Development of NDBC Standard Buoys

Bill Burnett

And

Chung-Chu Teng

NOAA/NWS/National Data Buoy Center

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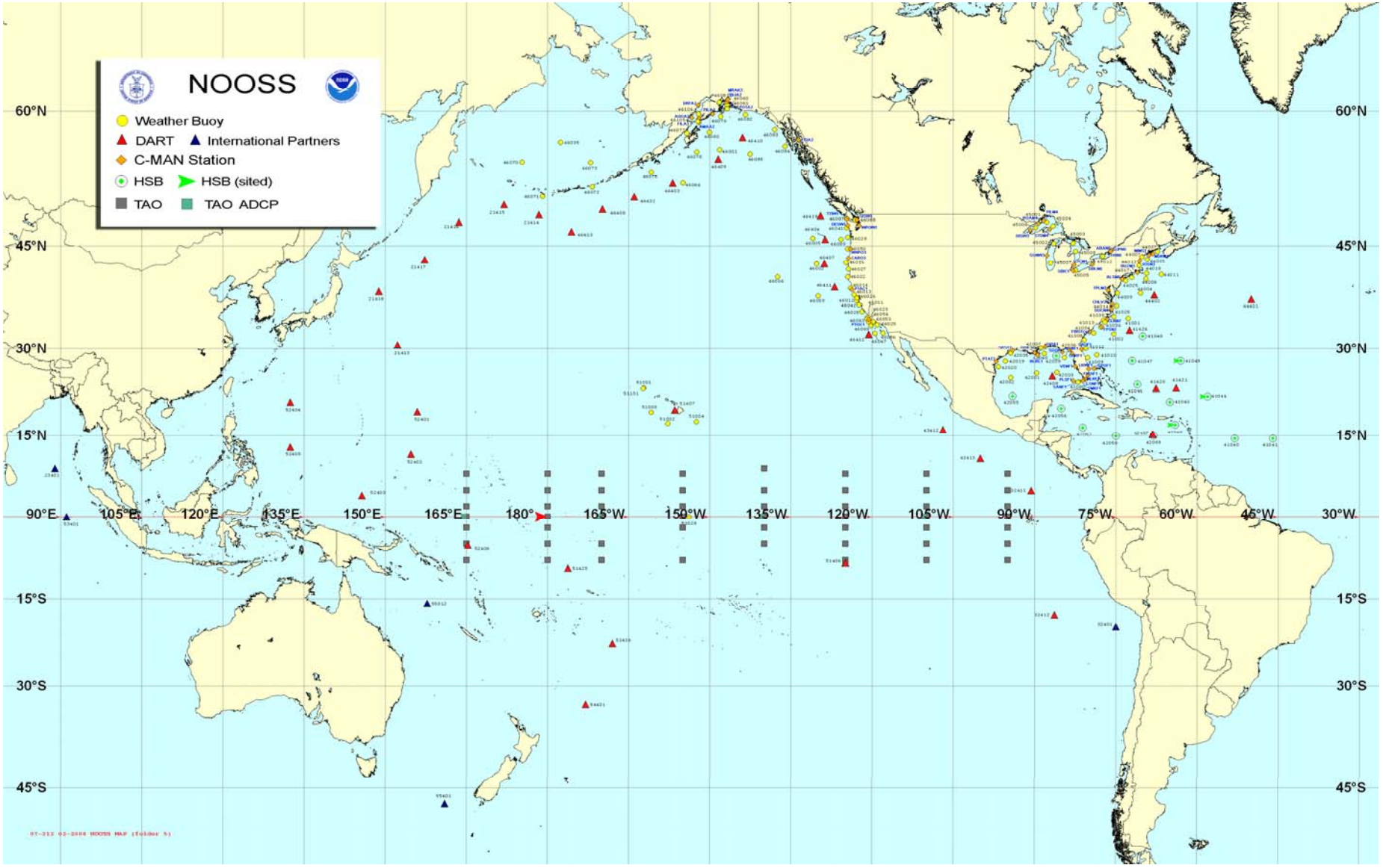
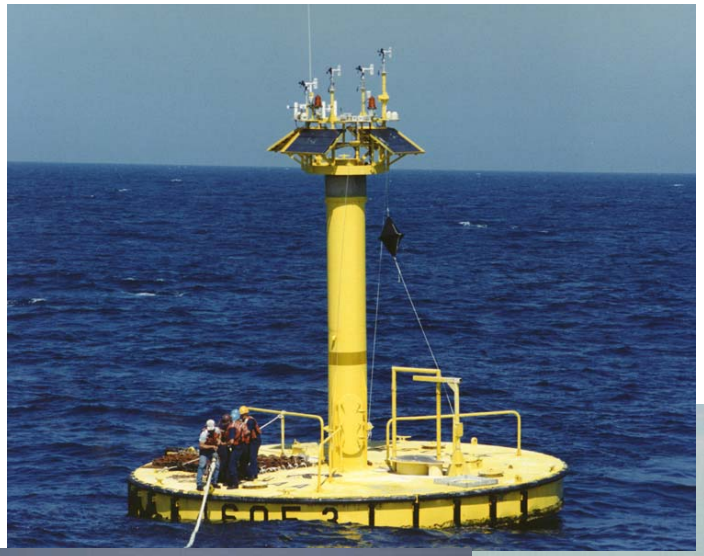
Three NDBC Major Networks

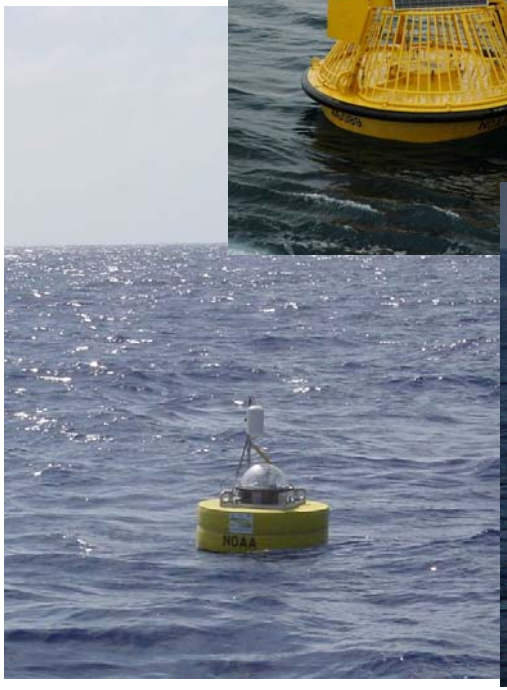
- **Met/Ocean Platform (MOP/YB)**
  - **105** Moored (Met/Ocean) Buoys – including 12 Hurricane Supplemental Buoys.
  - **56** land-based Coastal–Marine Automated Network Stations (C-MAN)
- **Tropical Atmosphere Ocean (TAO)**
  - **55** TAO Buoys + 4 ADCP Moorings
- **Deep-Ocean Assessment and Reporting of Tsunami (DART)**
  - **39** DART Buoys

NDBC Ocean Observing System of Systems (NOOSS)

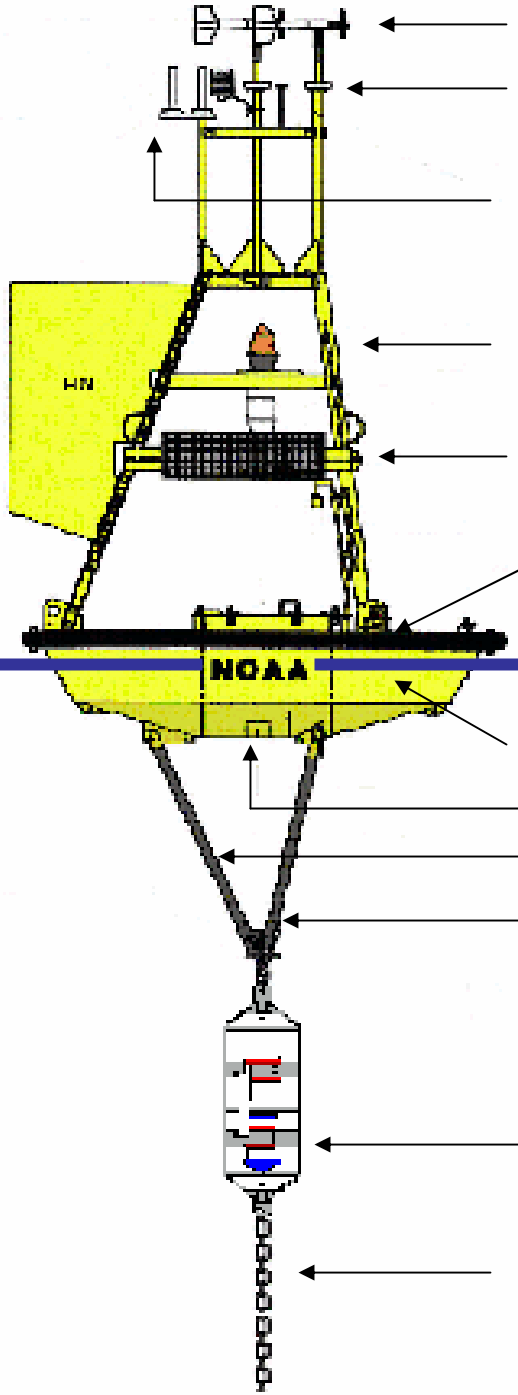


NDBC Met/Ocean (Yellow) Buoys





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



Wind speed / direction

Air temp / humidity / pressure

Tracking / communications

Navigational beacon

Solar panels

Magnetometer, compass, computer, batteries, position tracking

Air

Water

Wave height, period, direction*

Ocean temperature

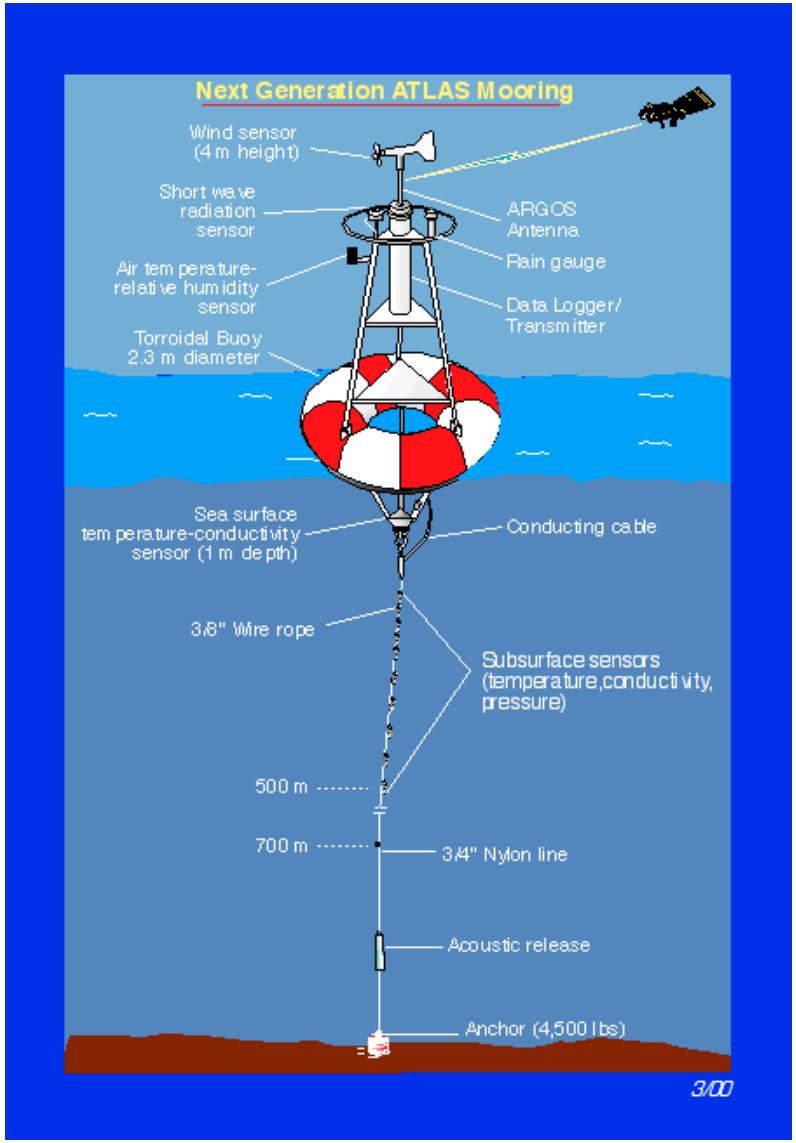
Surface currents

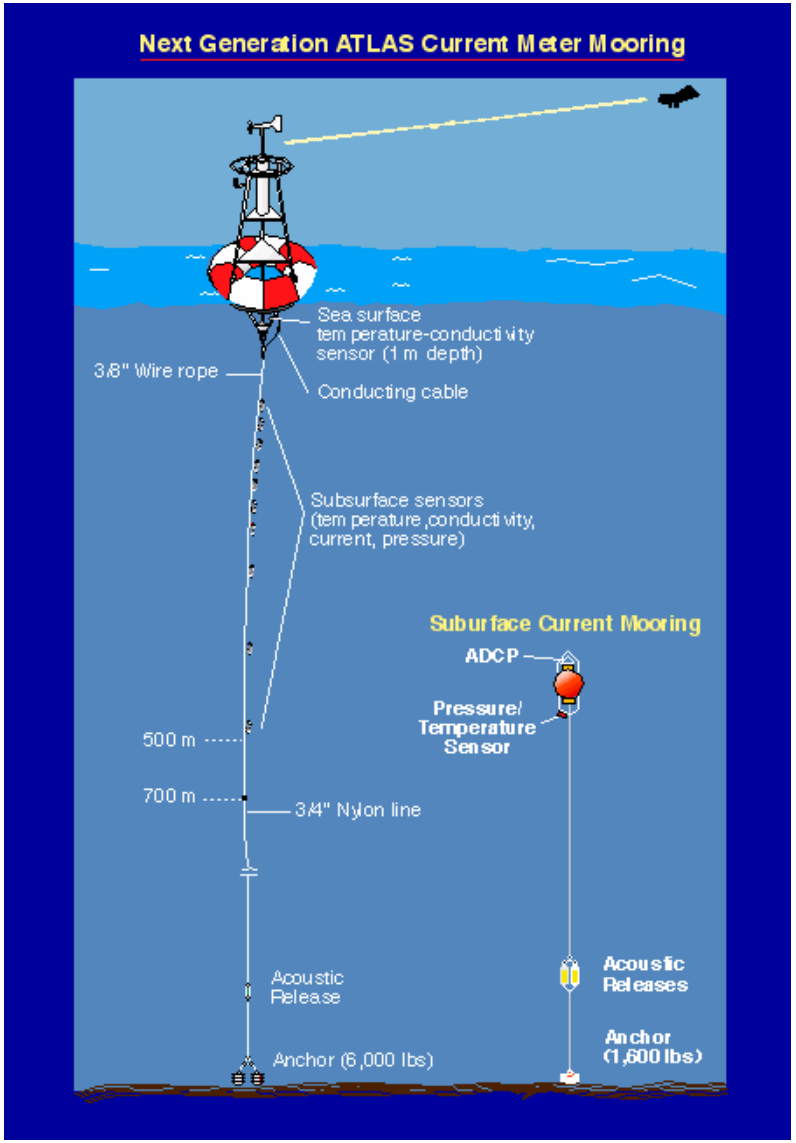
Surface salinity

Current profiler

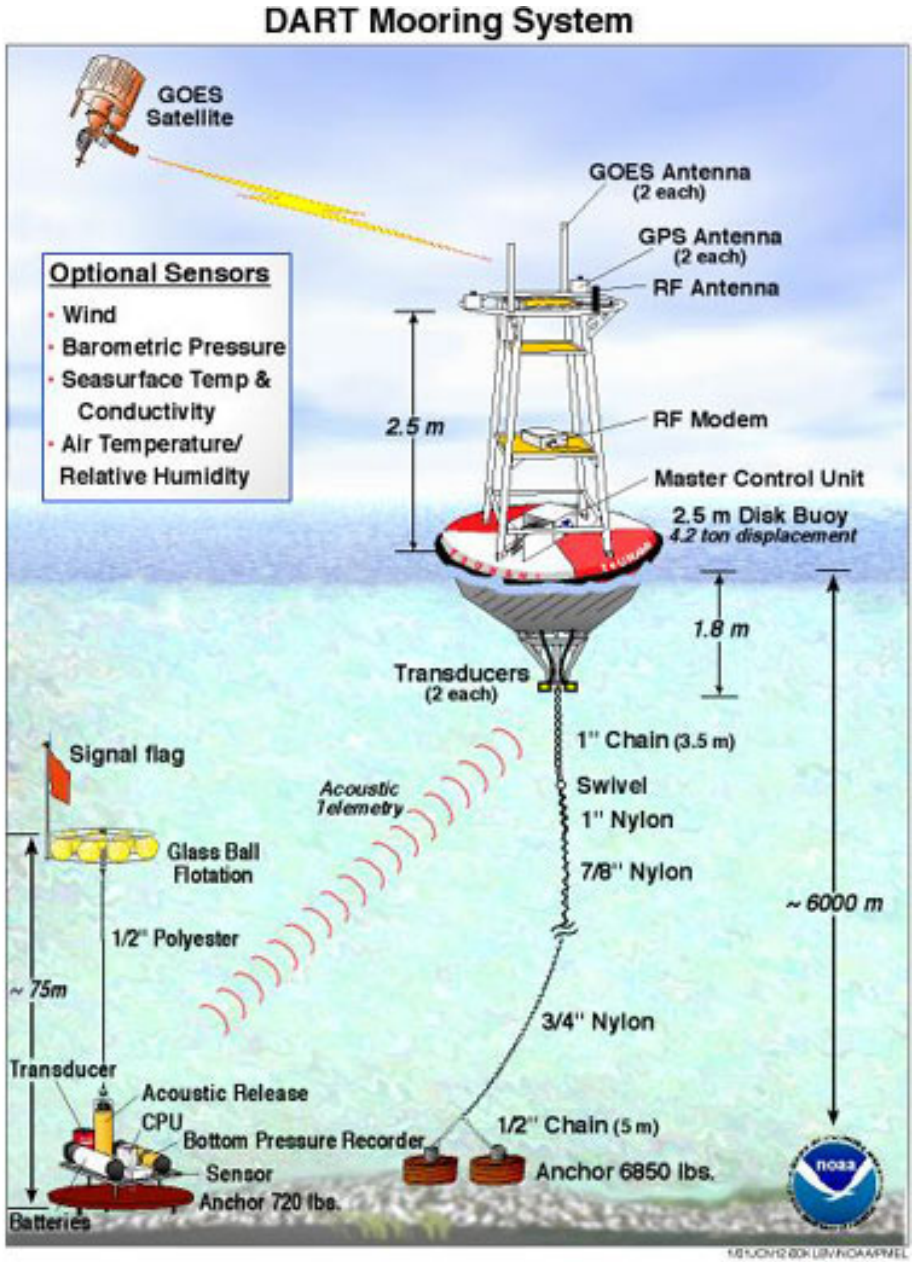
Mooring

Tropical Ocean Atmosphere (TAO)





DART Buoy System



Courtesy of PMEL

PURPOSE

Develop the Multi-Purpose (Standard) Buoy

….all Programs

….improve efficiency and cost effectiveness of NDBC operations

Common Platform (Standard Buoy)

- **Service multiple buoys from all programs on a cruise**
- **Use a wide variety of support vessels….increased opportunity**
- **Common components**
- **Establish baseline form factors**
- **Long-term replacement strategy for all 3m, DART, TAO hulls**

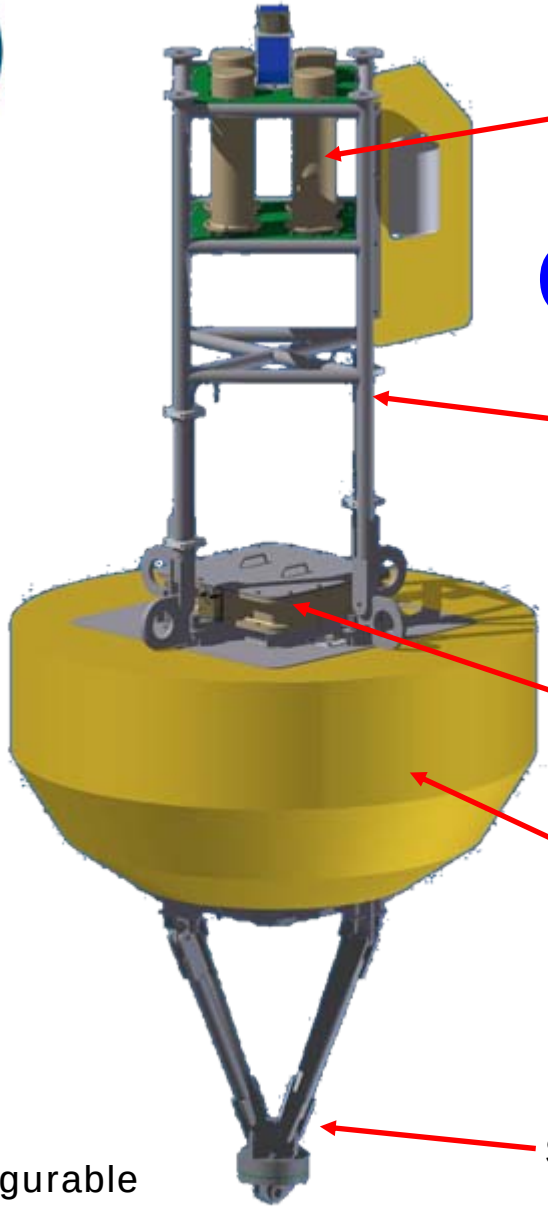
NDBC NOOSS Standard Buoys

TAO

WEATHER

DART

Common Components



Payload Tube + Payload

Aluminum Tower (7’-5”) with Wind Fin, Self Powered O+I light and Radar Reflector

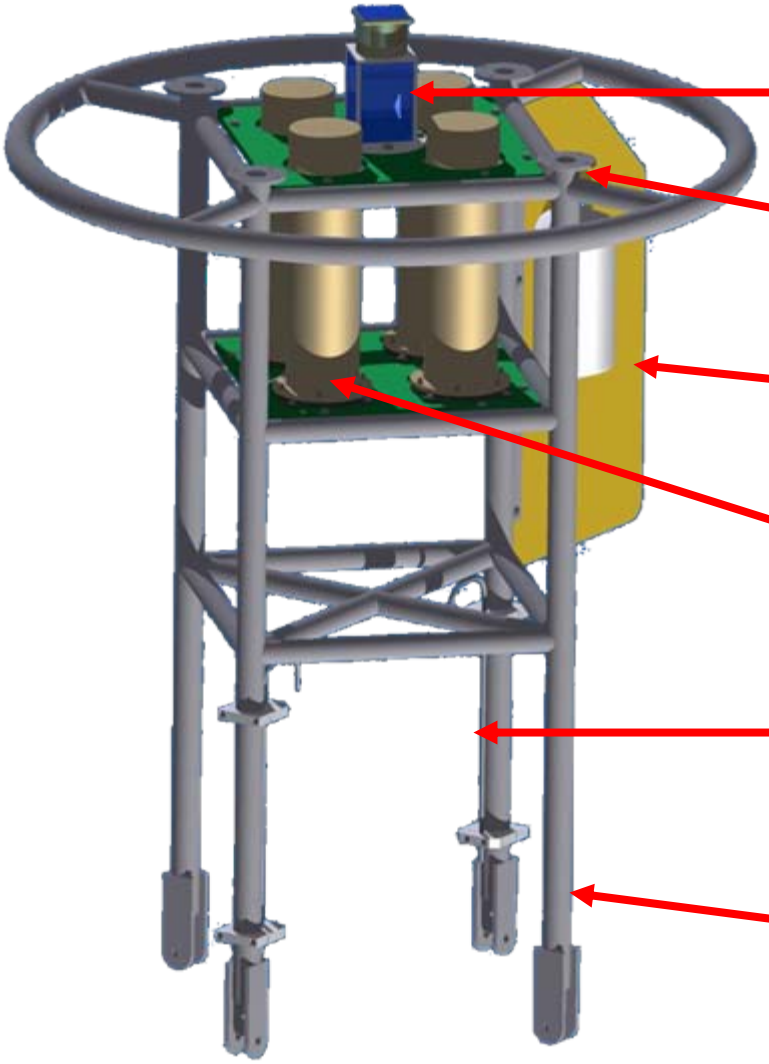
Removable Fiberglass Power Well (24” SQ x 30” Deep)

Gilman Foam Hull (7’-6” dia)* with Aluminum Upper + Lower Frames with SS Tie Rods

Stainless Steel 4 Leg Bridle

* Configurable

Standard Tower



Self Powered O+I Light

Sensor Mounting Flanges (4)

Wind Fin + Radar Reflector

Payload Station + Payload Tubes (4)

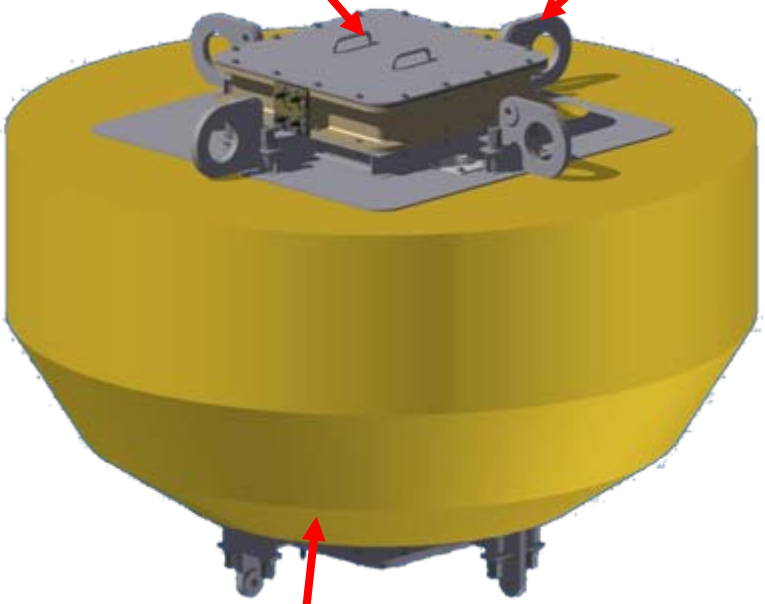
Vent Piping (2)

Aluminum Tower – 7’8” Tall

Standard Buoy Hull

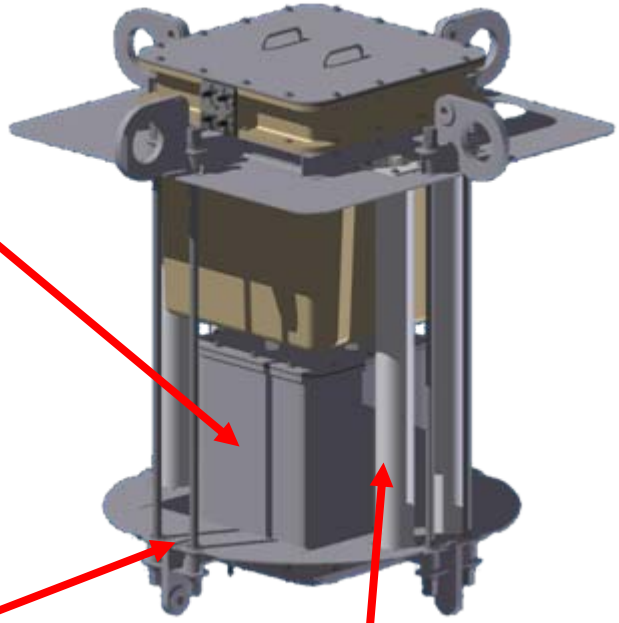
Removable Power
+ Sensor Well

Aluminum Upper Buoy
Frame + Tie Rods (8)



Foam Hull 7’6” DIA x 3’9”

Removable
Lower Well



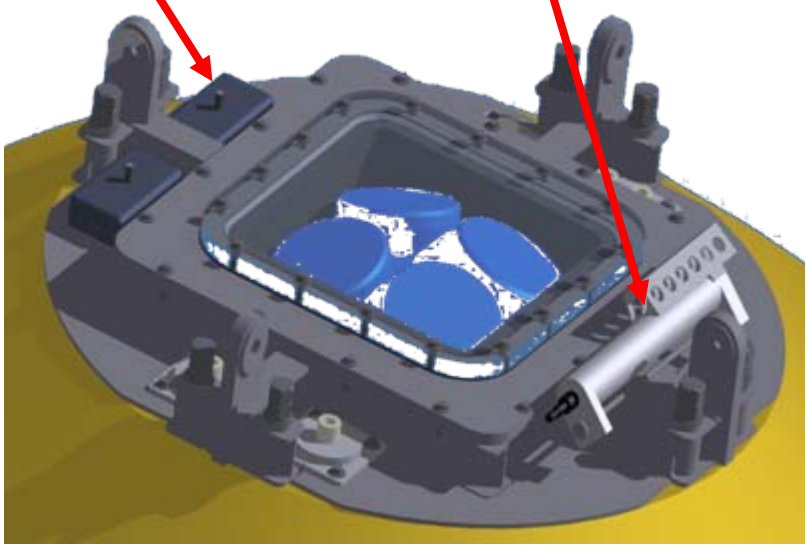
Aluminum Lower
Buoy Frame +
Tie Rods (8)

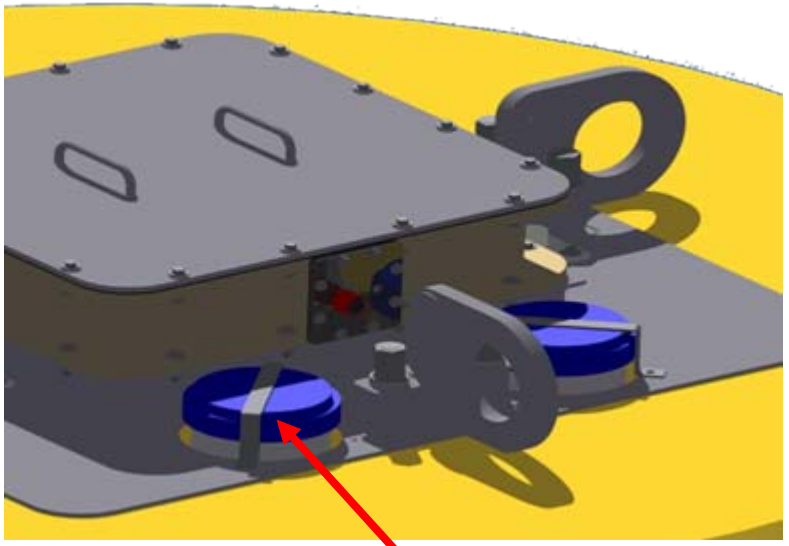
Cable Pass
Thru Tubes (4)

Hull External Mounts

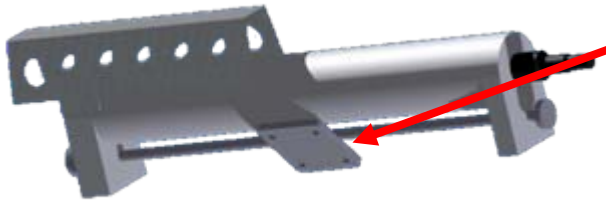
Lead Ballast

37SM CTD Sensor





External ADCP Battery Canisters (2) with Retainer Bracket

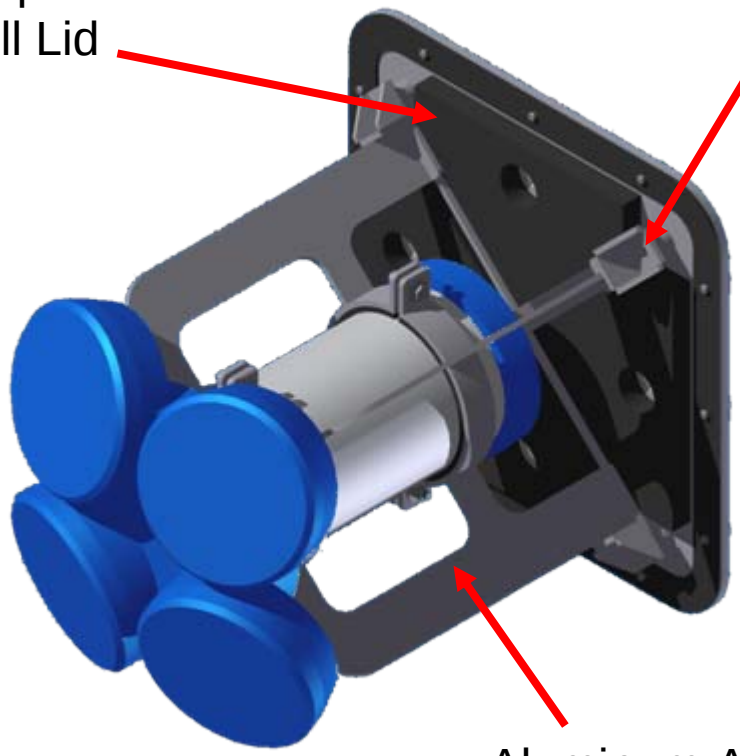


Bolt-on Bracket with Mounting Dowel (Aluminum)

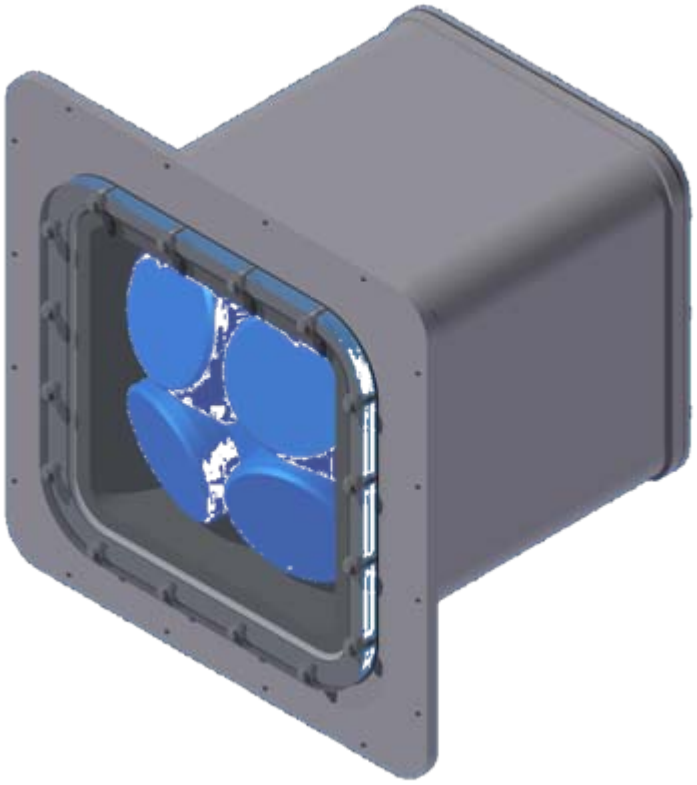
Lower Well Sensors

Neoprene Lined
Well Lid

Lid Mounted
ADCP Frame



Aluminum ADCP
Clamp Halves



Bridle Configurations

DART + Surface Current Meter

DART

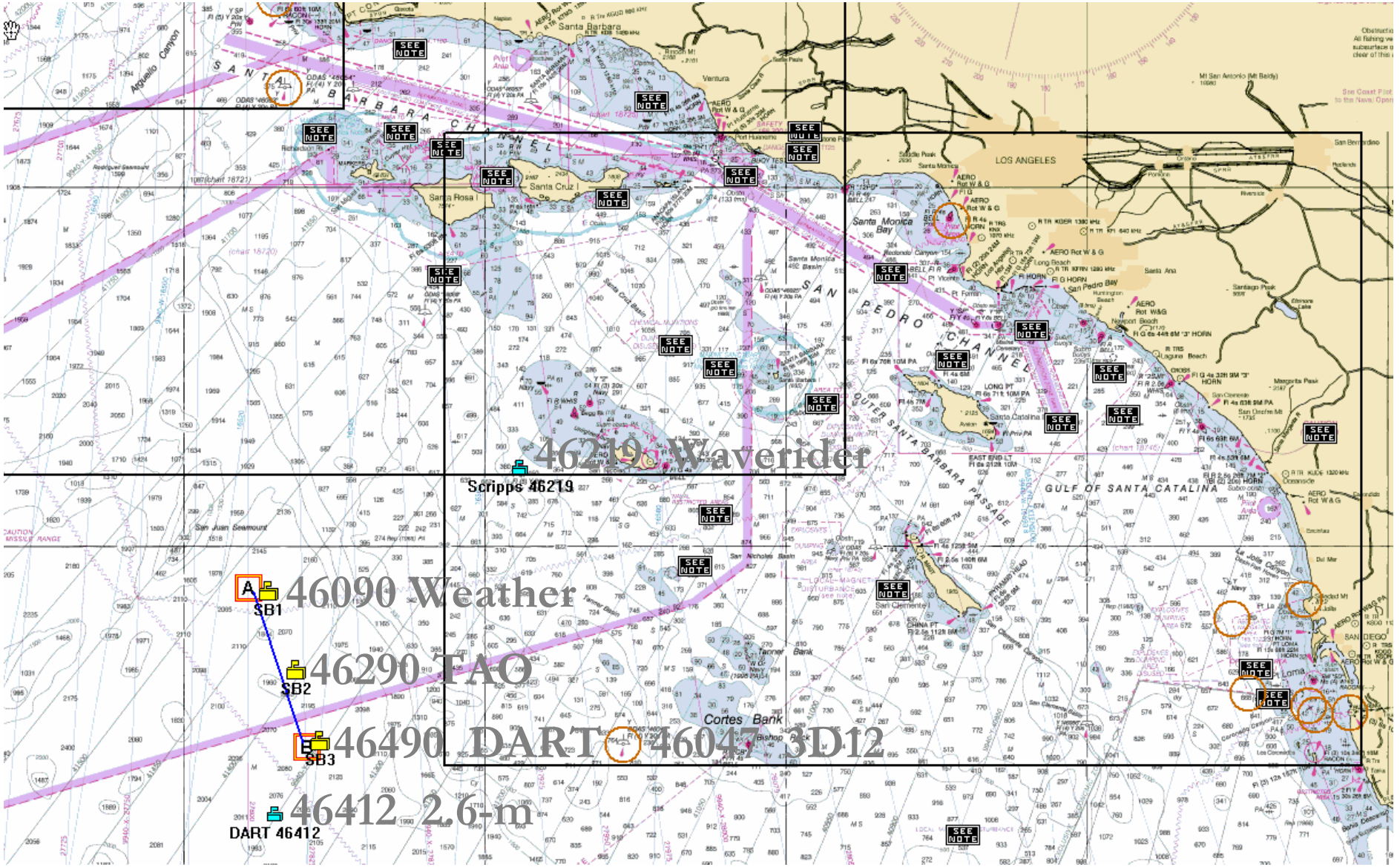
Surface Current Meter

Standard Bridle

Batteries

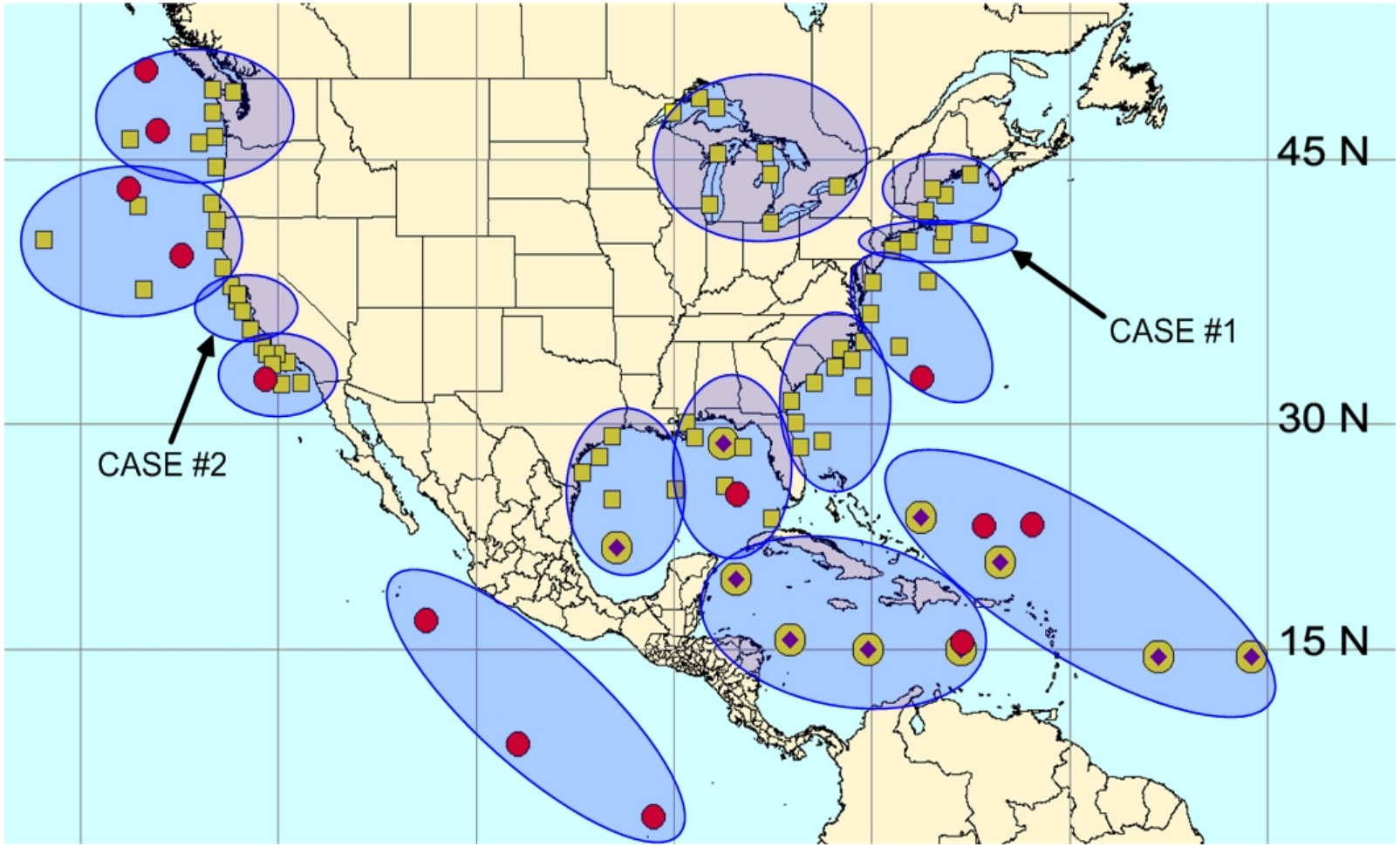
- Weather Buoy Configuration
  - Non Ferrous Air Cegasa Primary Batteries - Negates need for buoy spin locally and during service
  - 8 strings for 4800 Ahrs capacity
- TAO and DART Configurations
  - Common Lithium Battery Pack for TAO and DART
  - Co-located with Payload

Locations

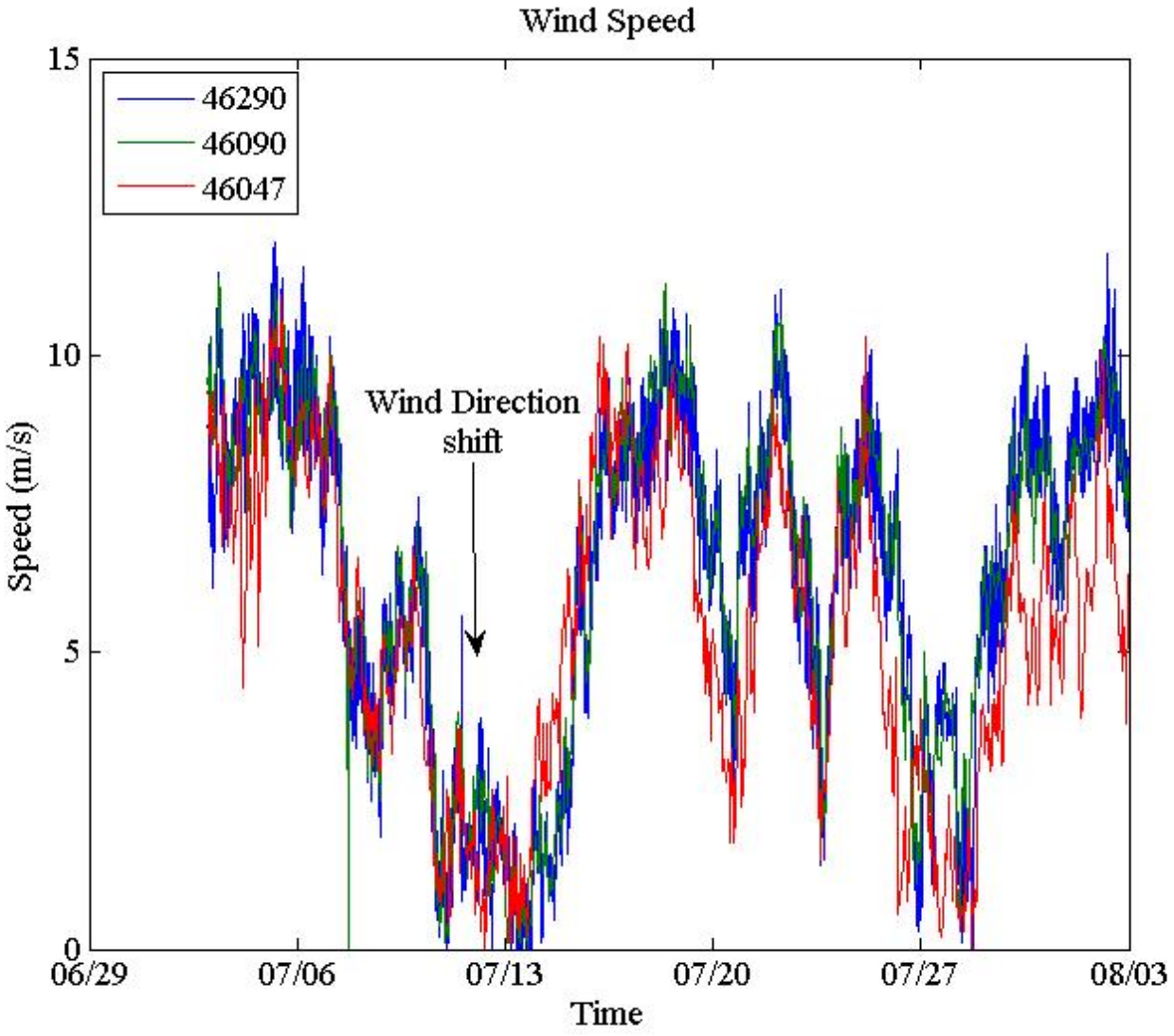

46219 Waverider
Scripps 46219
46090 Weather
SB1
46290 TAO
SB2
46490 DART
SB3
46412 2.6-m
DART 46412
46047 3D12
Santa Barbara
Ventura
LOS ANGELES
Santa Monica Bay
Santa Cruz I
Santa Rosa I
San Juan Seamount
Cortes Bank
GULF OF SANTA CATALINA
SANTA BARBARA CHANNEL
SAN PEDRO CHANNEL
OUTER SANTA BARBARA PASSAGE
Santa Catalina
SAN DIEGO

Deployment Pictures

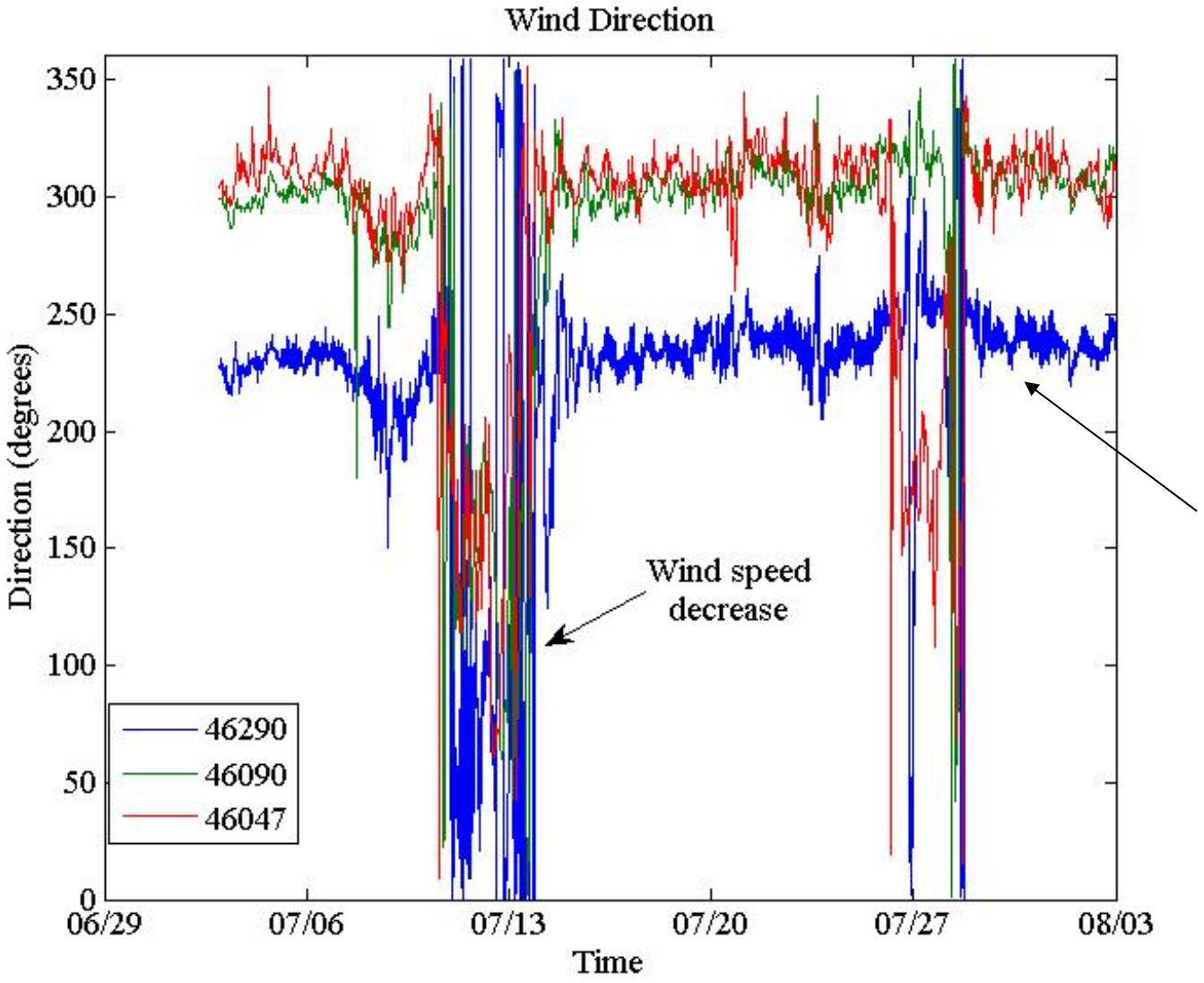
Potential Areas of Application



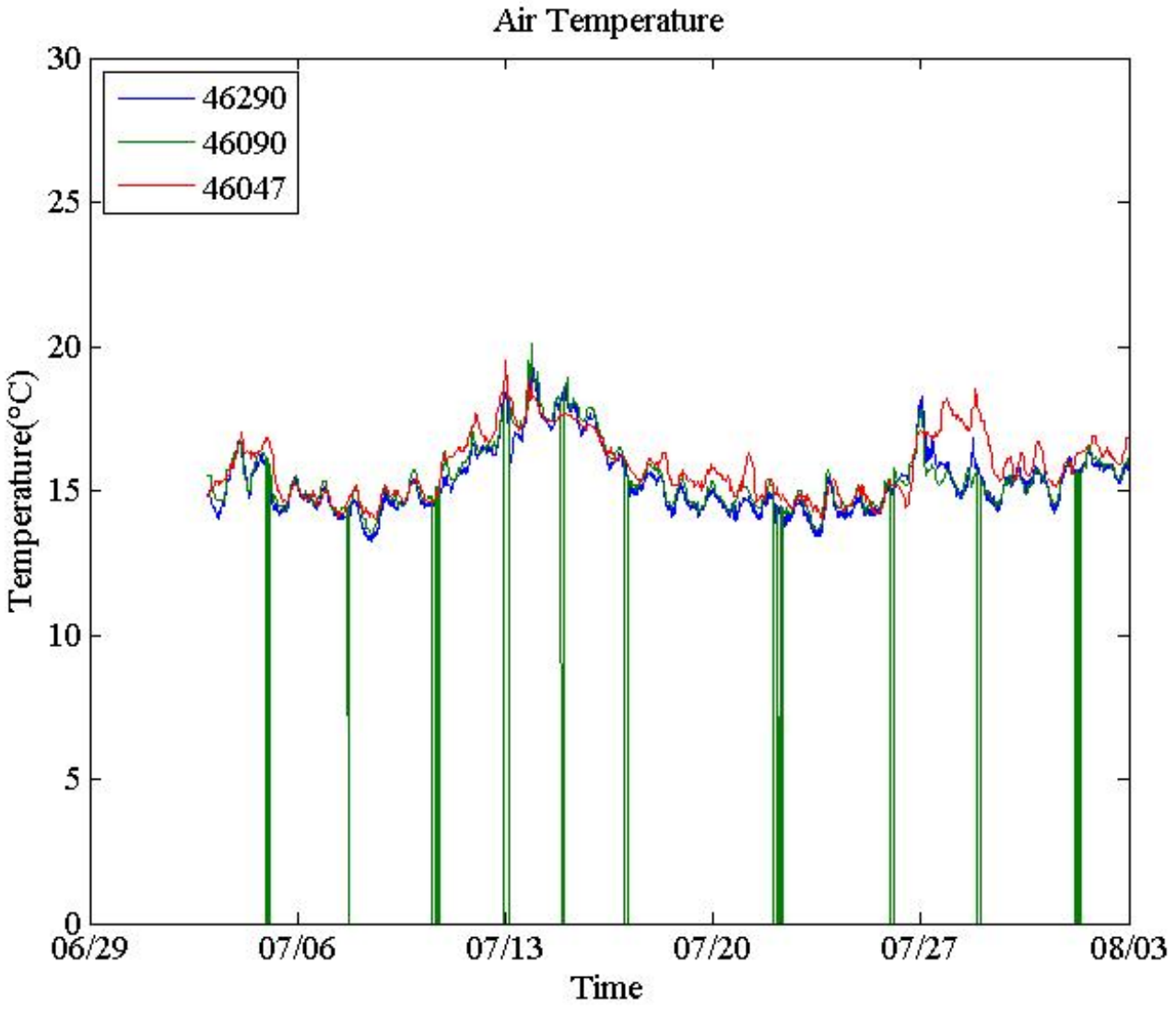
Wind Speed


Wind Speed
46290
46090
46047
Wind Direction shift
Speed (m/s)
15
10
5
0
06/29
07/06
07/13
07/20
07/27
08/03
Time

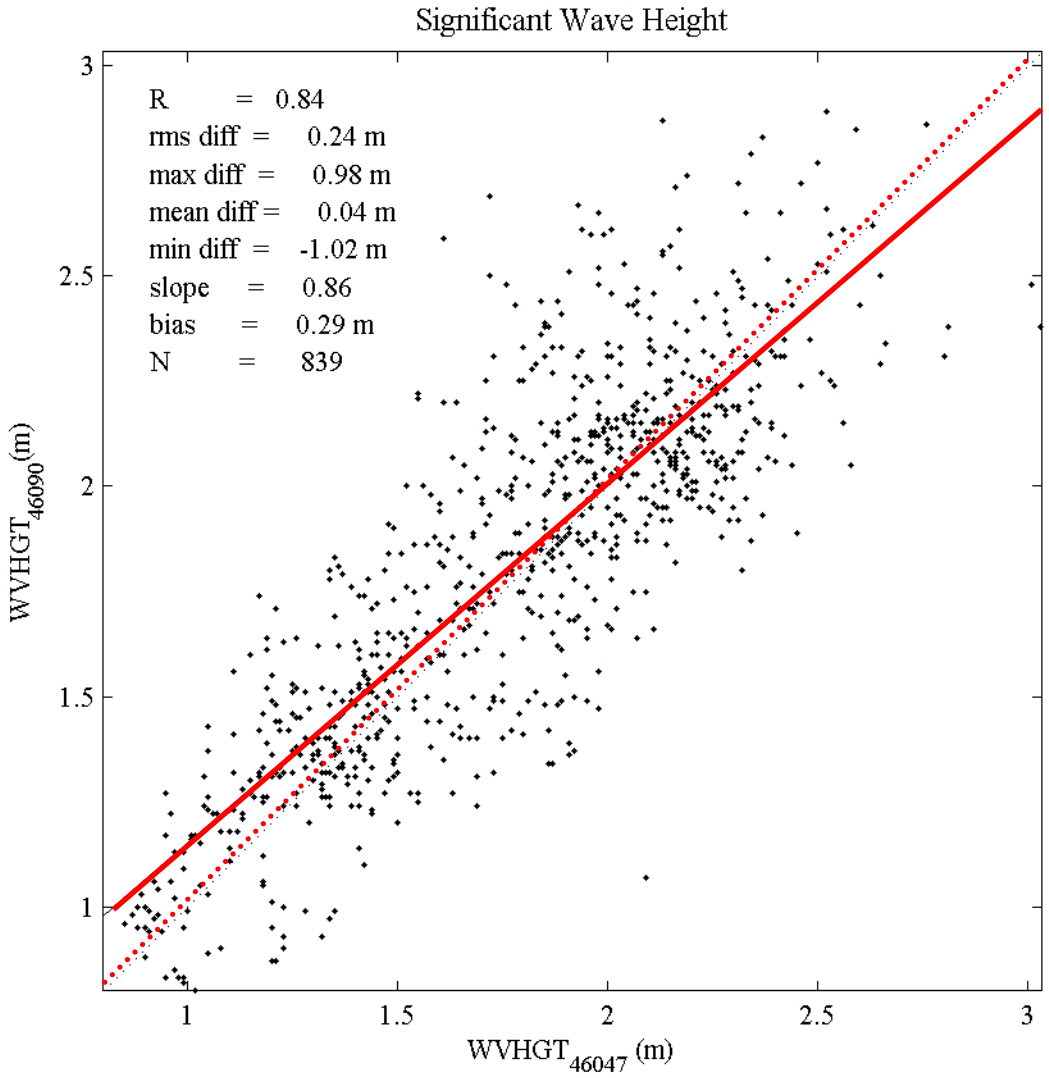
Wind Direction



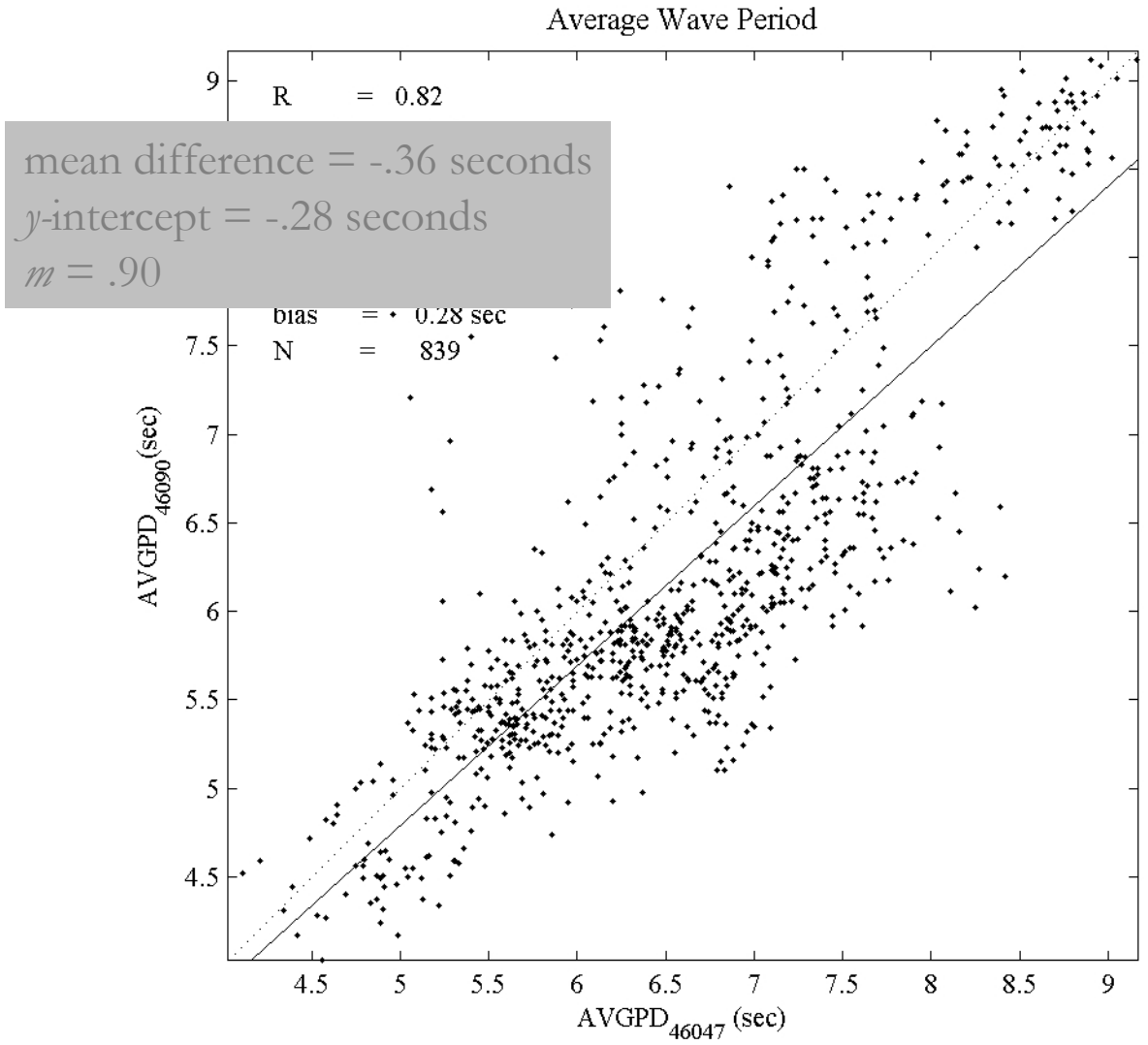
Air Temperature



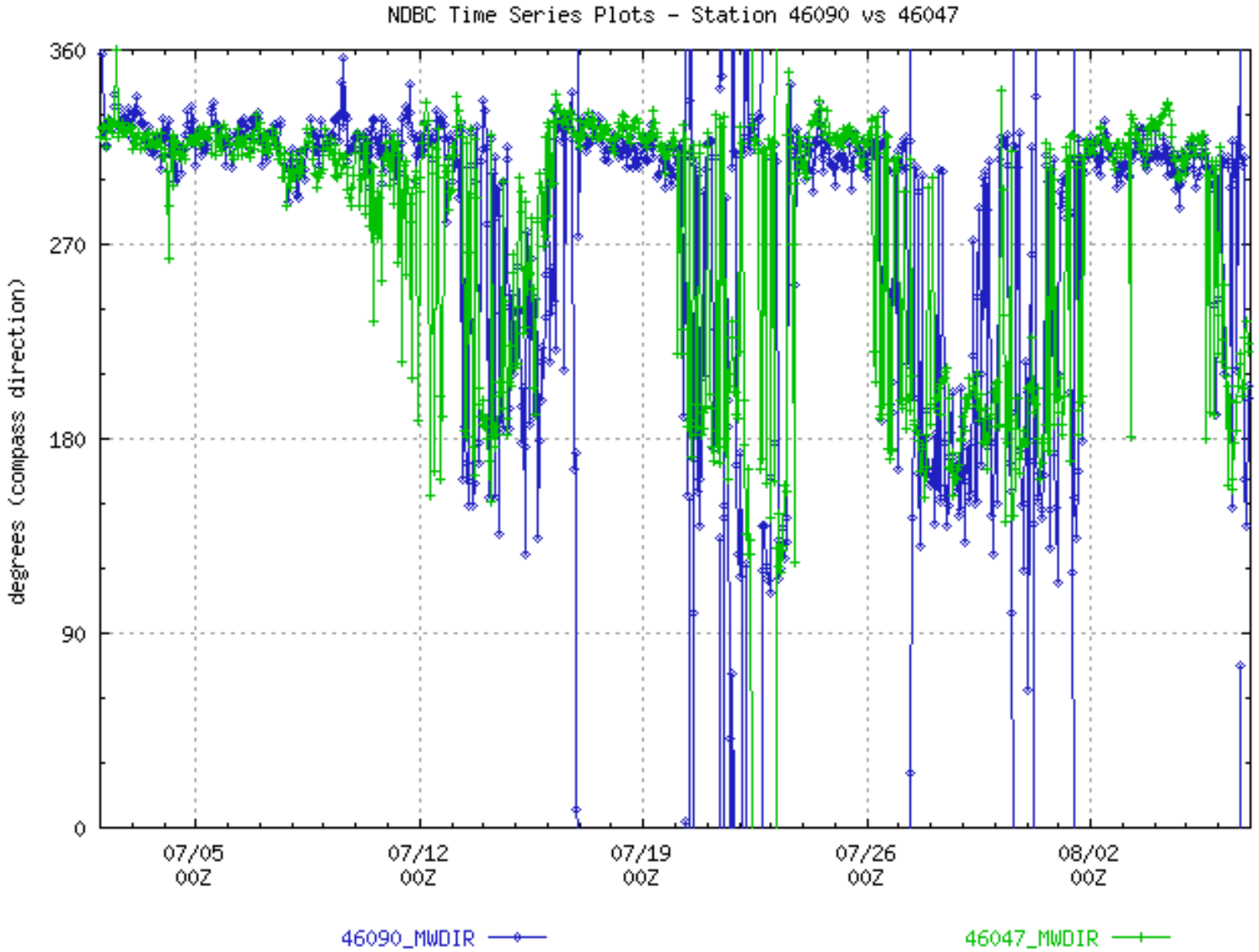
Significant Wave Height



Average Wave Period



Peak Wave Direction



Field Test Summary

- 46090 (Weather/Ocean)
  - When the data came in it was accurate
  - IM coupler or a payload board failed
  - 300 kHz ADCP performed well
  - 2.3-m hull with DDWM gives accurate enough wave heights, periods and directions
- 46290 (TAO)
  - Data matched closely with 46090
  - Wind directions off ~70°
- 46490 (DART)
  - Station performed as well as other DART stations

Project Status

- **Phase 1 – Formulate strategy**
  - **Completed FY07-Q4**
- **Phase 2 – Prototype development**
  - **Critical Design Review – Completed FY08-Q1**
  - **Procurement of Components – Completed FY08-Q2**
  - **Fabrication, Integration, Testing – Completed FY08-Q3**
- **Phase 3 – Field Testing & Strategic Ops Planning**
  - **Initial Field Deployment (3 prototypes West Coast) – Completed FY08-Q4**
  - **Proof of Concept Field Maintenance**
  - **Development of Implementation Plan**

Implementation Approach

- **Define environmental limits of buoy survivability**
- **Evaluate networks to identify appropriate locations for standard buoy use based on**
  - **Maximum Impact (cost and efficiency)**
  - **Expected Environmental Factors**
  - **Type and Availability of Service Vessels**
  - **Service History**
- **Phase-in mini-networks (5-10 stations)**
- **Use excess legacy hulls in more severe environments, or as ready-staged spares to increase the health of the overall network**


Thank you
46290
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