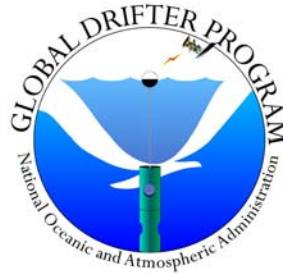


Argos-3 Pilot Project Drifter Comparison Study

Mayra Pazos

Rick Lumpkin



Drifter Data Assembly Center

NOAA/AOML/GDP

Miami, Florida

September 27-30, 2010, Oban, Scotland

Objectives

Background information:

During September-November 2009 a total of 23 Argos-3 drifters of various types were deployed in different oceans, and from three different manufacturers. All had strain gauge sensors to determine drogue loss except Marlin-Yug's drifters, which had submergence sensor.

- Evaluate the performance of each individual Argos-3 drifter :
Transmitter, drogue, Sea Surface Temperature, Sea Level Pressure, position accuracy ,based on number of transmissions of each quality index (q.i) :
Class 3: better than 250 m radius, Class 2: better than 500 m radius, Class 1: better than 1500 m radius
- Compare their number of fixes per day to other Argos-2 drifters in the same area, at the same time, regardless of buoy type.

Symbols:

* **Denotes Deployment position, ○ Indicates Drogue off**

Deployment Summary

Manufacturer

Number of Drifters

Clearwater

2 SVP-B-GPS, 2 SVP-B (1 failed on deployment)

Area: Equatorial Pacific and Mediterranean Sea

The GPS had problems and not many GPS fixes were received

Pacific Gyre

10 SVP (2 failed on deployment)

Area: 7 North Atlantic, 3 Southern Oceans

Marlin-Yug

2 SVP-B

Area: Black Sea

Metocean:

2 SVP, 5 SVP-B

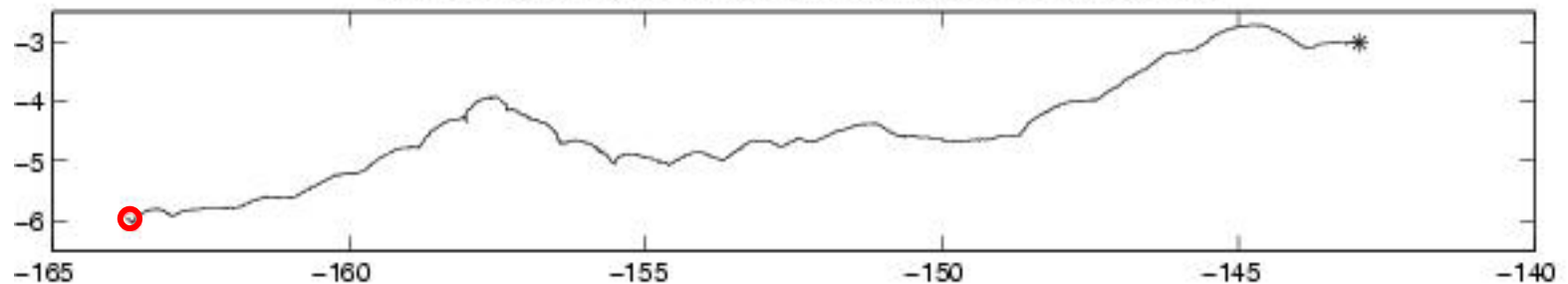
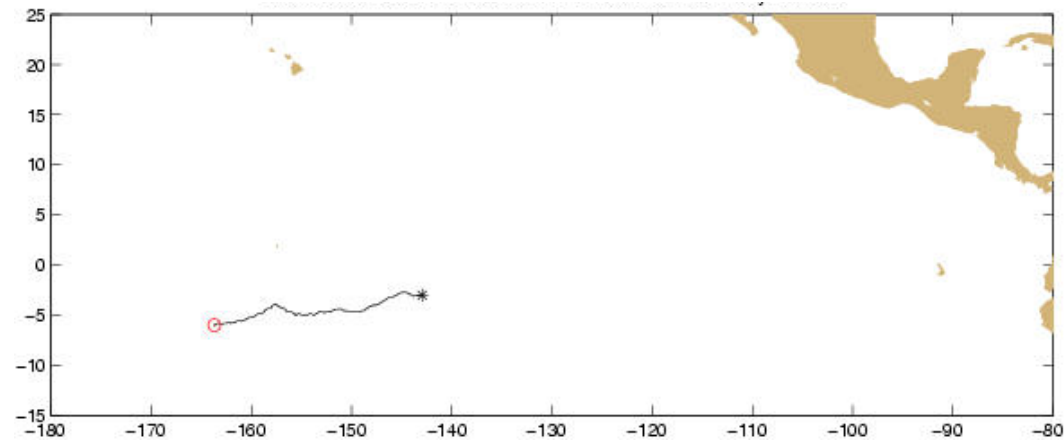
Area: South Atlantic and Tasman Sea

These are not included in the study, because all seven stopped sending sensor data after 2 weeks. A problem with the controller was found. Transmitter worked and produced Argos fixes.

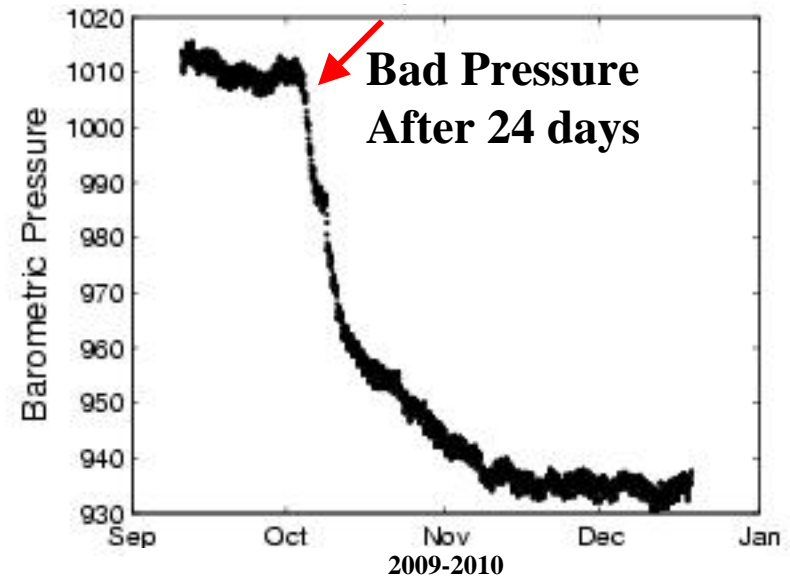
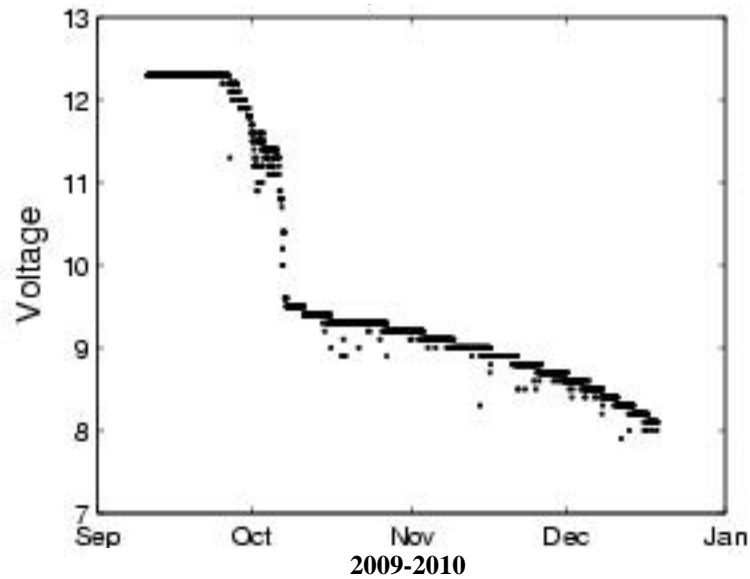
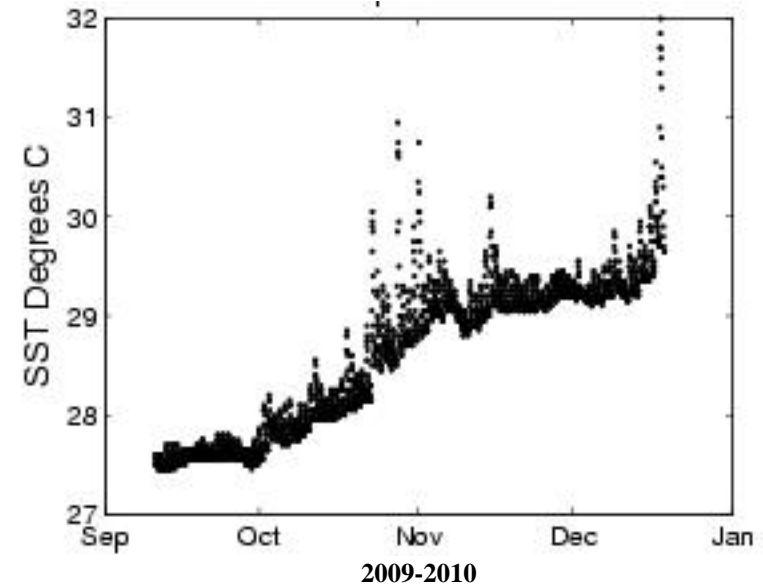
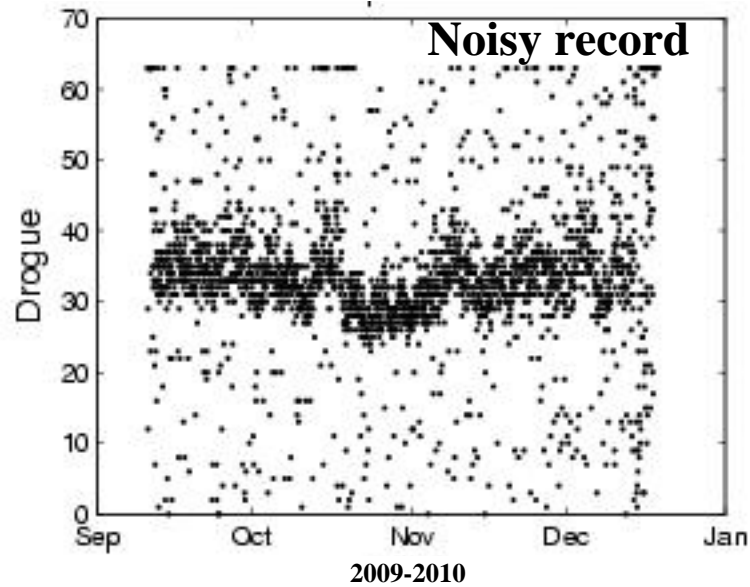
Drifter 82223, Clearwater, SVP-B

September 10, 2009 – December 18, 2009

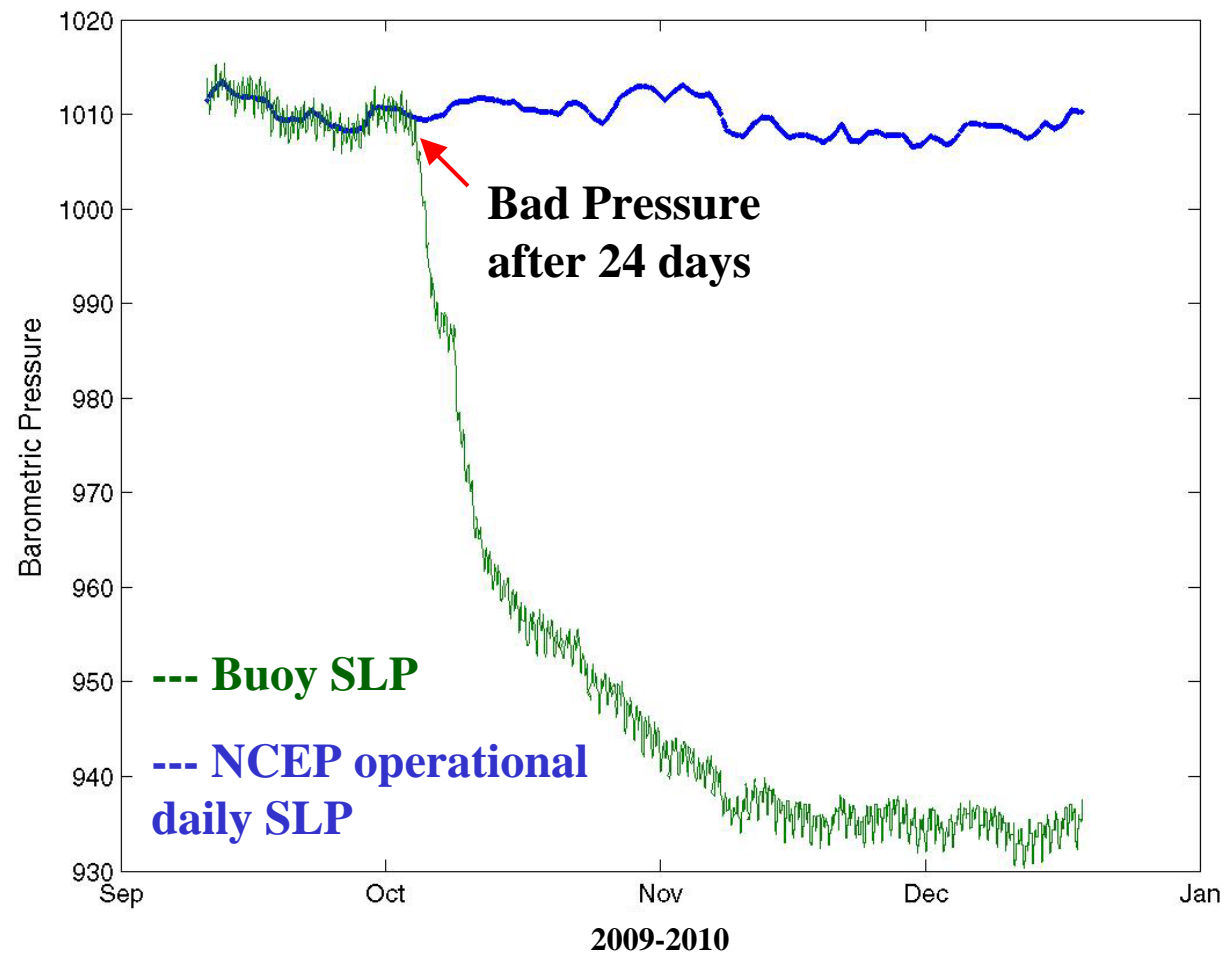
Number of Days Alive: **99**, Number of Days Drogue on: **99**



Drifter 82223: Sensors



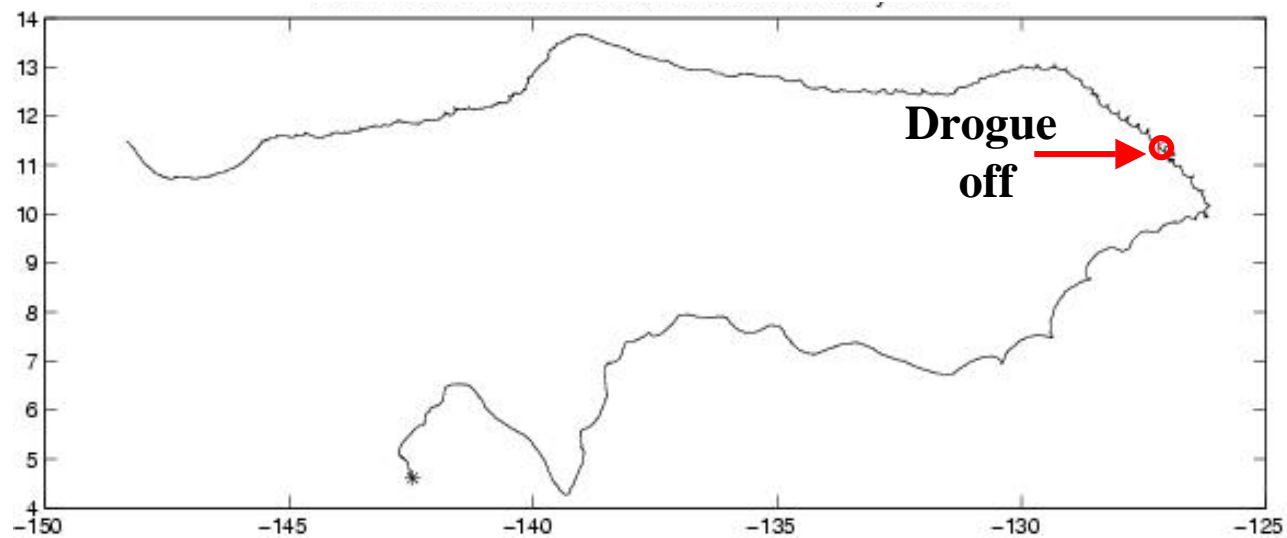
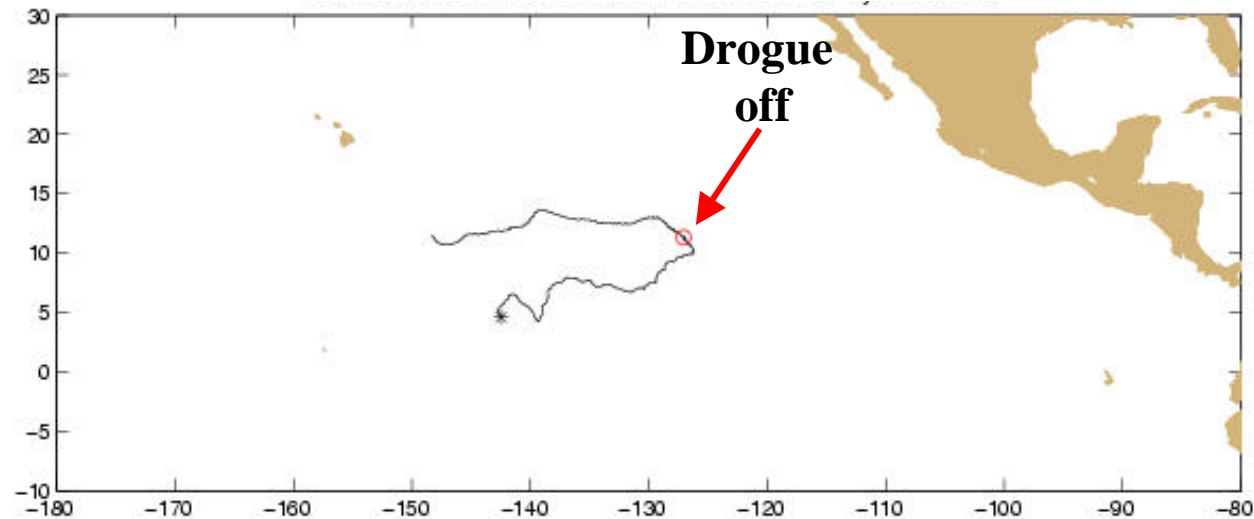
Drifter 82223



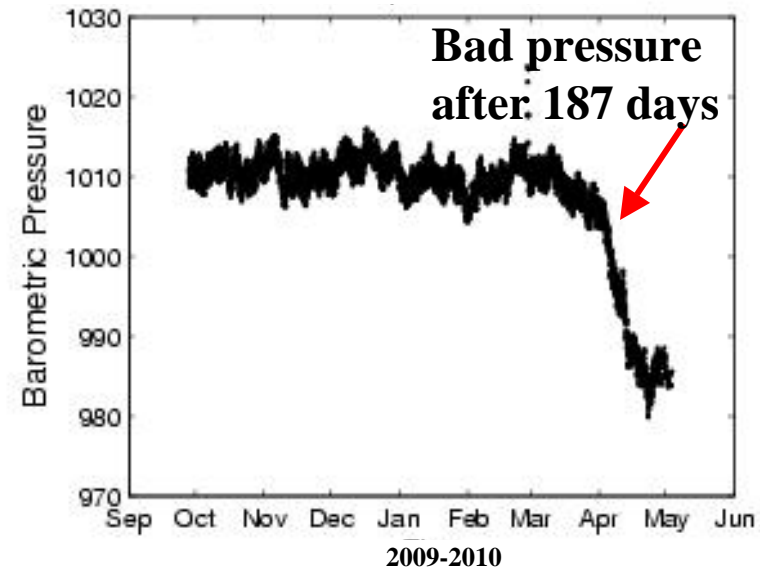
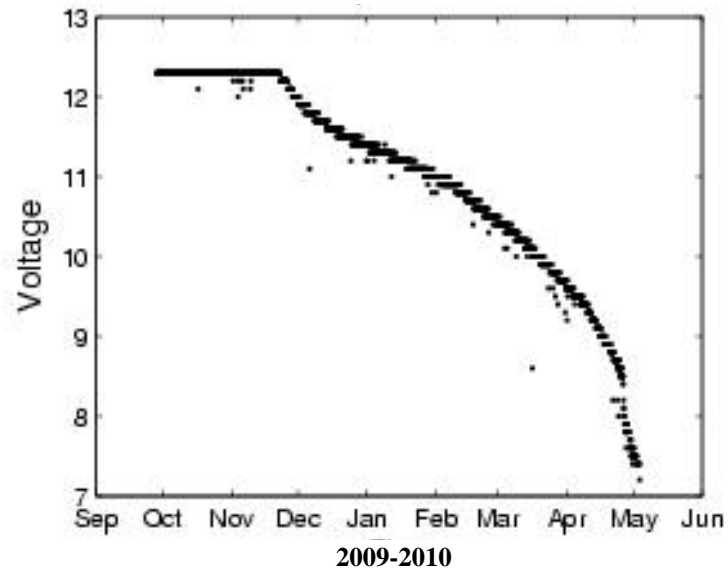
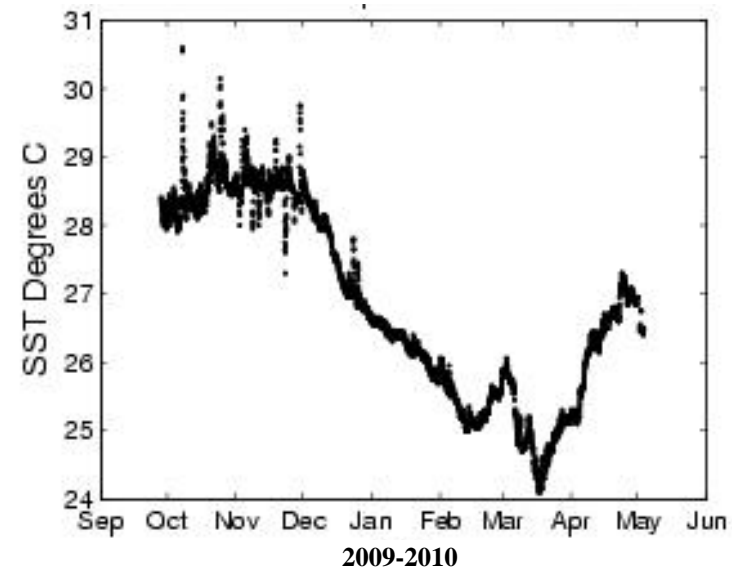
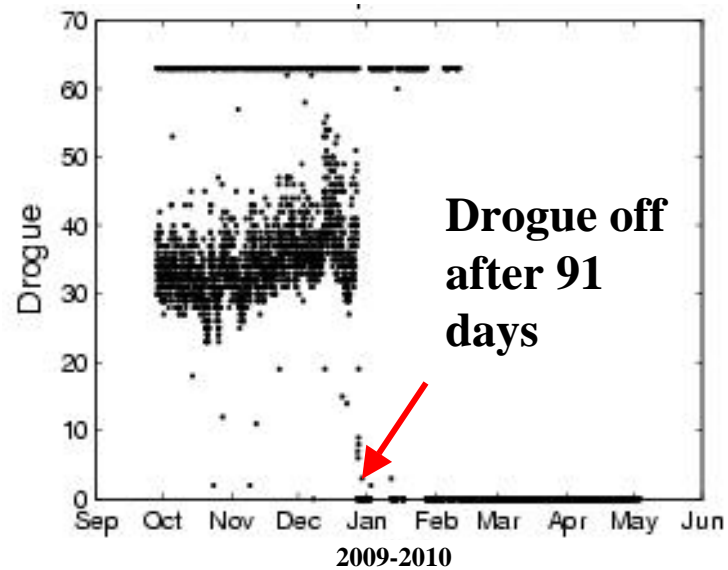
Drifter 82226, Clearwater, SVP-B-GPS

September 28, 2009 – May 3, 2010

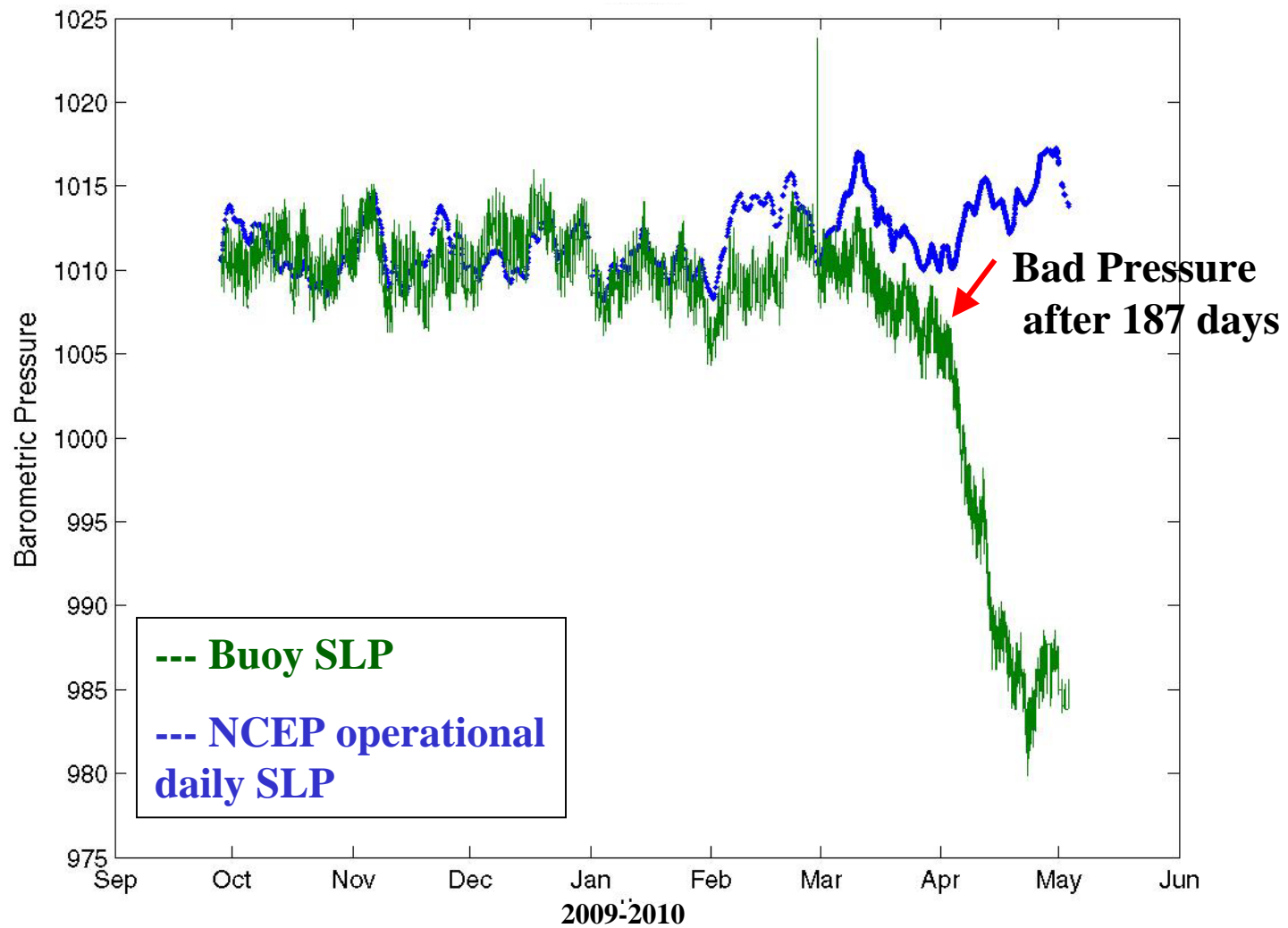
Number of Days Alive: **218**, Number of Days Drogue on: **91**



Drifter 82226: Sensors



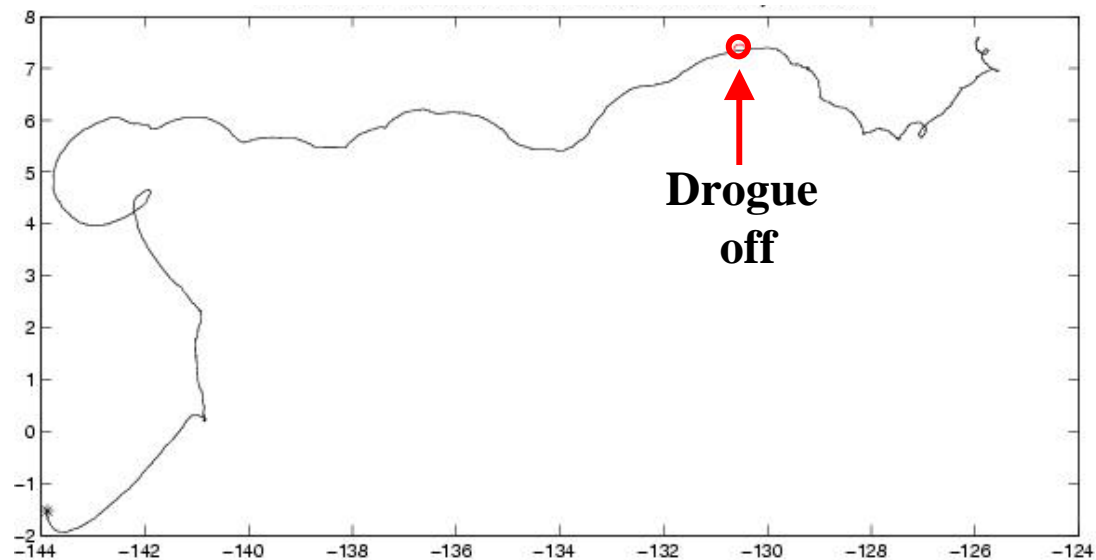
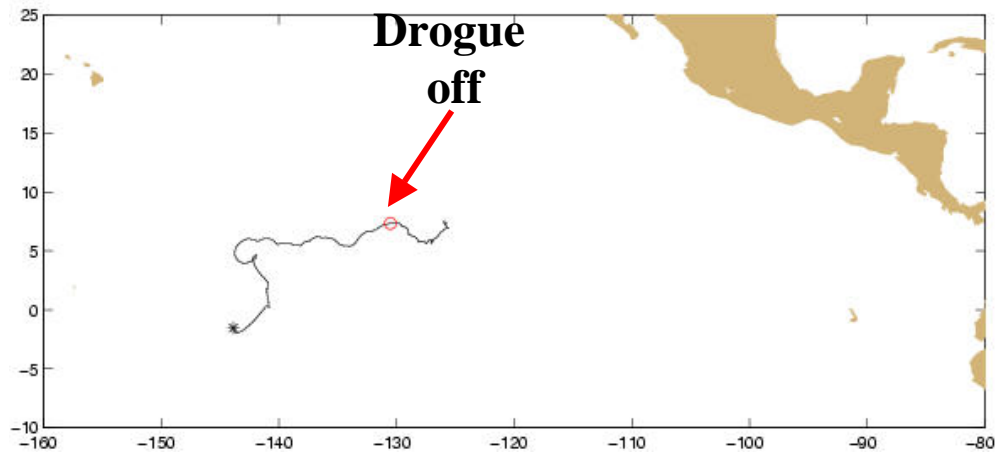
Drifter 82226



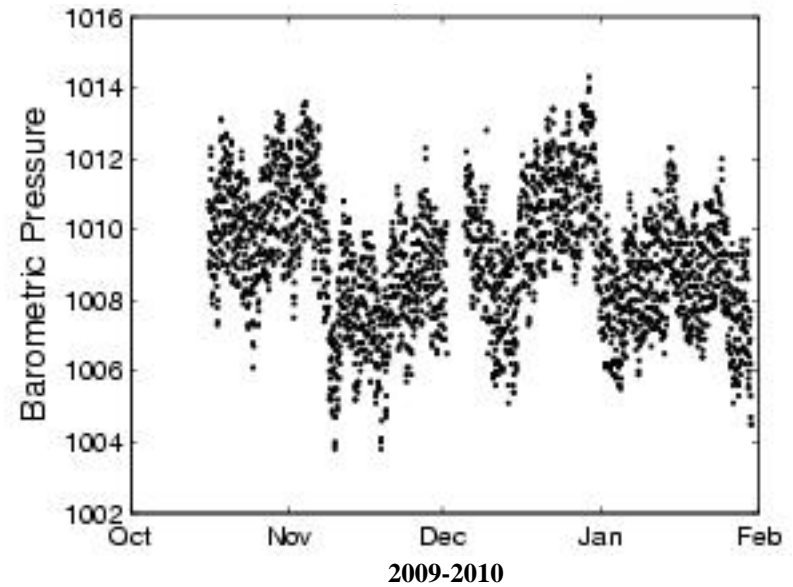
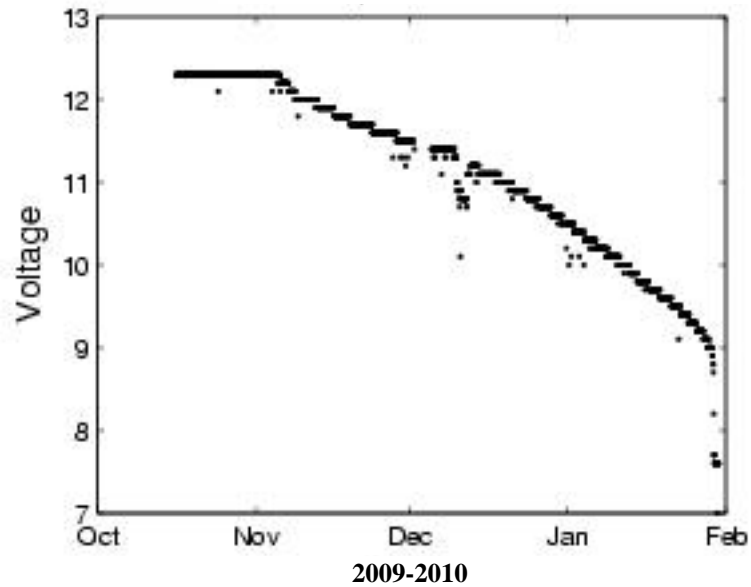
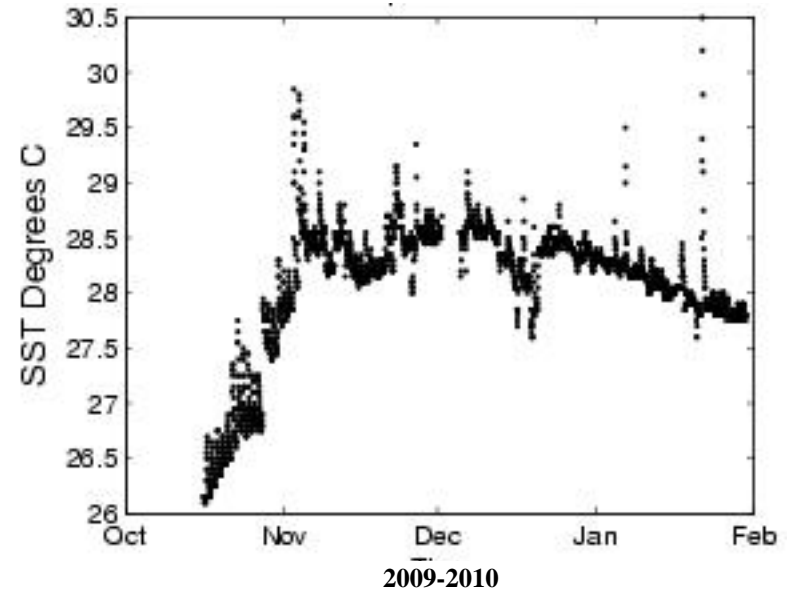
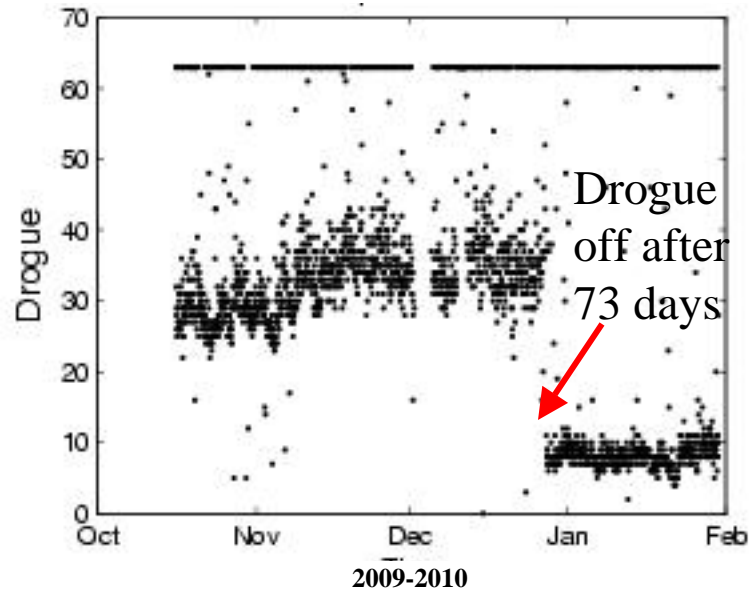
Drifter 82227, Clearwater, SVP-B-GPS

October 16, 2009 – January 30, 2010

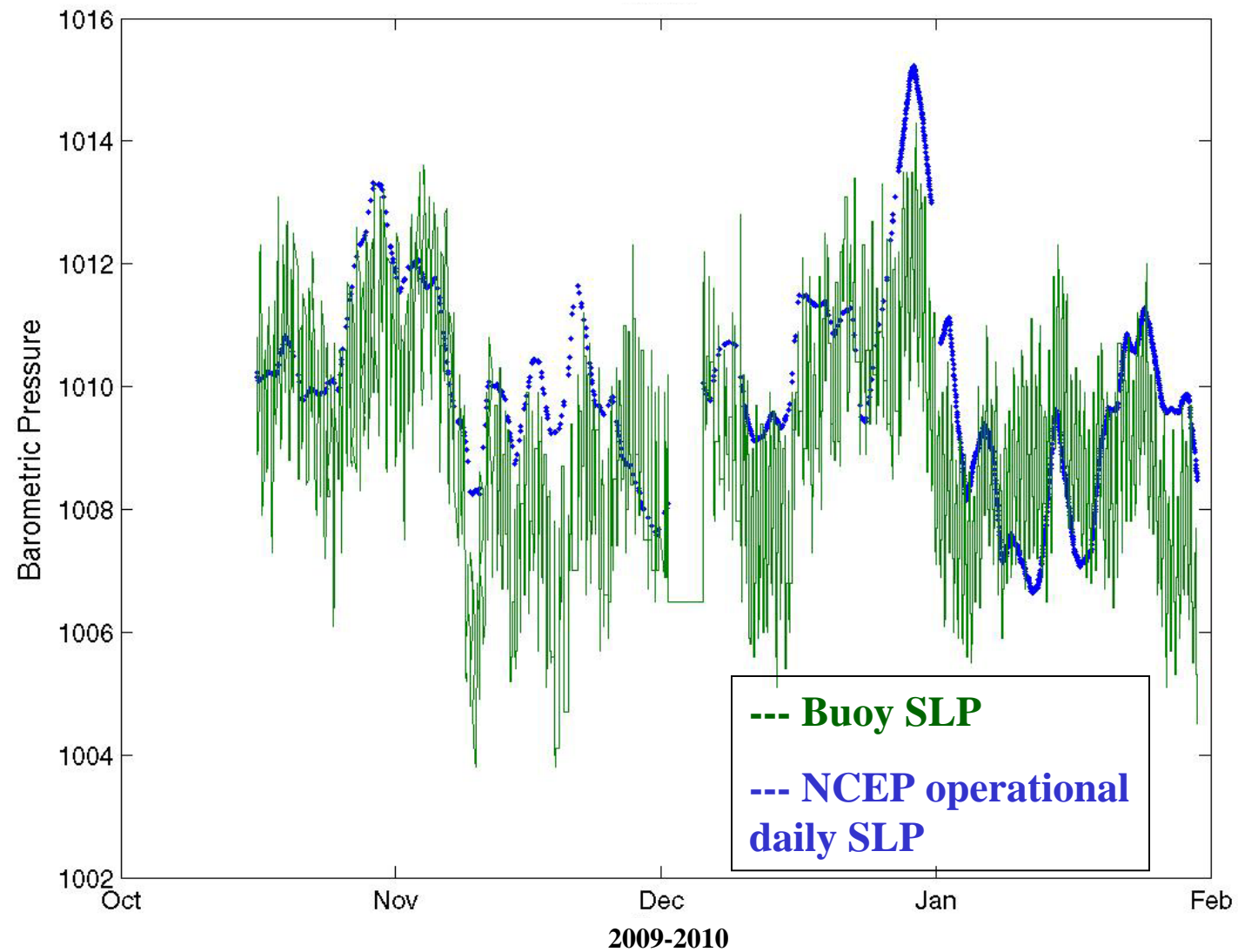
Number of Days Alive: **106**, Number of Days Drogue on: **73**



Drifter 82227: Sensors



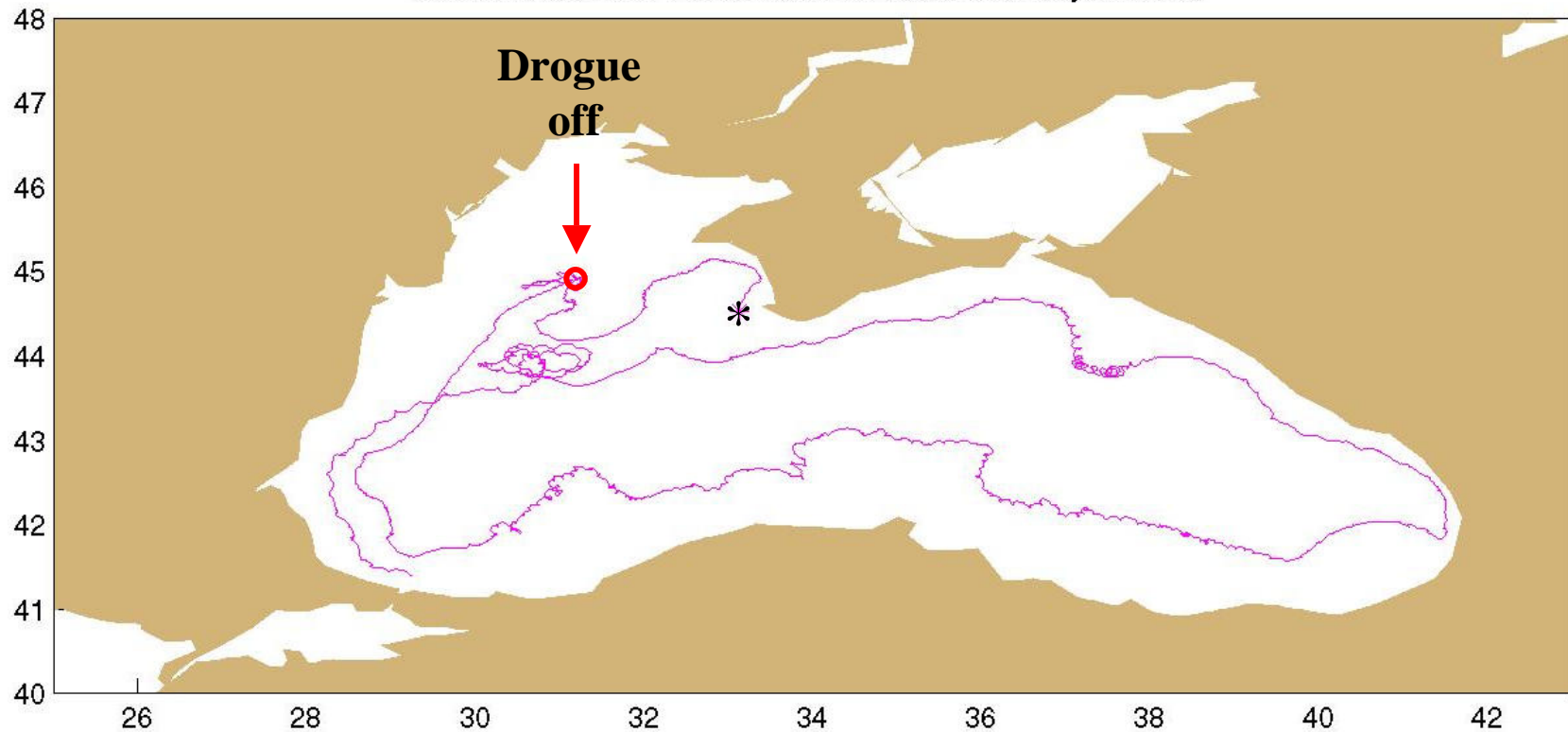
Drifter 82227



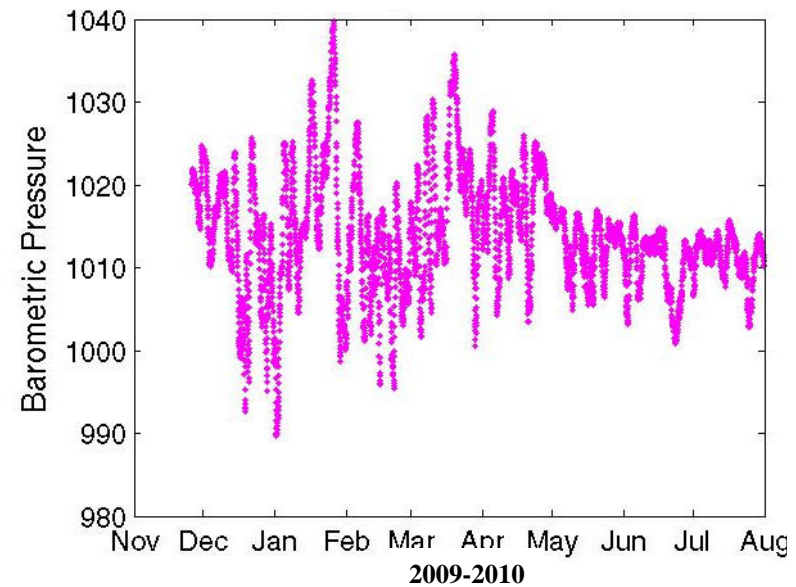
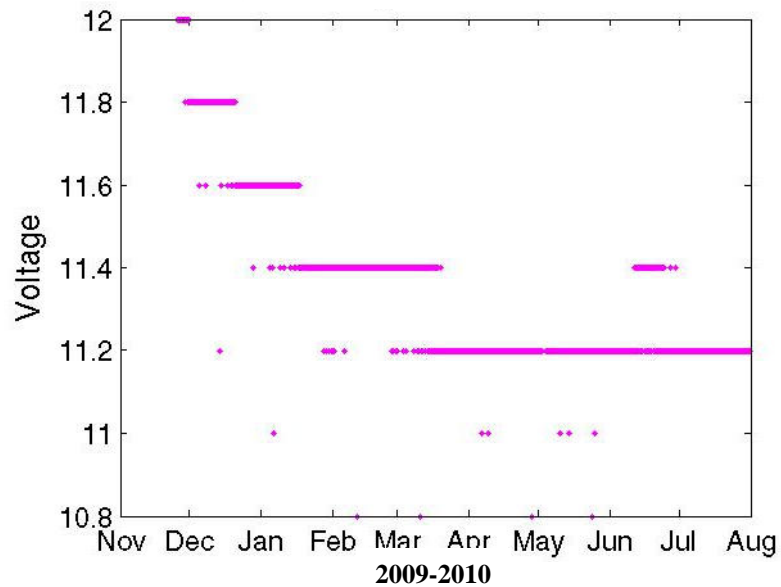
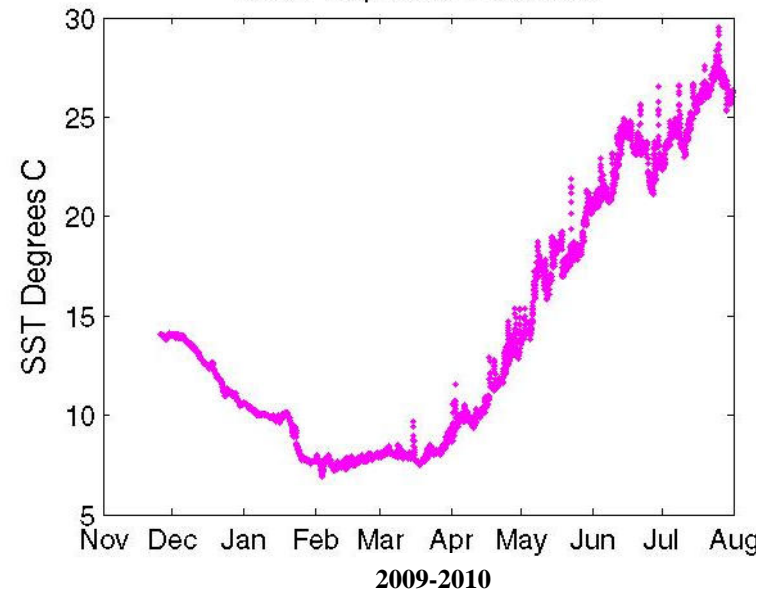
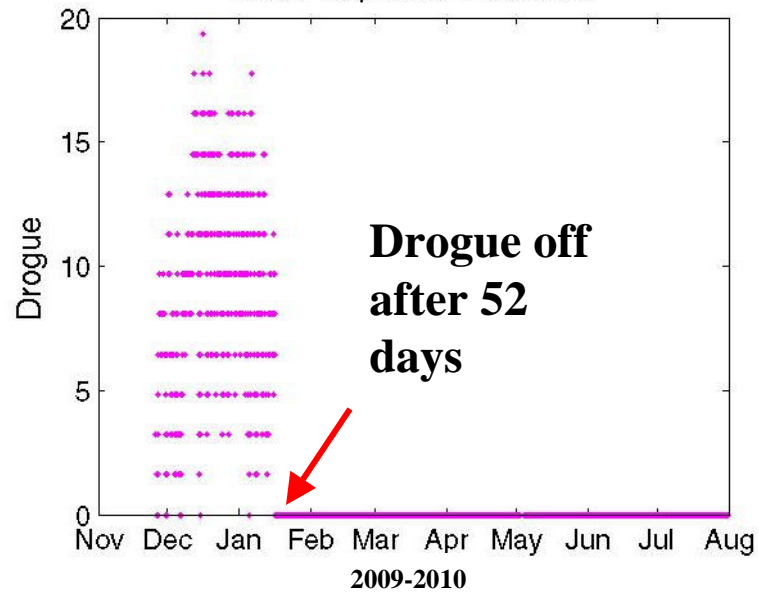
Drifter 82534, Marlin-Yug, SVP-B

November 26, 2009 – **Alive** as of July 31, 2010

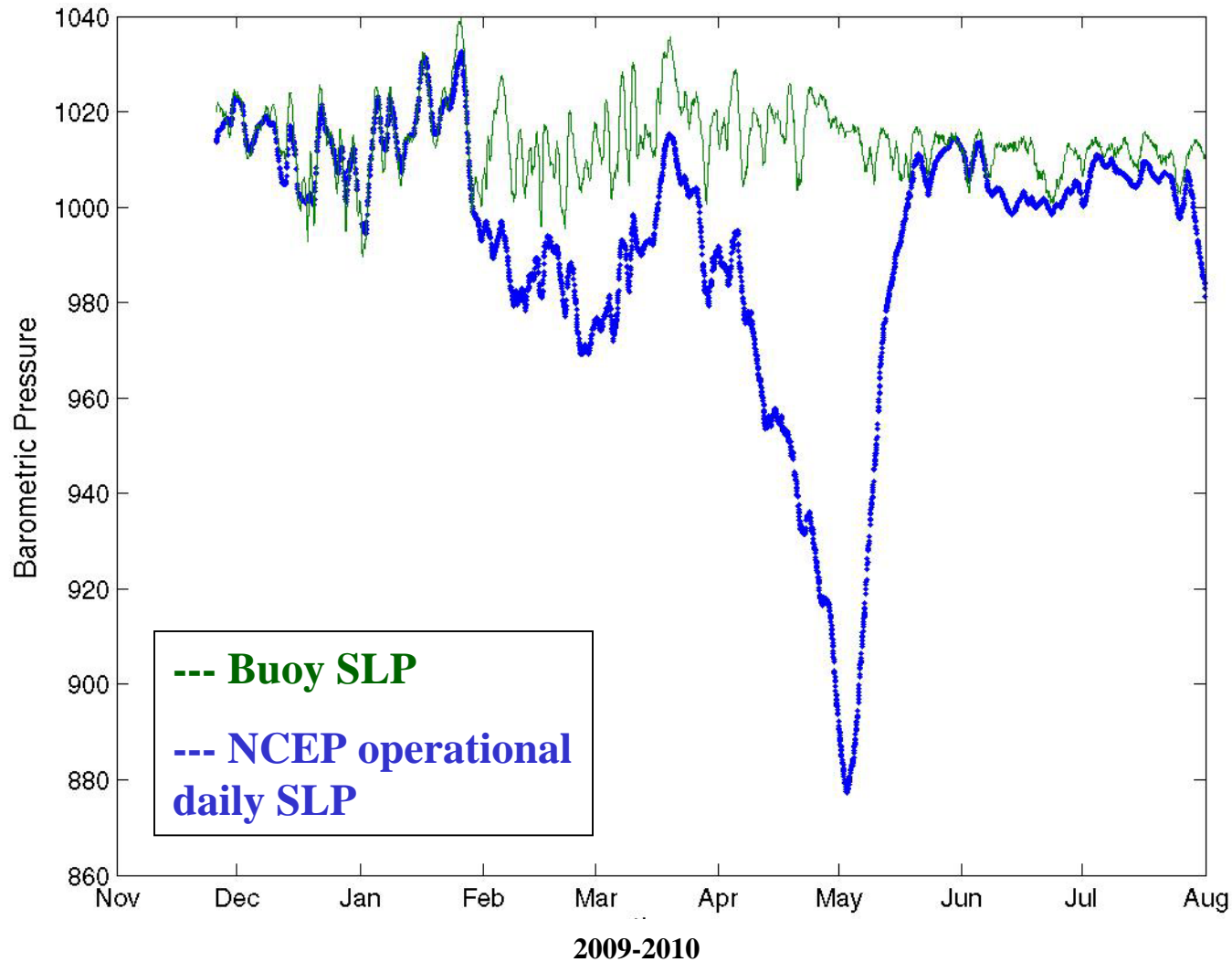
Number of Days Alive: **248+**, Number of Days Drogue on: **52**



Drifter 82534: Sensors



Drifter 82534

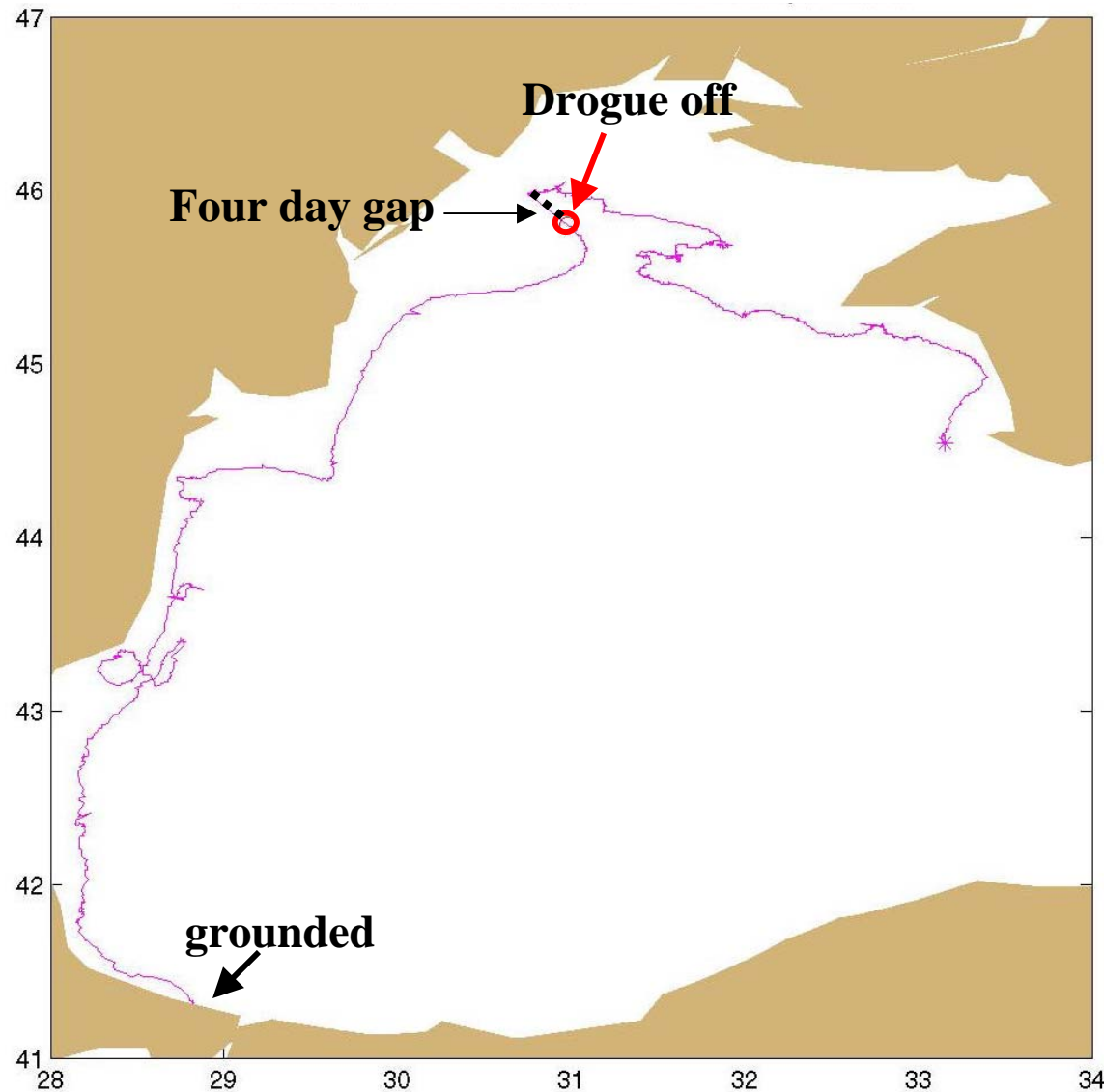


Note: Large differences in early May 2010

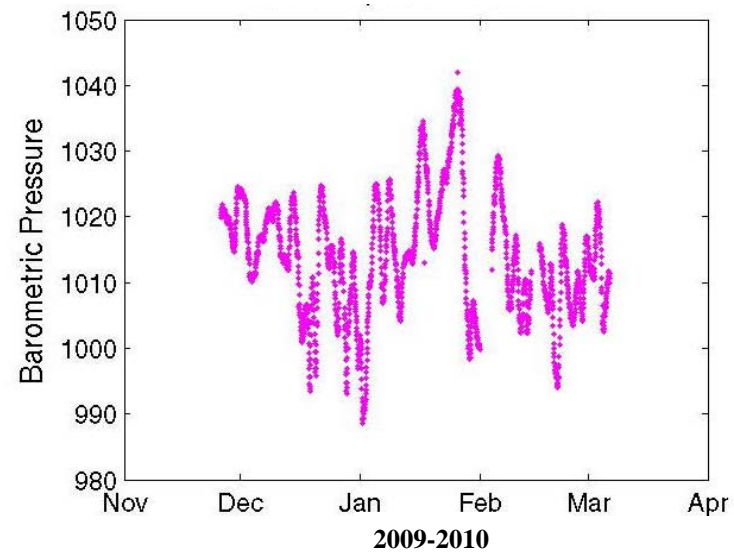
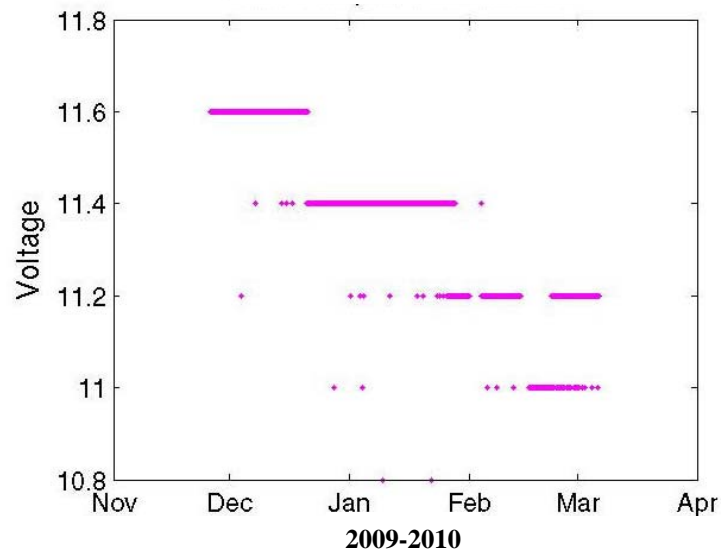
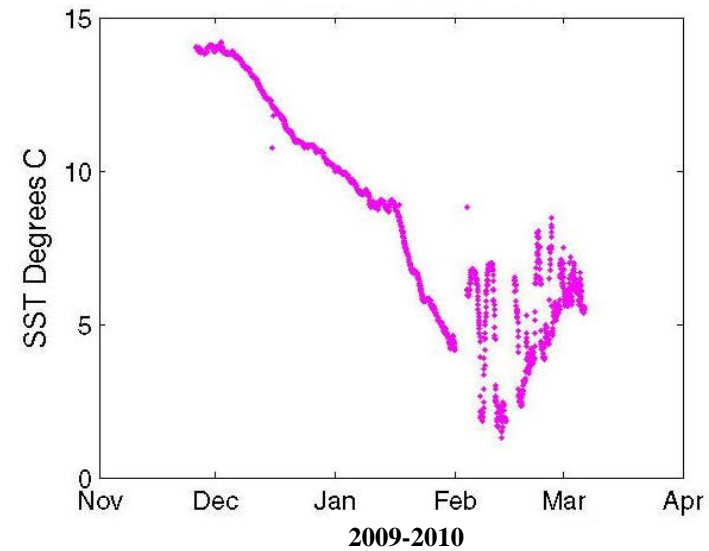
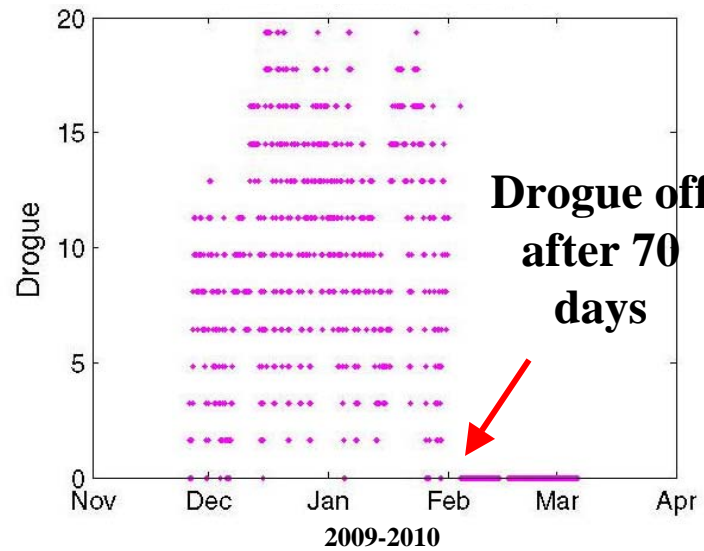
Drifter 82537, Marlin-Yug, SVP-B

November 26, 2009 – March 6, 2010

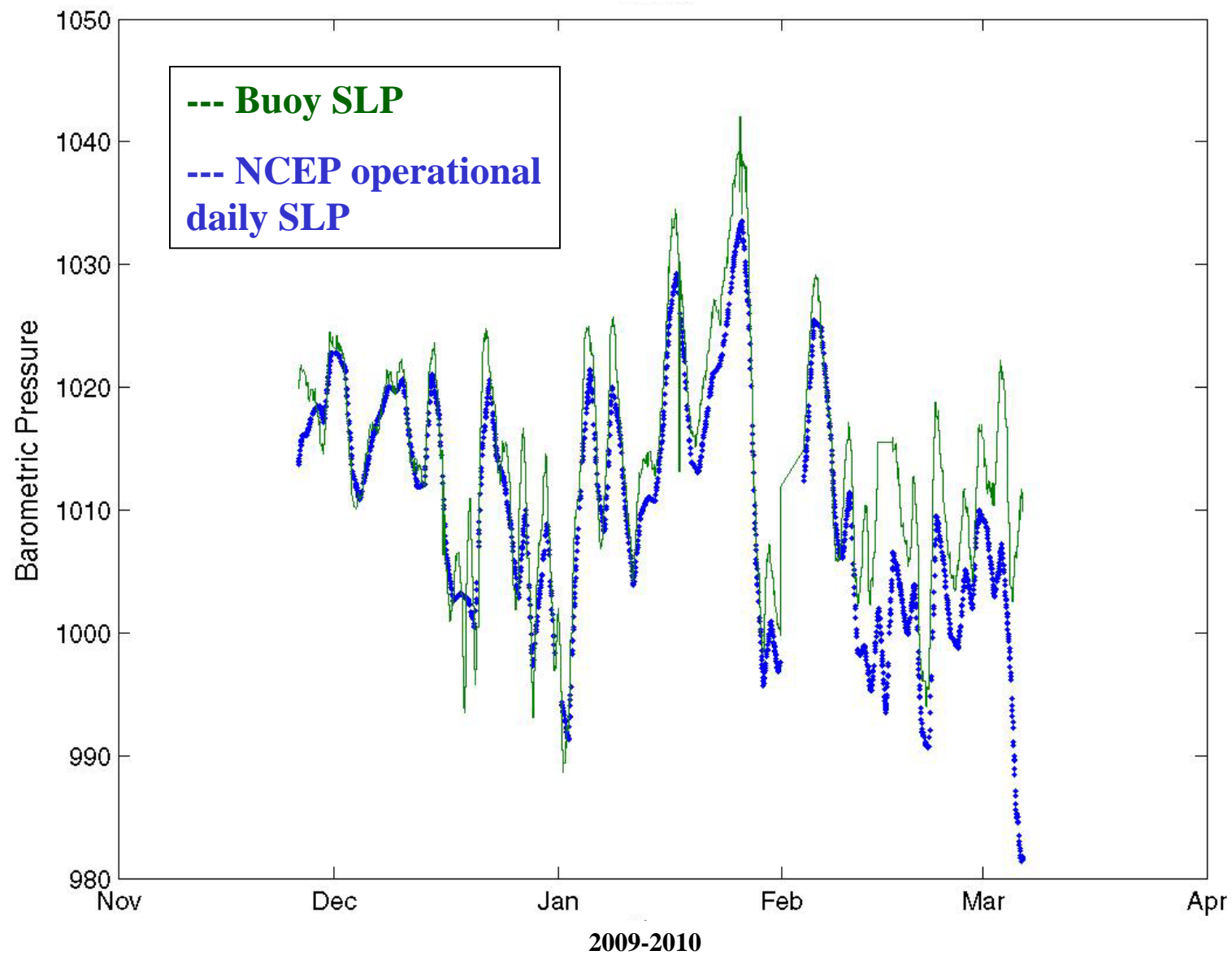
Number of Days Alive: **100**, Number of Days Drogue on: **70**



Drifter 82537: Sensors



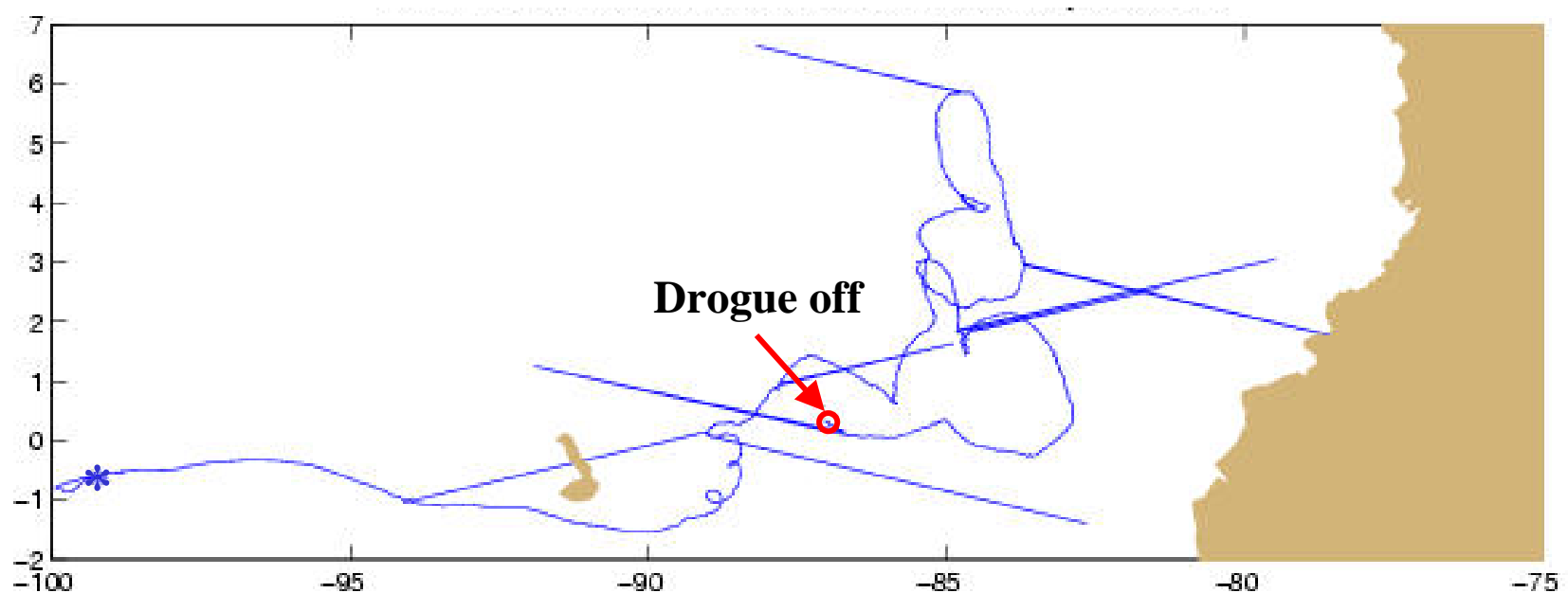
Drifter 82537



Drifter 82234, Pacific Gyre, SVP

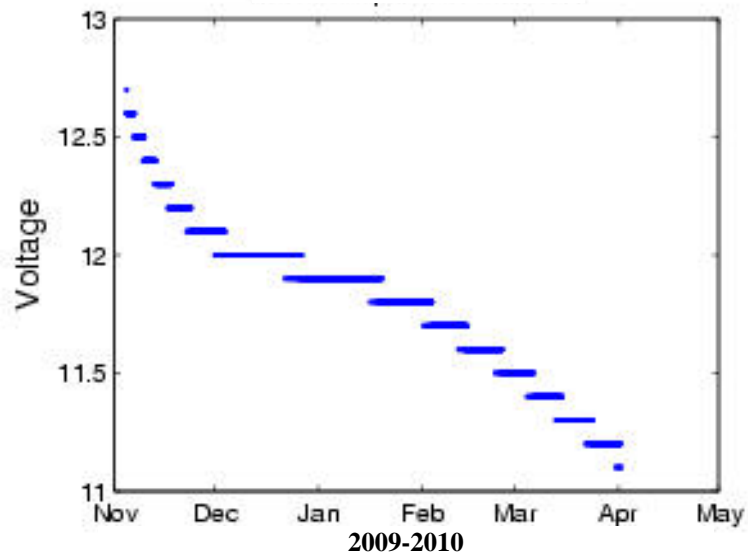
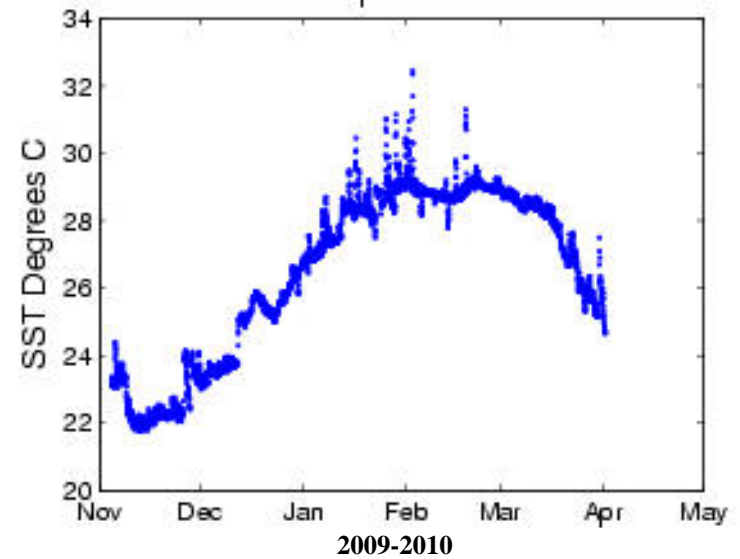
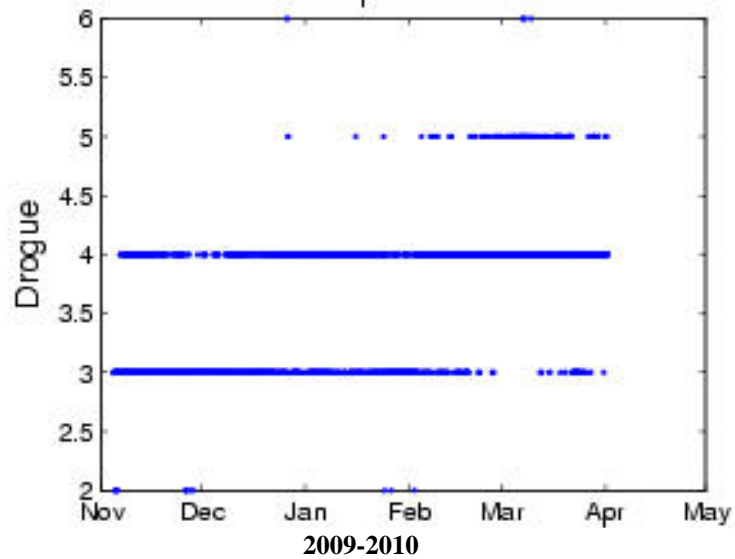
November 4, 2009 – April 1, 2010

Number of Days Alive: **148**, Number of Days Drogue on: **148**



Many erroneous fixes

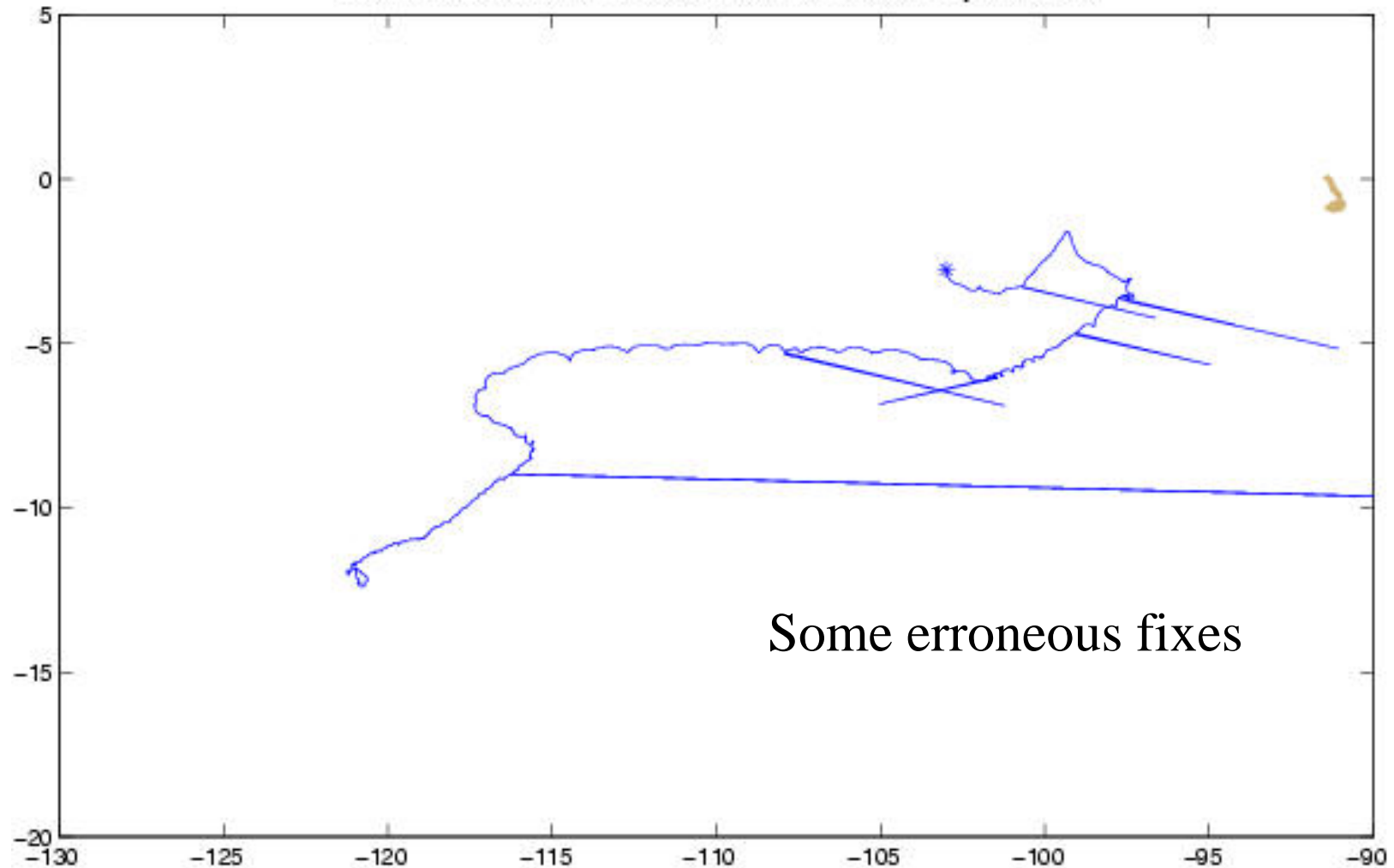
Drifter 82234: Sensors



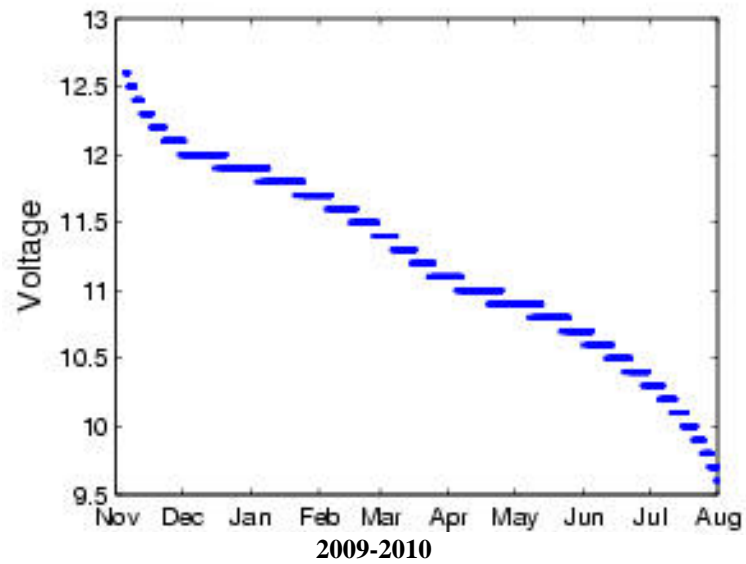
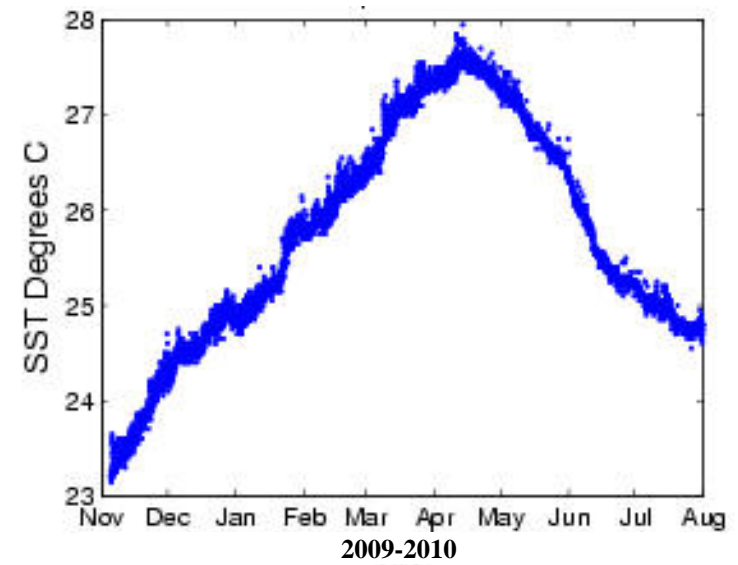
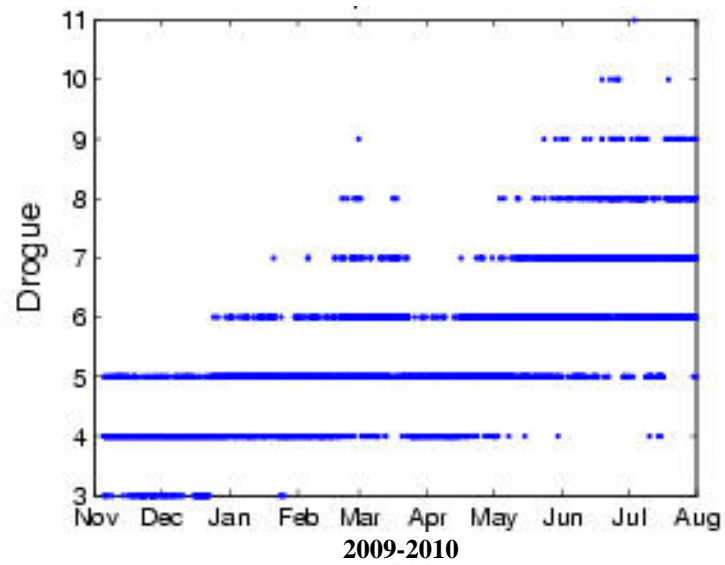
Drifter 82235, Pacific Gyre, SVP

November 5, 2009 **Alive** as of July 31, 2010

Number of Days Alive: **269+**, Number of Days Drogue on: **269+**
(Alive with Drogue on)



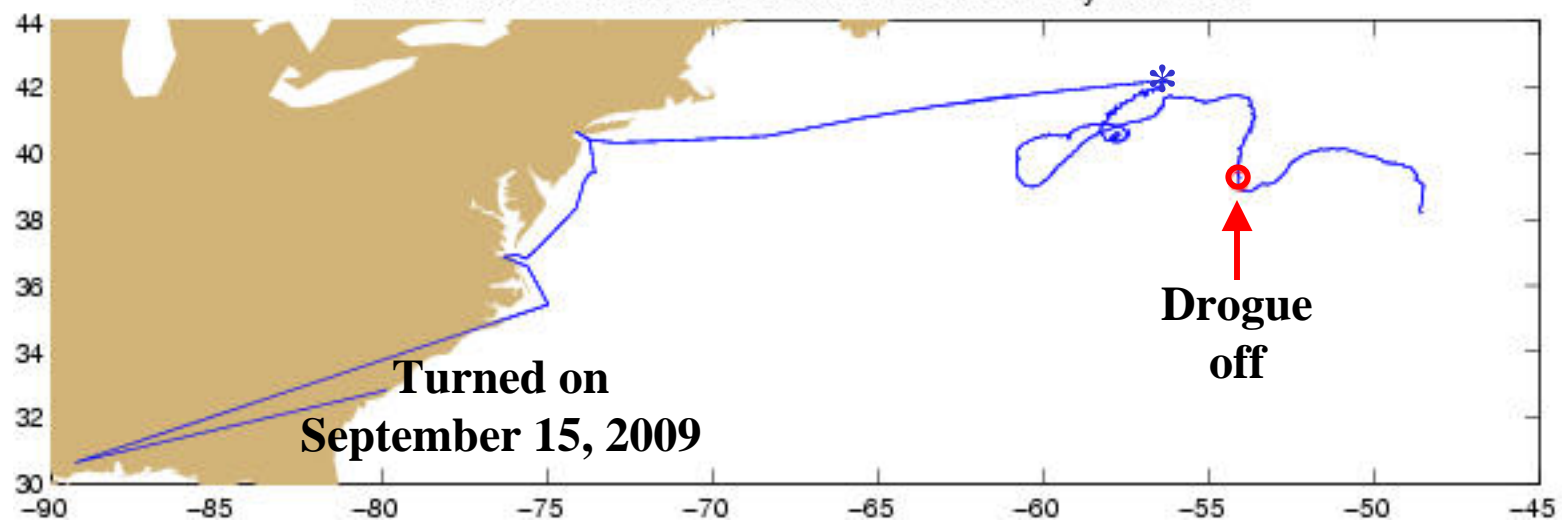
Drifter 82235: Sensors



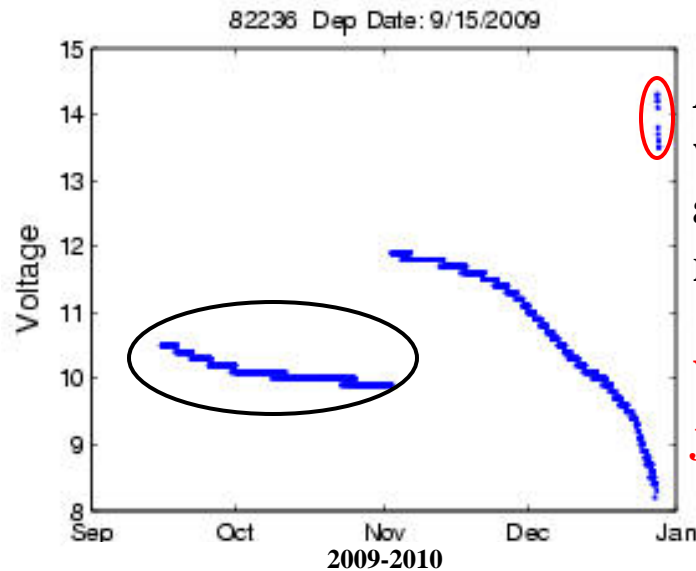
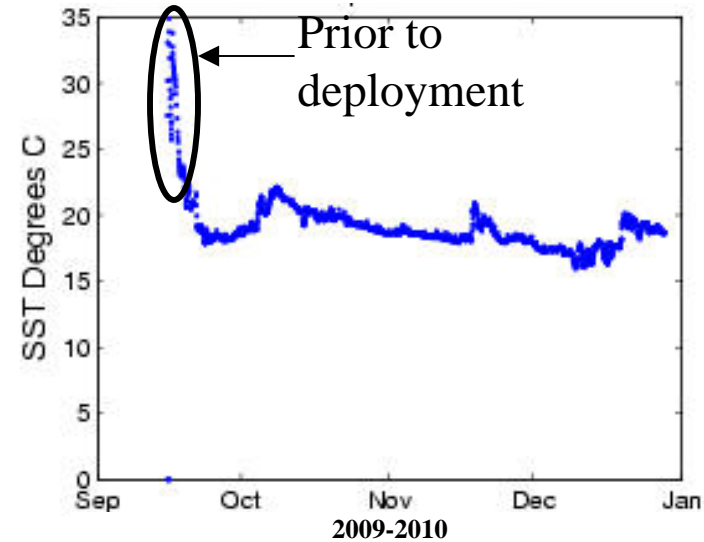
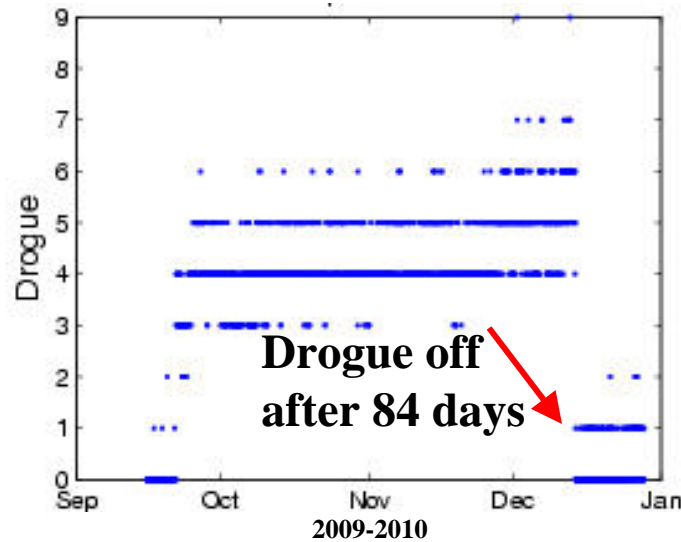
Drifter 82236, Pacific Gyre, SVP

September 21, 2009 – December 28, 2010

Number of Days Alive: **98**, Number of Days Drogue on: **84**



Drifter 82236: Sensors



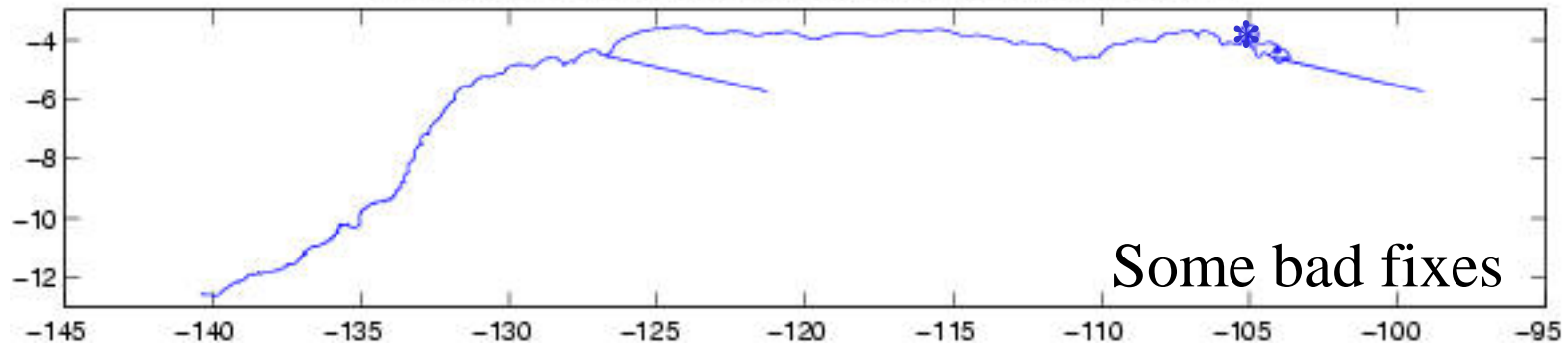
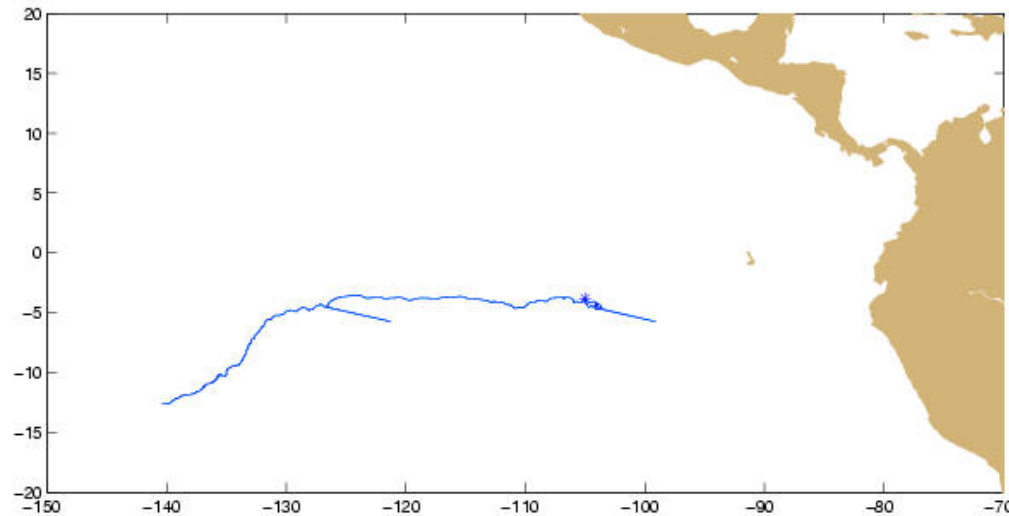
A correction to the voltage coefficient was received from the manufacturer after Nov. 1. Data needs to be reprocessed prior to Nov 1.

When voltage drops to 8, it then suddenly jumps to 14.3 volts

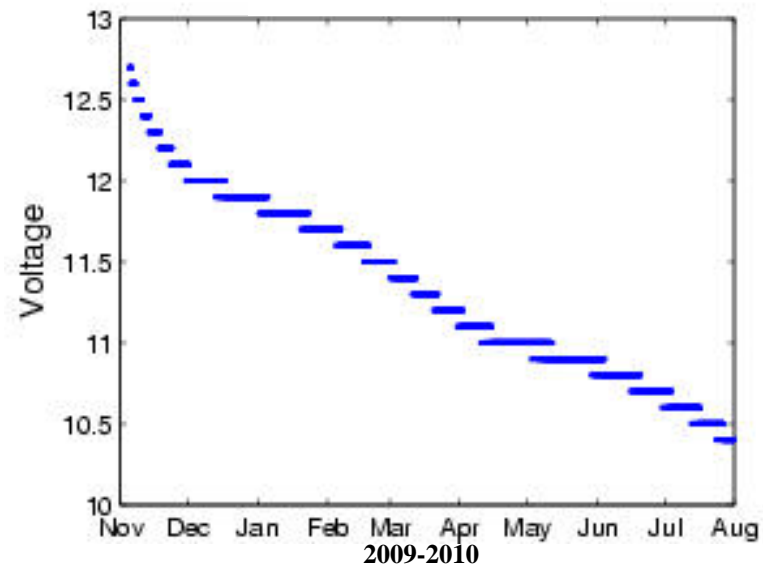
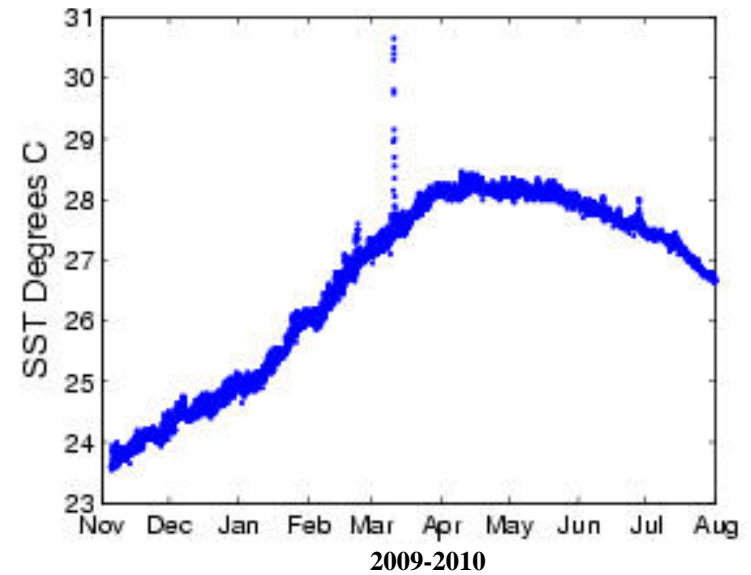
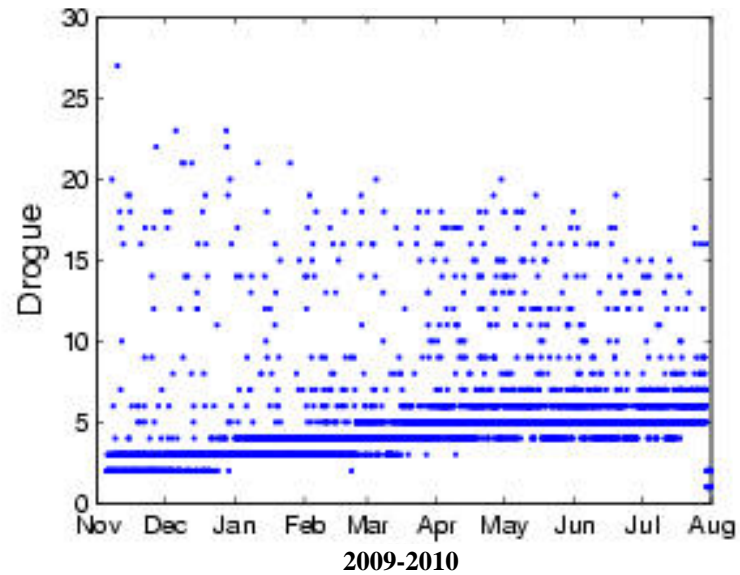
Drifter 82237, Pacific Gyre, SVP

November 5, 2009 – **Alive** as of July 31, 2010

Number of Days Alive: **269+**, Number of Days Drogue on: **269+**
Alive and Drogue on



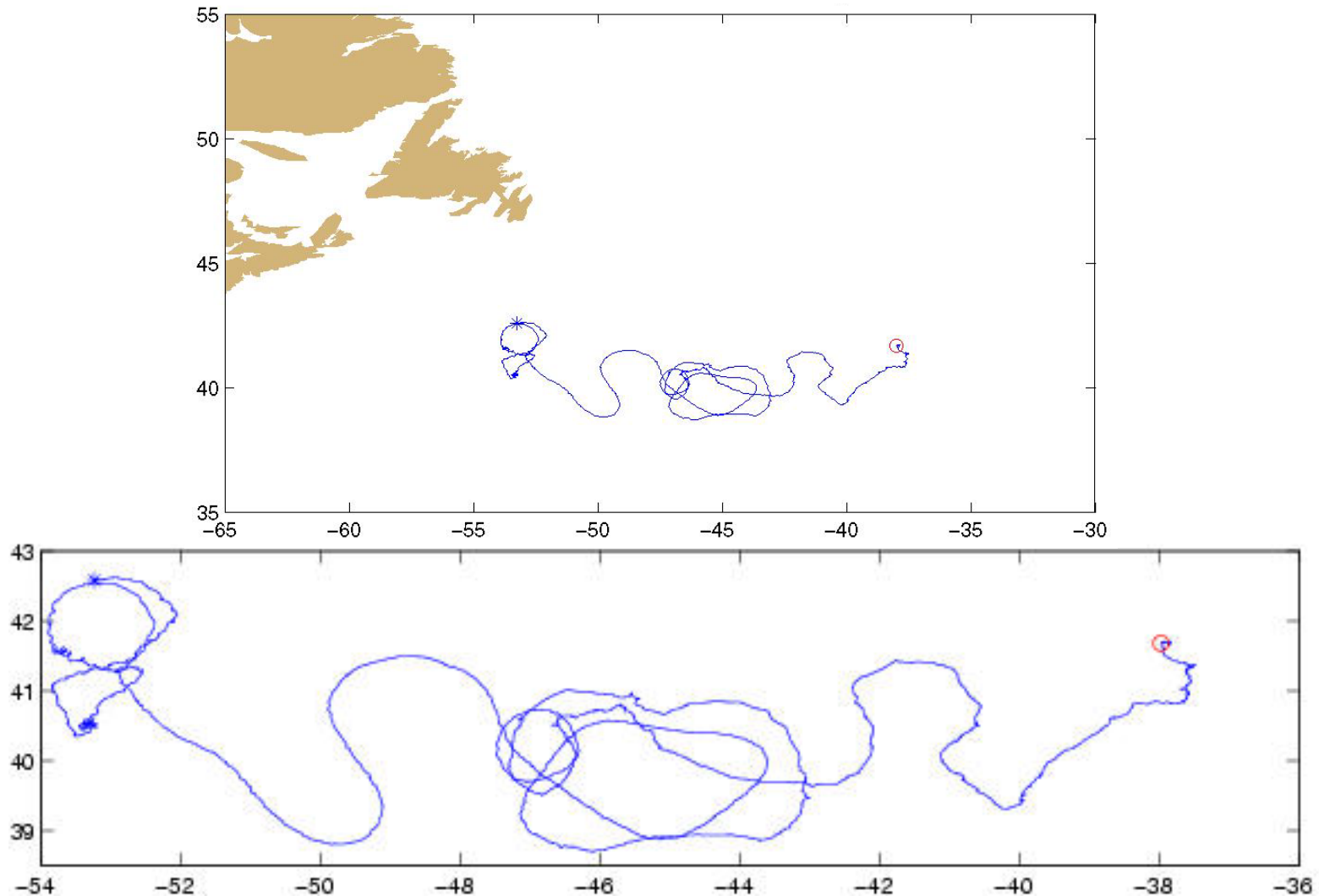
Drifter 82237: Sensors



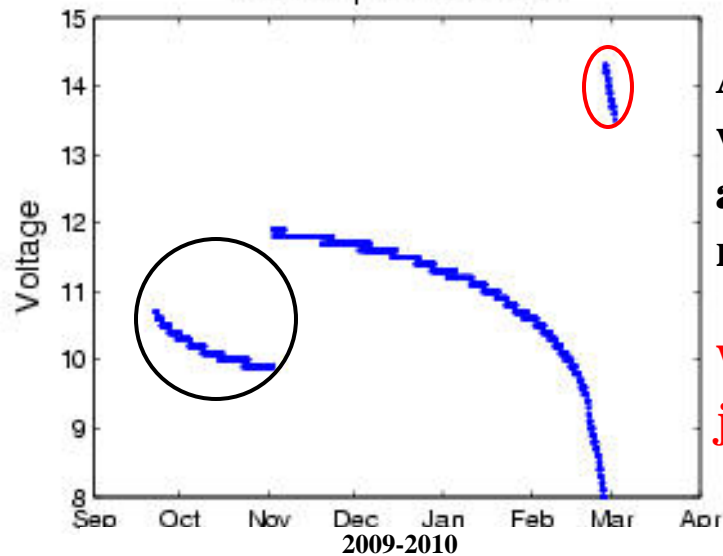
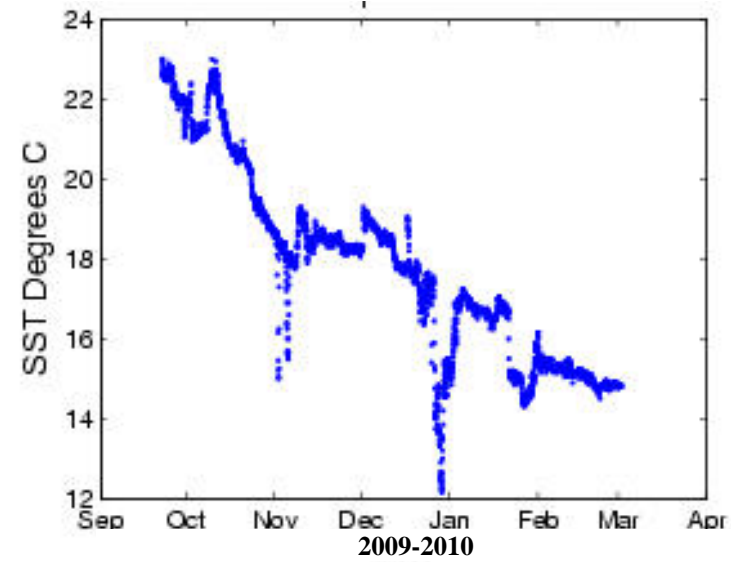
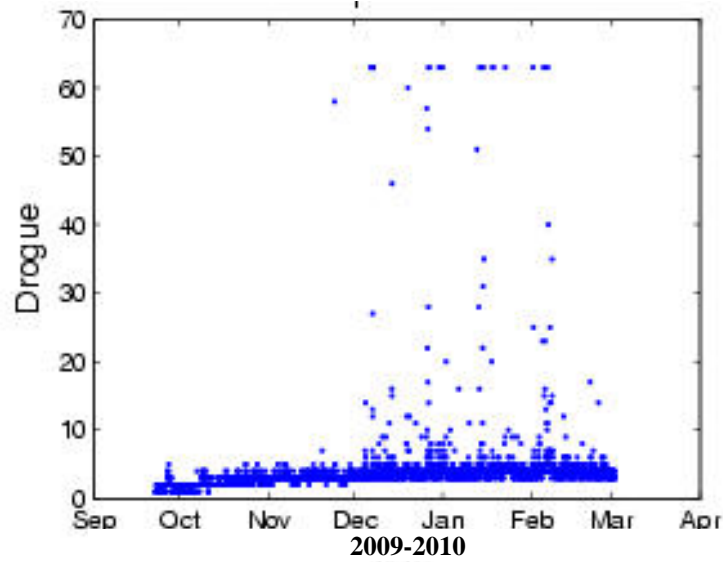
Drifter 82240, Pacific Gyre, SVP

September 22, 2009 – March 2, 2010

Number of Days Alive: **161**, Number of Days Drogue on: **161**



Drifter 82240: Sensors



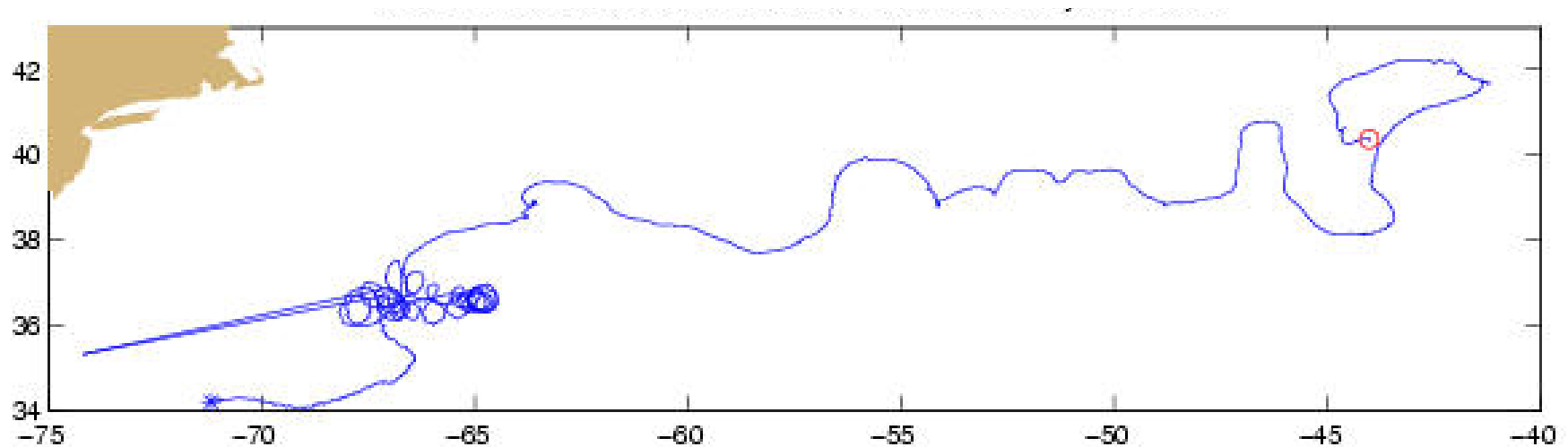
A correction to the voltage coefficient was received from the manufacturer after Nov. 1 . Data needs to be reprocessed prior to Nov 1.

When voltage drops to 8, it then suddenly jumps to 14.3 volts

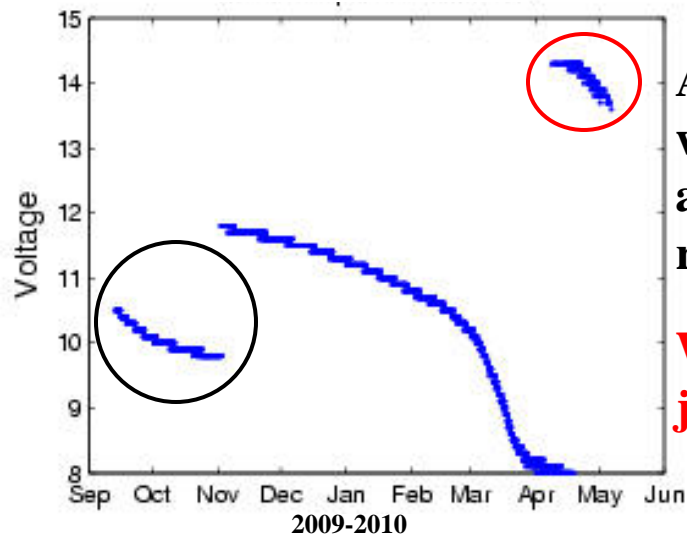
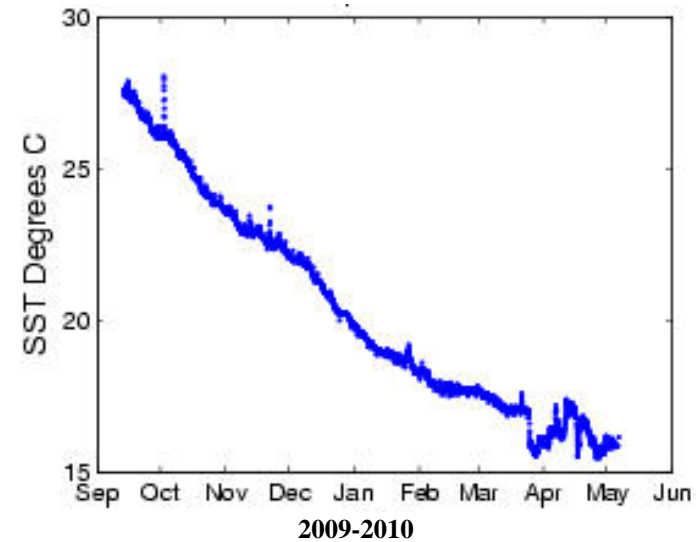
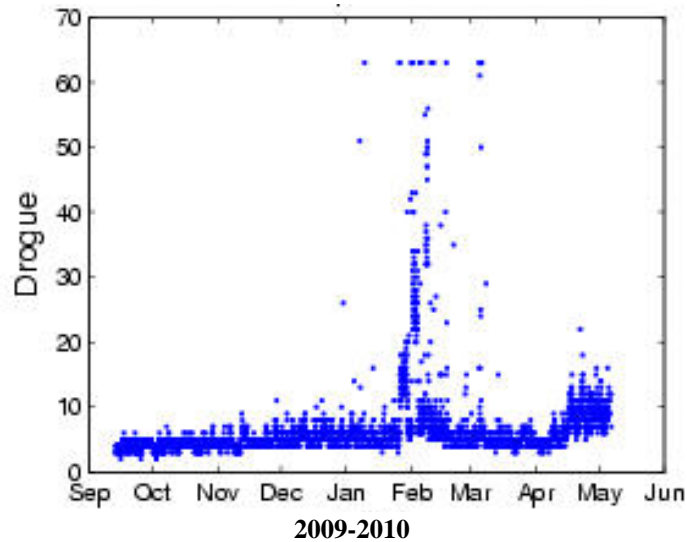
Drifter 82242, Pacific Gyre, SVP

September 13, 2009 – May 6, 2010

Number of Days Alive: **235**, Number of Days Drogue on: **235**



Drifter 82242: Sensors



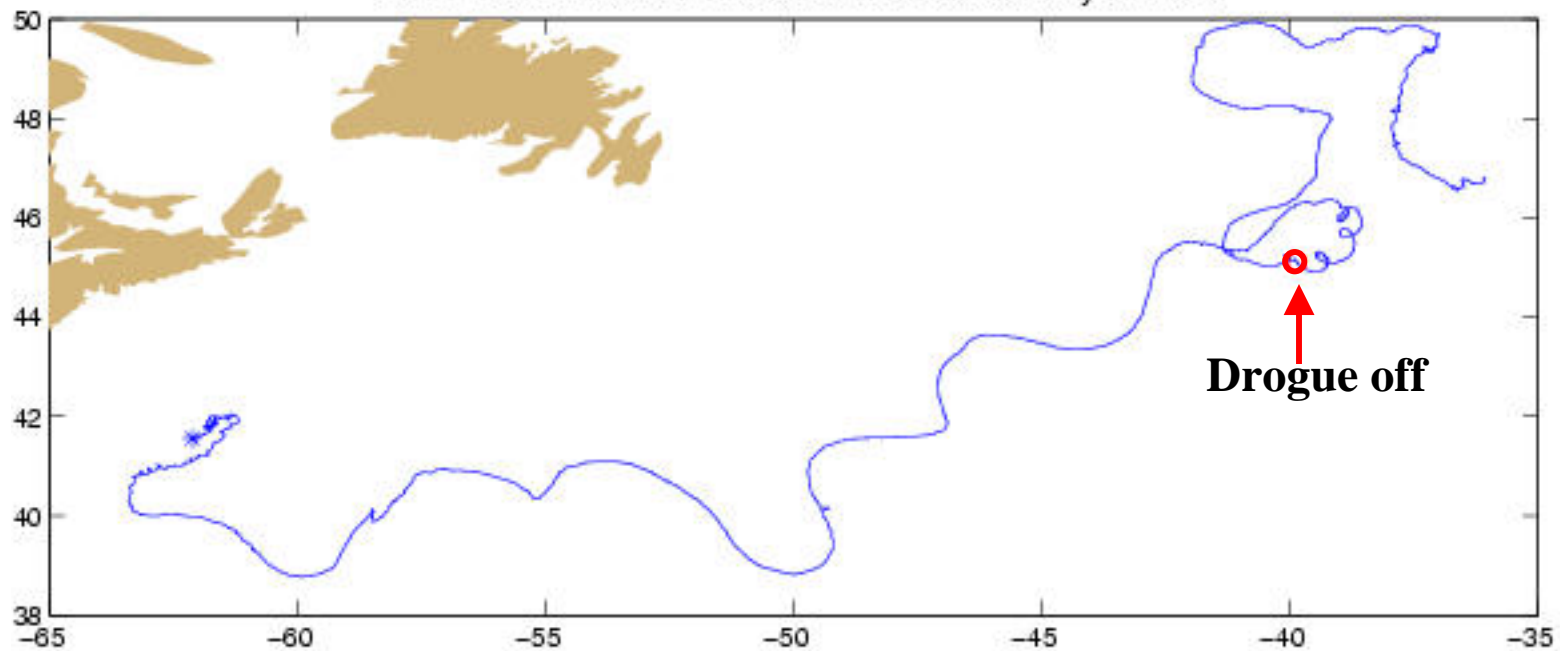
A correction to the voltage coefficient was received from the manufacturer after Nov. 1 . Data needs to be reprocessed prior to Nov 1.

When voltage drops to 8, it then suddenly jumps to 14.3 volts

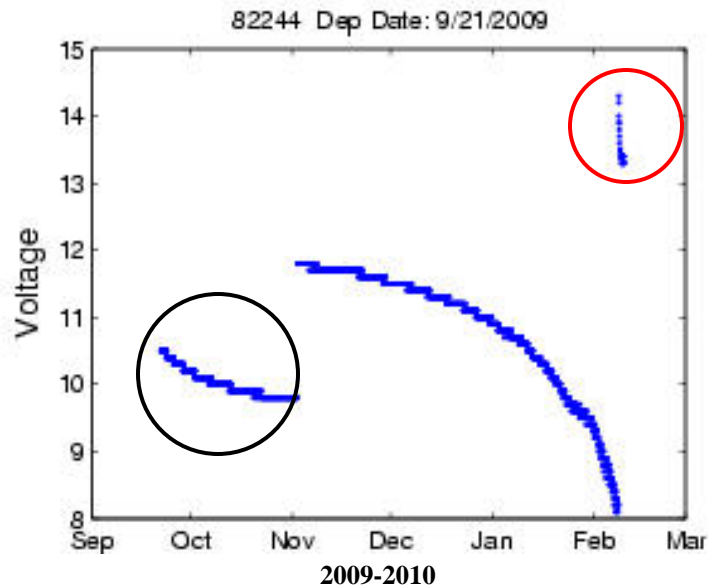
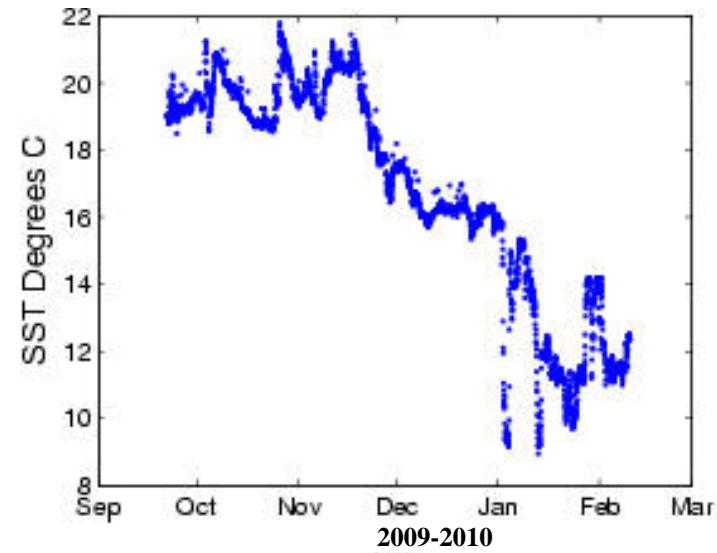
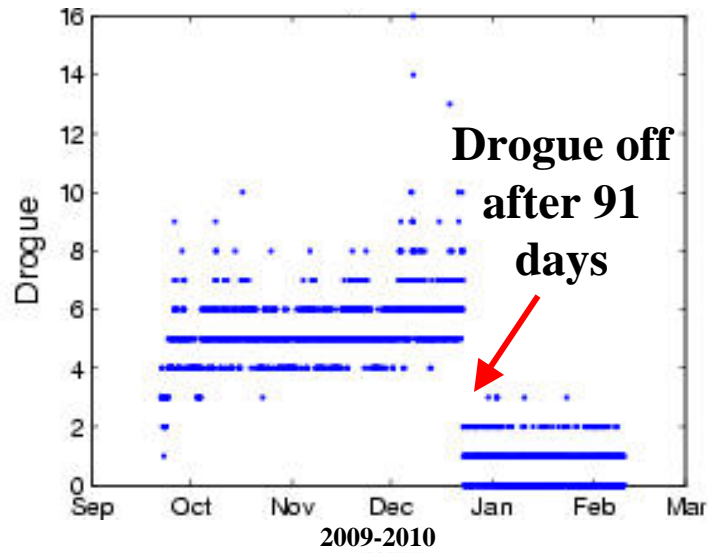
Drifter 82244, Pacific Gyre, SVP

September 21, 2009 – February 10, 2010

Number of Days Alive: **141**, Number of Days Drogue on: **92**



Drifter 82244: Sensors



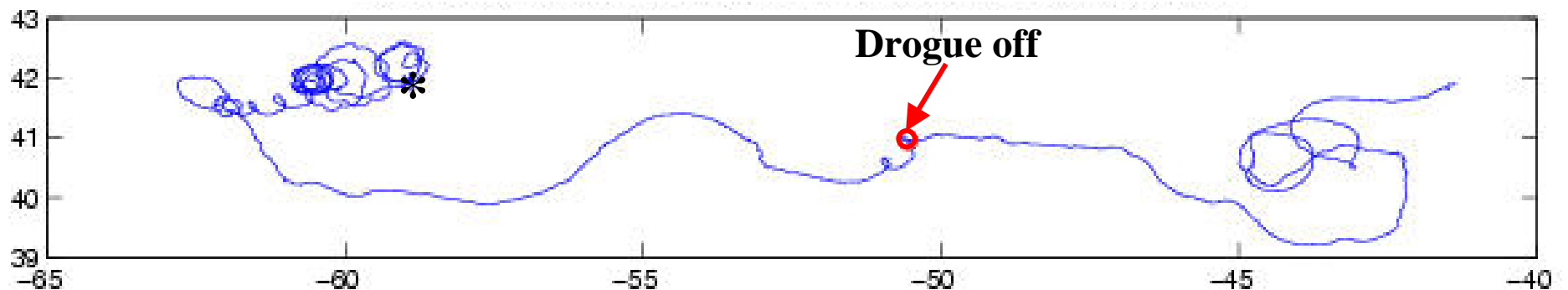
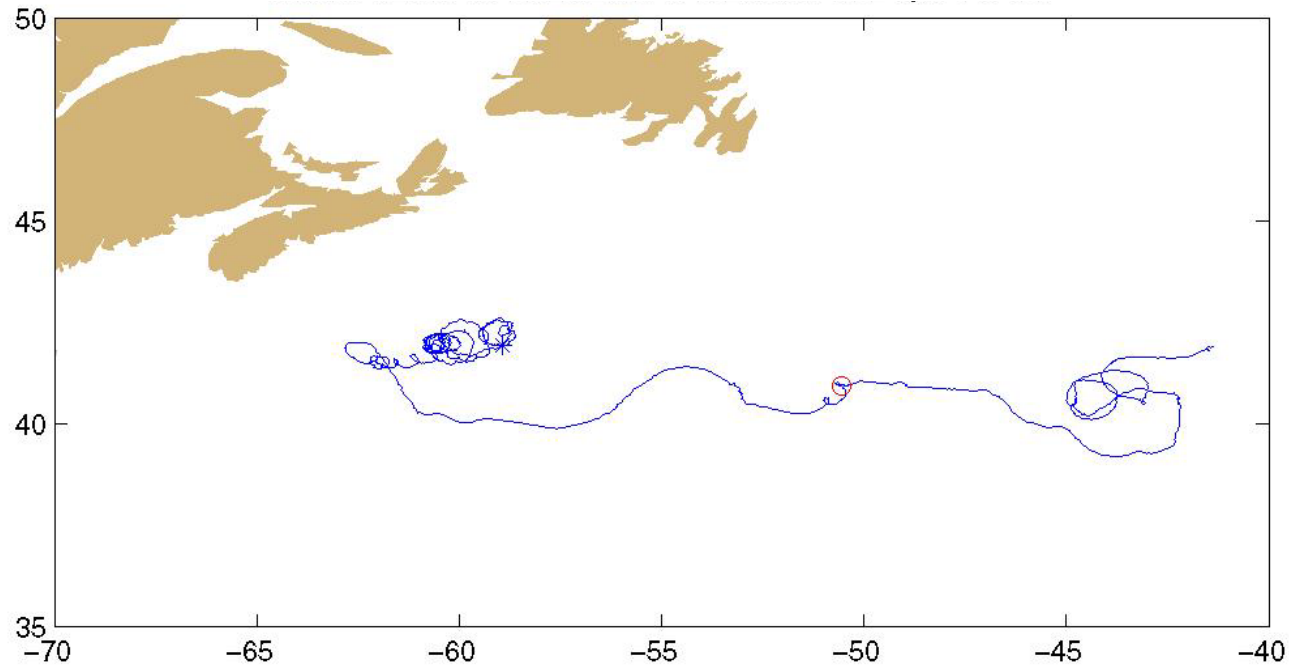
A correction to the voltage coefficient was received from the manufacturer after Nov. 1. Data needs to be reprocessed prior to Nov 1.

When voltage drops to 8, it then suddenly jumps to 14.3 volts

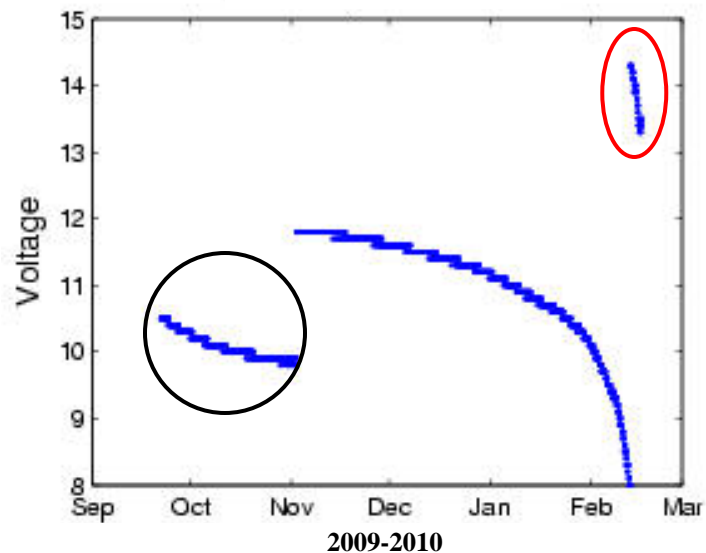
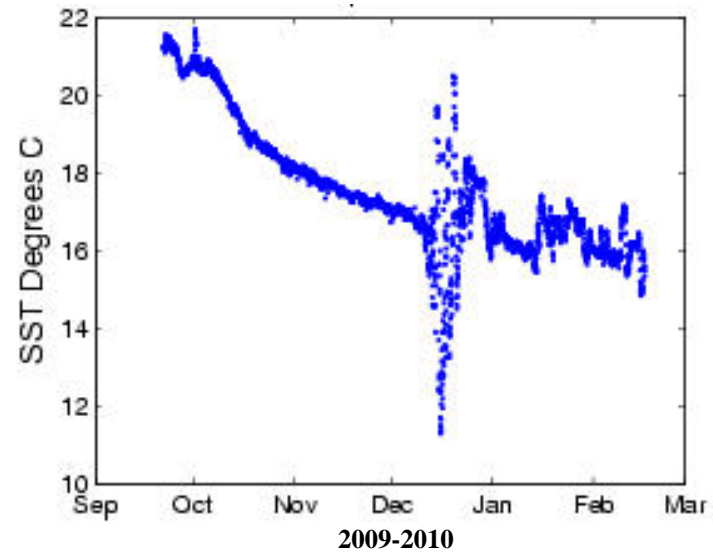
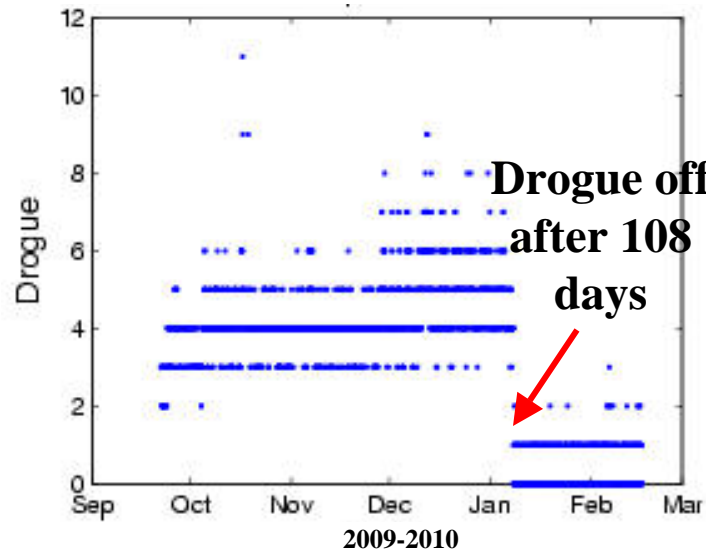
Drifter 82245, Pacific Gyre, SVP

September 21, 2009 – February 16, 2010

Number of Days Alive: **148**, Number of Days Drogue on: **108**



Drifter 82245: Sensors



A correction to the voltage coefficient was received from the manufacturer after Nov. 1. Data needs to be reprocessed prior to Nov 1.

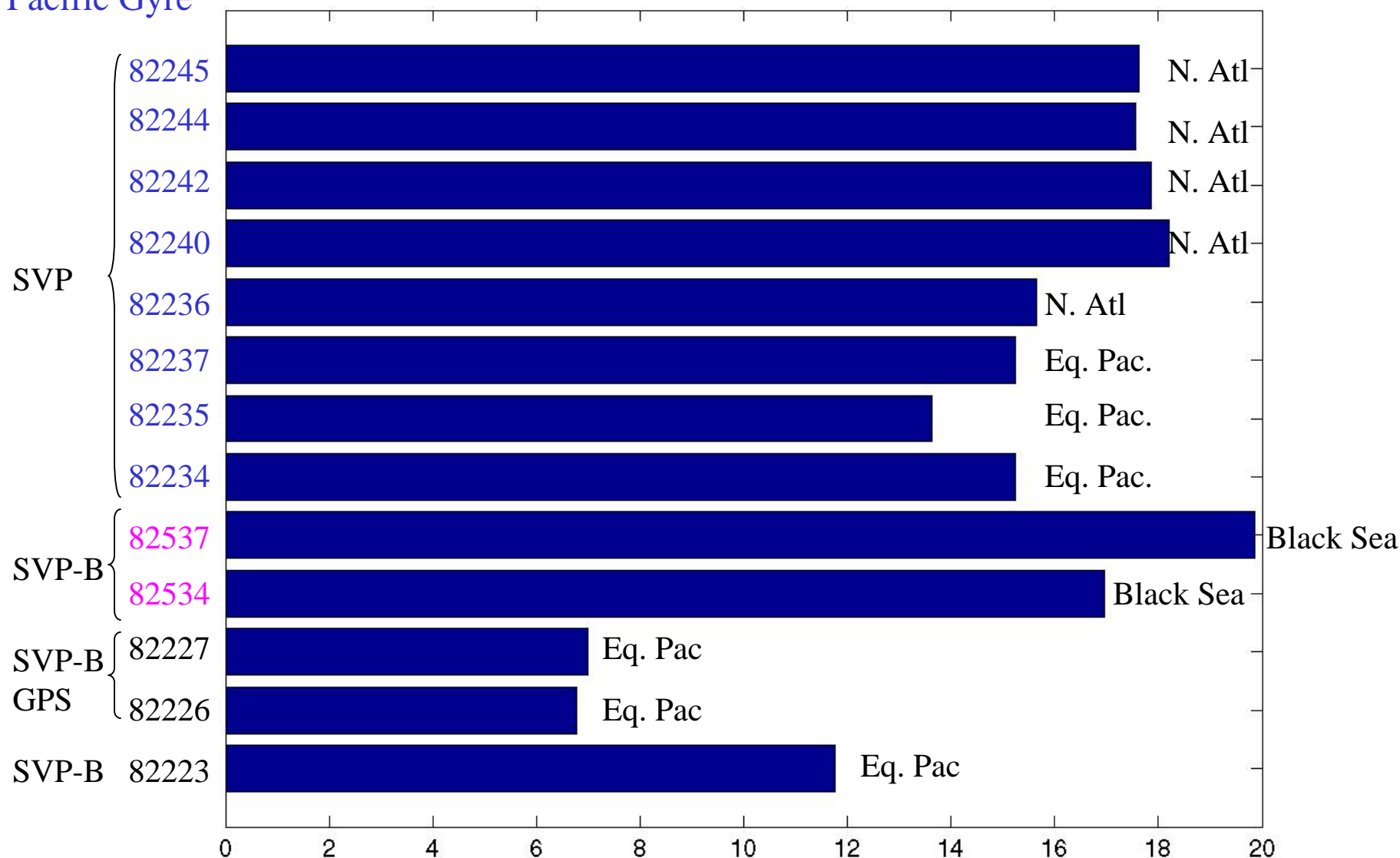
When voltage drops to 8, it then suddenly jumps to 14.3 volts

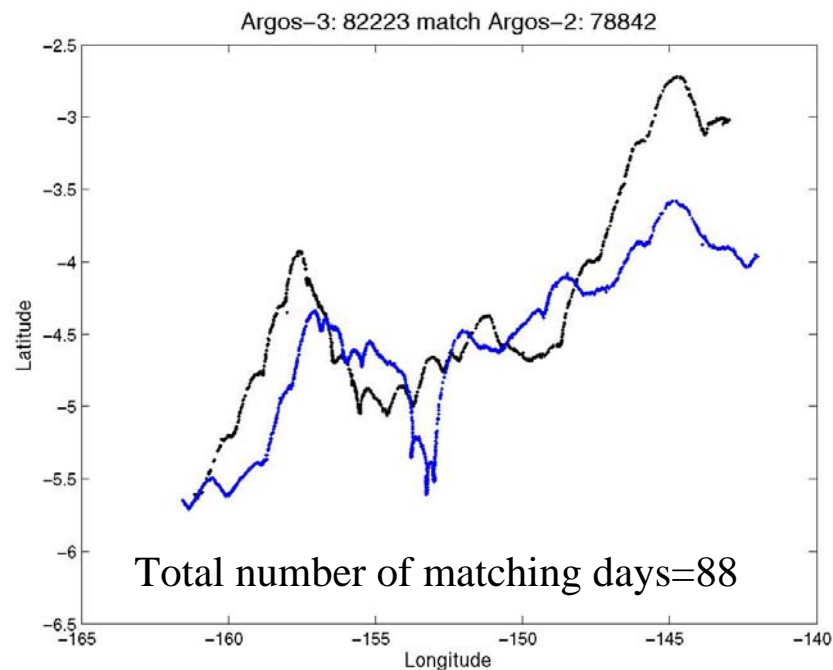
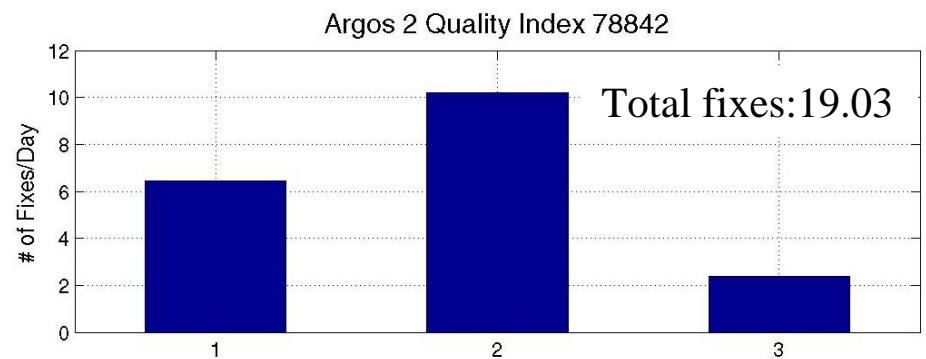
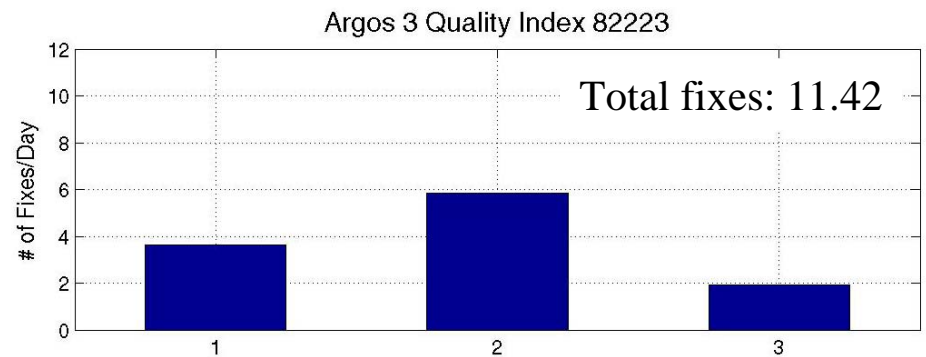
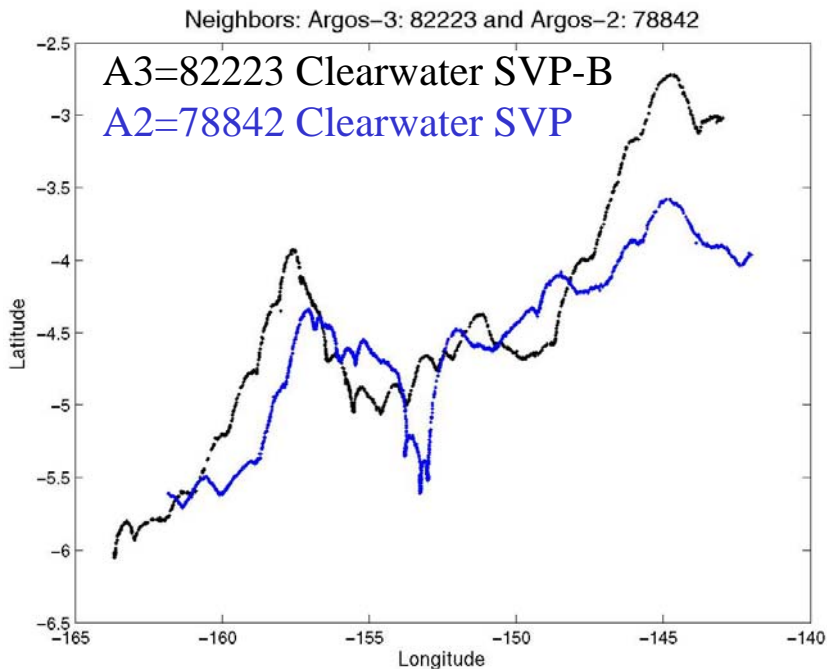
Methodology for computing number of fixes per day and average distribution of quality index (q.i), Argos-3 vs. Argos-2

- Searched Argos-2 database to find all buoys in the same area and at the same time, with drogue on, for the lifetime of each Argos-3 drifter when it had drogue on. (There was no Argos-2 match found for the Argos-3 IDs in the Black Sea area).
- **For average number of fixes per day:** compared several Argos-3 with the closest and longest concurrent single Argos-2 track, while both had drogue on, and counted the number of fixes from each q.i.
- For each Argos-3 position, we looked for the closest Argos-2 position (within 1 hour and 1000 km). This creates a “Composite Argos-2” set of matching positions (from more than one Argos-2 drifter).
- **For mean distribution of q.i:** Composite Argos-2 vs Argos-3.

-- Clearwater
-- Marlin-Yug
-- Pacific Gyre

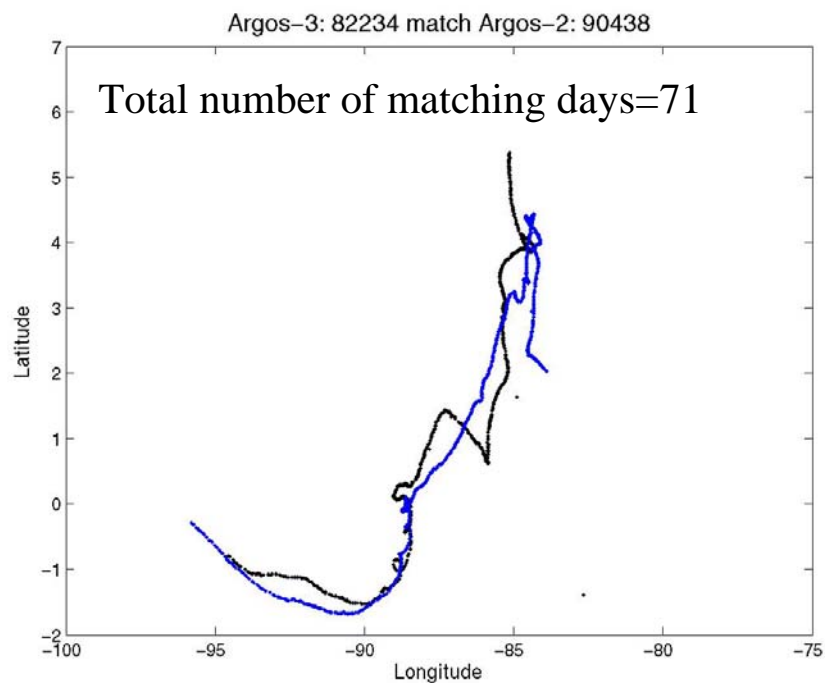
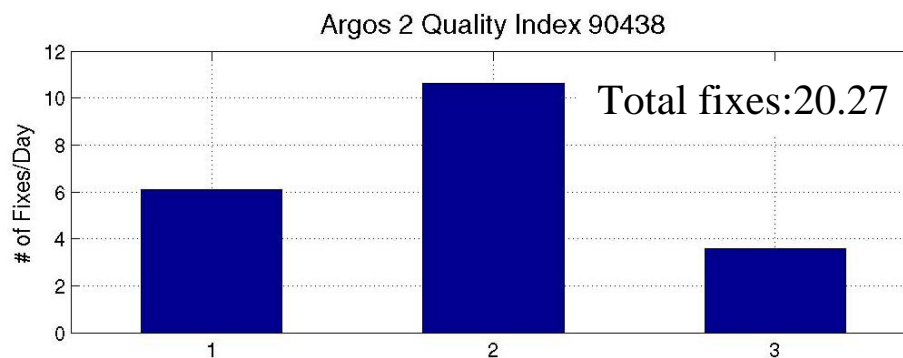
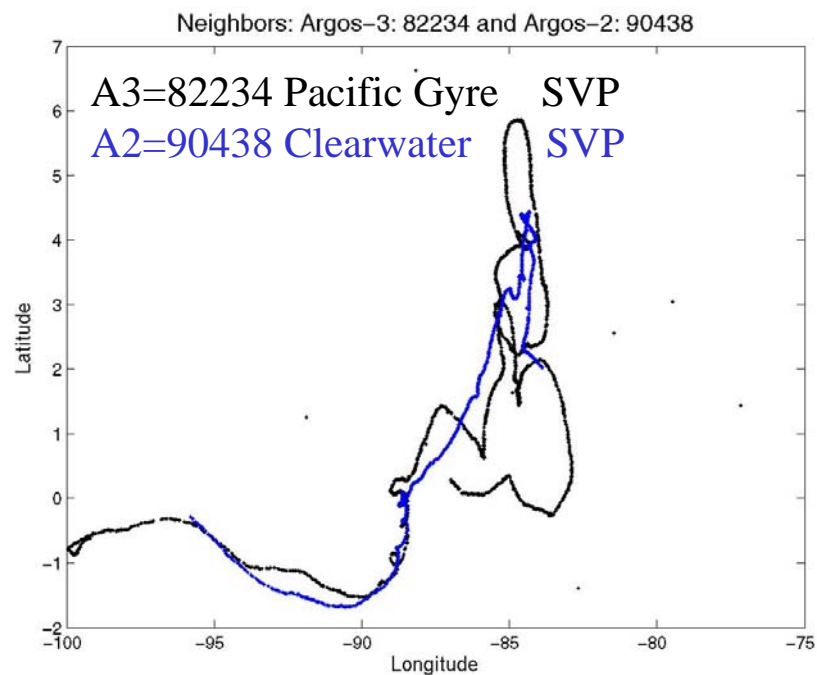
Argos-3 Average Number of Fixes per day





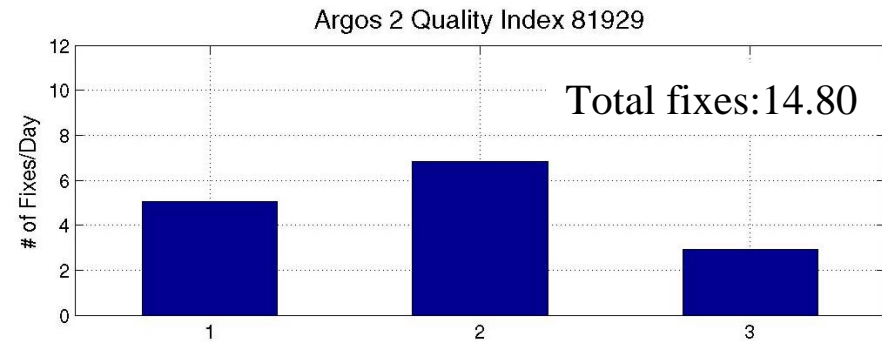
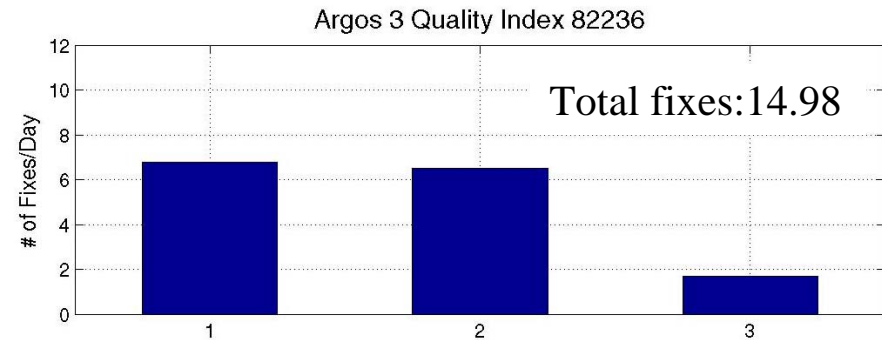
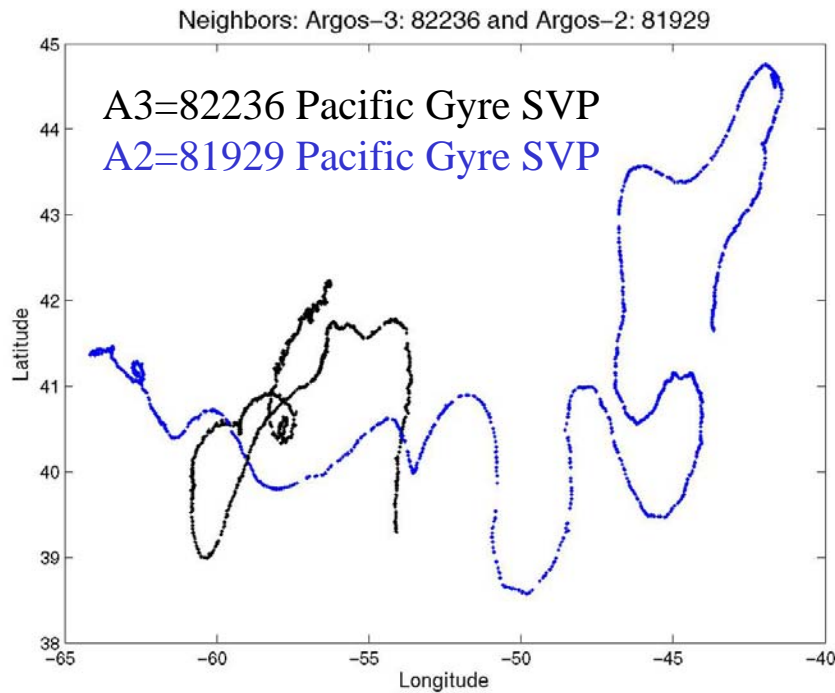
Argos-3 had less total fixes per day, but also had fewer positions with the lowest accuracy (q.i.=1). Roughly the same number of q.i.=3.

- q.i. 3: < 250 m radius,
- q.i. 2: 250 - 500 m radius
- q.i. 1: 500 - 1500 m radius



Argos-2 had more positions of all accuracy classes.

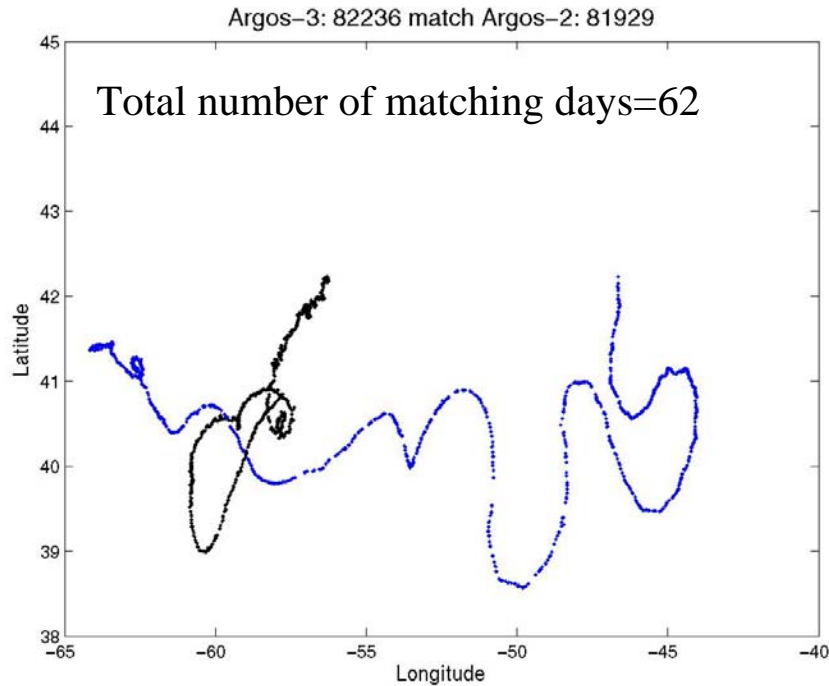
- q.i. 3: < 250 m radius,
- q.i. 2: 250 - 500 m radius
- q.i. 1: 500 - 1500 m radius

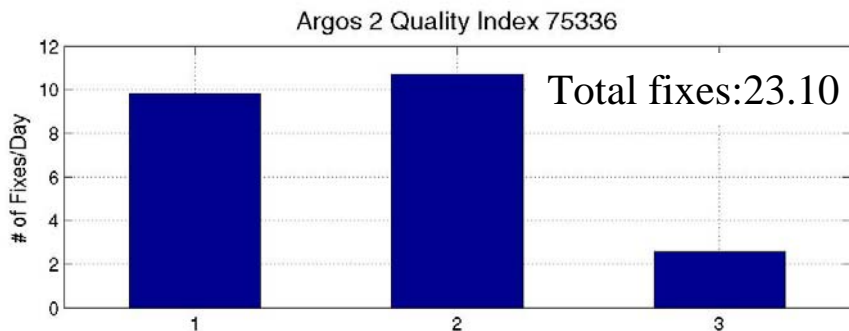
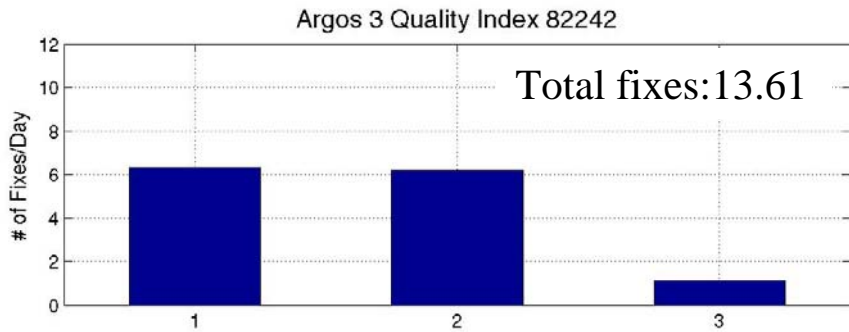
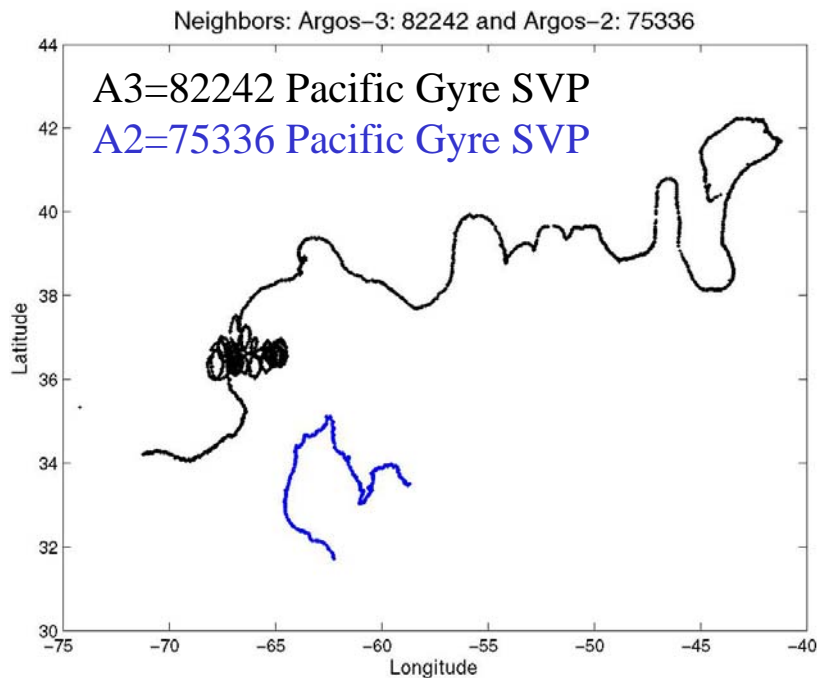


Argos-3 had more positions with lowest accuracy (q.i.=1) and less of highest accuracy (q.i.=3).

Both received nearly the same number of fixes per day.

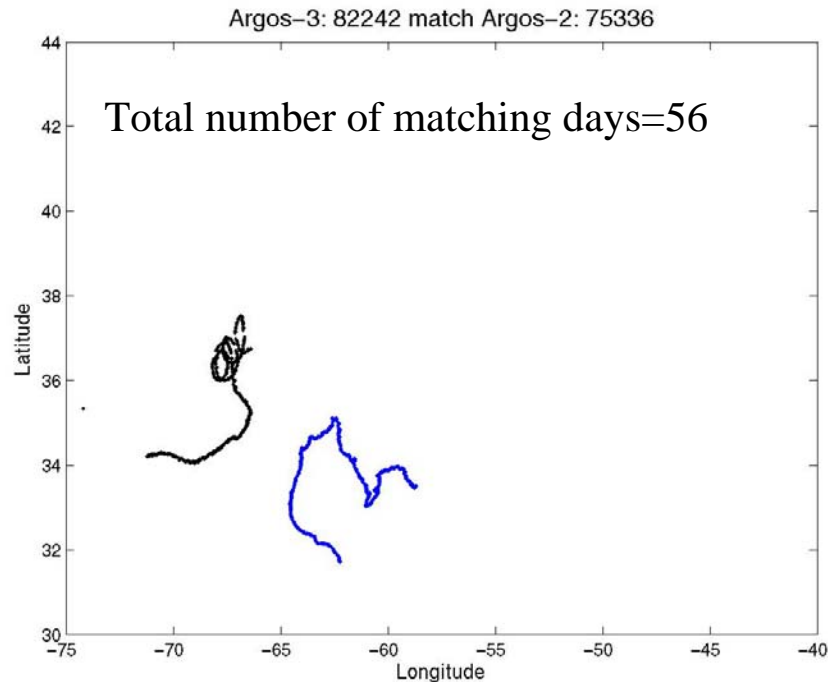
- q.i. 3: < 250 m radius,
- q.i. 2: 250 - 500 m radius
- q.i. 1: 500 - 1500 m radius

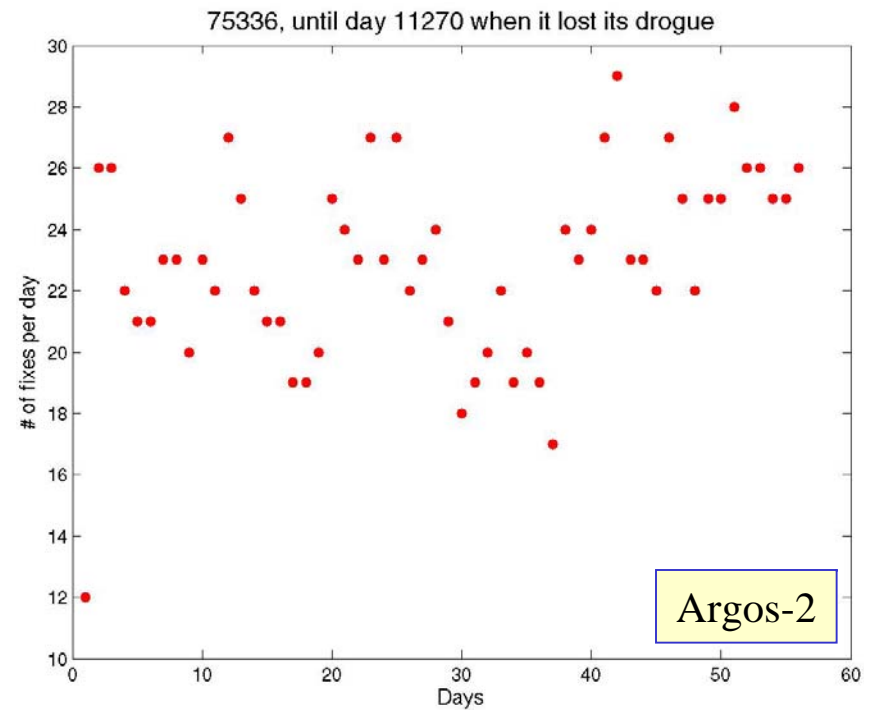
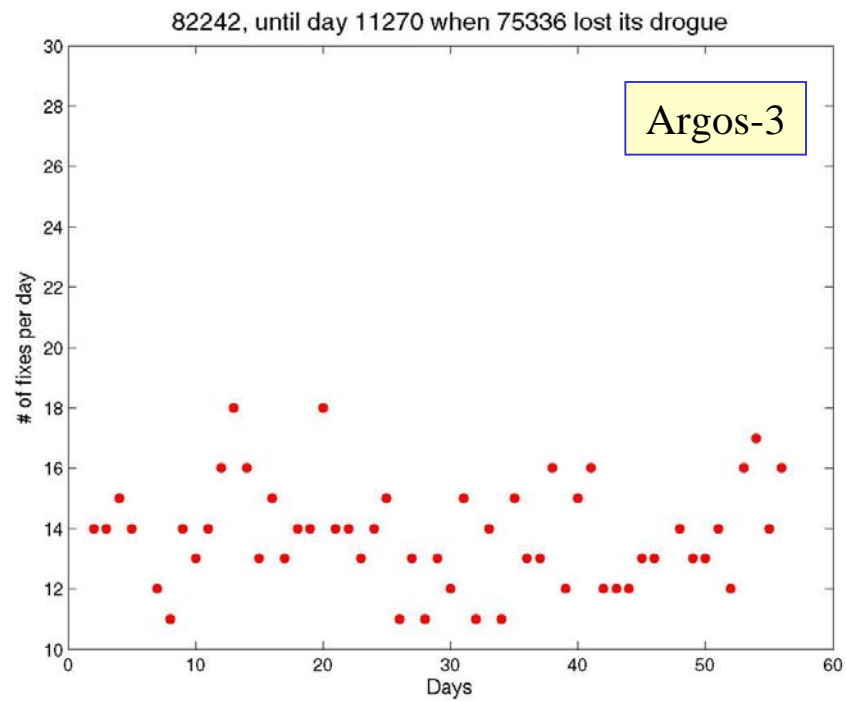
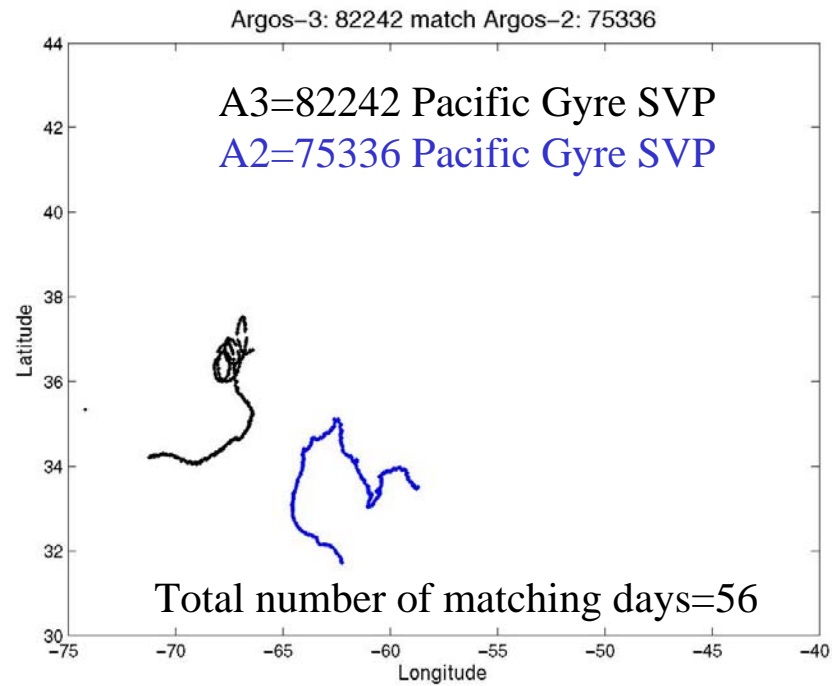


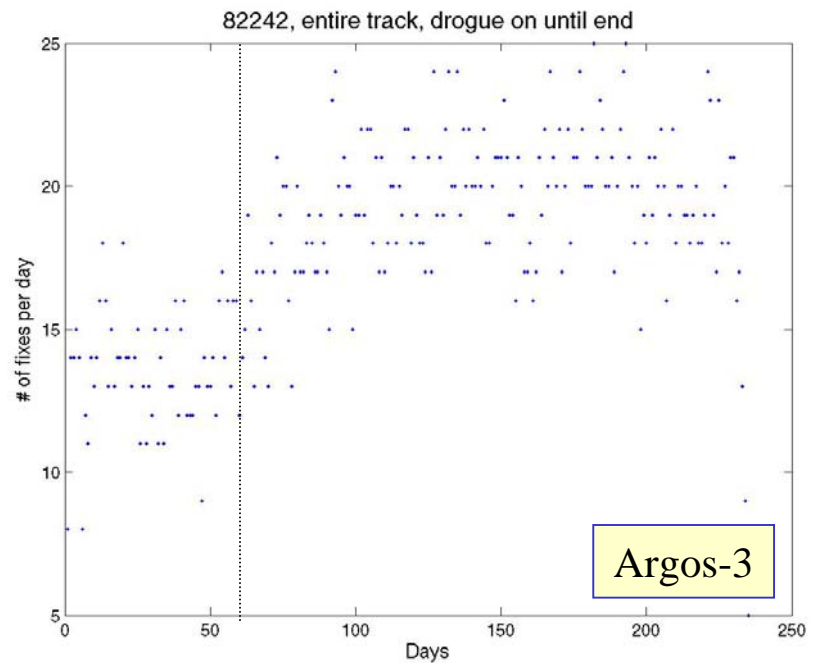
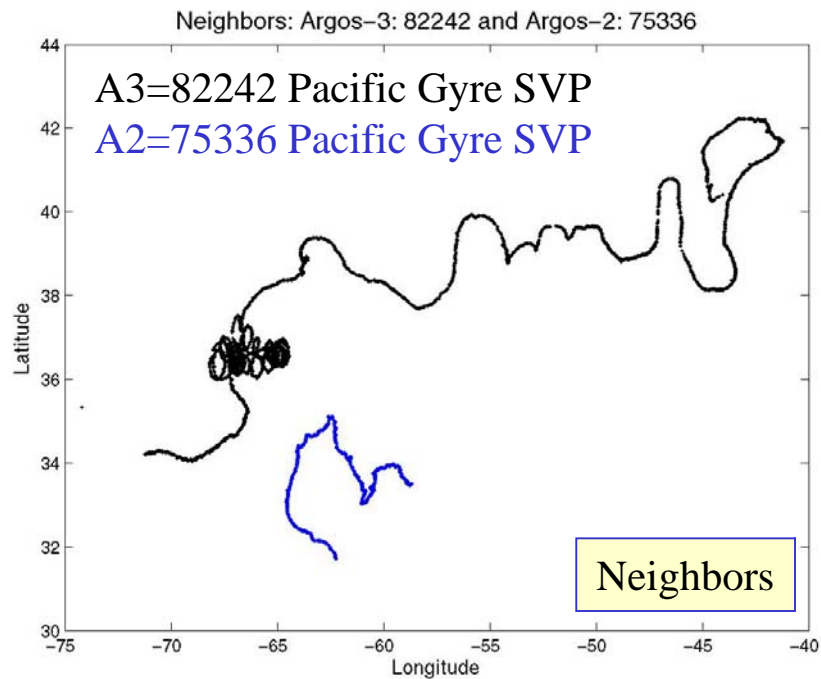


Argos-2 had more positions of all accuracy values, and the total number of fixes per day was considerably larger than the Argos-3.

- q.i. 3: < 250 m radius,
- q.i. 2: 250 - 500 m radius
- q.i. 1: 500 - 1500 m radius



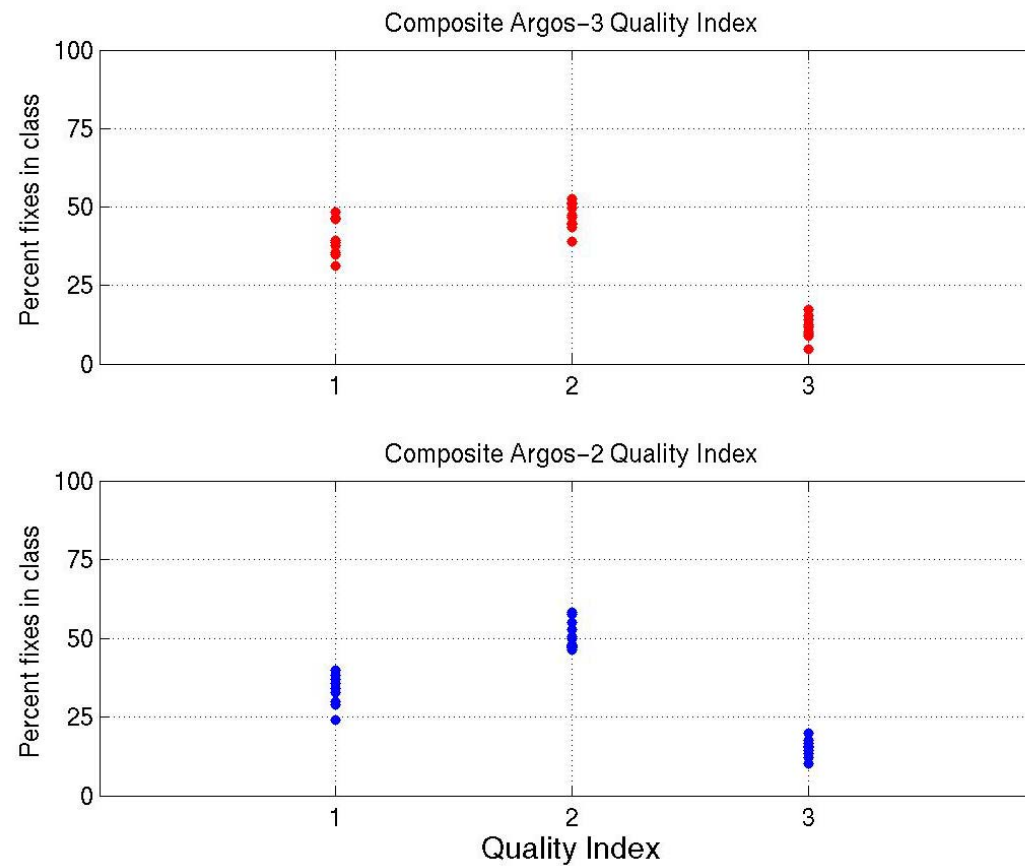




Argos-3 starts getting more fixes per day
North of 37N

Argos 3 vs. Composite-Argos 2: mean distribution of q.i.

This exercise shows that for this batch of Argos-3 drifters, the distribution of q.i. is very similar: *no significant difference between Argos-3 and the closest Argos-2 position fix quality.*



Summary

- Clearwater built SVP-B with GPS but GPS had problems and not many fixes were received.
- All Pacific Gyre's drifters: when voltage drops below 8 volts, it then suddenly jumps up to 14.3 volts.
- Pacific Gyre drogue counts not pegging at a ceiling (as with earlier drifters).
- As of July 31, 2010 there are two Pacific Gyre drifters alive and with drogue on after 269 days and one Marlin-Yug alive after 248 days. All others died after an average of 145 days.
- Metocean drifters stopped sending sensor data due to a problem with the controller. Transmitter worked fine and position fixes were computed.
- Sea Level Pressure failed in 2 out of 5 SVPB drifters after 24 and 187 days. All SST sensors performed well.
- Argos-3 drifters during their entire life, in the North Atlantic and Mediterranean Sea, produced an average of 18 fixes/day while those in the Equatorial Pacific produced an average of 16 fixes/day. This appears to be lower than nearby Argos-2 drifters, and should be reevaluated after more Argos-3 drifters are deployed. The distribution of position quality is similar for Argos-3 and Argos-2.

Summary Table

Argos-3 ID	Man	Type	Days alive	Days Drogue on	Comments
82223	C	SVPB	99	99	Bad SLP after 24 days
82226	C	SVPB-G	218	91	Bad SLP after 187 days , GPS malfunctioned
82227	C	SVPB-G	106	73	GPS malfunctioned
82534	M	SVPB	248A+	52	Alive as of Sep 1, 2010, with drogue on
82537	M	SVPB	100	70	grounded, submergence drogue sensor
82234	PG	SVP	148	148	Died with drogue on
82235	PG	SVP	269A+	269A+	Alive as of Sep 1, 2010, with drogue on
82236	PG	SVP	98	84	
82237	PG	SVP	269A+	269A+	Alive as of Sep 1, 2010, with drogue on
82240	PG	SVP	161	161	Died with drogue on
82242	PG	SVP	235	235	Died with drogue on
82244	PG	SVP	141	92	
82245	PG	SVP	148	108	