National Data Buoy Center

NDBC Presentation

Observational

Data Workshop

September 14, 2011

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NWS/NDBC

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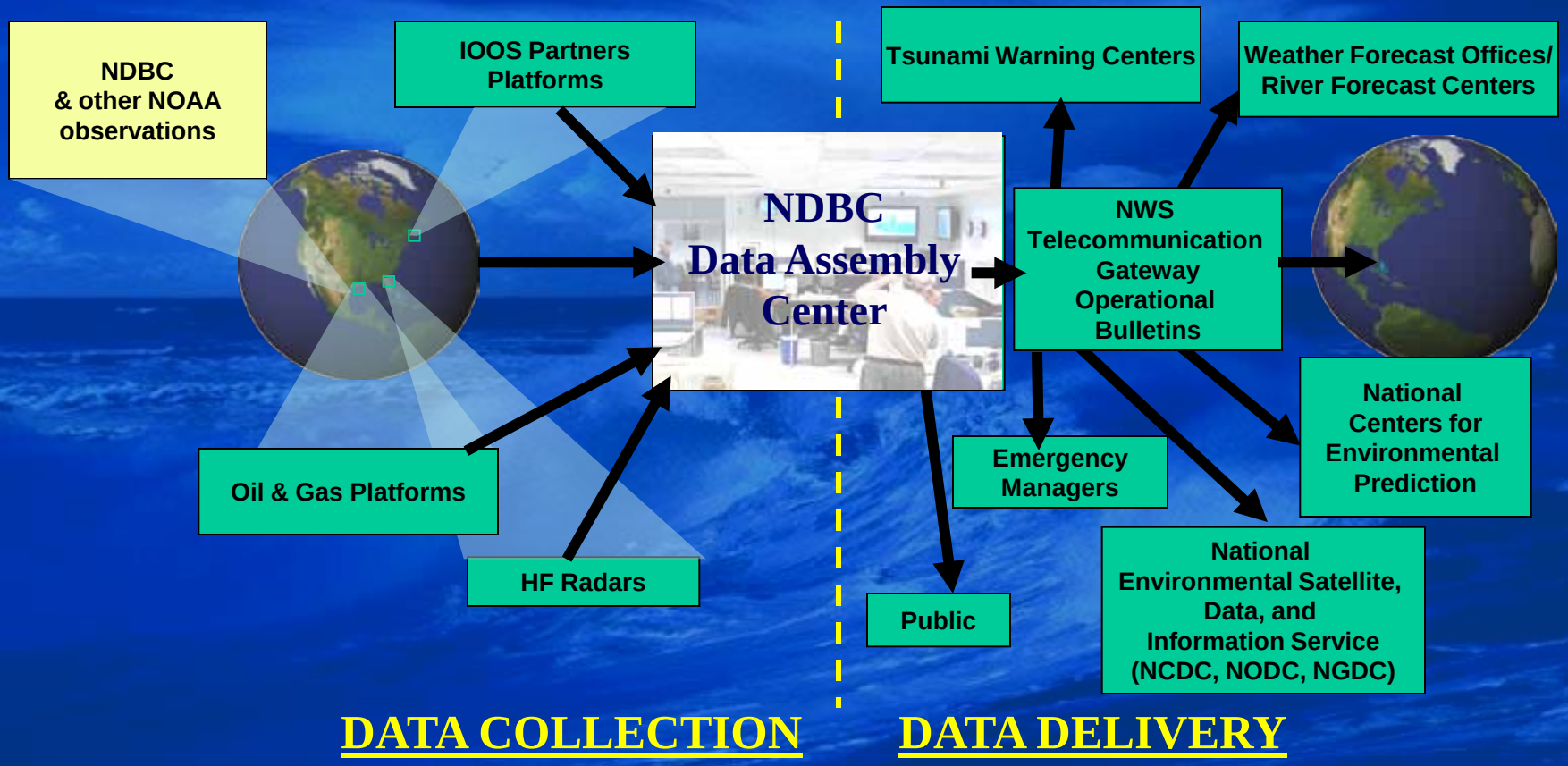
To provide a **real-time**, end-to-end capability beginning with the **collection** of marine atmospheric and oceanographic data and ending with its transmission, **quality control and distribution**.



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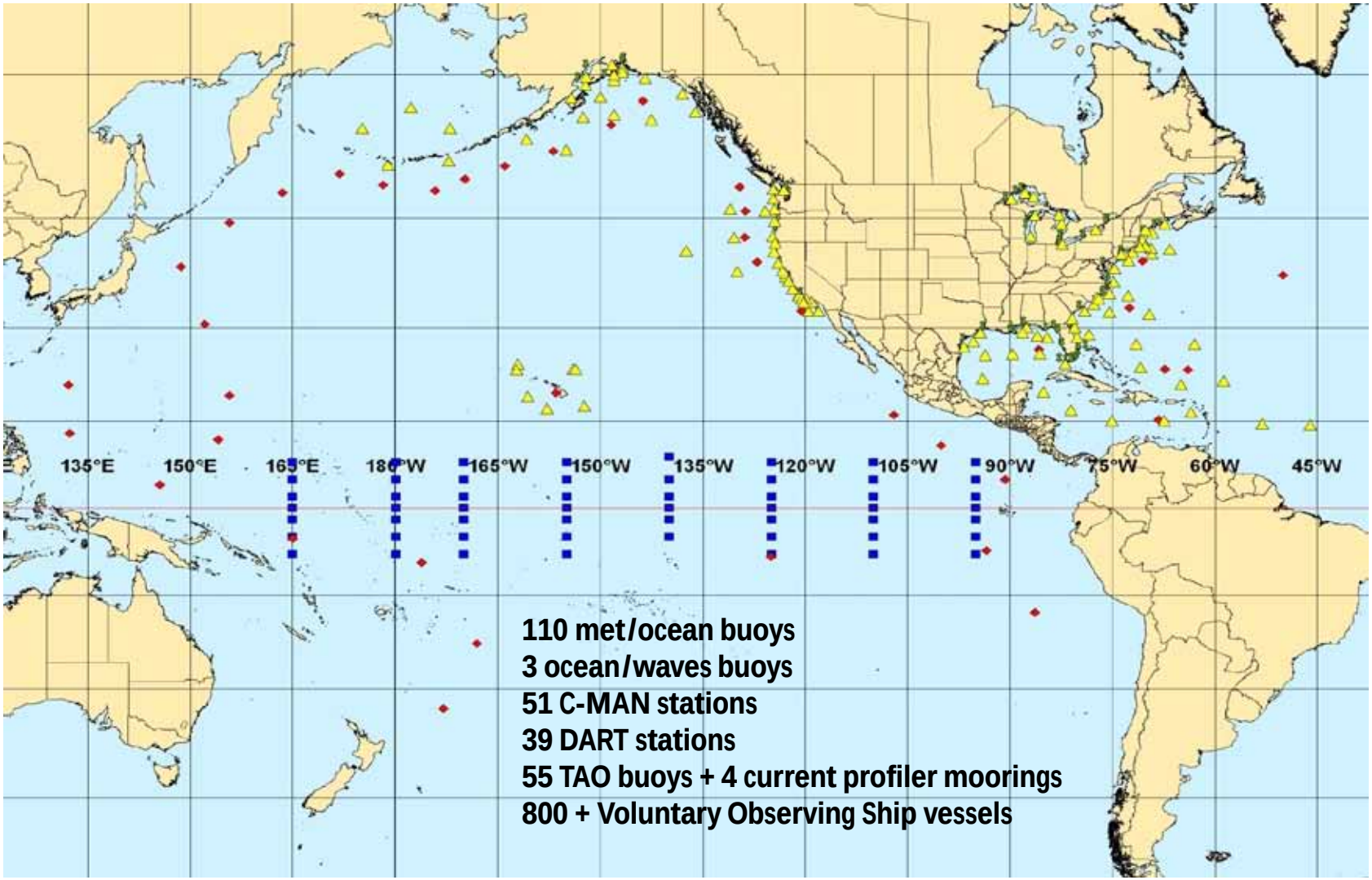
NWS/NDBC Ocean Observing Systems



NDBC's Data Center

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Data Feed	Type Data Received
Geostationary Operational Environmental Satellites (GOES)	Weather Buoy, C-MAN, Forecast and VOS
IRIDIUM Satellite System/Router Based Unrestricted Digital Interworking Connectivity Solution (RUDICS)	DART Data
IRIDIUM Satellite System/Department of Defense (DoD)/Short Burst Data service	Hurricane buoys, TAO refresh, some weather buoys
Service ARGOS, Inc. (ARGOS) satellite system	Buoy positioning, TAO legacy data
Integrated Ocean Observing System Participants (IOOS)	Partner data via FTP, web services
HF Radar	High Frequency Radar Data
GTS/GODAE	Non-NDBC marine observation data in support of the web and OSMC

Growth of Observational Data

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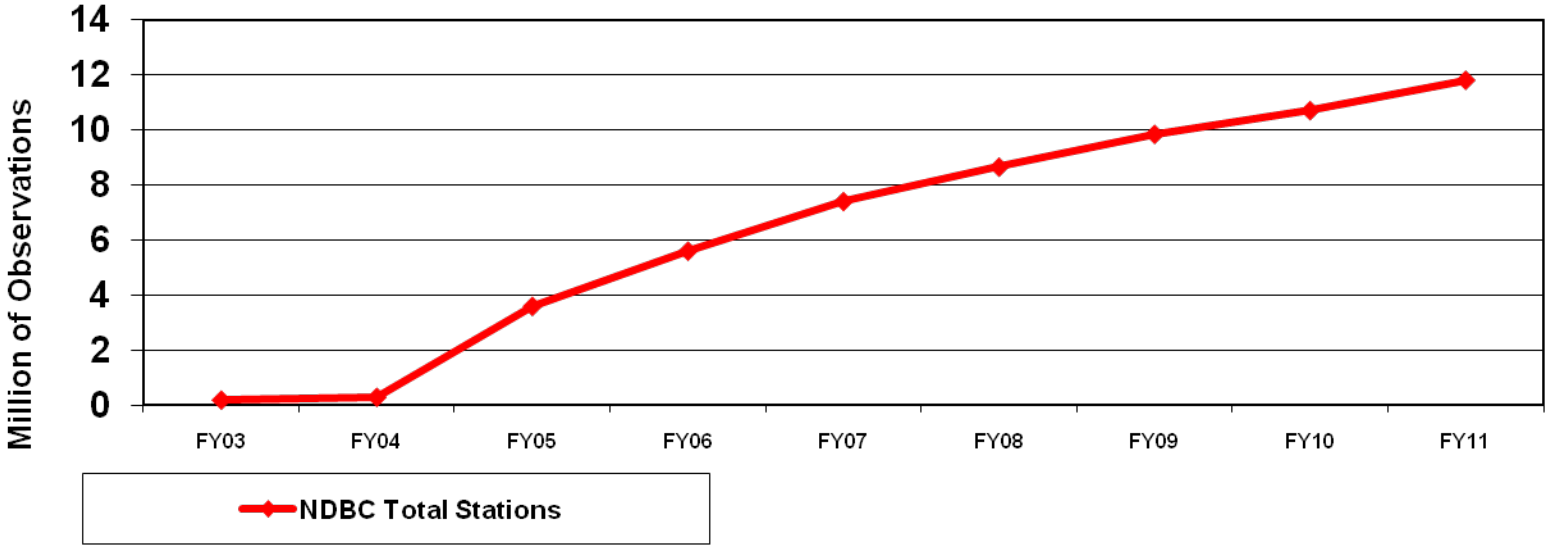

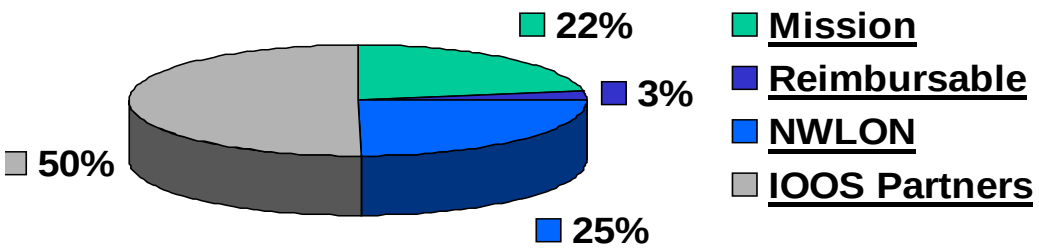

Mission Control Center

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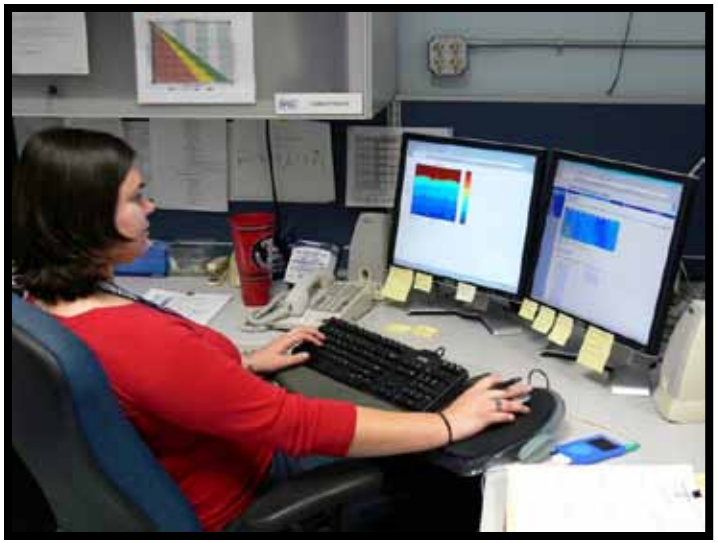

- Monitor status of all NDBC platforms – 24x7x365
- Alert users and customers of actual or potential outages
- Monitor status of gliders within the Glider Operations Center
- Management of station configuration and metadata
- Automated and Manual Quality Control Procedures
- Combination of Physical Scientists and IT Specialists
- Ingest, process and analyze observations
- Conduct data processing and QC algorithm development
- Disseminate observations via multiple methods

Proper Data Management

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- More than just placing a meteorological, oceanographic or geophysical instrument in the water or on the land,
- More than just collecting an observation, and
- More than just disseminating the data via a data portal

NDBC's Data Management will follow:

- Global Climate Observing System's Climate Ten Monitoring Principles: http://www.ncdc.noaa.gov/crn/crnclimmonprin.html
- Quality Assurance of Real-Time Ocean Data's Seven Data Management Laws: http://www.facebook.com/topic.php?uid=183720751655&topic=13660

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Weather and Ocean (WxOP) Buoys

1.8-m discus, 3-m discus, 6-m boat-shaped NOMAD , 10-m/12-m discus buoys

Operations at NDBC and in the Field

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- **System Preparation, Integration and Testing at NDBC**
  - System/component and mooring fabrication
  - System/component refurbishment
  - System integration
  - System testing
- **Field Operations**
  - System deployment
  - Field trouble-shooting and repair
  - Field refurbishment
  - System retrieval

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Components of NDBC Observing Systems

Meteorological Sensors

Wind speed/direction
Air pressure
Air temp
Relative humility

Buoy/platform structures

Buoy hull/platform
Surface structures
(e.g., Mast)
Underwater structures

Support equipments

Radar reflector
O&I light

Other sensors

Bottom Pressure Recorder
Bottom-mount systems
(e.g., current profiler)

Communications

Transmitters
Antennas
Position tracking devices

Power system

Batteries
Solar panels
Controller

Payload/data logger

Ocean Sensors (surface/subsurface)

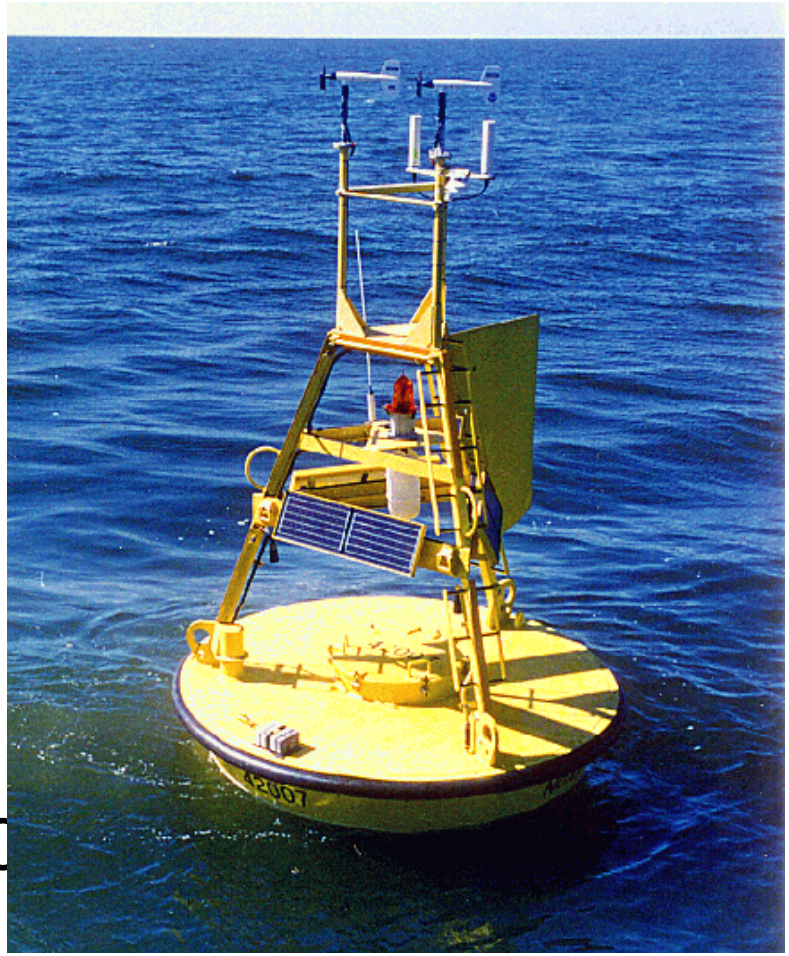
Surface Current
Surface temperature/salinity
Current Profiler
Temperature/salinity Profiler
Directional & non-directional Wave Measurements
Other ocean parameters

Mooring system

Cables Floats Anchors

3 – Meter Discus Buoy

- Most common
- Anemometer at 5 – meters
- Fin orients buoy into wind
- Discus hull allows for measurement of directional waves
- Hull now made at NDBC



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6-Meter NOMAD Buoy

- Can't measure directional waves
  - Not axi-symettric
  - Bridled from port to starboard
- Can take anything except excessive icing
- Anemometer height is about 5-m.
- Probably won't acquire anymore

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10/12-m Discus Buoys

- Large navigation buoys (LNBs)
- Anemometer height at 10 meters
- Can capsize in steep seas with H_0 > 10 m
- Must be towed, others can be lifted and trucked
- Steel hull is difficult to maintain
- Being phased out

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Did I mention they can flip?

- Last report from 42073 04/07/2011 @ 1550
- Wind dir =250
- Wind speed = 24 m/s
- Gust = 30 m/s
- Wave height = 11.7 m
- Peak period = 16 s
- Average period = 11.2 s

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C-MAN Stations

- Anemometer heights vary. Many are 20 - 40 m.
- Power available. Easier to install additional sensors
- Low maintenance costs, but access is becoming more difficult as Coast Guard turns over property to other organizations.

Climate Monitoring Platforms

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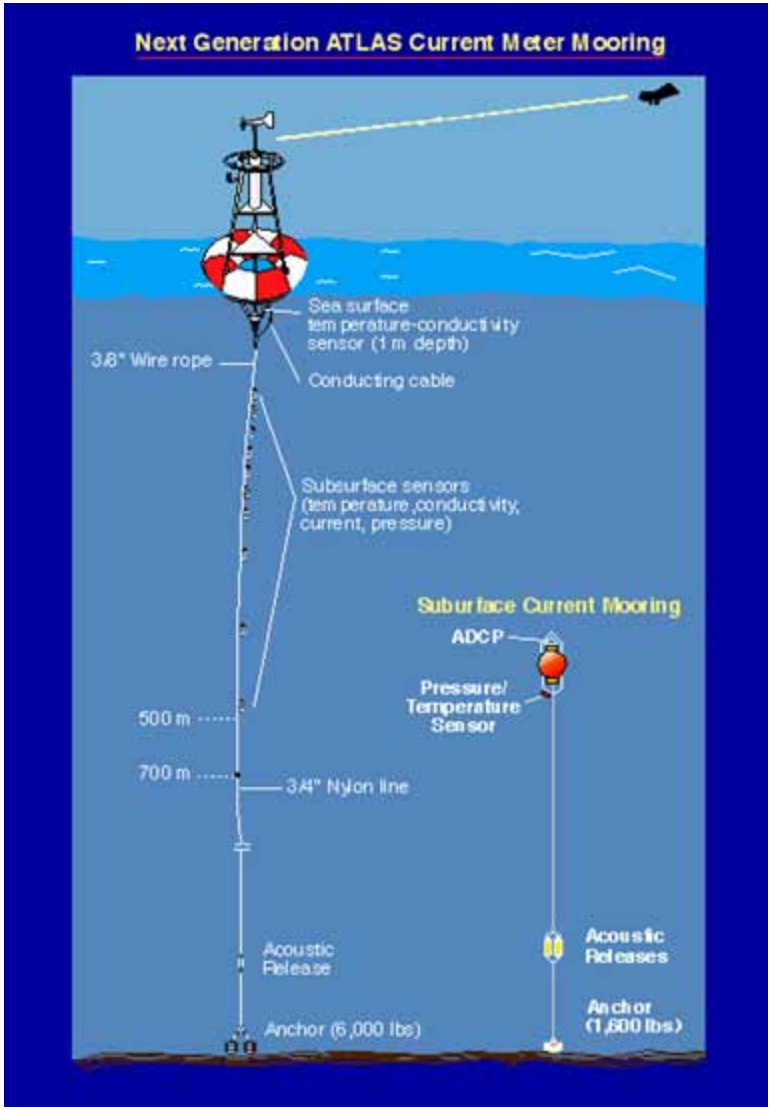
Tropical Atmosphere Ocean (TAO)

55 equatorial Pacific buoys

4 Ocean Current Profilers

~250 Ship days at sea on NOAA vessels



Tsunami Monitoring Platforms

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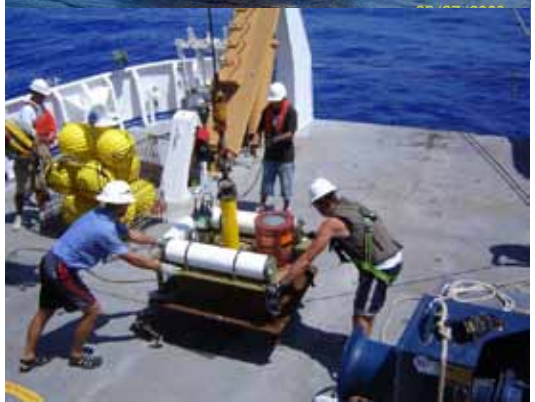
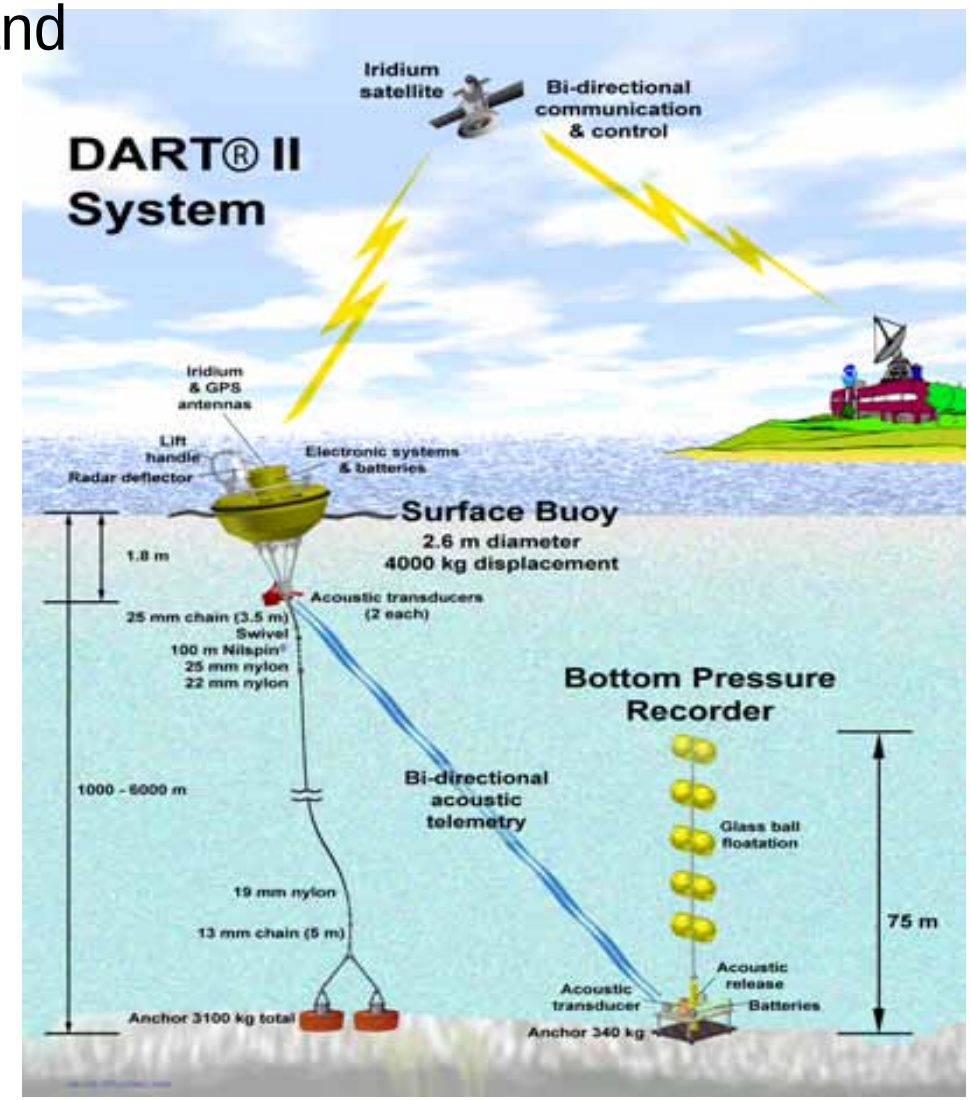
Deep-ocean Assessment and Reporting of Tsunamis

39 Stations

~230 ship days at sea on charter vessels





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New Developments

- Insertion of Benthic Glider Data from Partner Organizations to GTS, also AXBTs, hurricane profiling floats
- Acquiring and disseminating Marine Arctic Data (wx buoys, ice tethered profilers)
- Wave Glider Testing as a WX and Tsunameter Platform
- 2.3 – Meter Standard Buoy

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2.3-Meter Standard Hull

- One hull for WxB, TAO and DART fleets
- More economical foam hull
- Easier to transport
- Easier to deploy
- Greater standardization
- 4-meter anemometer ht.

Standard Buoy Development

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Multi-purpose / Multi-configurable Platform

Wave Glider Launched by NDBC
South of Pascagoula, MS
April13, 2011

On station
5 nm SSW of
10-m buoy 42040
in the Gulf of Mexico
until June 11, 2011

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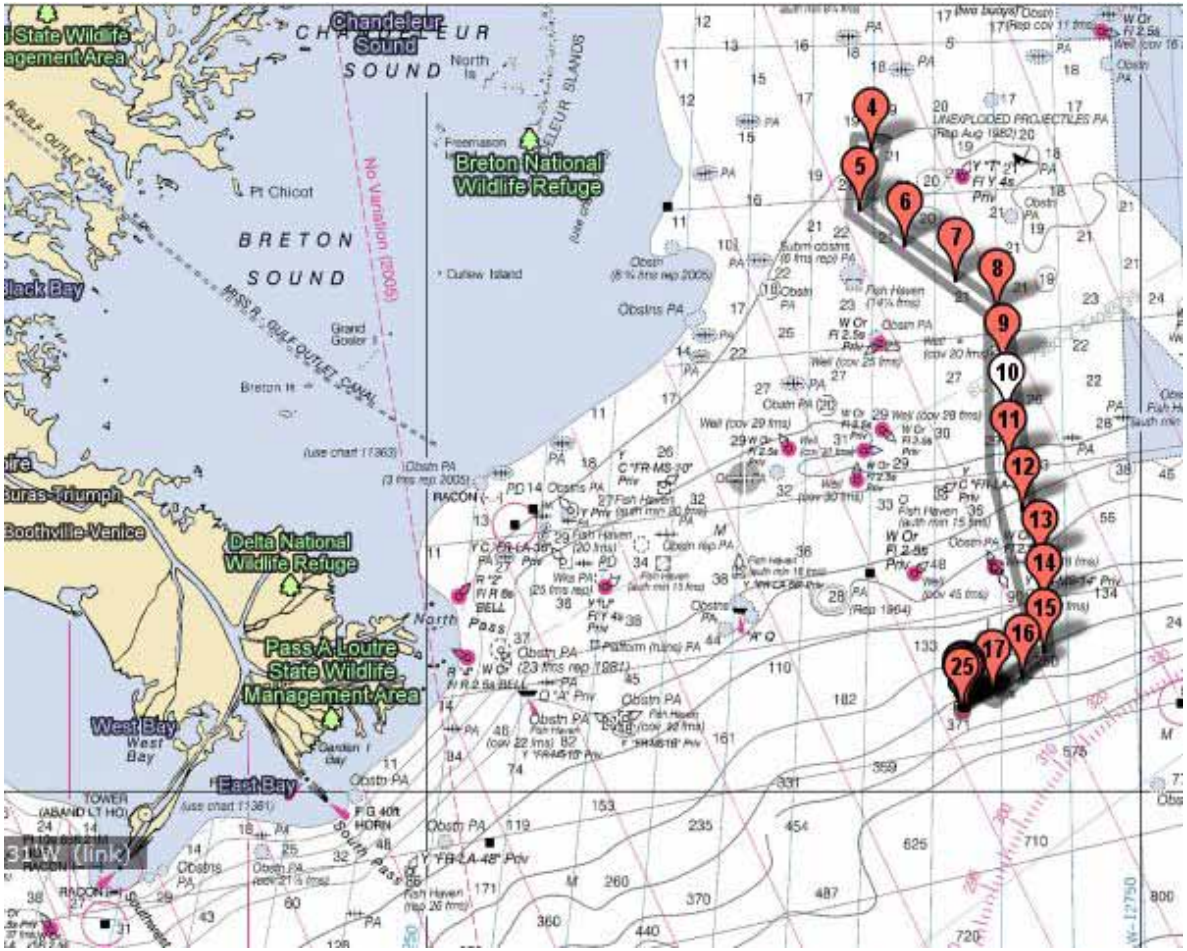
Wave Glider Track to Station




IF FOUND CALL
NATIONAL WEATHER SERVICE

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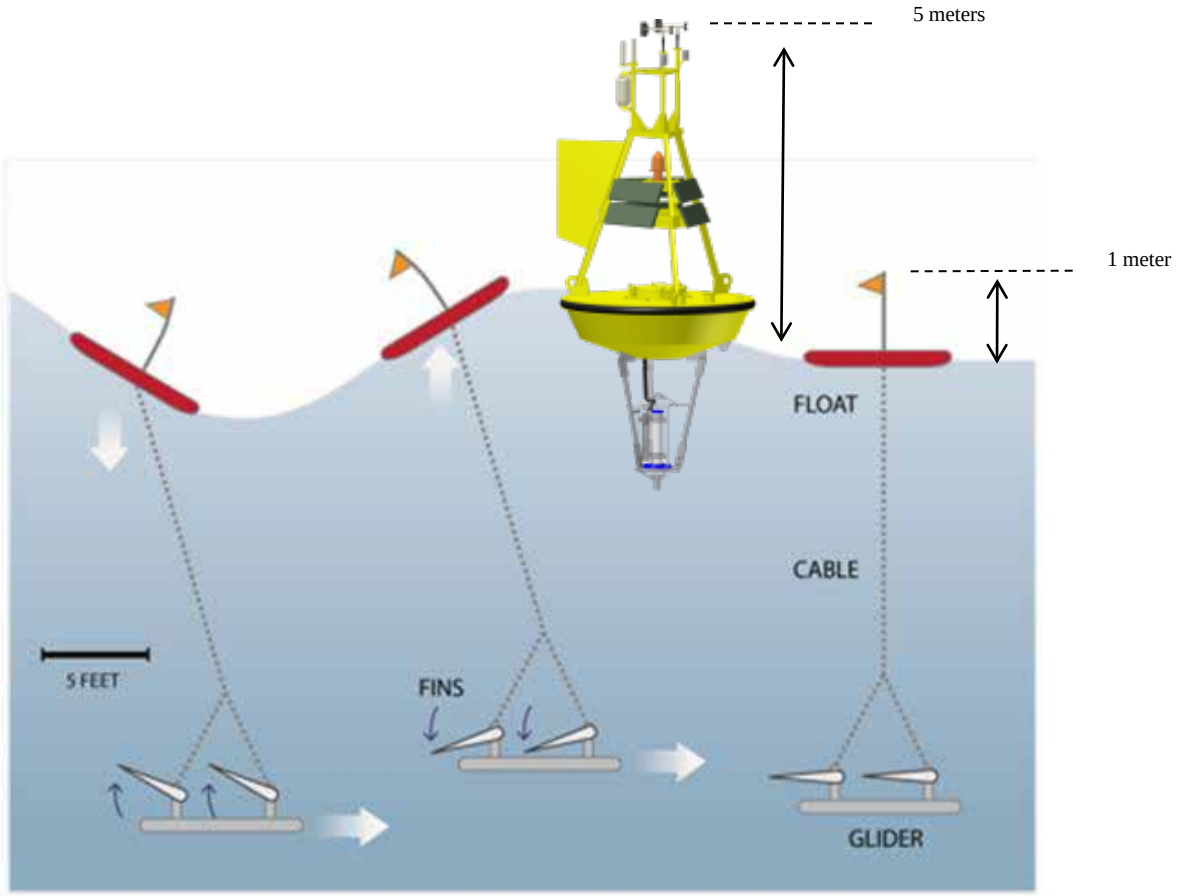
Wave Gliders – How they Work



- **Wave Glider is comprised of a surfboard-like float with a ~ 20 ft rubber tether connected to a submerged frame supporting multiple free-swiveling wings**

- **Up/down motion on wings due to wave action produces forward propulsion**

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Wave Glider Discussion

- Wave gliders can potentially replace weather buoys at selected stations if they can collect data that meets NOAA/NWS requirements.
- If they can meet accuracy requirements, they may reduce the reliance on available Coast Guard ship time since they can be deployed and retrieved by small boats close to shore.
- Wave Gliders, in some cases, could be deployed and repositioned without requiring fielding of maintenance teams or larger vessel support.
- NDBC is just beginning to evaluate the potential of wave gliders as meteorological stations. Much more work is required to determine what the quality of the data will be under a variety of conditions.

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