2008 AOML Data Buoy (ADB) Comparison Study

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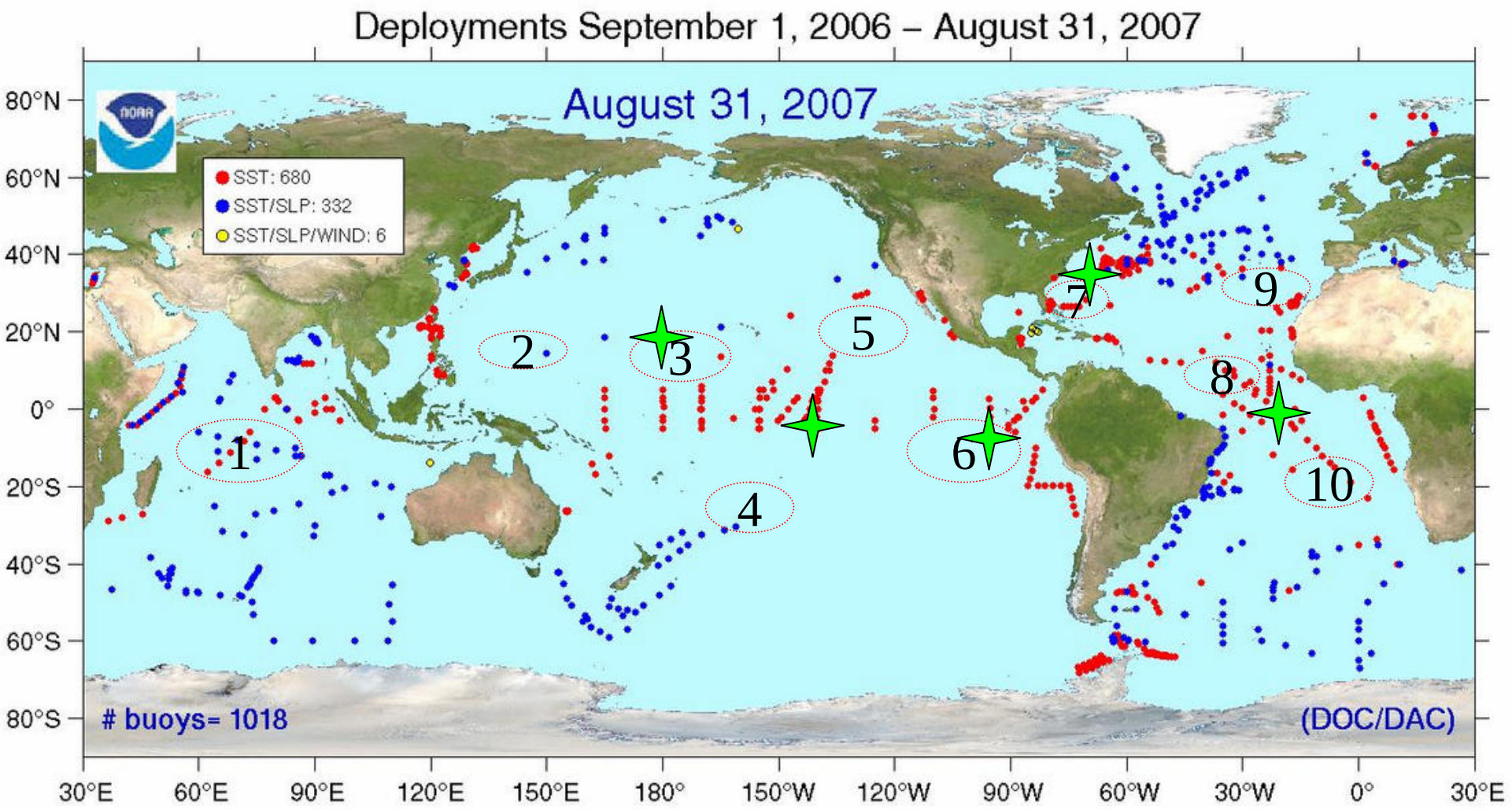
2008
AOML Data Buoy (ADB) Comparison Study

- SVP drifters from 4 major buoy manufacturers were selected at random and tested according to GDP standards.
- Buoy deployments were made in oceans throughout the world.
- Various participants handled and deployed buoys from each manufacturer.

Deployment Strategies

- Locations in accordance with Global Array and local needs
- Aboard ships capable of deploying 4 buoys at the same time
- Variant temperatures and sea conditions
- Maximum drift time (i.e. limited shipping time and fast deployment ability)

2008
ADB Comparison Study
Deployment Locations (✦)



2008 Concerns

1. Deployment Instructions need to be included with every buoy.

2. Variation in packaging (with regard to colored safety tape and colored instructions)

3. Pull-Pin activation magnet used by one manufacturer

Pacific Gyre

"Handles are always a good idea."

"The handles work as long as they use a bit thicker line;
a few of the first ones had the line break and the buoy hit the deck."

Technocean

Metocean

Clearwater

Next Generation Drifter:

"My vote goes with anything that a 5'6" delicate flower of a 43 year old female can load in her truck and carry up the gangway - and drop over the rail for deployment."

"Buoys should be the size of a paperback book, weigh less than 1 lb. and fit in my hip pocket."

Convention used throughout:

* Deployment location
  - Drogue off
- Drifter is alive

Color codes for manufacturers

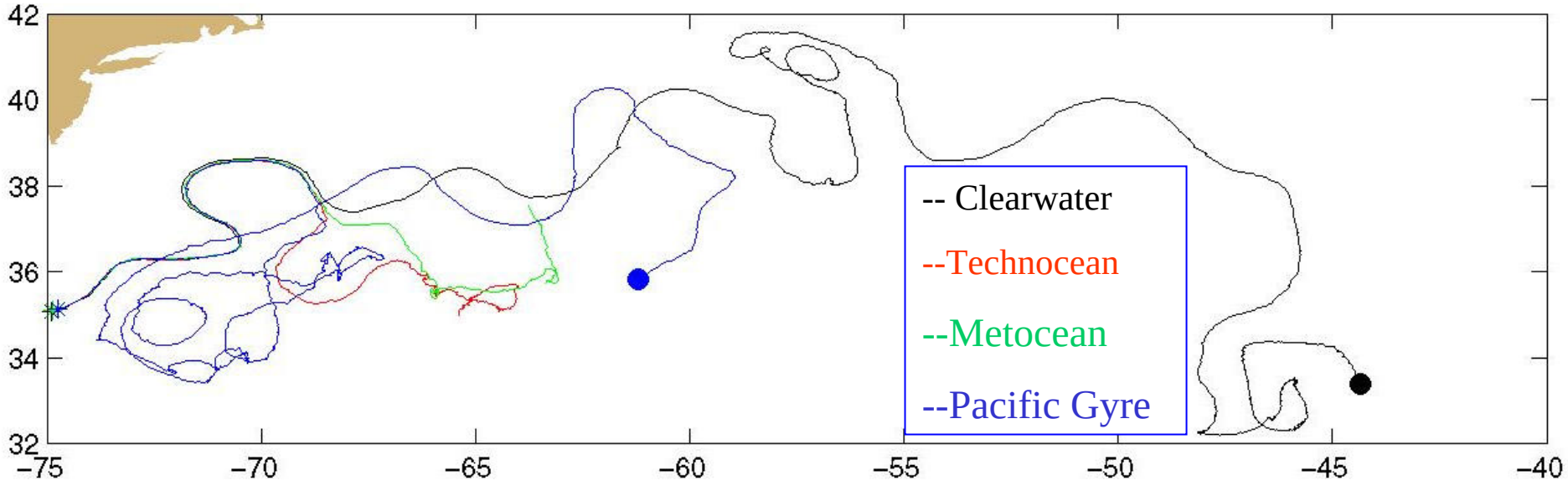
-- Clearwater

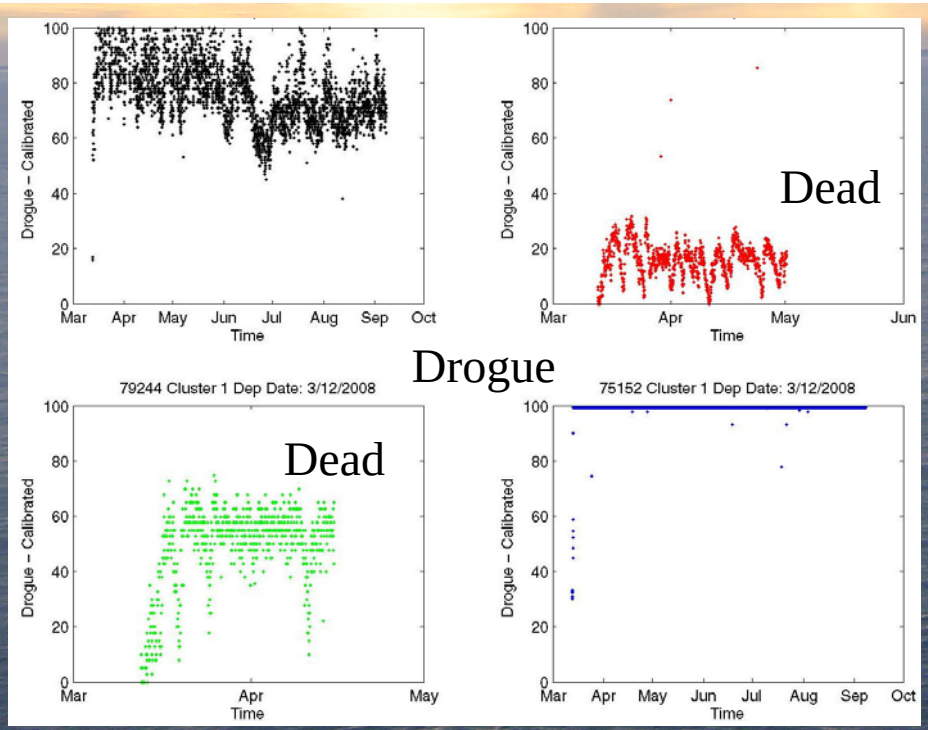
--Technocean

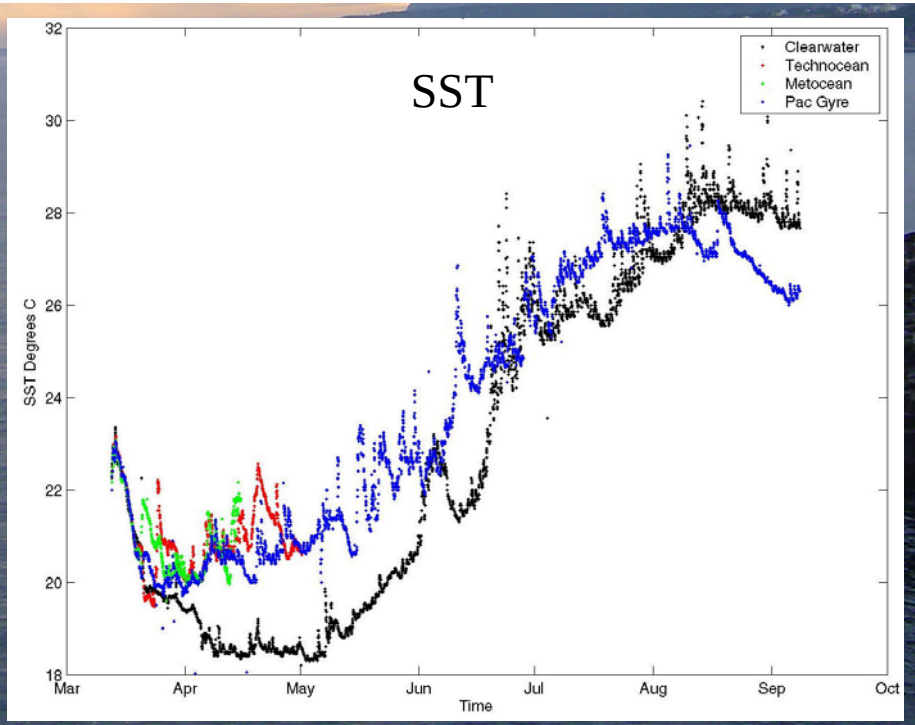
--Metocean

--Pacific Gyre

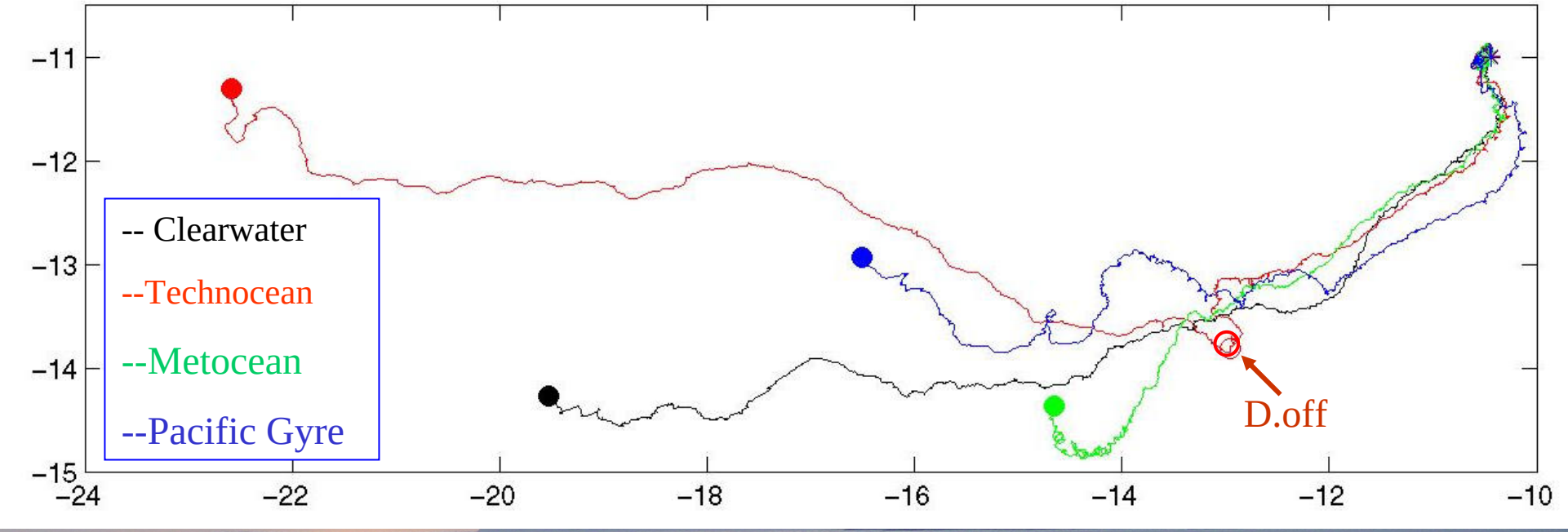
Cluster 1: Deployed March 12, 2008

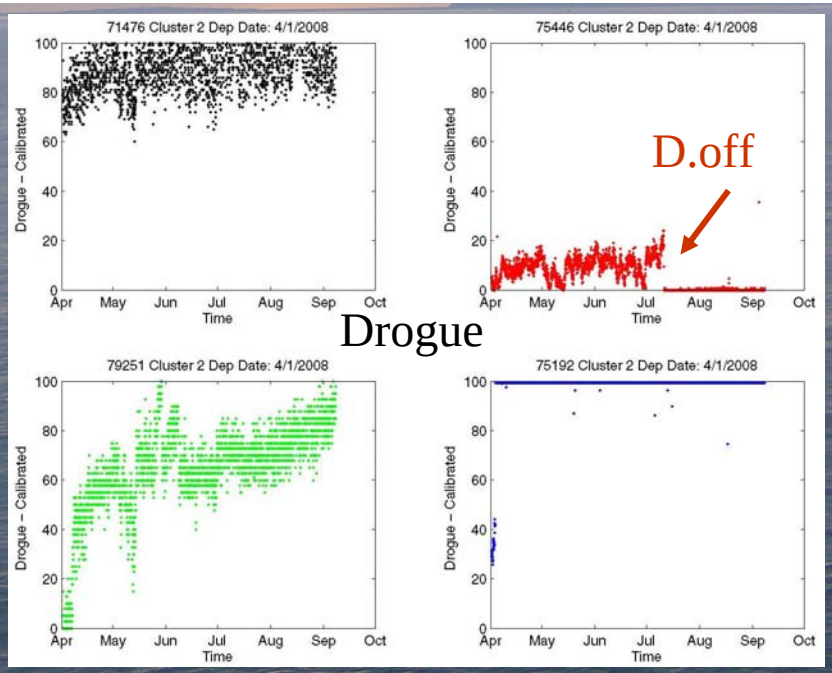


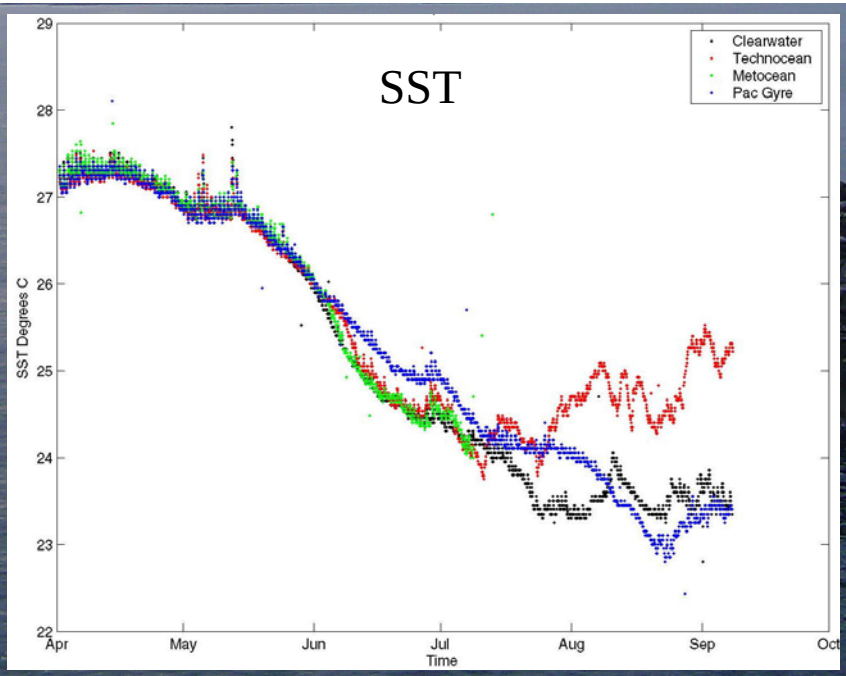




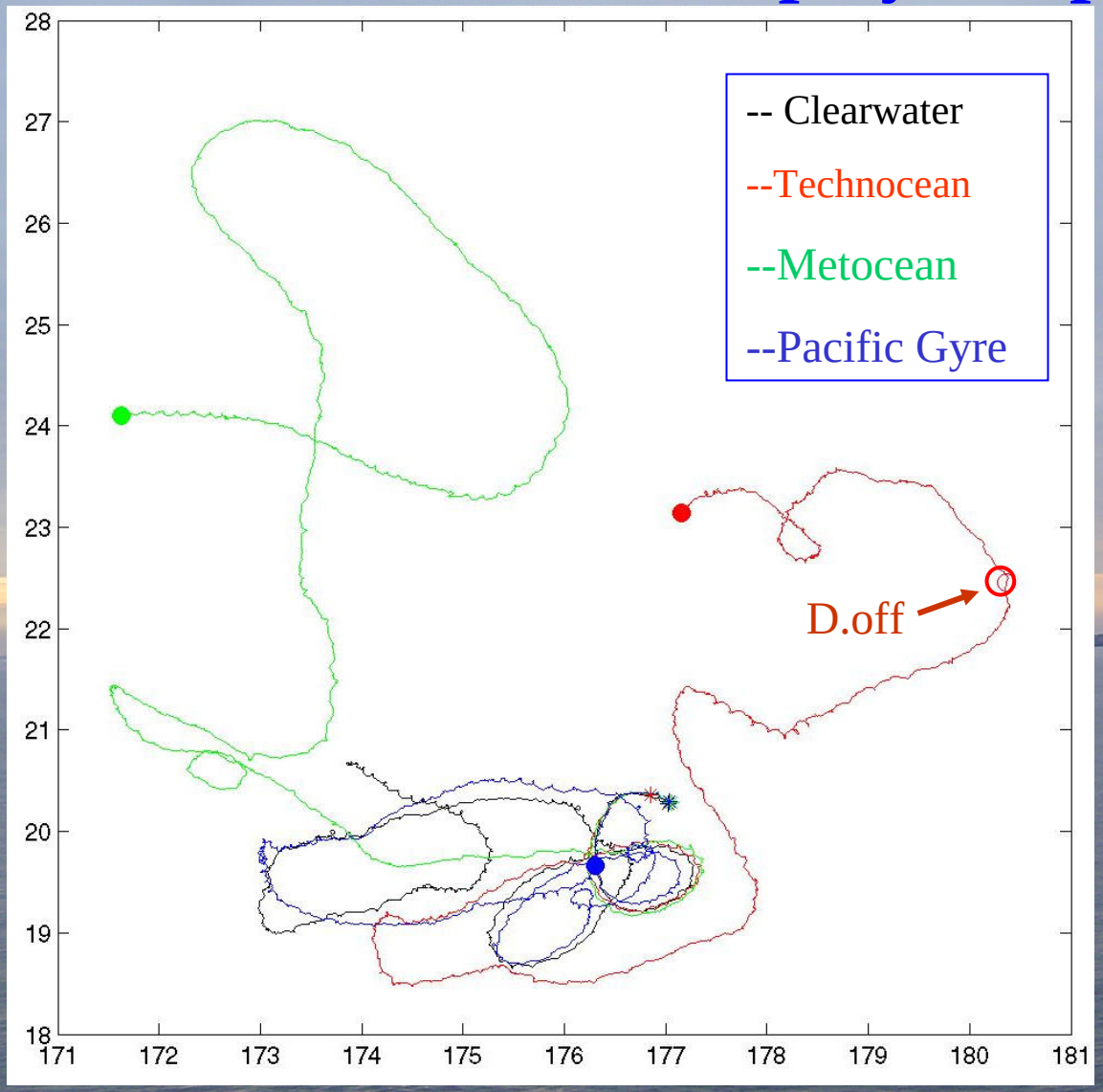
Cluster 2: Deployed April 1, 2008

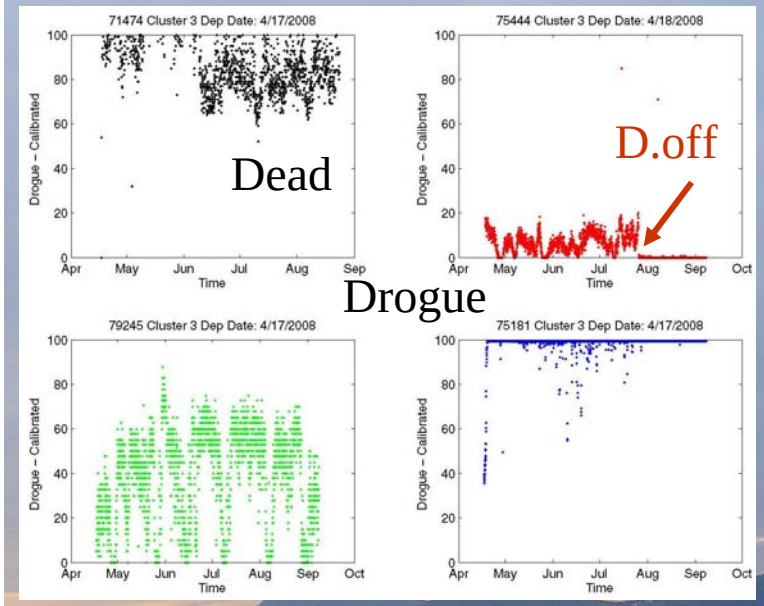


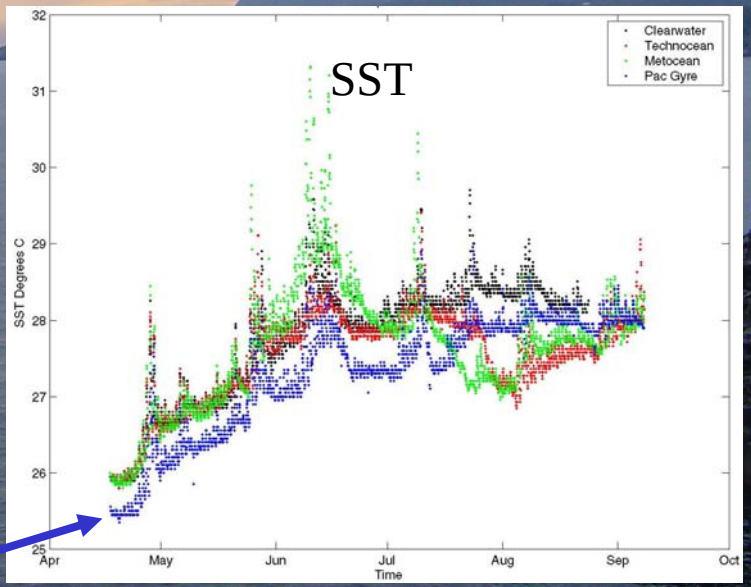




Cluster 3: Deployed April 17, 2008

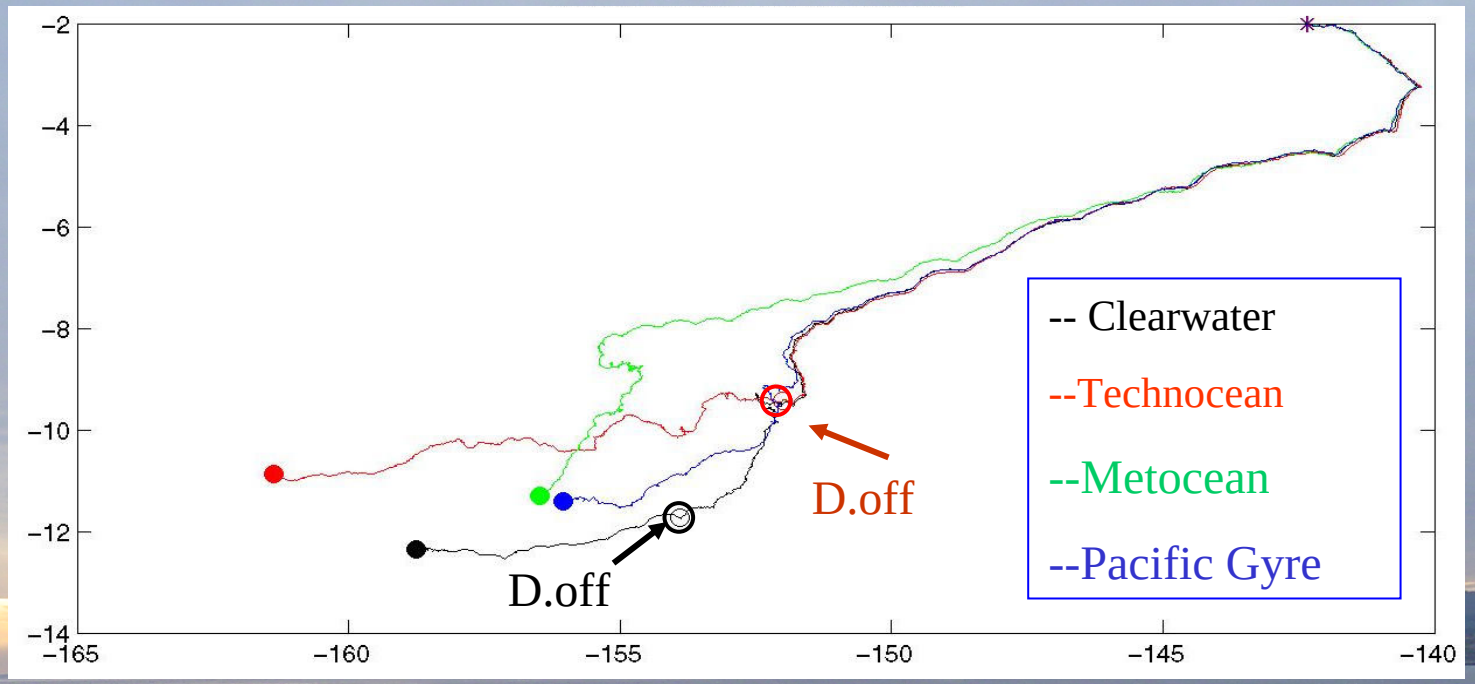


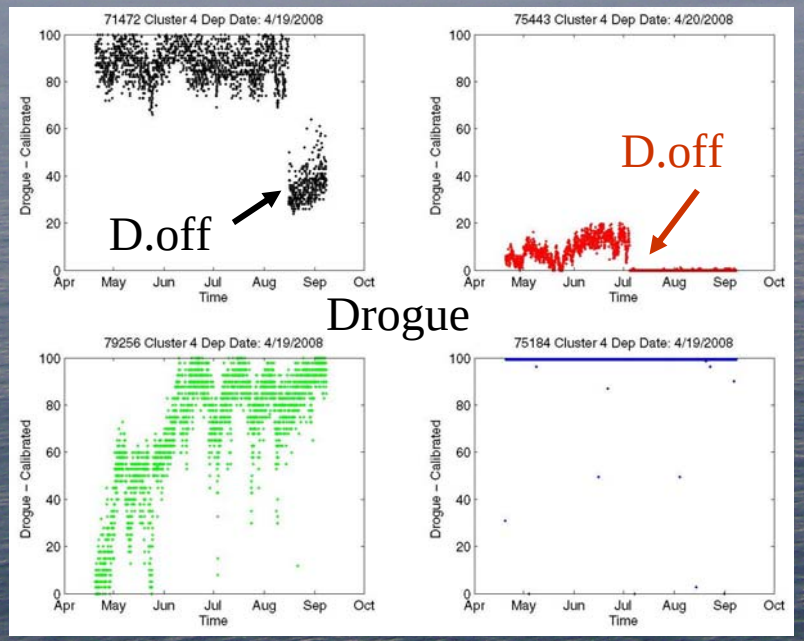


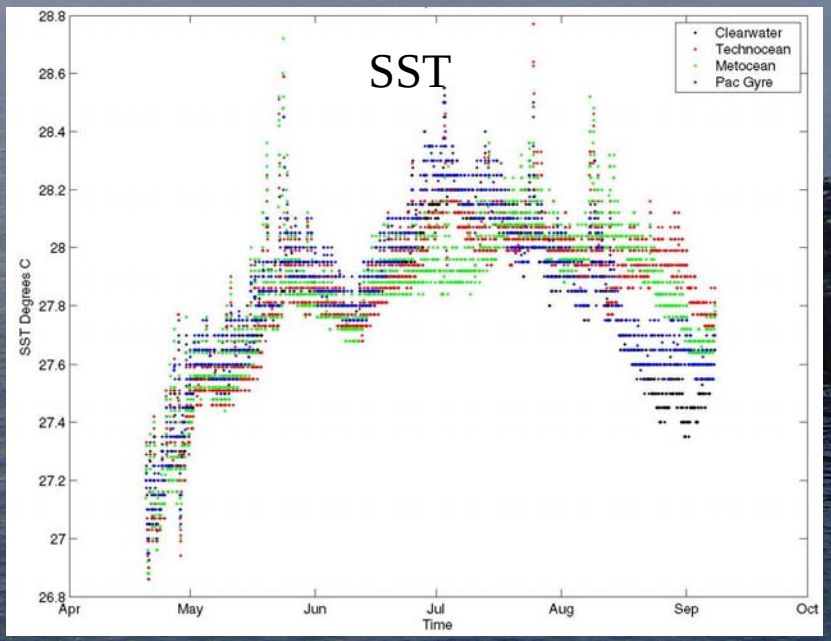


0.45 offset was added to correct SST

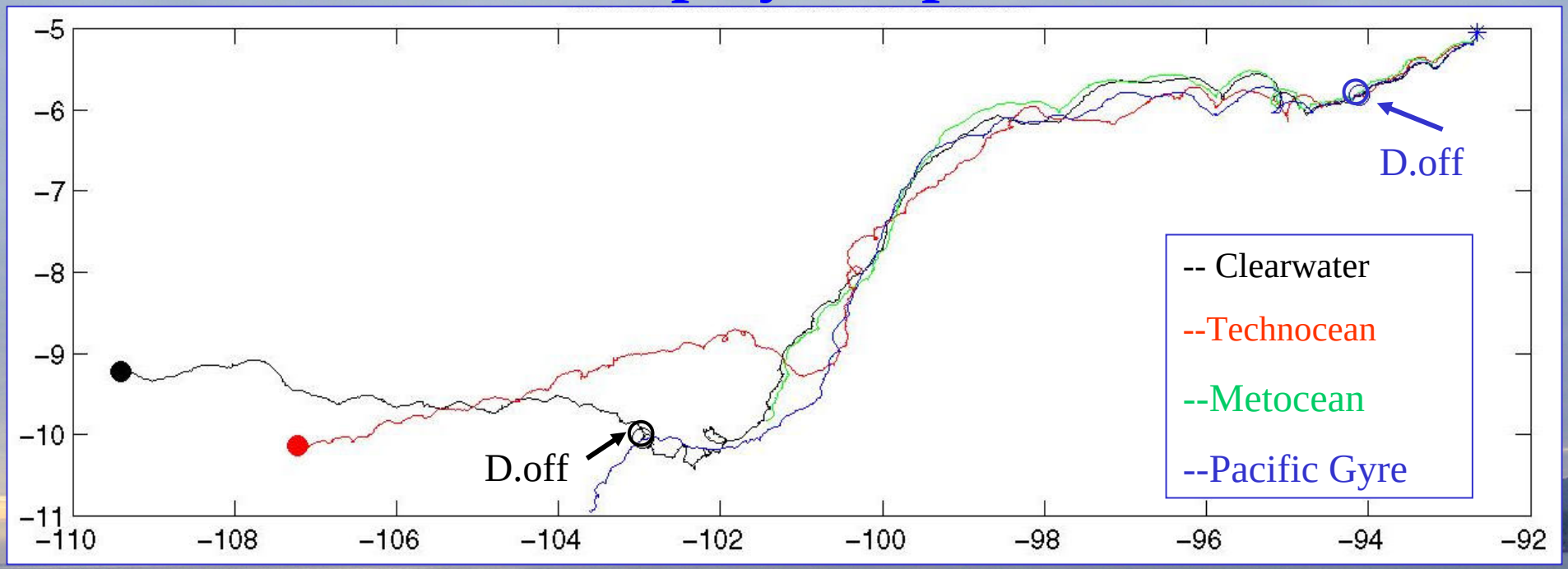
Cluster 4: Deployed April 19, 2008

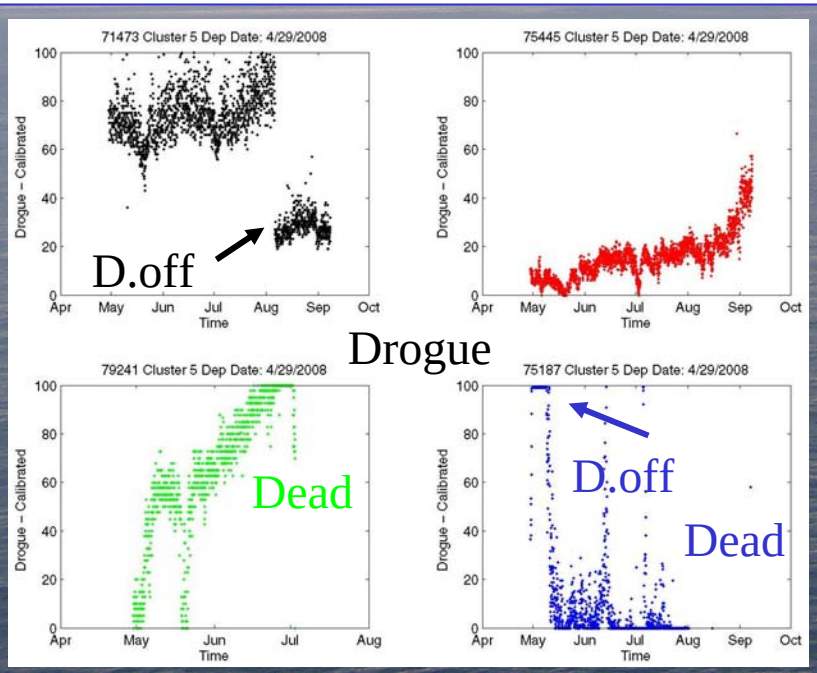


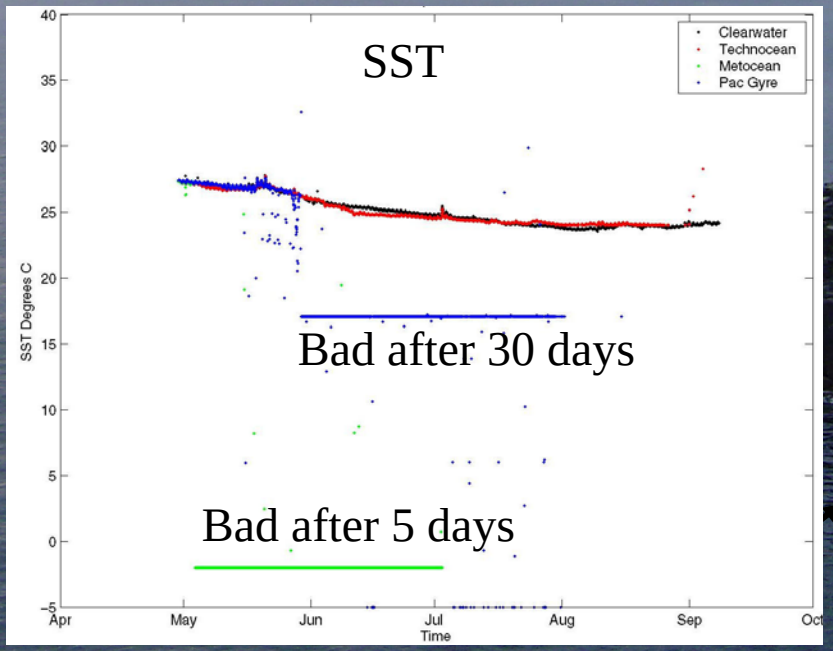




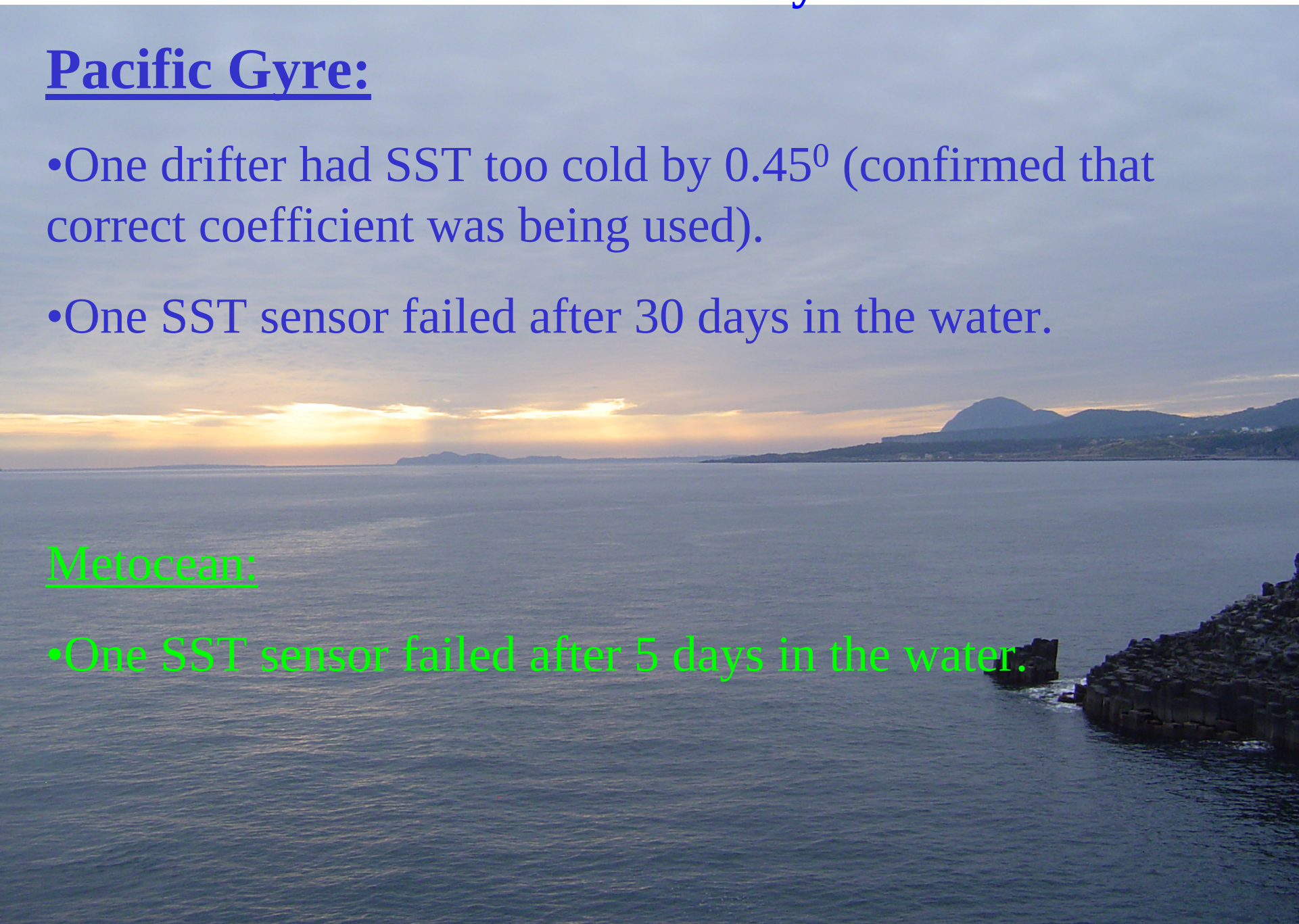
Cluster 5: Deployed April 29, 2008







SST Summary



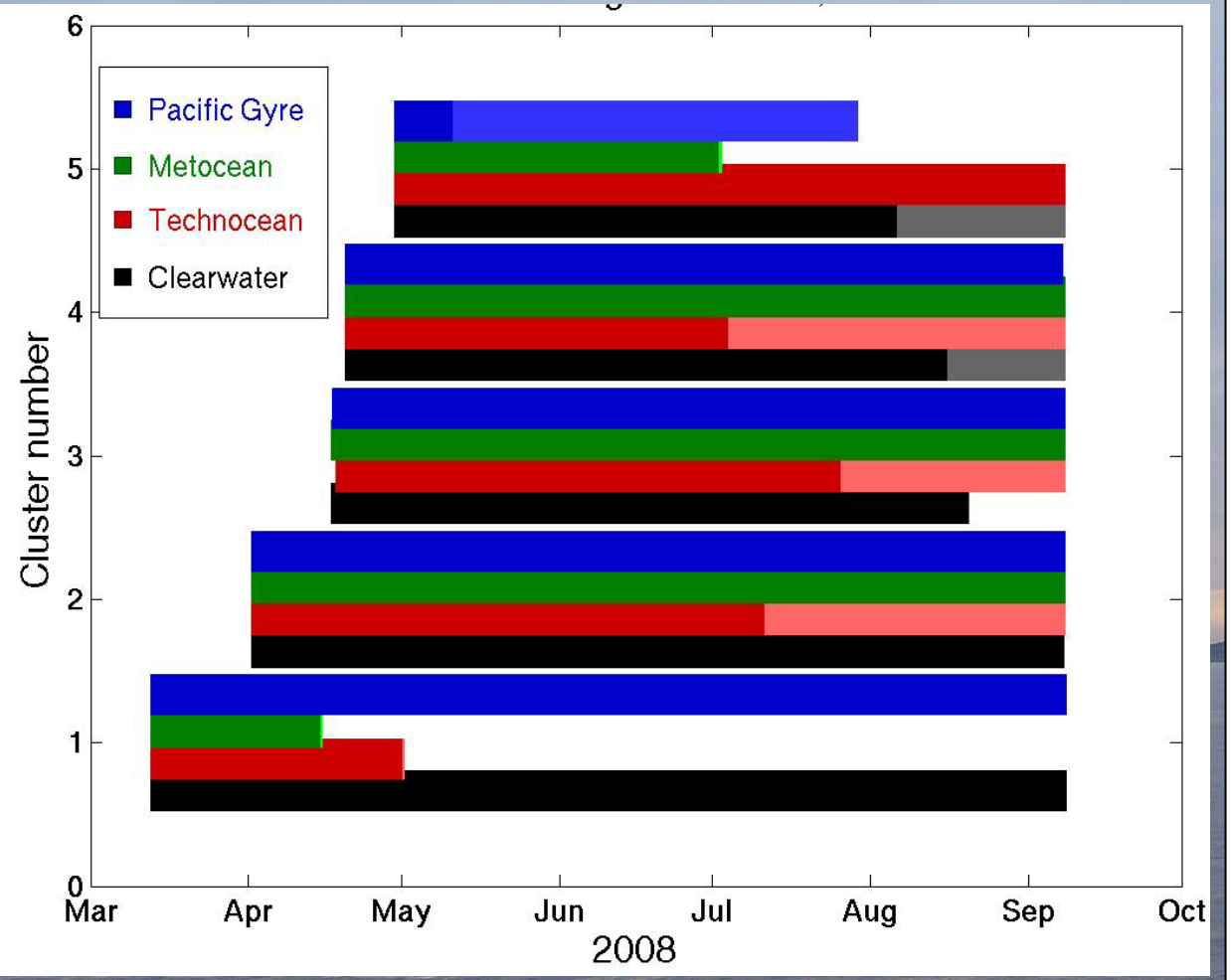
Pacific Gyre:

- One drifter had SST too cold by 0.45^0 (confirmed that correct coefficient was being used).
- One SST sensor failed after 30 days in the water.

Metocean:

- One SST sensor failed after 5 days in the water.

Transmitter and drogue lifetimes



Latest update: September 8, 2008

Lighter shades of colors indicate transmitters' life

Darker shades of colors indicate drogues' life

Pacific Gyre:

One drogue was lost after 12 days.

One transmitter quit after 91 days.

Metocean:

Two transmitters quit - one after 34 days and the other after 64 days.

All drogues attached.

Technocean:

One drifter died after 50 days.

Three lost their drogues - after 75, 99, and 101 days.

Clearwater:

One transmitter quit after 125 days.

Two lost their drogues - one after 99 days and the other after 119 days.

Summary Table of Transmitters' Life Times (days)

Clusters

Manufacturers	1	2	3	4	5
Clearwater	*	*	125 (Quit)	*	*
Technocean	50 (Quit)	*	*	*	*
Metocean	34 (Quit)	*	*	*	64 (Quit)
Pacific Gyre	*	*	*	*	91 (Quit)
Max. Days Possible	**180**	**160**	**144**	**142**	**132**

*** = OK until last update, September 8, 2008**

Clearwater:
One transmitter quit after 125 days.

Technocean:
One drifter died after 50 days.

Metocean:
Two transmitters quit - one after 34 days and the other after 64 days.

Pacific Gyre:
One transmitter quit after 91 days.

Summary Table of Drogues' Life Times (days)

Clusters

Manufacturer	*1*	*2*	*3*	*4*	*5*
Clearwater	*	*	125* (Quit)	119	99
Technocean	50* (Quit)	101	100	75	*
Metocean	34* (Quit)	*	*	*	64* (Quit)
Pacific Gyre	*	*	*	*	12 (Quit)
Max. Days Possible	**180**	**160**	**144**	**142**	**132**

Clearwater:
Two lost their drogues - one after 99 days and the other after 119 days.

Technocean:
Three lost their drogues - after 75, 99, and 101 days.

Metocean:
All drogues attached.

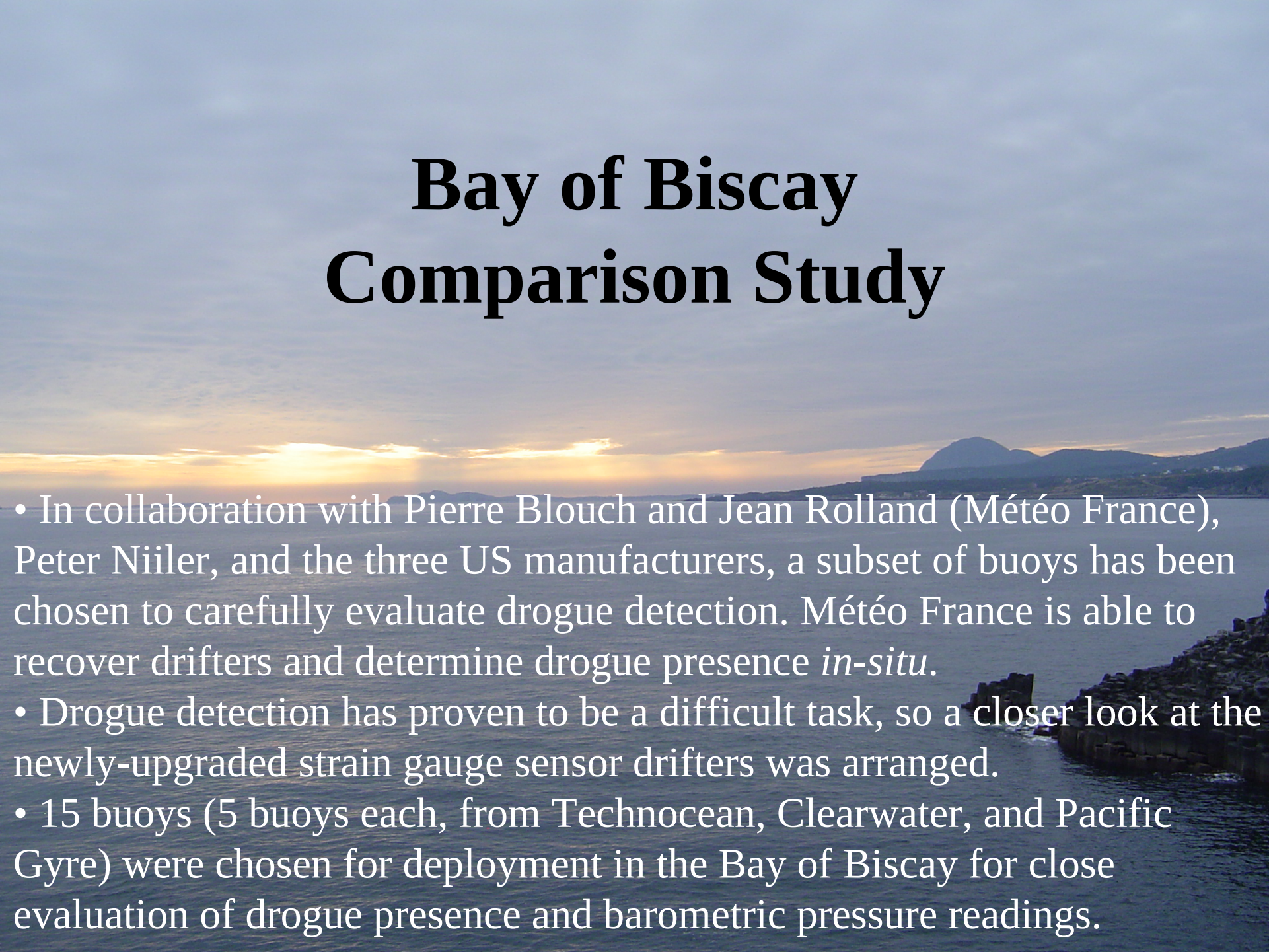
Pacific Gyre:
One drogue was lost after 12 days.

*** = OK until last update, September 8, 2008 (or drifter death)**

SVP Drift Buoy Specs.

	Clearwater	Metocean	Pacific Gyre	Technocean Inc.
Surface Float (diameter)	30.5 cm	38.0 cm	30.48 cm	38.0 cm
Drogue Segments	4	5	4	5
Drogue Segment Length	125 cm	130 cm	122 cm	122 cm
Drogue Design	Wire Rope Radials	Wire Rope Radials	Wire Rope Radials	Wire Rope Radials
Drag Area Above Drogue	1,042	1,350.10	942	1,234
Drag Area of Drogue	42,672	54,776	41,664	52,139
Drag Area Ratio	40.95 : 1	40.57 : 1	44.23 : 1	42.25 : 1
Drogue Detection	Tether Strain	Submergence	Submergence	Submergence

Bay of Biscay Comparison Study



• In collaboration with Pierre Blouch and Jean Rolland (Météo France), Peter Niiler, and the three US manufacturers, a subset of buoys has been chosen to carefully evaluate drogue detection. Météo France is able to recover drifters and determine drogue presence *in-situ*.
• Drogue detection has proven to be a difficult task, so a closer look at the newly-upgraded strain gauge sensor drifters was arranged.
• 15 buoys (5 buoys each, from Technocean, Clearwater, and Pacific Gyre) were chosen for deployment in the Bay of Biscay for close evaluation of drogue presence and barometric pressure readings.

Bay of Biscay Comparison Study -

Early Evaluations by Blouch & Rolland

External Appearance:

"Although the buoys are different in size and shape, they seem fine… except the air intake on Pacific Gyre buoys which seem perhaps more fragile than this of others. I also take note from Pacific Gyre to secure the floatability of the upper ring of the drogue."

Drifter Activation:

"All the buoys were activated yesterday (29th of July), in the morning by removing their magnet. One Technocean (83327) didn't start. It started today after putting the Magnet back and removing it again. It seems that Technocean buoys were less often located during the test than other buoys : the first location took more time than for the other indeed."

Data Format:

"All the buoys follow the DBCP-M2 sharing (8, 4, 11, 9, 9, 6, and 3 bits) and the checksum computation works. Some differences exists in the standard calibration values for submergence and battery voltage."

Bay of Biscay Comparison Study -

Early Evaluations Cont. by Blouch & Rolland

Missing Measurements:

"…Pacific Gyre buoys don't compute the pressure tendency. It must be reminded that this tendency must be computed over the past 3 hours (WMO rule). Pressure tendency values reported by Clearwater buoys seem wrong."

Quality of Air Pressure Measurements:

"Applying the standard calibration values, it seems the measurements carried out by the Druck sensor (Clearwater) are less accurate - or are suffering from a lack of calibration - than those carried out by the Honeywell sensors (Pacific Gyre and Technocean). All needed a re-calibration of their barometers (fixed biases)."

Bay of Biscay Comparison Study Deployments (★)

Bay of Biscay Comparison Study

Preliminary Results (as of 25 Sept.)

•4 of 5 Technocean buoys are reporting drogue loss

-Buoys 83329 and 83326 reported drogue loss after 17 days (failed 29/30 Aug.)

-Buoys 83328 and 83325 reported drogue loss after 24 days (failed 5 Sept.)

"Wave heights were 5 meters on the 5th of September but 1.5 meters only on the 29/30th of August…"

GTS data transmissions were stopped for all 4 buoys with drogue loss.

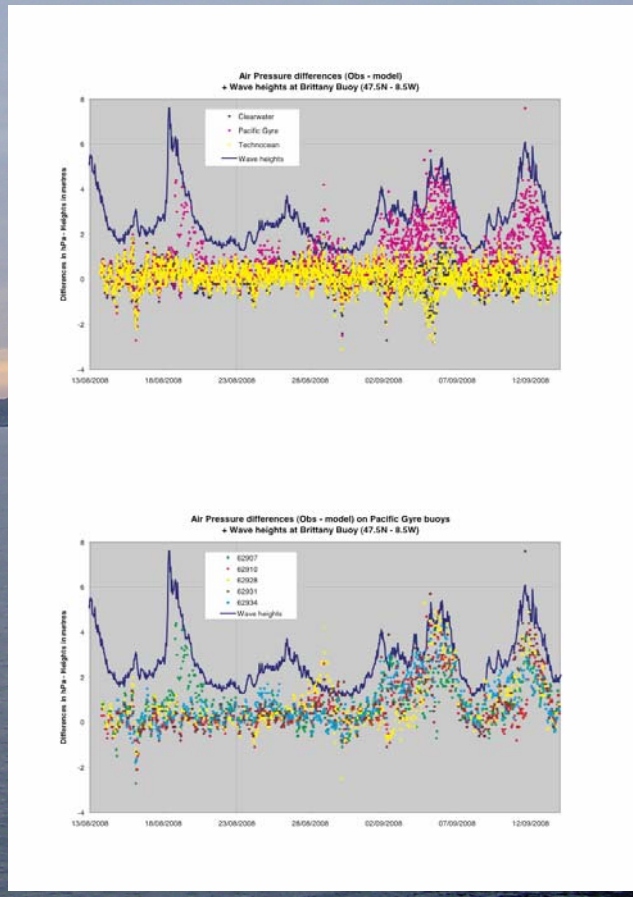
On 18 Sept., Technocean buoy 83325 was recovered . As anticipated, the buoy had lost it's drogue.

"According to the captain, the cable which links the buoy to the drogue is cut at 11.70 Metres… He also said that 3 bends appear at the end of it. The cable is bent at 90°."

Bay of Biscay Comparison Study

Preliminary Results Cont. (as of 25 Sept.)

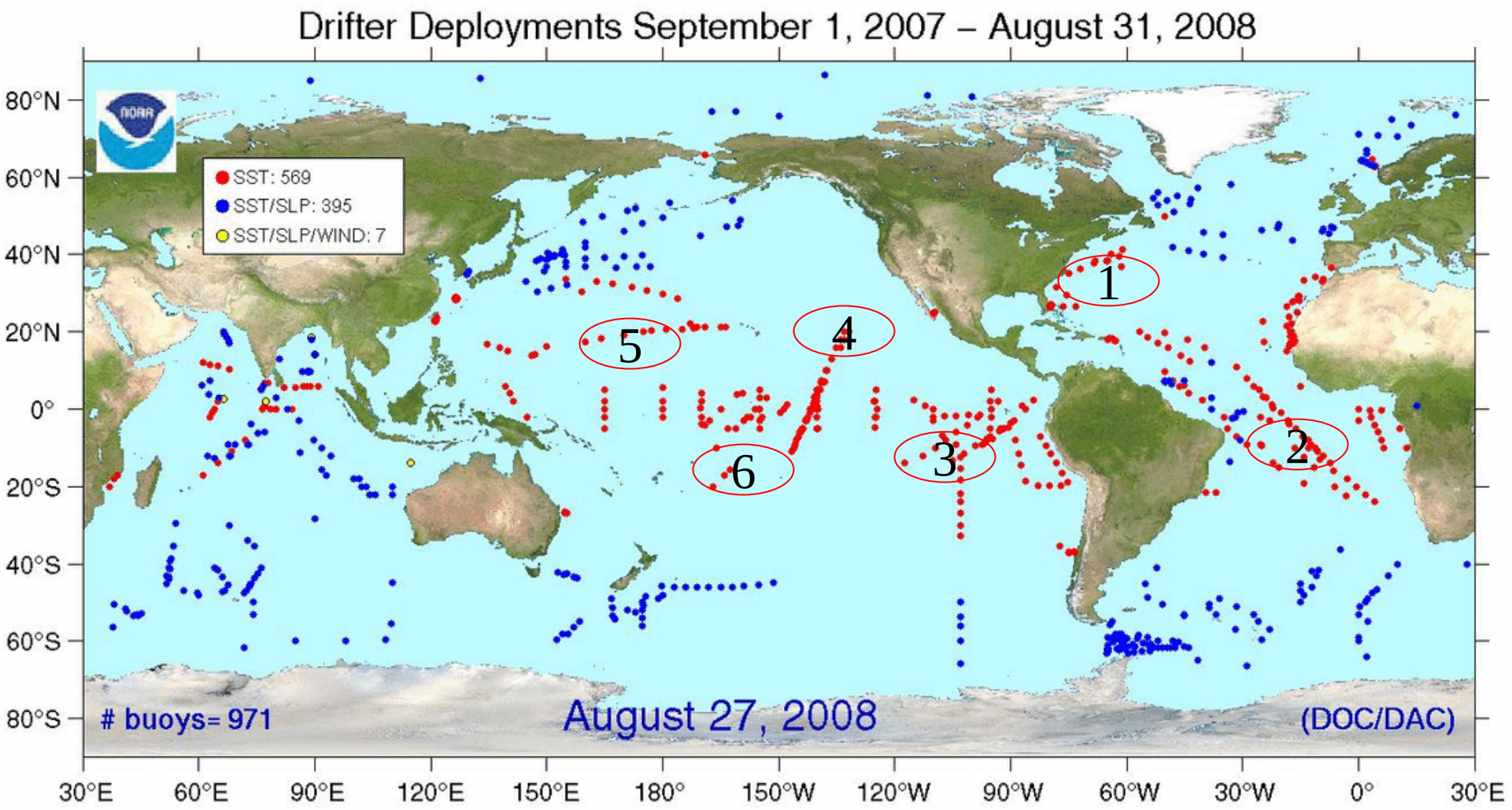
•“On the graph, you’ll see the differences of air pressure between the 15drifters and the model outputs. It clearly appears that the air pressure measurements carried out by Pacific Gyre buoys are less accurate than those of the two other manufacturers.”



•“The graph shows that all the buoys from Pacific Gyre are concerned. You’ll also see on both graph a strong relationship between overpressures from Pacific Gyre buoys and wave heights measured on a moored buoy in the area.”

• All 5 Pacific Gyre buoys have had air pressure transmissions removed from the GTS.

2009 ADB Comparison Study Deployment Locations



2009
ADB Comparison Study

- SVP drifters from 4 major buoy manufacturers will be selected at random and tested according to GDP standards.
- Buoy deployments will be made in oceans throughout the world.
- Various participants will handle and deploy buoys from each manufacturer.

Current Concerns

1. Difficulty in assessing drogue presence in some cases, even with tether strain

2. Variation in packaging (with regard to colored safety tape and instructions)

3. Some drifters are losing their drogues quickly (6 out of 25 ADB drifters lost drogues within 120 days; 4 of 5 Technocean drifters in Bay of Biscay study after less than one month)

Thank You!

The Global Drifter Program would like thank the many participants and partners who make these deployments and advancements possible. Your assistance is greatly appreciated and highly valued.