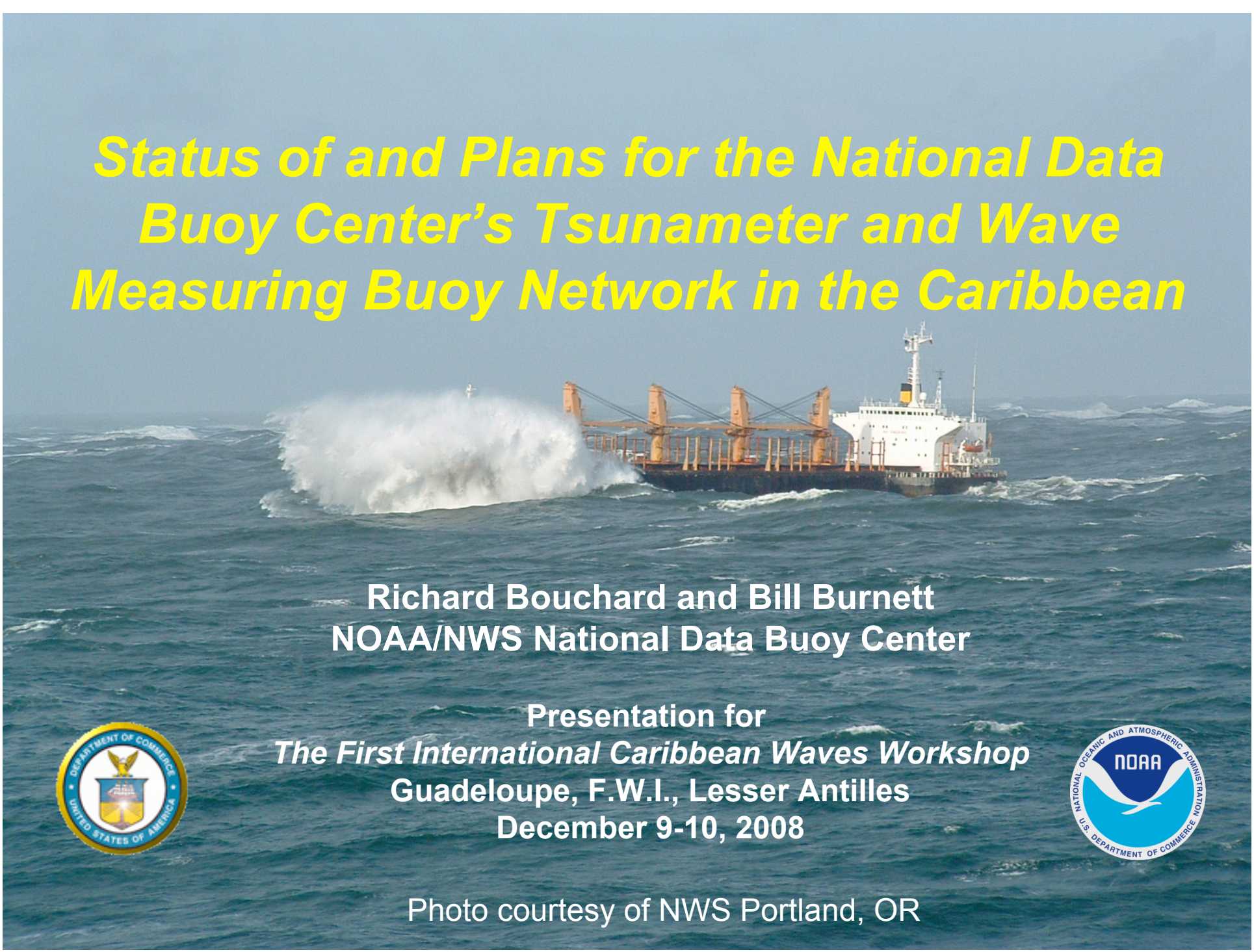
Status of and Plans for the National Data Buoy Center's Tsunameter and Wave Measuring Buoy Network in the Caribbean



Richard Bouchard and Bill Burnett
NOAA/NWS National Data Buoy Center

Presentation for
The First International Caribbean Waves Workshop
Guadeloupe, F.W.I., Lesser Antilles
December 9-10, 2008

Photo courtesy of NWS Portland, OR

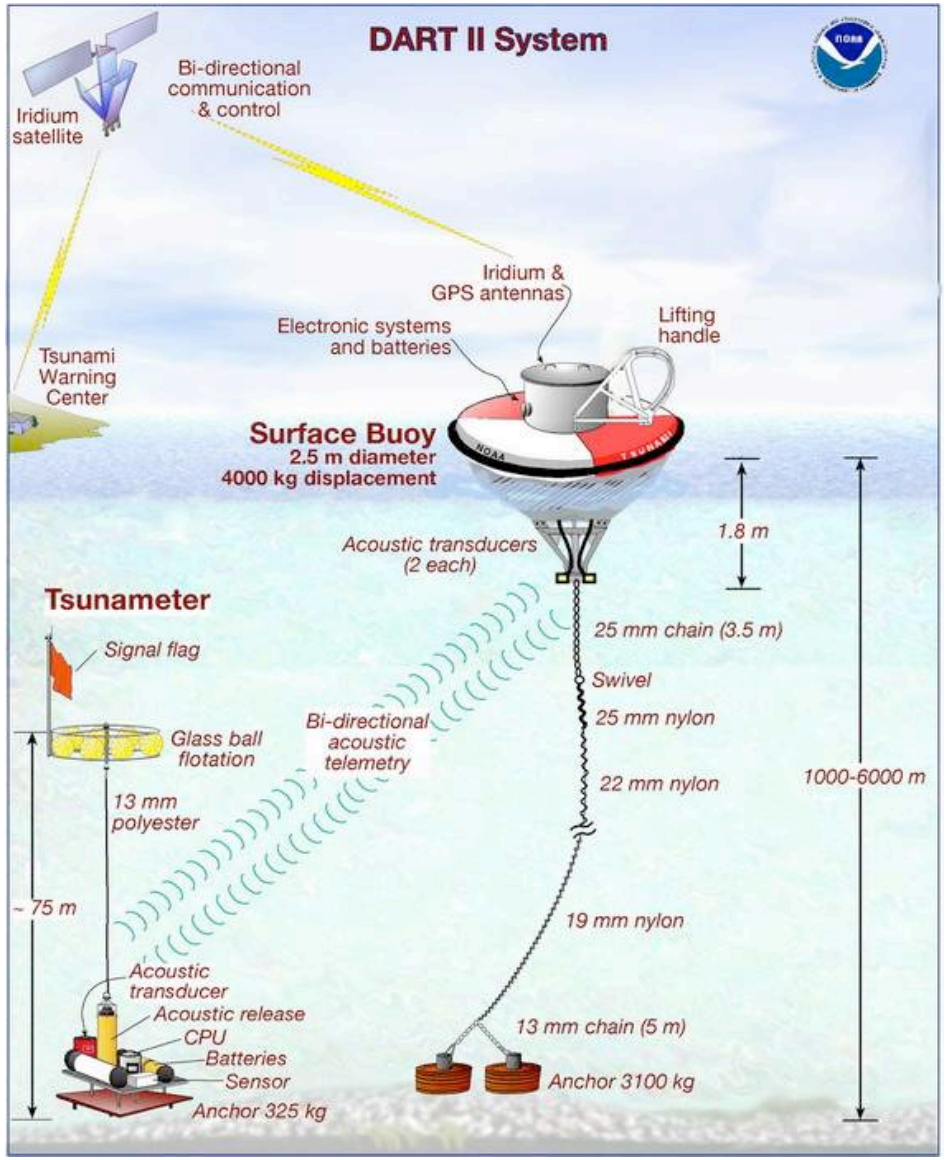
National Data Buoy Center

- An agency of the National Oceanic and Atmospheric Administration's National Weather Service
- Deploying and operating ocean weather buoys since 1970 , presently ~105
  - First permanent buoy in Caribbean in 2005 for Hurricane Warning support
- Tsunameters since 2004, presently 39 world-wide
  - First Caribbean Tsunameter in 2006

NOAA/NWS Tsunameters

Transitioned to Operational Status 2004

- **DART® II technology**
- **Sampling Rate @ 15 s**
- **Normal Data @ 15-minute intervals sent every 6 hours**
- **Tsunami Detected – Rapid Reporting or Event Mode**
  - Seismic signals actually trip the system into rapid reporting
  - A few 15-s, then 1-minute averages for about 4 hours
- **Full-resolution 15-s data:**
  - 1 Hour's worth via telecommunications
  - Entire deployment (~ 2 years) when BPR recovered

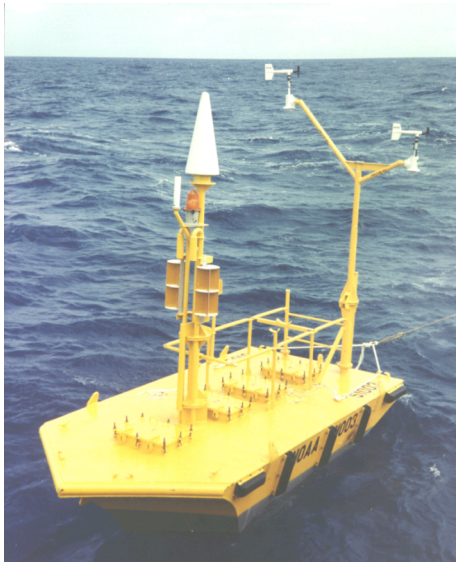


Caribbean Wave Measurements
Directional from 10 & 12-meter Discus Buoys @ Periods >= 5 seconds;
Only Nondirectional from 6-meter NOMAD

- **Heave from Strapped-down Accelerometers**
  - Correct for hull-mooring response and low-frequency noise caused by tilt
- **Directions from Heave, Pitch, and Roll (Longuet-Higgins *et al.*, 1963)**
  - Pitch and Roll from 3 Orthogonal Angular Rate Sensors
  - Orientation of buoy from Earth's magnetic flux, corrected for declination
  - Tendency of 10/12-m hulls to rotate in currents at short periods
- **Time Series Converted to Spectrum via Fast Fourier Transform**
- **Only Spectrum Transmitted Ashore**

10-m Discus

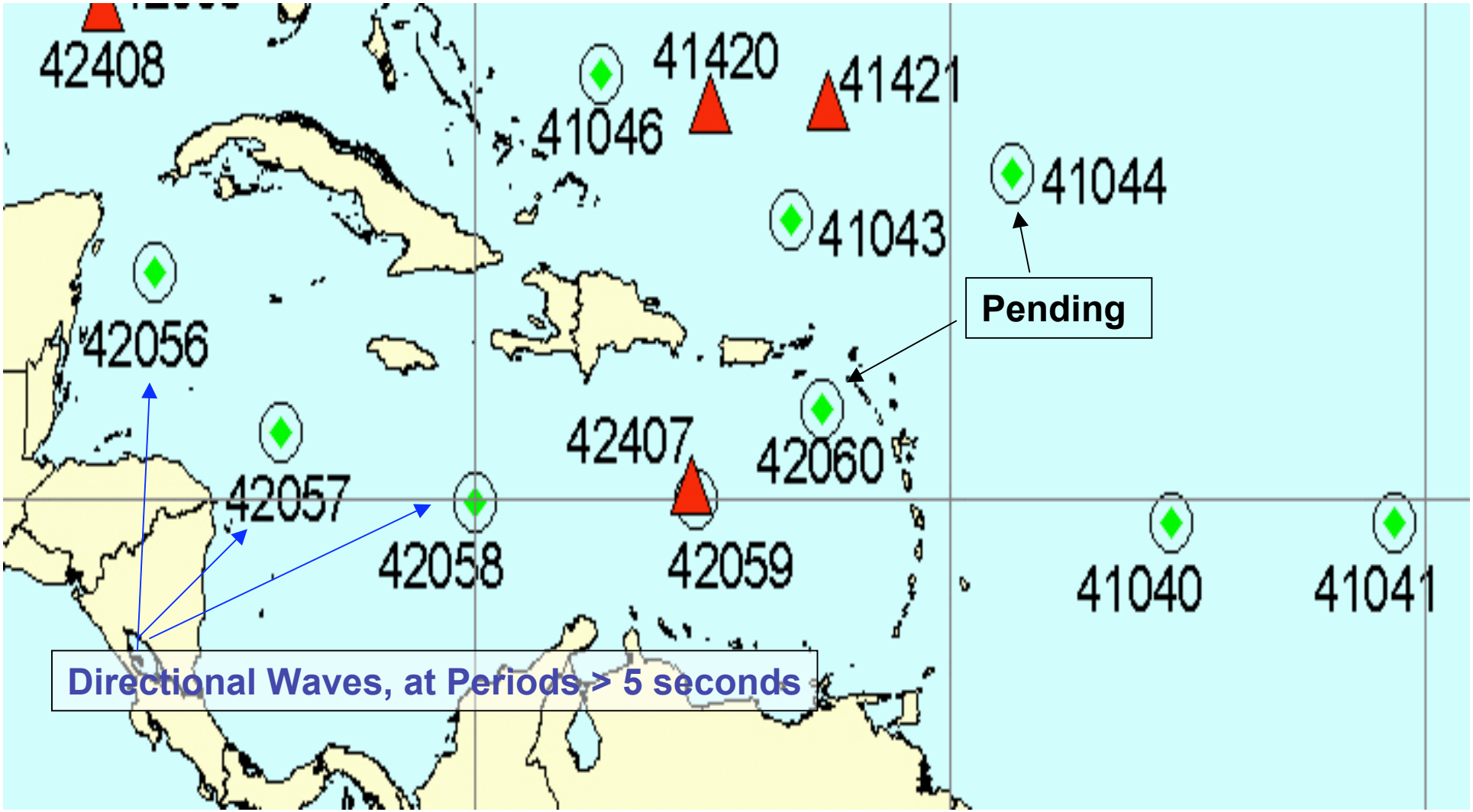
6-m NOMAD



Caribbean Network

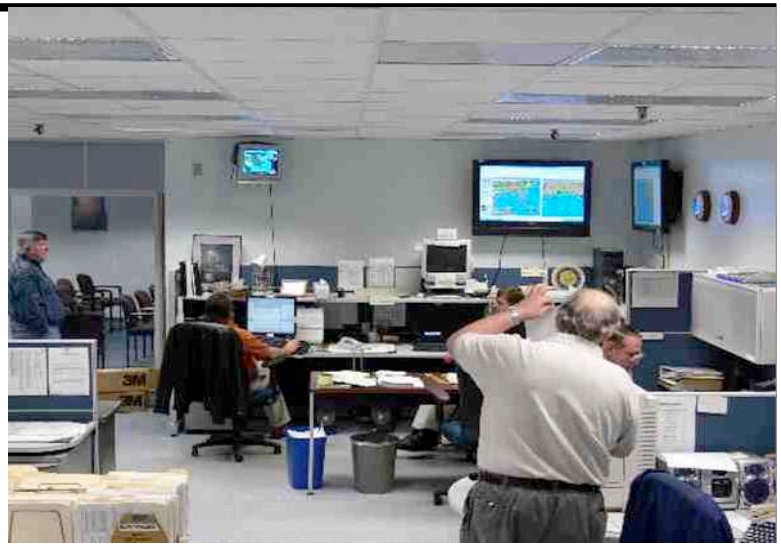
Red Triangle = Tsunameter

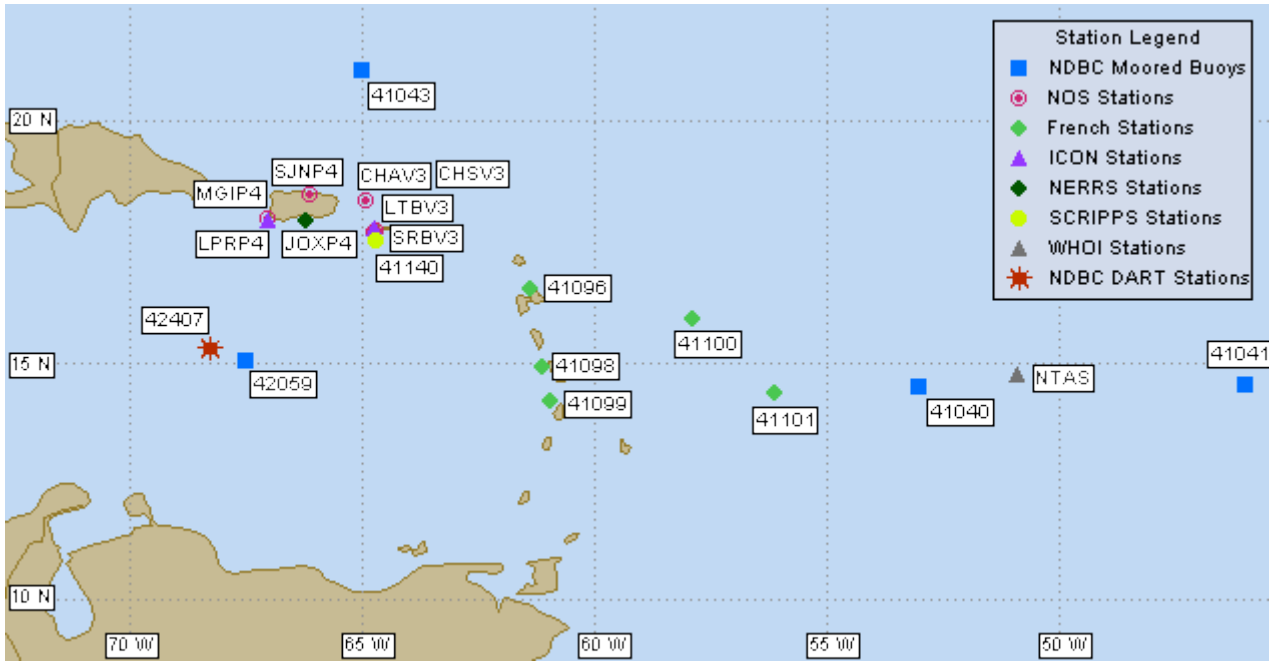
Circled Green Diamond = Wave Measuring Buoys



NDBC Data Assembly Center (DAC)

- 24/7/365 support
- Real-time Automated Quality Control
  - http://www.ndbc.noaa.gov/handbook.pdf
- Expert Analysis





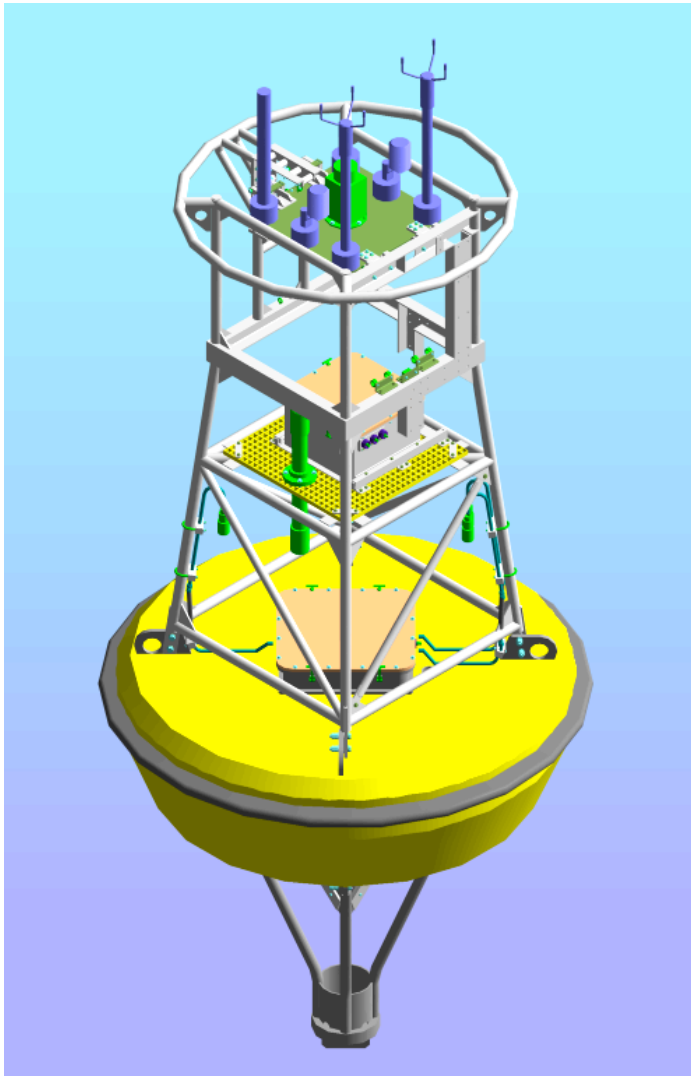
Facilitate Data Exchange for non-NWS Observatories:

- QC
- Encode and Insert onto GTS

Data Availability

- Real-Time Data
  - Global Telecommunications System, NOAAPort & NWS Family of Services
    - Waves: FM-13 SHIP and FM-65 WAVEOB WMO Codes
    - Tsunameters: Modified DART native format
  - Web: http://www.ndbc.noaa.gov/
- Archives
  - Waves: http://www.nodc.noaa.gov/BUOY/buoy.html
  - Tsunameter: http://www.ngdc.noaa.gov/hazard/DARTData.shtml

Plans



- Deploy remaining Hurricane Supplemental Buoys, 41044 & 42060, when ship ($$) is available
- Investigating using more responsive 3-m hull buoys to replace 10 & 12-m hulls
- Multi-purpose stations, e.g., Tsunameter with ocean & atmospheric observations

NOAA's National Data Buoy Center

Contact Information

Waves (Tsunami and Otherwise)

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For More Information:

Waves: *Nondirectional and Directional Wave Data Analysis Procedures*, available on-line at:
http://www.ndbc.noaa.gov/wavemeas.pdf

Tsunameters: http://www.ndbc.noaa.gov/dart.shtml

Quality Control Procedures:
http://www.ndbc.noaa.gov/handbook.pdf