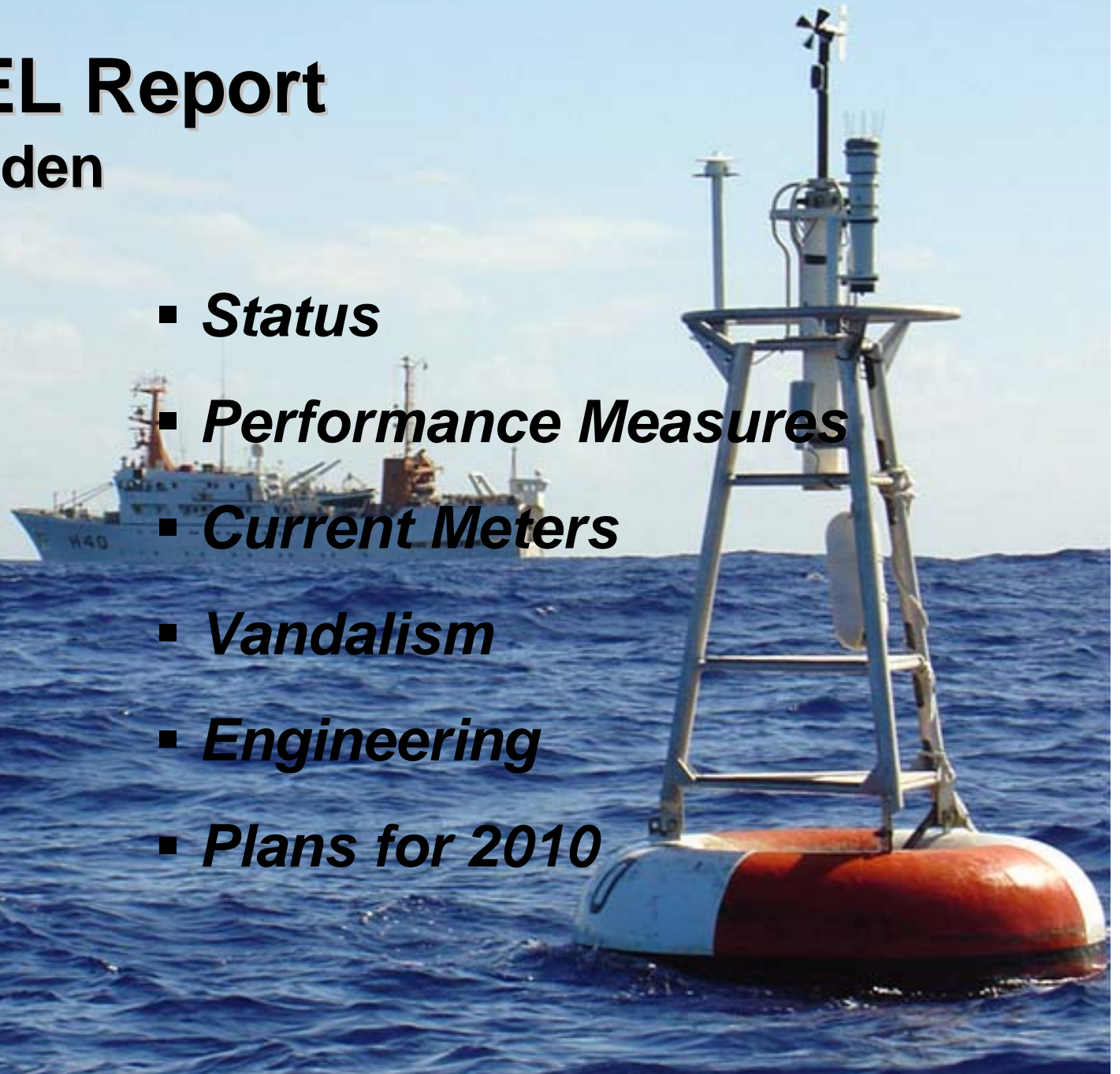


2009 PMEL Report

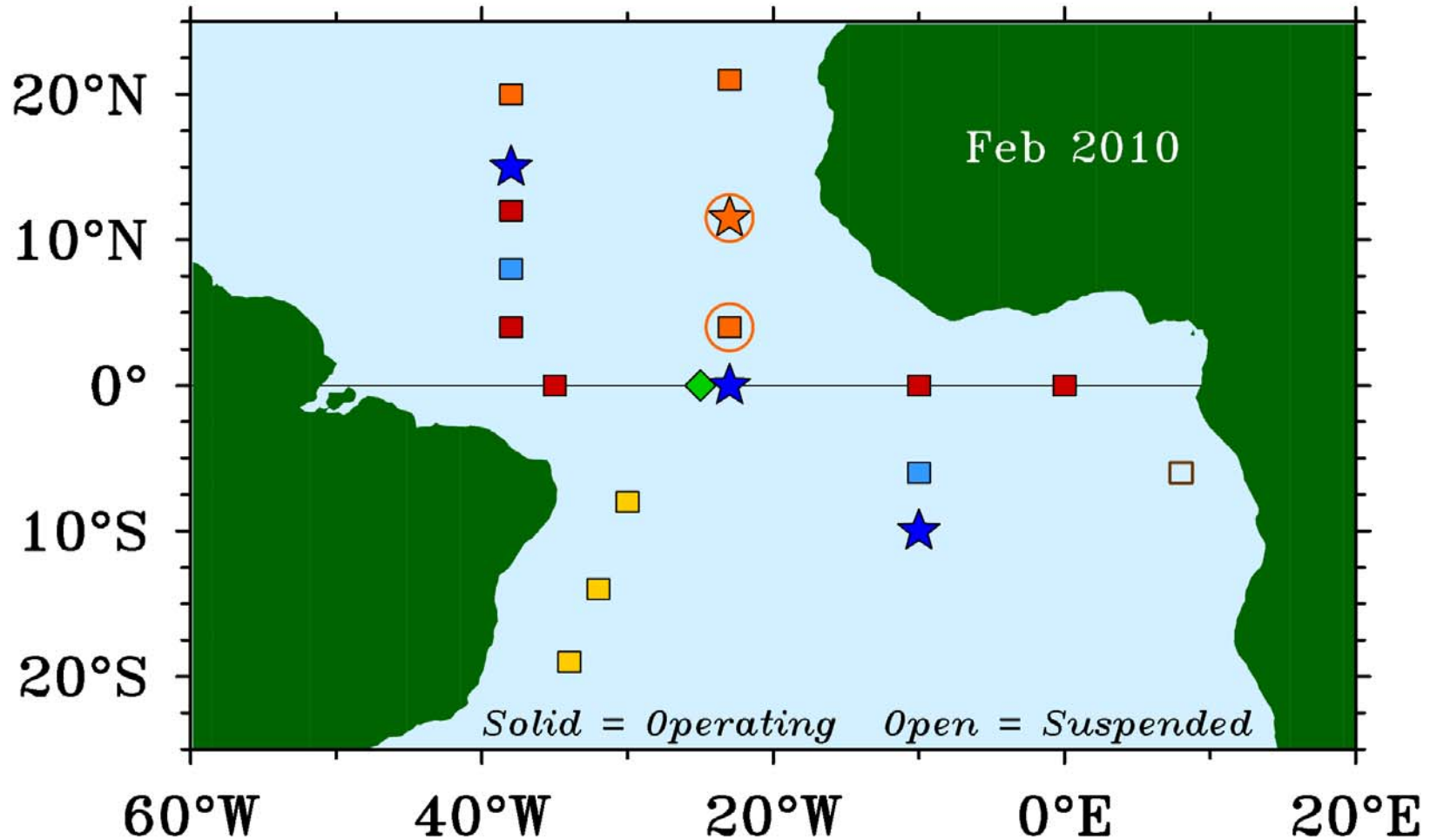
Mike McPhaden

- *Status*
- *Performance Measures*
- *Current Meters*
- *Vandalism*
- *Engineering*
- *Plans for 2010*

PIRATA-15
5 March 2010
Miami, FL



The Flavors of PIRATA



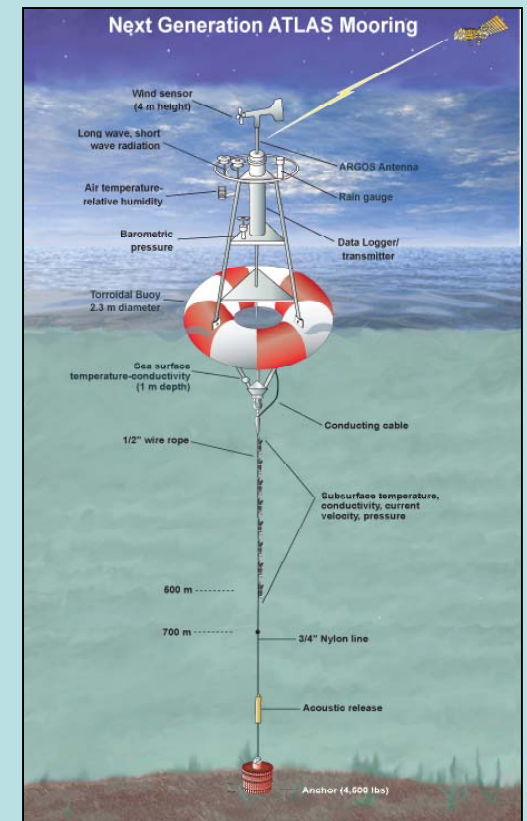
■ Standard ATLAS ◆ ADCP

■ Northeast Extension ■ Southwest Extension ■ Southeast Extension

★ ★ Flux Reference Site ■ CO₂/O₂ Enhanced ATLAS ○ O₂ Enhanced ATLAS

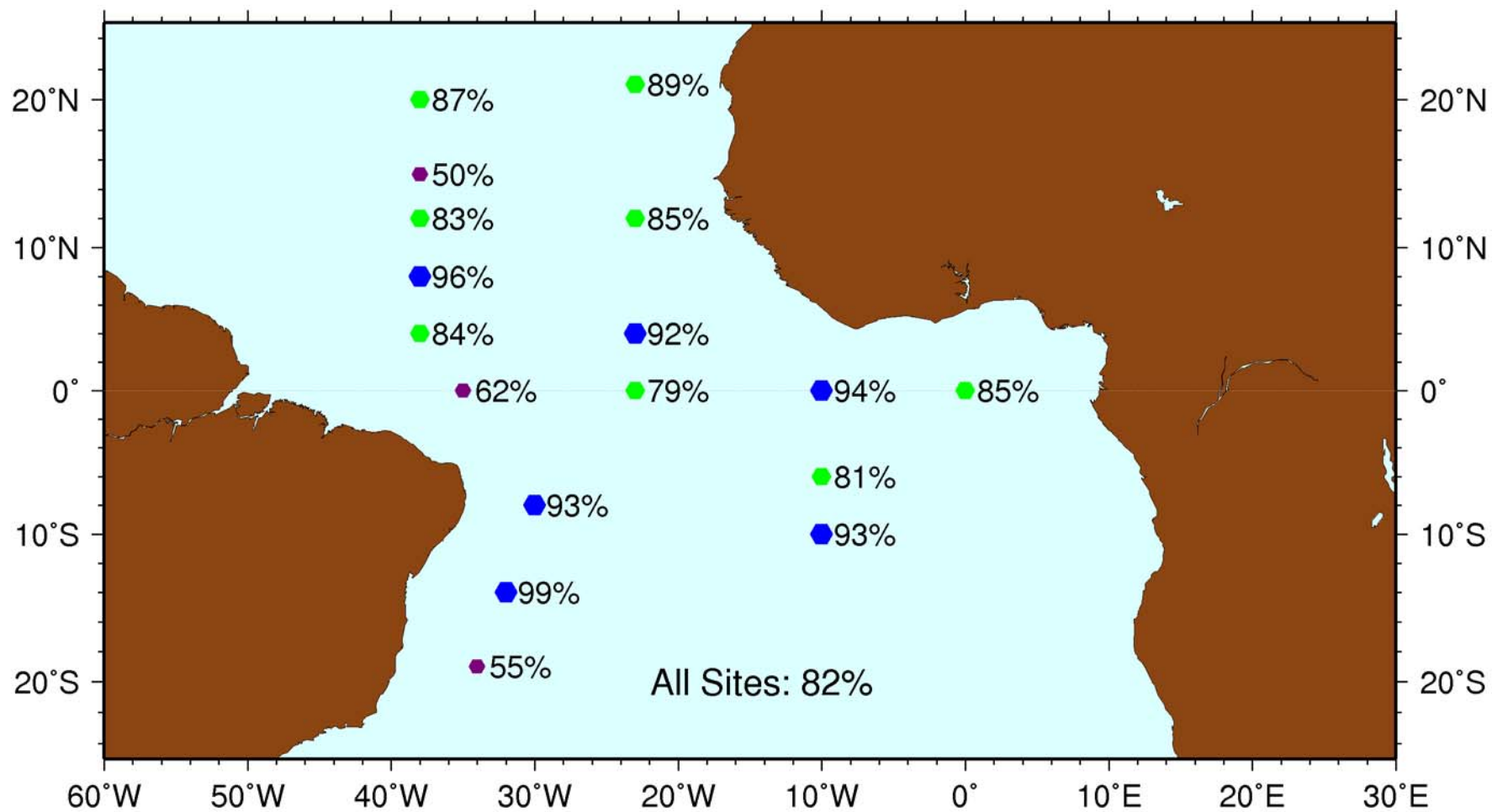
Field Work (Feb 09-Mar 10)

- ATLAS Moorings Deployed: 17
- Cruises: 104 days
 - ANTARES (Mar–Apr 09; Aug 09) —33 days
 - ANTEA (Jun-Jul 09)—39 days
 - BROWN (Jul-Aug 09)—32 days
- PMEL Person-days at sea: 105
 - ANTARES: 25
 - ANTEA: 16
 - BROWN: 64



PIRATA Mooring Real-Time Data Return

October 2008 - September 2009



All Sensors

● 0% - 50%

● 50% - 75%

● 75% - 90%

● 90% - 100%

PIRATA Real-Time Data Return

Oct 2008-Sept 2009

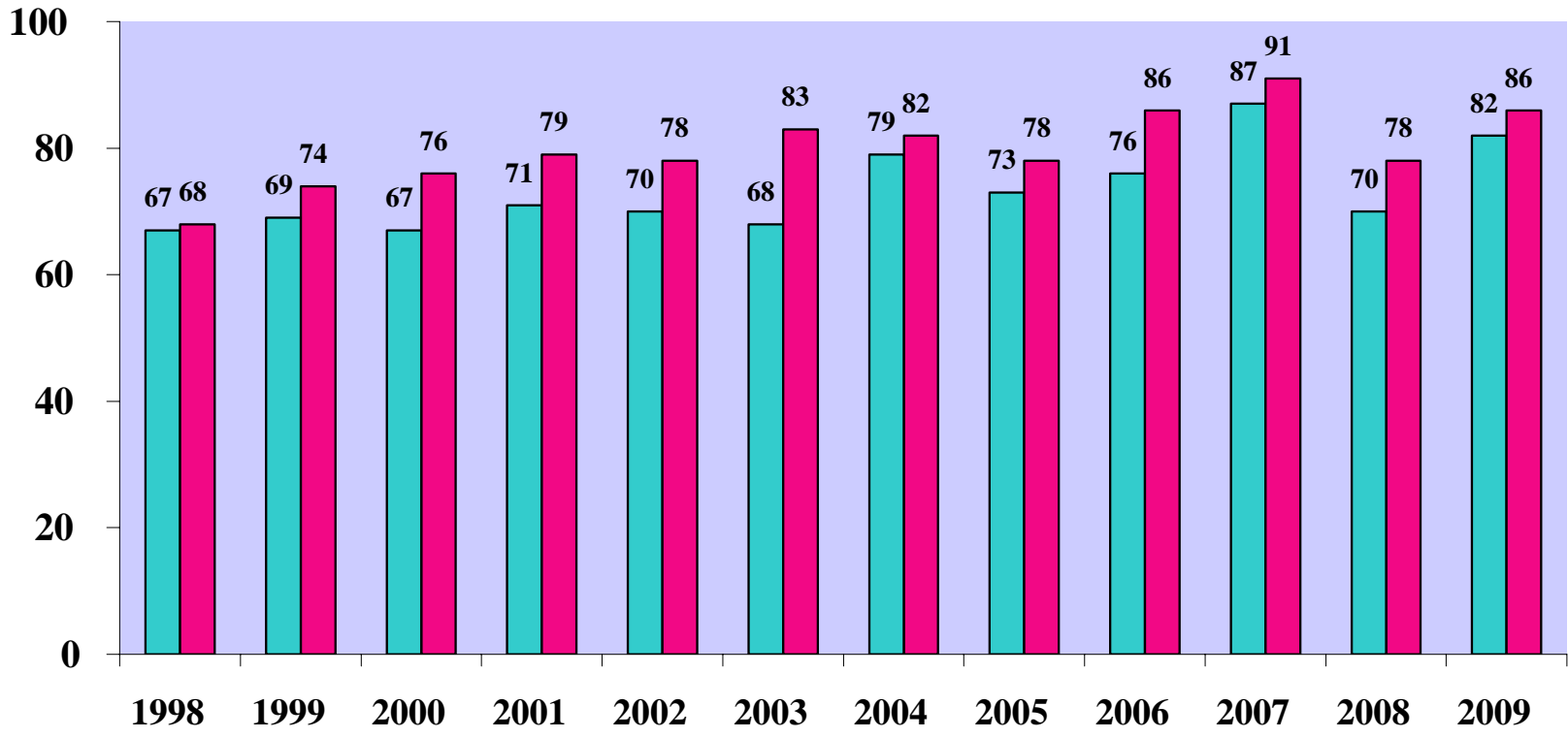
	Air T	SST	T(Z)	Wind
% Data Return	90	87	84	90

	RH	Rain	SWR	Salinity
% Data Return	91	70	88	80

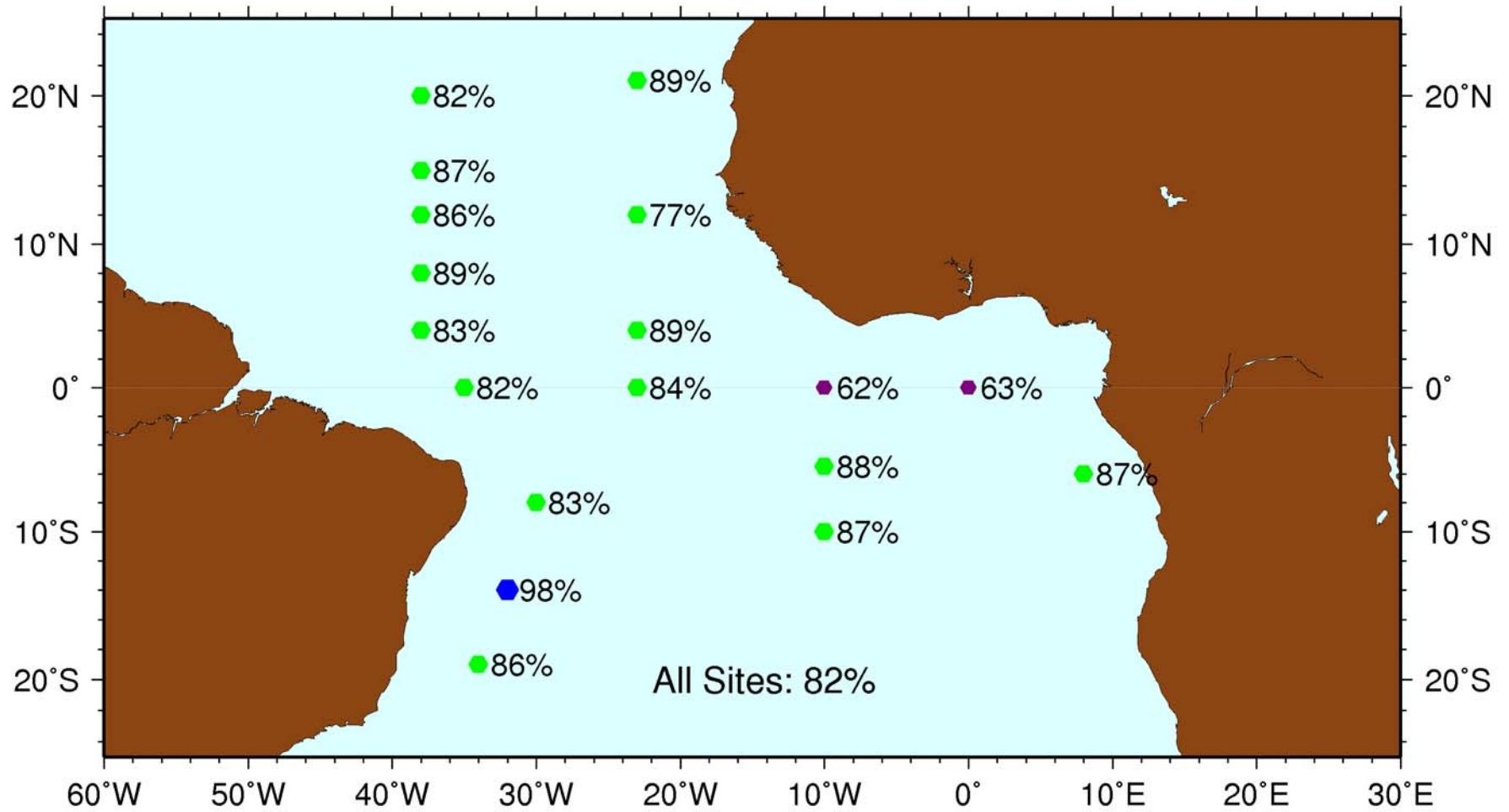
	Currents (7 sites)	LWR (4 sites)	AirP (4 sites)	All Sensors
% Data Return	42	80	84	82%

PIRATA Data Return

Real-Time Delayed Mode



PIRATA Mooring Data Return 1997 - 2009



All Sites: 82%

All Sensors

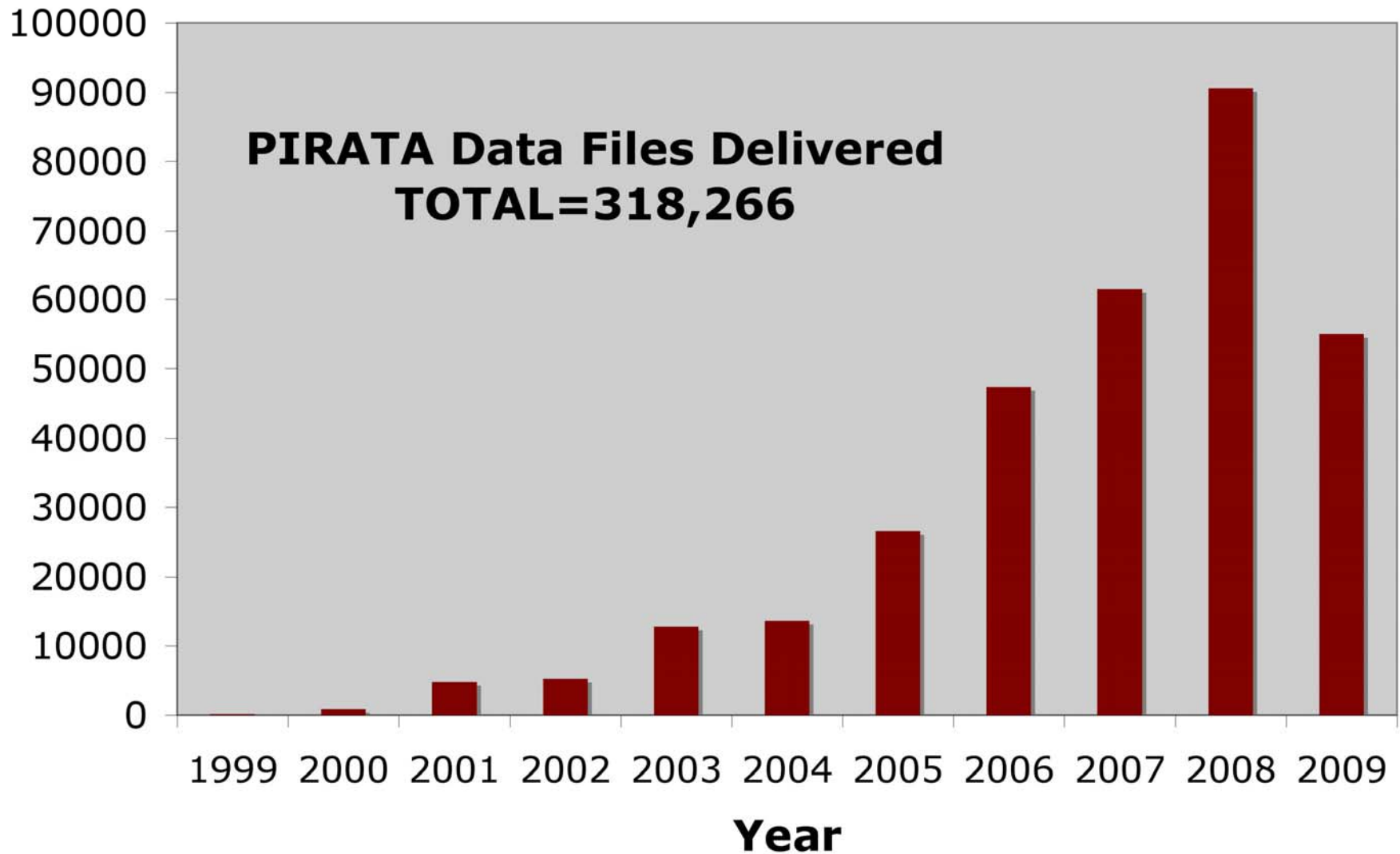
● 0% - 50%

● 50% - 75%

● 75% - 90%

● 90% - 100%

5612 user requests → 55008 data files delivered FY 09



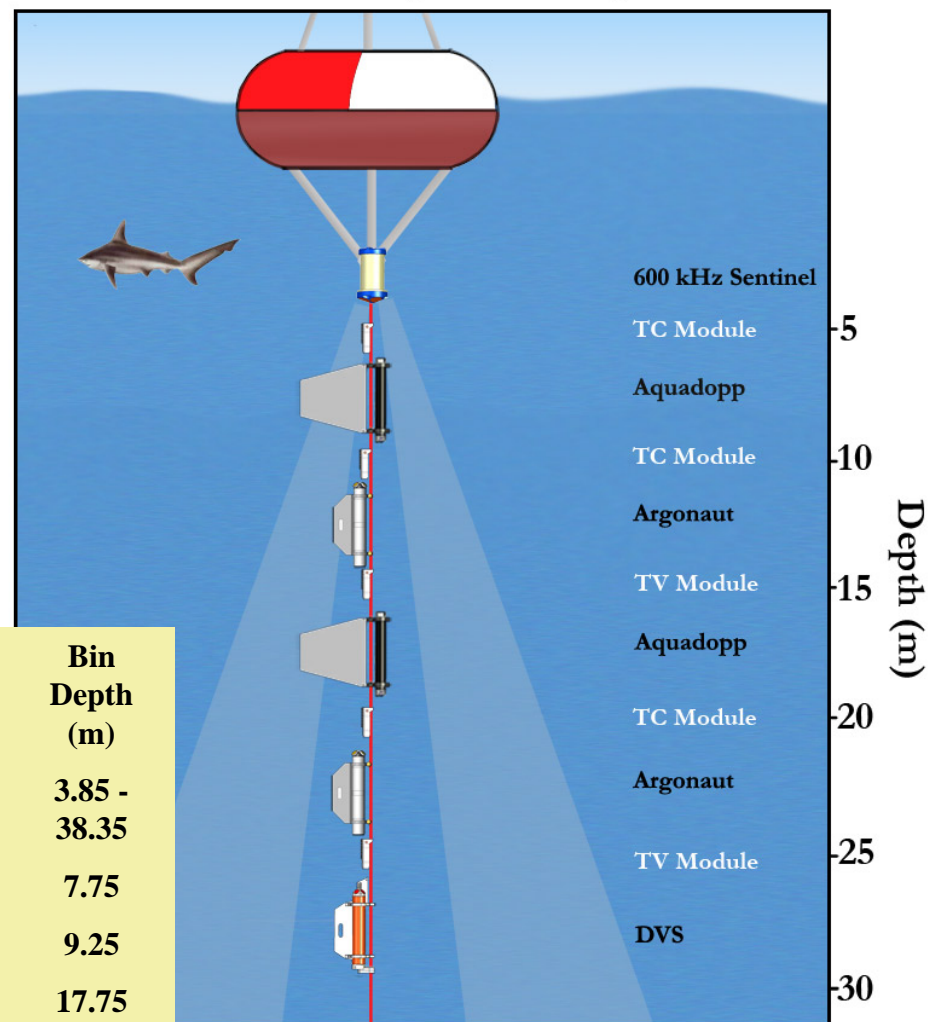
PIRATA Current Meter Experiment

Deployed 13 Oct 08

Recovered 18 Jun 09



Current Meter Experiment 0°, 23°W

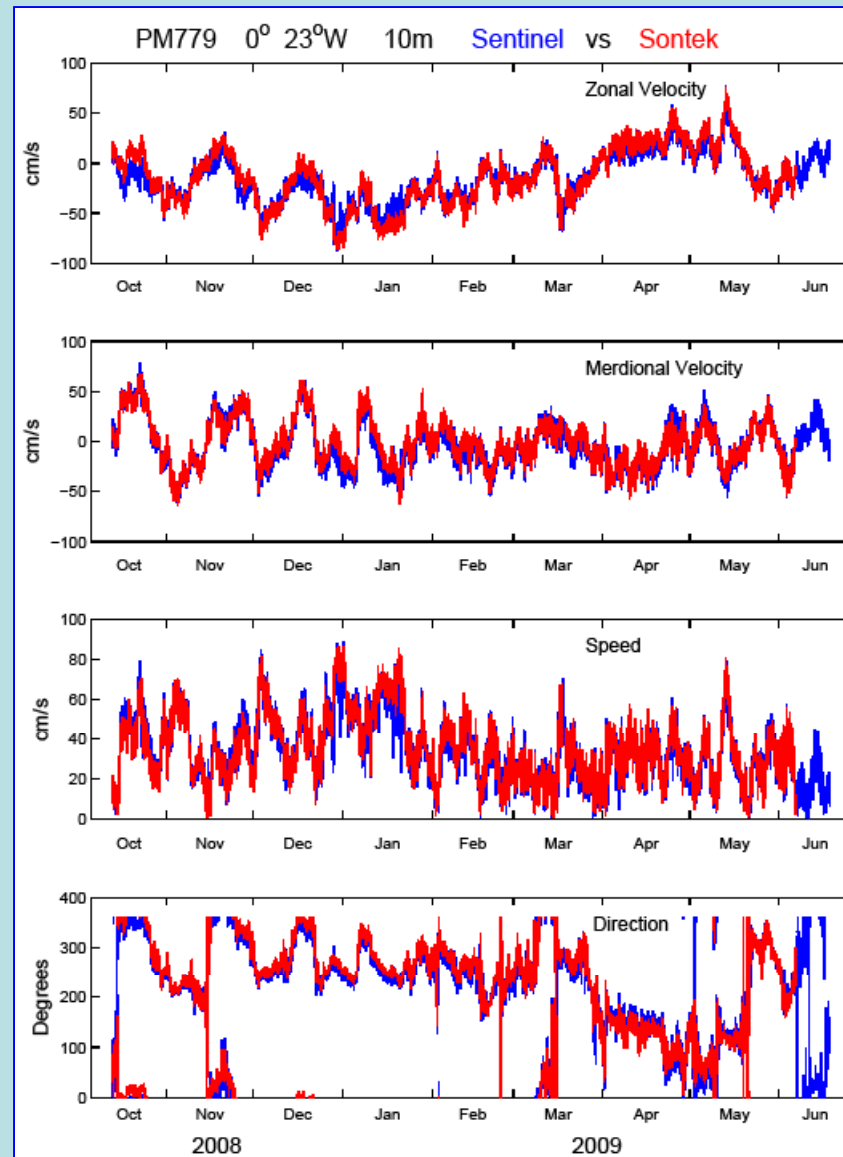


Instrument	Freq.	Head Depth (m)	N Bins	Bin Width (m)	Bin Depth (m)
RDI Sentinel	600 kHz	2	47	0.75	3.85 - 38.35
Nortek Aquadopp	2.0 MHz	7	1	0.75	7.75
Sontek Argonaut	1.5 MHz	12	1	2.5	9.25
Nortek Aquadopp	2.0 MHz	17	1	0.75	17.75
Sontek Argonaut	1.5 MHz	22	1	2.5	19.25
RDI DVS	2.4 MHz	27	5	0.5	23.75 - 25.75

PIRATA Current Meter Experiment

Deployed 13 Oct 2008
Recovered 18 Jun 2009

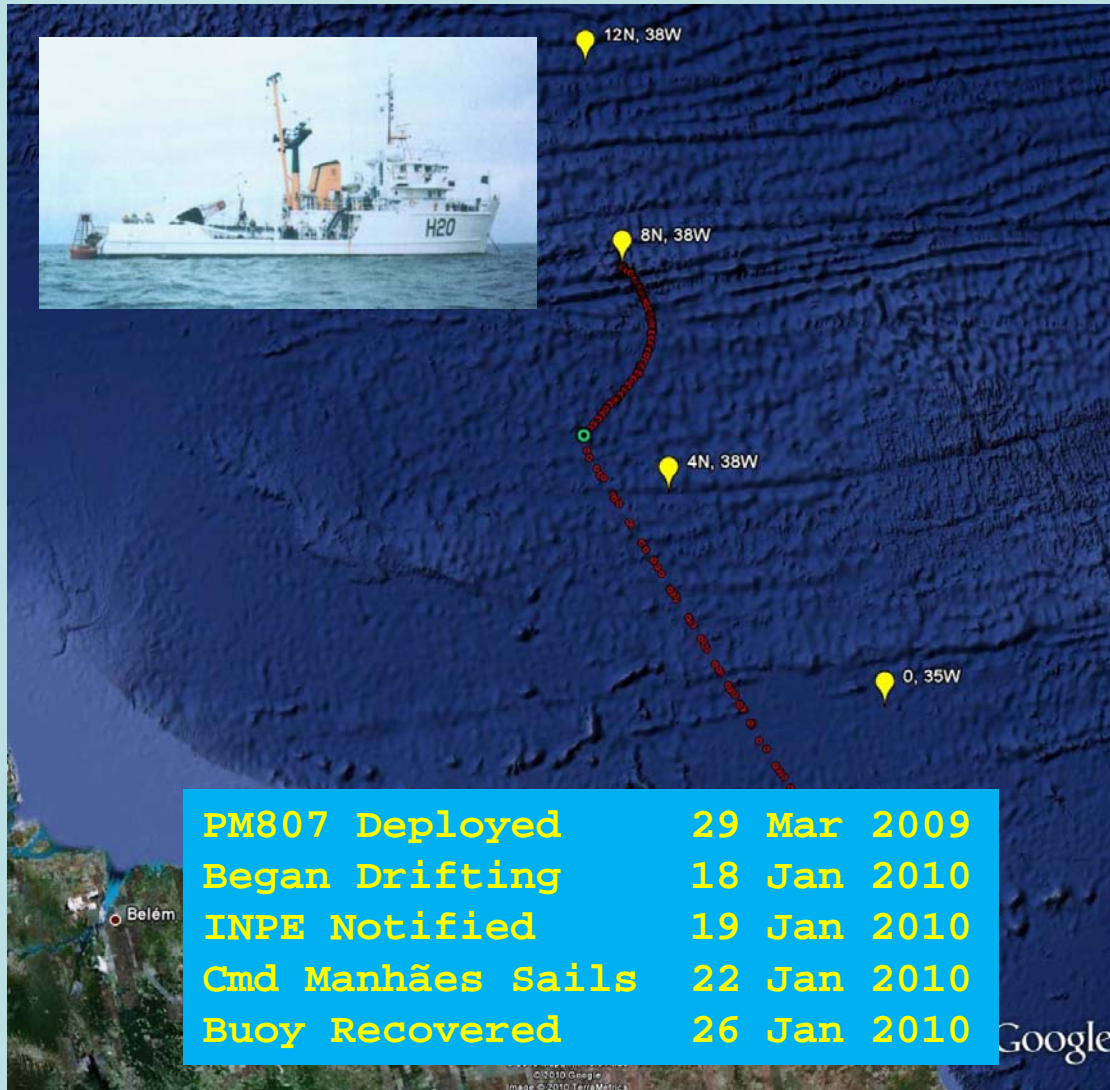
Point Doppler and ADCP
data are comparable to
first order.



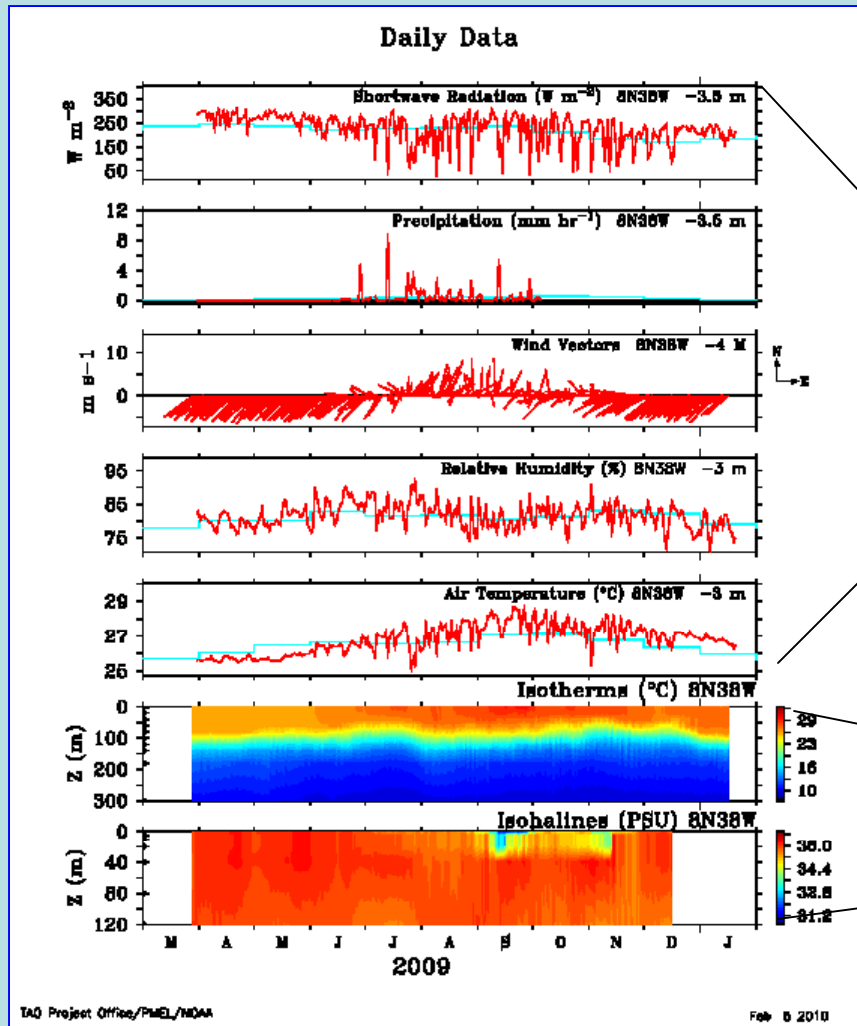
Major Vandalism

8°N, 38°W went adrift on 18 Jan 2010

8°N 38°W RECOVERY



8°N 38°W Losses Due to Vandalism



10-min met data recovered,
sensors damaged

10-min subsurface data and
sensors lost



Certificate of Recognition
for exceptional service

to the

PIRATA Program

presented to

Officers and Crew

of

Brazilian Navy Ship

NB Comandante Manhães

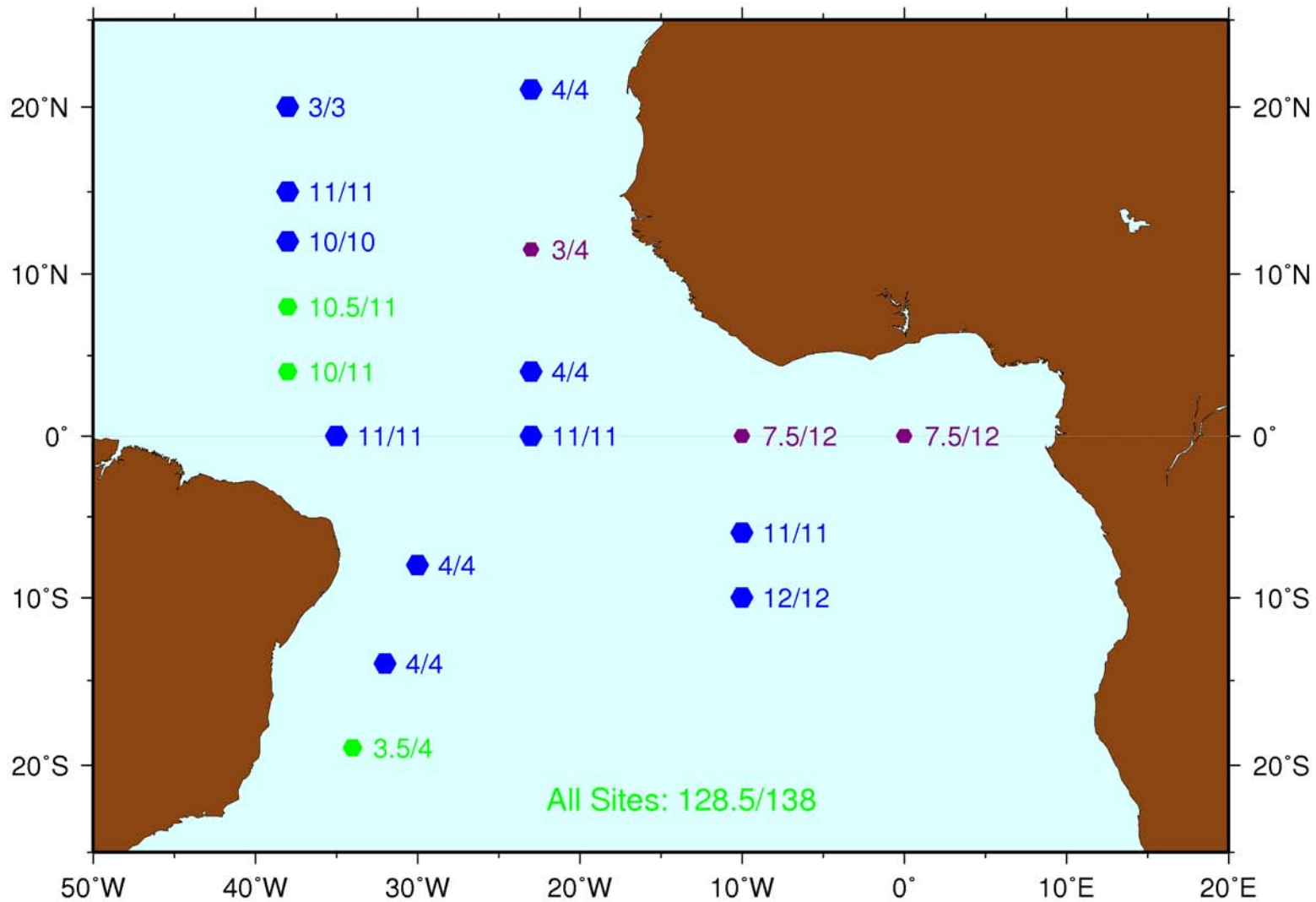
From the TAO Project Office
and

PIRATA Scientific Steering Committee



PIRATA Mooring Survival

September 1997 - February 2010



Moorings Intact / Moorings Deployed

96% - 100% Intact 81% - 95% Intact 51% - 80% Intact 0% - 50% Intact

ATLAS Update Project

Goal: Update PMEL's ATLAS with more modern, commercially available components.

Design criteria:

- Maintain ATLAS suite of measurements.
- Meet or improve data accuracy and return.
- Meet or improve mooring performance.
- Increase temporal resolution of telemetered data.
- Maintain or improve data latency for synoptic weather forecasting.
- Telemeter data in calibrated engineering units.
- Add option for redundant meteorological sensors.
- Add option for new instrumentation.
- Decrease losses due to vandalism.

ATLAS Update Project

Short term: Adapt new electronics to existing mooring hardware

- Eppley PSP (short wave) and PIR (long wave)
- RM Young Capacitance rain gauge
- Paroscientific barometer
- *Gill Windsonic (integrated with Sparton compass)*
- *Rotronic Hygroclip 2 (air temperature and relative humidity)*
- *Optional Met: Vaisala WXT520 (Wind, AT, RH, Rain, BP)*
- *Seabird SB37 (T, pumped C) and Seabird 39 (T, P) with SBE Inductive Modem*
- *Nortek Aquadopp or RDI DVS (Doppler current meters) w/SBE IM*
- *Iridium Telemetry (~ \$2/day. GTS submission an issue)*

Updated sensors and features

Sampling, Averaging and Telemetry

Measurement	Sample Rate	Average	Recorded Resolution	Telemetered Resolution	Call Frequency
Wind Speed, Direction, Air Temperature, Relative Humidity	1 sec	2 min	10 min	hourly	6 hours
Rain and Radiation	1 sec	1 min	1 min		
Barometric Pressure	1	2 min	hourly		
Water Temperature, Conductivity, Pressure	1 sample	1 sample	10 min		
Current	1 sec	2 min	20 min		

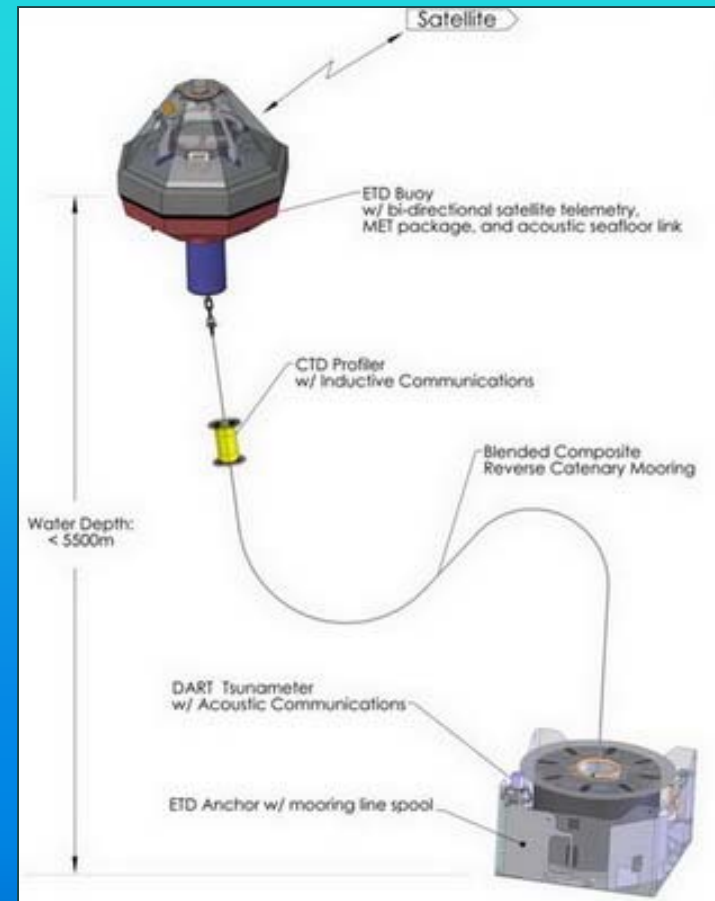
First deployment:
~Fall 2010



ATLAS Replacement Project

Longer term: Smaller moorings

- Safer and significantly simplified operations compared to traditional moorings
- Palletized design eliminates the need for large vessels and skilled deployment personnel
- Mass producible design
- Multi-sensor, vandal resistant features
- Capable in high latitudes, up to 5500 m water depths
- 2-3 year design life



PMEL Plans for 2010

- Continue to support PIRATA core activities:
 - ✓ Provide mooring equipment
 - ✓ Support PIRATA cruises
 - ✓ Continue data processing, web display and data distribution
- Staff PNE Cruise on *NOAA Ship Ron Brown* in May/June 2010
- Continue scientific analysis of PIRATA data
- Analyze Current Meter Experiment data
- Continue engineering development