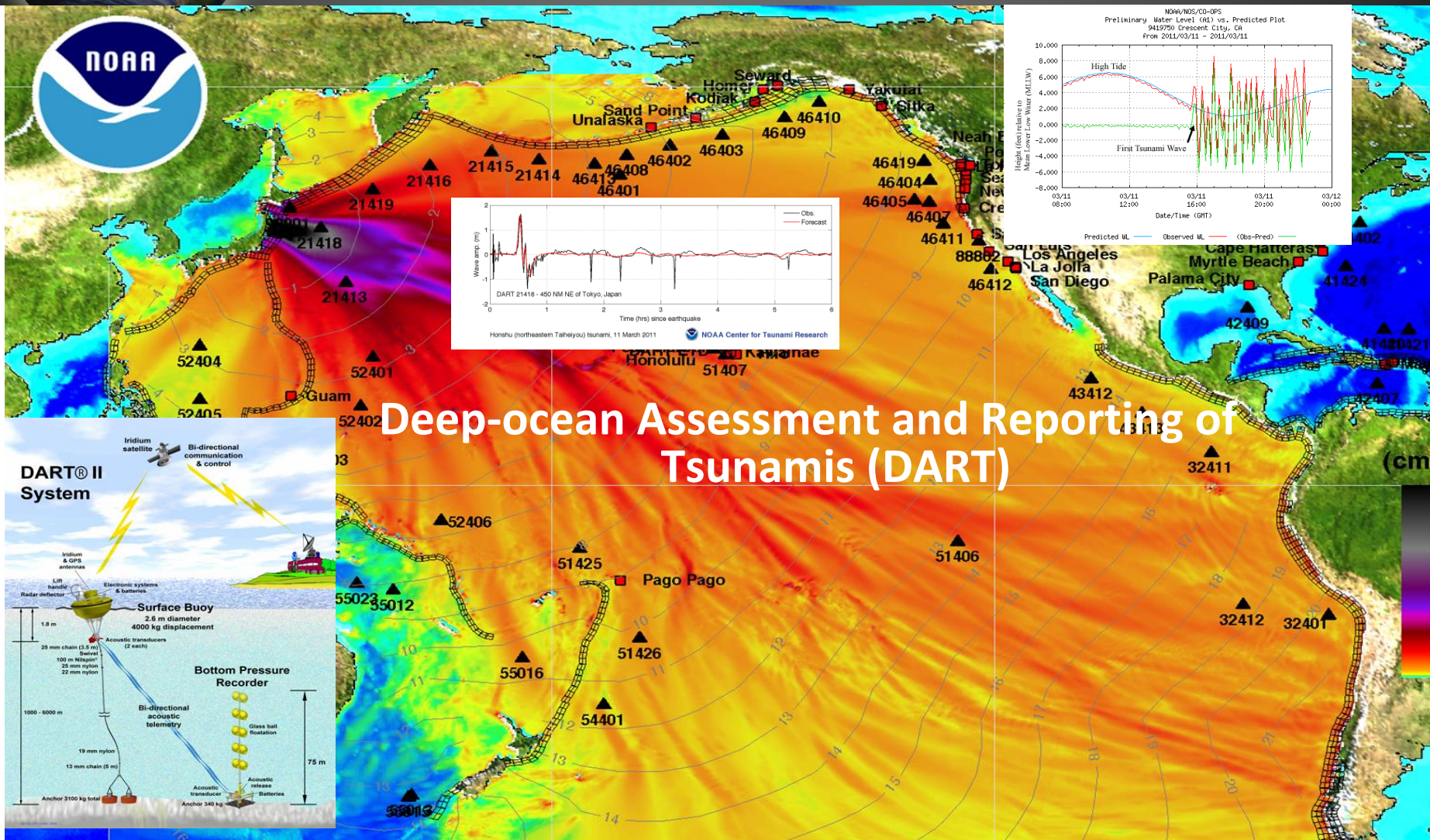
ENSO / Climate Monitoring

Tropical Atmosphere Ocean (TAO) - 59 moorings in the Equatorial Pacific Ocean
NOAA Researchers and Labs established the Array in the mid-1980's





Tsunami Assessment



Deep-ocean Assessment and Reporting of Tsunamis (DART)



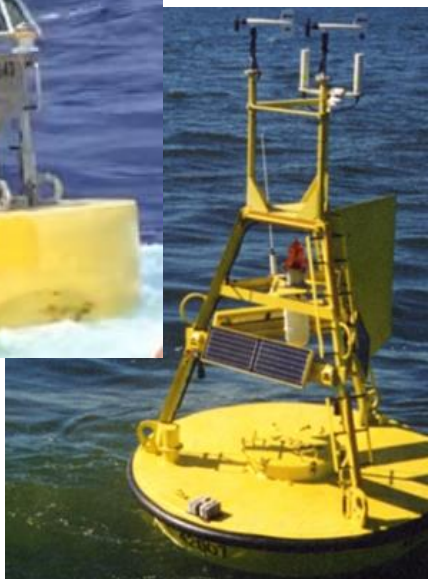
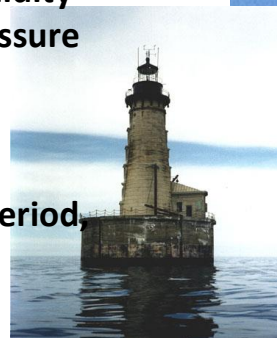
Weather/Ocean Observing Platforms

106 Weather-Ocean observing buoys/moorings

47 Coastal-Marine Automated Network
On Lighthouses, offshore structures, fishing
piers

Camera images
AIS (ship identification)
Wind speed / direction
Air temp / humidity
Barometric pressure

Ocean temp
Wave height, period,
direction
Ocean currents
Salinity





Cooperative Observing Partner Platforms

50 Observing Partners – 600 Platforms

Active Buoy Sponsors

U.S. Coast Guard
NASA Kennedy Space Center
Army Corps of Engineers

NOS/NWLON and other NOAA Obs

60 Oil and Gas Platforms

IOOS and other Observing Partners

NERACOOS

Stevens Institute (NJ)

Texas General Land Office

Louisiana State University

University of Connecticut

Louisiana Universities Marine Consortium

University of North Carolina

Skidaway Institute of Oceanography

Scripps Institution of Oceanography

University of Southern Mississippi

Forrest Oil

Chesapeake Bay Observing System

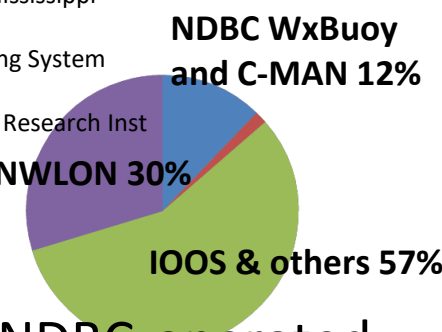
Shell Oil

Monterey Bay Aquarium Research Inst

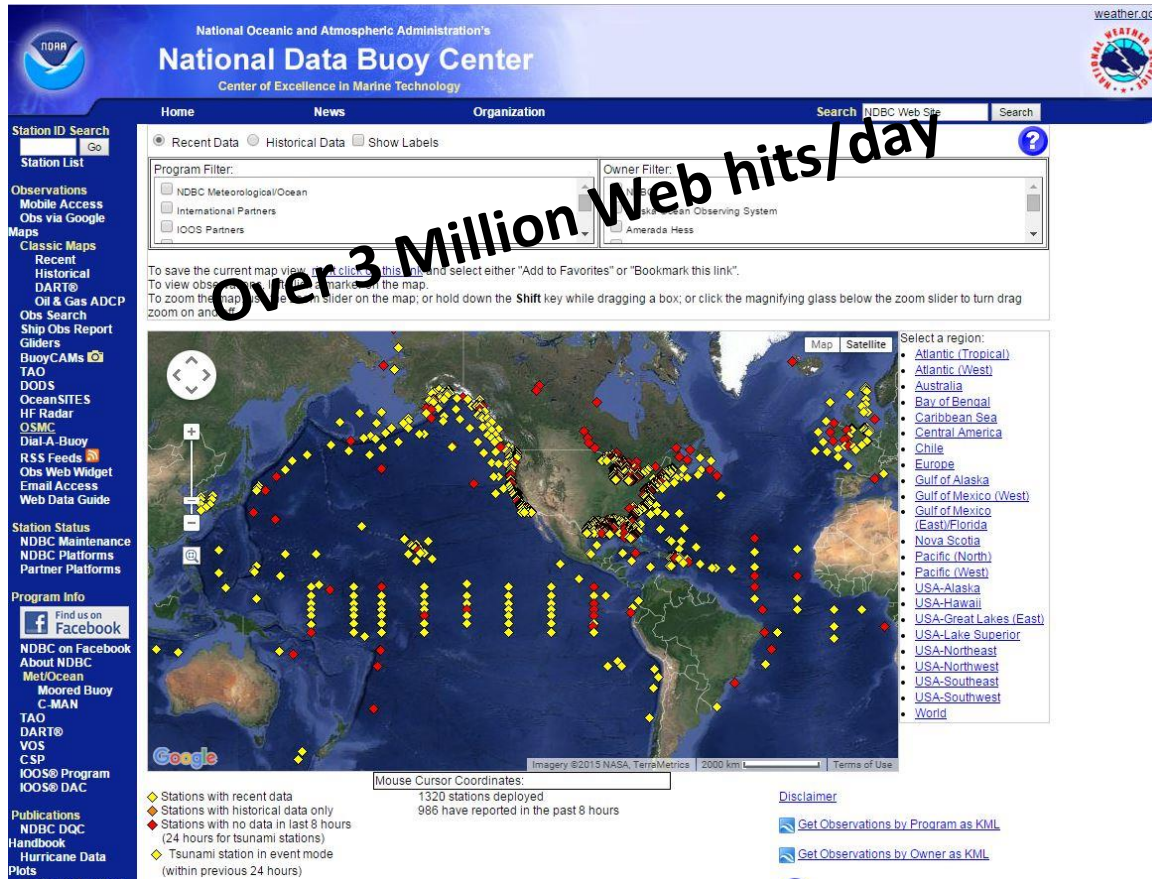
Oregon State University

Petrobras

IOOS and others)



Over 3 Million Web hits/day



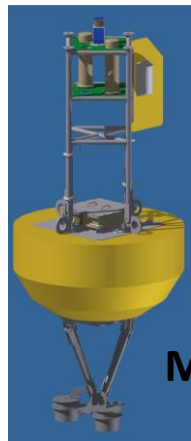
NDBC website is a portal for real-time observations from NDBC-operated buoys and stations, and those from observing “partners”



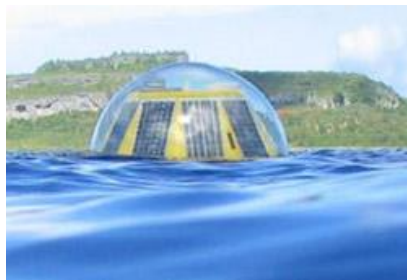


Evolving Technologies

New Observing Platforms



Modular
Buoy



COTS Wx buoys



Profiling Glider



Wave Glider

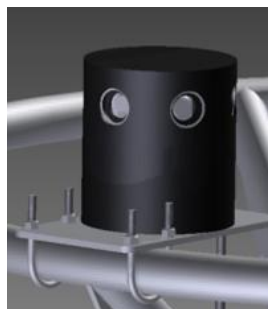


COTS
Tsunami
System

Modular Observing Payloads



SCOOP



Camera



Integrated
Weather sensors



Tsunami
Sensors



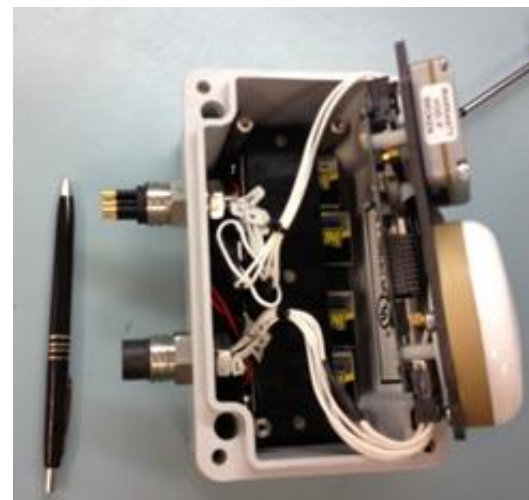
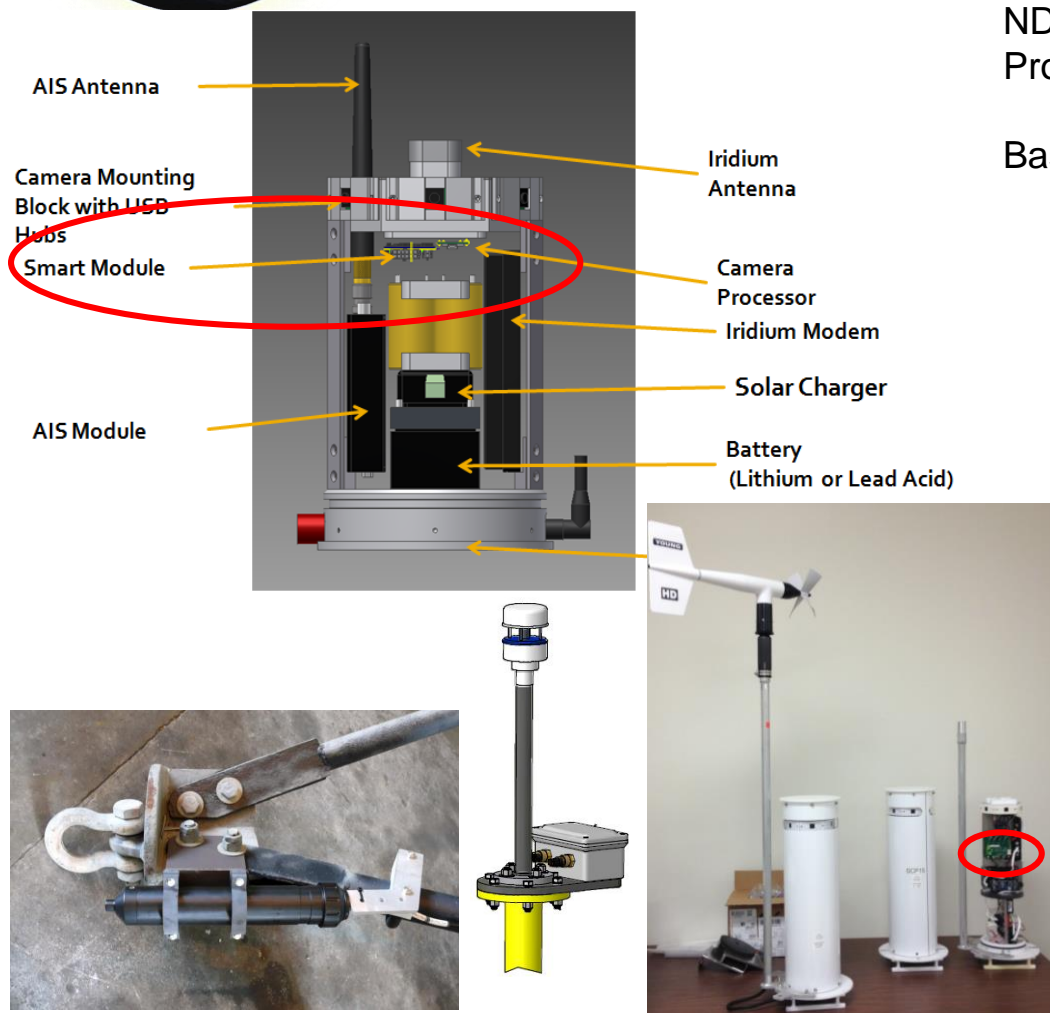


NDBC “Smart Module”

NDBC’s Smart Module for Communications, Processing and Interface (Patent 9,297,925)

Basic platform for

- *BuoyCam*
- buoy position-tracking system
- fish identification/tracking device
- Smart Wx station (for backup and on C-MAN)
- Self-Contained Ocean Obs Payload (SCOOP)

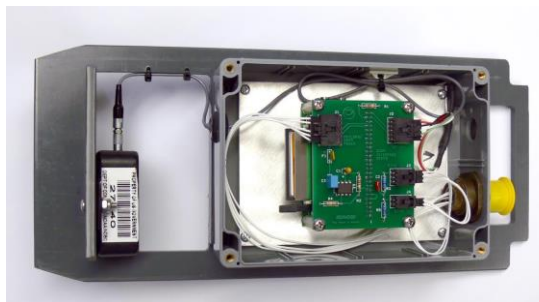




NDBC Directional Waves System

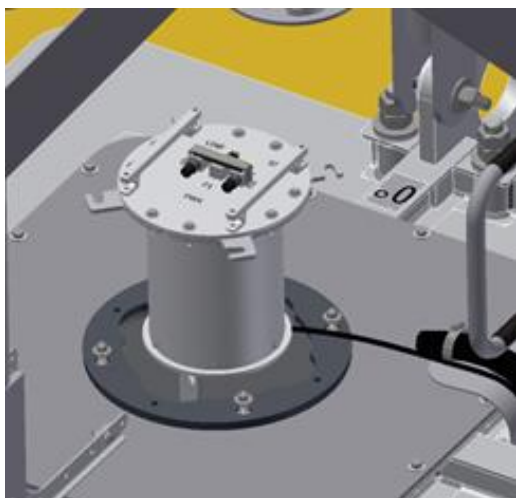
NDBC's Digital Directional Waves Module (DDWM)
(Patent Pending)

Packaged with Smart Module for SCOOP Waves system module



DDWM Electronics

- Circuit Board
- CPU
- Memory caed



Motion Sensor (3DM-GX1)

3 axes measurements of

- Magnetic flux
- Acceleration
- Angular rate





Challenge - Cost of buoy operations

NDBC Weather Buoy “Refresh” Underway

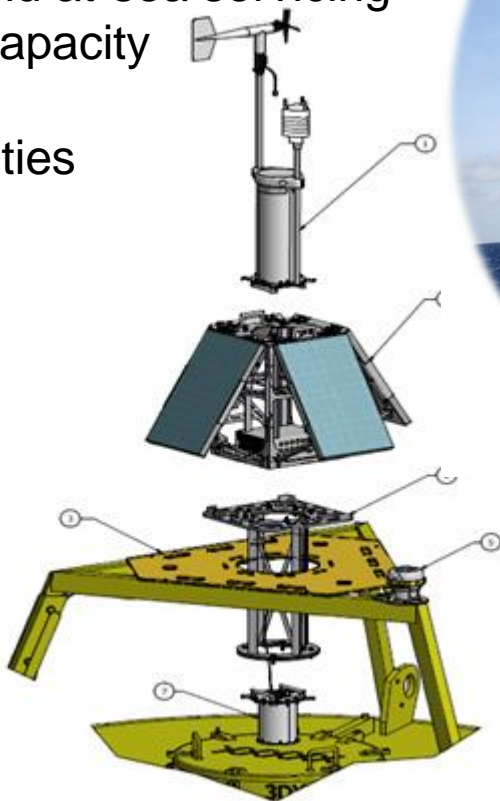
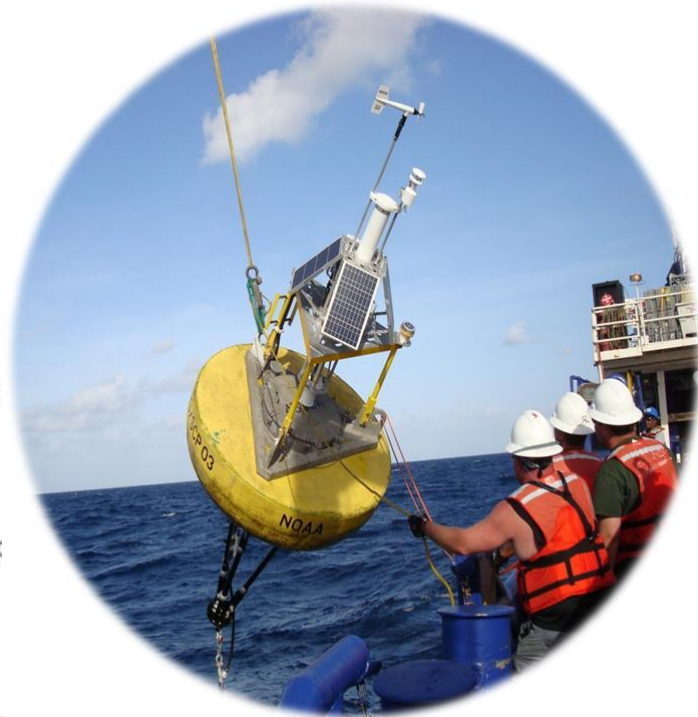
Self Contained Ocean Observing Payload (SCOOP)

Less labor intensive assembly, and at-sea servicing

Allows use of ships with less lift capacity

Requires less time on station

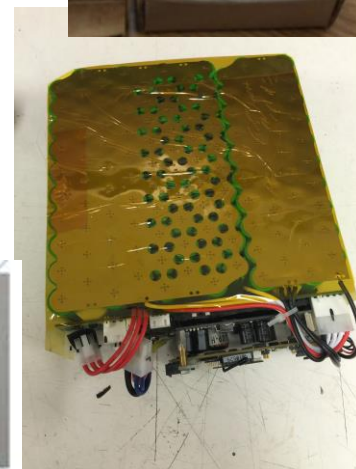
Has expanded observing capabilities





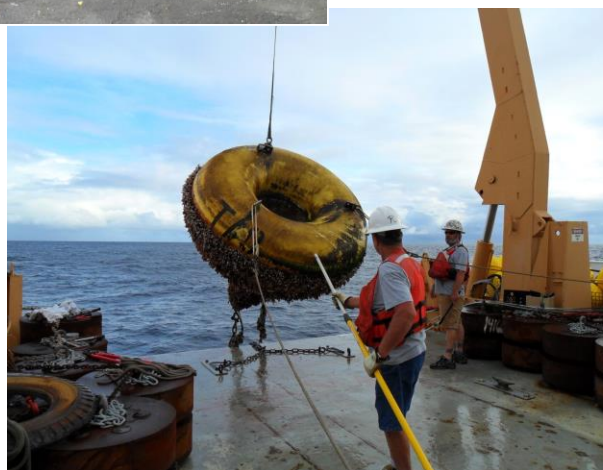
Challenge - Power for autonomous operations

- Efficient solar power generation
- Wave or ocean current power generation
 - CRADA with Ocean Power Technologies, Inc. to demonstrate their "PowerBuoy" - Ocean wave based power generation and energy storage technology.
- Wind power generation
 - Initial testing of wind generators on C-MAN
- Power storage
 - Lithium battery technologies





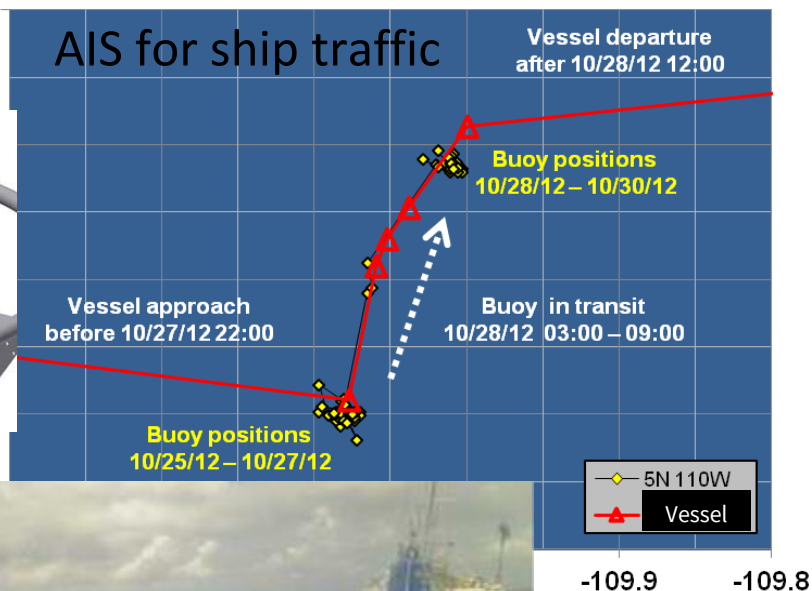
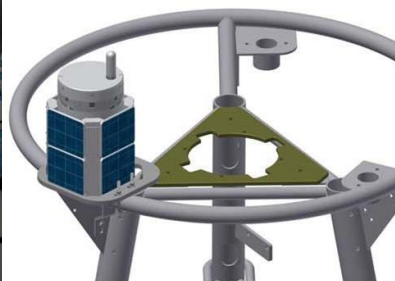
Challenge - Collision and Vandalism





Counter-Vandalism Actions

5.3



ata Buoy Center Station ID: 8N95W 04/19/20



Expanding use of *BuoyCAM* Images

Calm seas Gulf of Alaska



National Data Buoy Center Station ID: 46061 12/11/2014 2101 UTC

Rough seas Gulf of Alaska



high ocean surface current Gulf of Mexico



Fog / low visibility Portland
Maine





Expanding use of *BuoyCAM* Images

Cameras can monitor

- Ice, snow cap
- Vessel traffic
- Marine debris
- Algae blooms
- Marine life



Develop image recognition algorithms

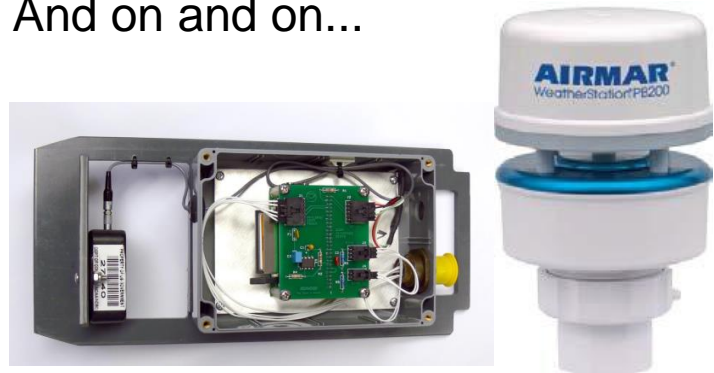
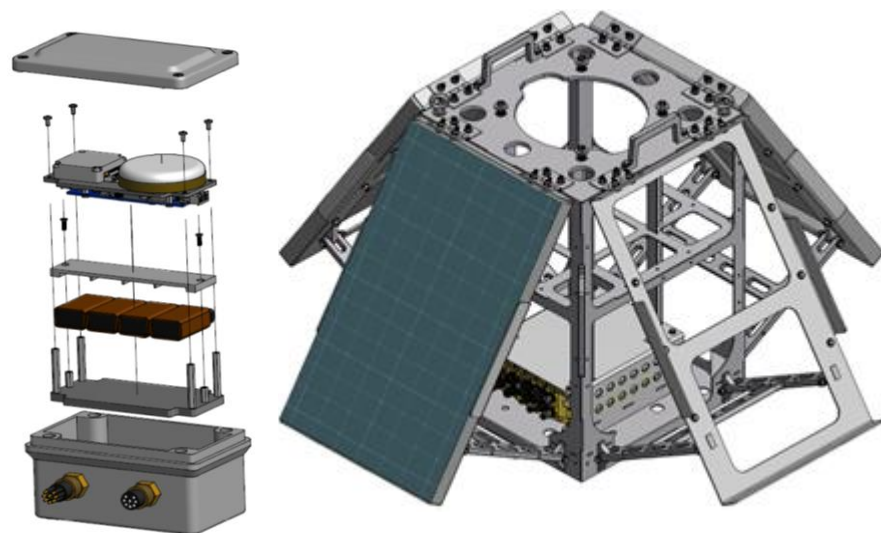
- Sea state
- Visibility
- Precipitation
- Clouds





Outsourcing of Technical Expertise, Services & Buoy Components

Buoy structure - hulls, masts, racks
COTS ready to deploy buoy systems
Circuit boards
Specialized materials
Sensors
Power generation and storage technologies
Communications technologies
Materials analysis and testing
Destructive and non-destructive testing
Buoy deployment - vessel services
And on and on...





NOAA

SCIENCE. SERVICE. STEWARDSHIP.



What questions do you have?



National Data Buoy Center
Stennis Space Center, MS