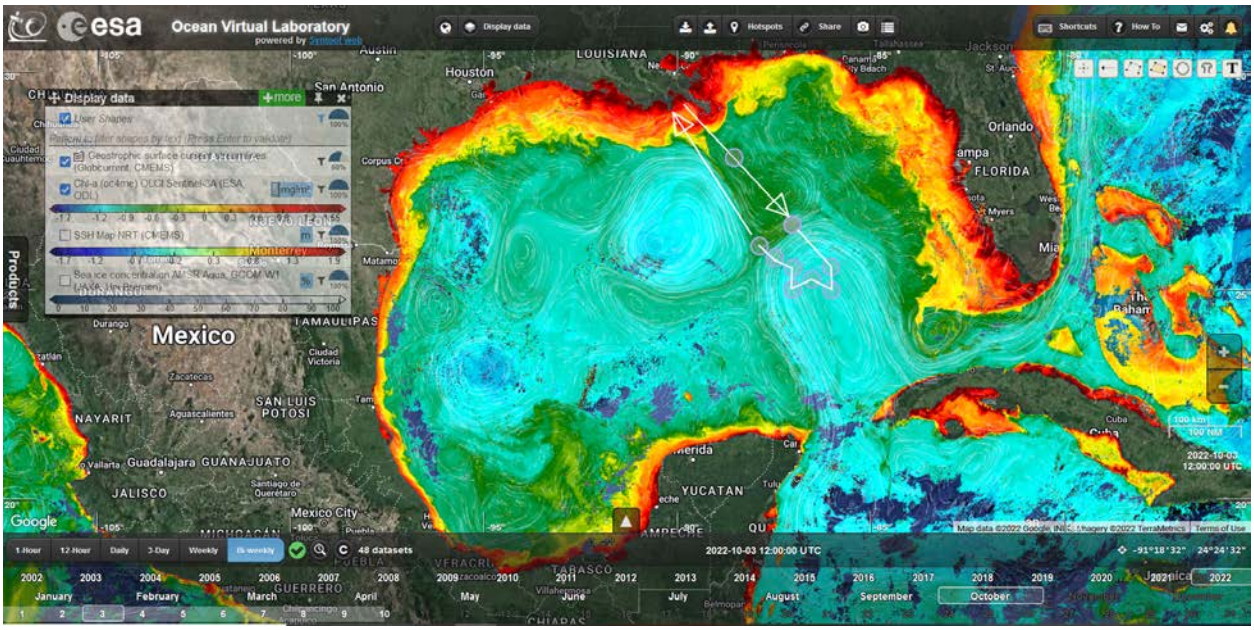
UGOS GODEEP Cruise Report

R/V Pelican, PE23-07
1-5 October 2022
Cocodrie to Cocodrie, LA



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Abstract

This cruise report documents the fifth deployment of S2A profiling floats as part of National Academy of Sciences Understanding Gulf Ocean Systems (NAS UGOS)-funded research in the eastern Gulf of Mexico. This is the first time this work has been completed on a stand-alone cruise. In past years, the deployments have been completed as part of NAS UGOS cruises led by Kathy Donohue and Randy Watts from the University of Rhode Island.

In addition to eight S2A profiling float deployments, we sampled deep (depth > = 1400 m) water to try to measure deep salinity values with accuracy < 0.003 salinity units from which to calibrate the Gulf of Mexico Argo and UGOS float fleet. We also filmed video footage and created instructional videos for future cruises-of-opportunity for the WHOI Argo program. We deployed one Argo float equipped with a new style of conductivity sensor made by RBR. And finally, we deployed four surface drifters for Scripps Institute of Oceanography's Global Drifter Program.

This cruise was remarkable in that we crossed the Loop Current twice and fought our way home through the eastern flank of a recently-pinched off Loop Current Eddy Yazoo. Currents were so strong (2.5 knots) that we steamed at about 6.5 knots for most of a night and day and had to come into port one day later than originally planned.

(Photo by H. Furey)

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1. Science Personnel

Heather Furey, WHOI, Chief Scientist
Deb West-Mack, WHOI, Argo Group Float Technician
Grace Fulton, LUMCON, Marine Science Technician
Skylar Lebouef, LUMCON, AB
Larkin Bohn, LUMCON, AB

2. Overview

The R/V Pelican left Cocodrie, LA, on October 1, 2022 and steamed to the eastern central Gulf of Mexico. Science personnel H. Furey and D. West-Mack were in charge of all science operations: profiling float deployments, CTD casts, water sampling, filming for instructional videos, and surface drifter deployments. The cruise track is shown in Figure 1. The weather was fair, winds generally light, and seas less than one meter for the entire cruise. There were no rough weather periods, though ship's speeds were greatly hampered by the Loop Current and especially the Loop Current Eddy Yazoo encountered on the steam back to port.

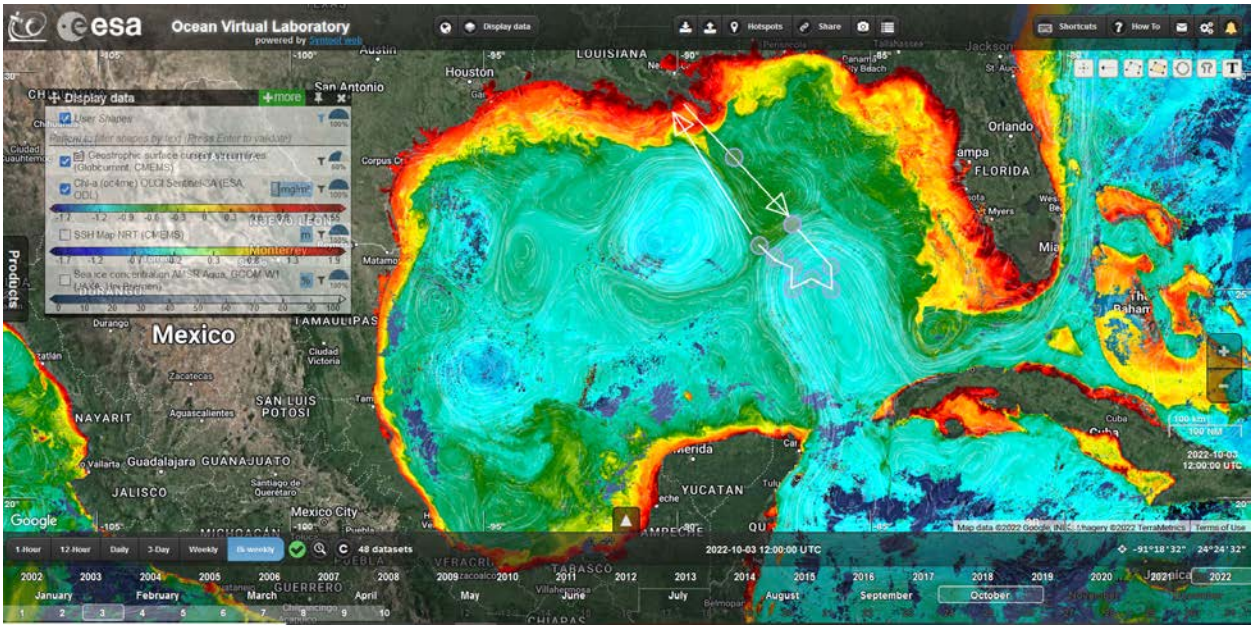

Figure 1. Cruise track for PE23-07, Cocodrie to Cocodrie, 1-5 October 2022. Schematic cruise track is overlaid on chlorophyll-a (ocean color) and geostrophic surface current streamlines from CMEMS. Stations are marked by gray circles. Image is from Ocean Virtual Laboratory (https://ovl.oceandatalab.com/).

3. Cruise Narrative

A timeline of events for this short cruise is provided in Table 1. We worked to get the new floats into two target regions: the southerly Gulf enclosed by the Loop Current and the saddle region between the Loop Current and the recently pinched off Loop Current Eddy. We also considered the locations of the existing floats in the Gulf and tried to keep the new floats in geographically different regions if possible.

Both target regions had a lack of active floats. Due to the evolving position of both the Loop Current and the Loop Current Eddy, and the saddle region between the two, we assessed model, chlorophyll-A, and ADT data daily (or multiple times per day) using the Ocean Virtual Laboratory viewer. Andrée Ramsey (WHOI) provided daily maps of proposed and existing profiling float locations on a contoured ADT field, with bathymetry and the EEZ overlaid. The original proposed float deployment locations and the final float deployment locations are shown in Figure 2. Overall cruise progress and station information is listed in Table 2.

Table 1. Timeline of work operations.

Date	Day	Summary of activities	Details
30-SEPT-2022	FRI	Arrived at ship. Floats and gear were loaded in science labs. Loaded surface drifters. Initialized all floats. Filmed. Met with captain, crew and LUMCON port officer Joe Malbrough.	All floats appeared to start normally, however it was found that float 7690 had an error during startup that was not noticed until after the float was deployed.
01-OCT-2022	SAT	Arrived at ship, safety briefing, set sail. Performed test CTD cast and test sampling. Steamed to RBR-equipped Argo site. Filmed.	Test cast: 5/12 Niskins either did not close, or leaked. One did not close, two miss-seated (bottom cap); two leaked either through air-vent screw or end cap. Practiced sampling, practiced deploy/recovery of package, practiced CTD data acquisition.
02-OCT-2022	SUN	Deployed RBR-sensor equipped Argo float. Completed three GODEEP stations. Filmed.	GODEEP Station A: CTD cast with salt sampling, S2A and surface drifter deployment; Station B: S2A deployment; Station C: CTD cast with salt sampling, S2A deployment.
03-OCT-2022	MON	Completed five GODEEP stations. Filmed.	GODEEP Stations D, E, F: S2A deployment; Station G, H: S2A and surface drifter deployments.
04-OCT-2022	TUES	Steamed home.	Got caught going north in the eastern flank of a recently-pinched anti-cyclonic Loop Current Eddy.
05-OCT-2022	WED	Arrived port one day late, at ~06:30. Unloaded ship, prepared and staged shipment to WHOI.	Eddy Yazoo delay.

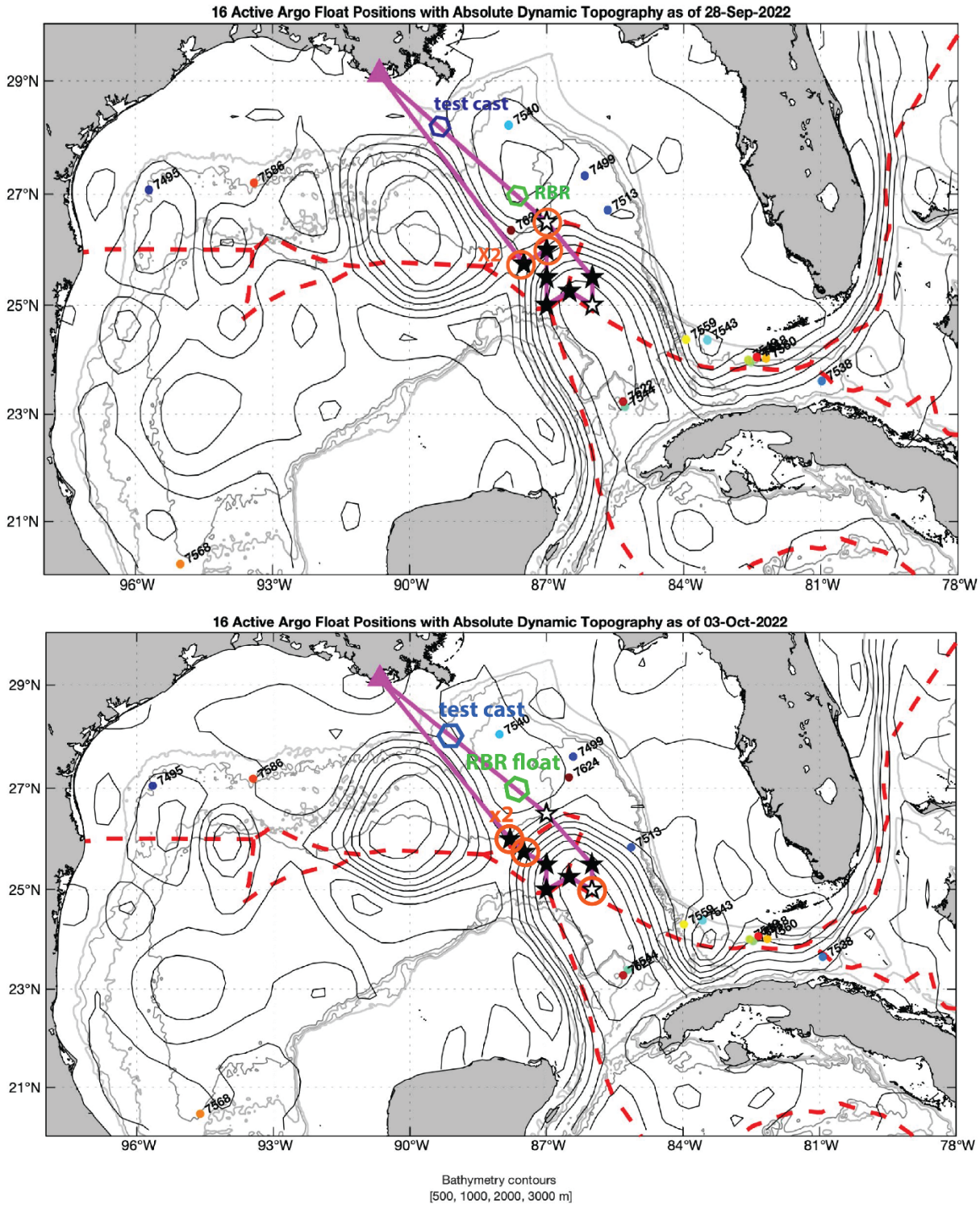

Figure 2. Pre-cruise intentions (top panel) and post-cruise reality (bottom panel) of station locations and deployments based on evolving Loop Current and Loop Current Eddy positions, and locations of existing profiling floats. Locations of the test CTD cast and RBR-equipped float deployment are labelled. Black stars indicate S2A profiling float deployment locations, white stars indicate S2A deployment and water sampling stations, and orange circles indicate GDP-chosen surface drifter deployment locations.

Photo: Deb West-Mack initializes floats prior to departure. (H. Furey)

Table 2. Overall station information and cruise progression.

PE23-07
8 Argo
1 RBR
4 surface drifters, to be deployed at existing stations (no additional stops)
3 CTD / water sampling stations - one test, two "real"
8.5 knot cruising speed
* after first station, about 3.5 hours between stations (56 km)

date	~time LOCAL	station	lat N	long W	GMT	requirements / s/n	asset	action	comments
10/1/2022	08:00	port	29.12	90.66	13:00		port	leave dock	
10/1/2022	16:00	test station, ~500m	28.489	89.815	21:00	in water > 200 m deep, on transit	CTD#001	test cast - fire all Niskins, get familiar with CTD data acquisition system and with sampling procedure	
	17:00	depart next station							
10/2/2022	09:00	RBR site, ~2800 m	26.968	87.660	13:49	in water > 2000 m deep, on transit; s/n 11151	RBR	deploy RBR float on transit to main study area	Float water release was slow to deploy.
10/2/2022	13:30	A	26.497	86.988	18:37		CTD#002	first major sampling	

								station, ~2.5 hour cast	
10/2/2022	15:26		26.488	86.972	20:26	s/n 7742	Argo#1	deploy float at end of cast	Float water release never fired, the straps where manipulated to release the box.
10/2/2022	15:27		26.487	86.971	20:27	IMEI *9630	Sfc drifter #1	deploy float	
10/2/2022	23:42	B	25.500	86.000	04:42	s/n 7701	Argo#2	deploy float	Float water release worked well.
10/3/2022	04:12	C	25.000	86.000	08:12		CTD#003	second (and last) major sampling station, ~2.5 hour cast	
10/3/2022	06:30		24.994	85.994	09:53	s/n 7729	Argo#3	deploy float at end of cast	The float was over the side and the float slipped out of the straps.
10/3/2022	08:39	D	25.249	86.498	13:39	s/n 7700	Argo#4	deploy float	Deb inspected and fixed the water release, worked great.
10/3/2022	12:24	E	25.000	87.000	17:24	s/n 7690	Argo#5	deploy float	Deb inspected and fixed the water release, worked great
10/3/2022	15:30	F	25.000	86.499	20:30	s/n 7703	Argo#6	deploy float	Deb inspected and fixed piston, worked great
10/3/2022	19:30	G	25.752	87.497	00:30	s/n 7755	Argo#7	deploy float	Deployed using the 'burrito roll' - alternative method developed by SIO.
10/3/2022			25.753	87.498	00:33	IMEI *9880	Sfc drifter #2	deploy float	
10/3/2022	22:50	H	26.002	87.900	03:47	s/n 7726	Argo#8	deploy float	Deb inspected and adjusted water release, water release didn't fire, box started to disintegrate and the box and float fell through the straps.
10/3/2022	22:50		26.004	87.901	03:50	IMEI *9760	Sfc drifter #3	deploy float	
10/3/2022	22:50		26.004	87.902	03:50	IMEI *9880	Sfc drifter #4	deploy float	
10/3/2022	23:00						@Argo#8	leave for port, 22hr steam?	
10/5/2022	06:30	port	29.120	90.660	11:30		port	dock	

4. CTD and Water Sampling

An interesting part of the cruise plan was our work to collect water samples where the Gulf water is exceptionally uniform in salinity, below the sill depths or about 1200 m. Deep water samples were collected to add to database of direct salinity observations in the deep Gulf of Mexico. CTDs on Argo platforms are calibrated by comparing to direct observation of deep temperature-salinity structure. Due to being a closed-basin without local deep-water sources, the deep hydrography of the Gulf is largely uniform. Rather than using the hydrographic casts to map our weak horizontal gradients in deep salinity, the sampling scheme was focused on collecting multiple samples on two hydrographic casts to best try to measure the deep temperature-salinity relation.

We were not interested in calibrating the profiling float data with concurrent and adjacent CTD profiles. We were only interested in collecting a large number of water samples from which to try to accurately determine salinity in the deep Gulf. We chose to sample at two locations and at three depths: 1400, 1700 and 2000m, and to take 4 samples per Niskin bottle. At 1400 and 1700 m depths, we took samples from 2 bottles, and at 2000m depth, we took samples from 3 bottles. The quantity of sampling was driven by the number of bottles we brought: 56, 28 per case. We chose to sample at two deep-water stations as far apart as possible, to see if any regional difference in salt existed. Pelle Robbins (WHOI) and Deb West-Mack were instrumental in researching Gulf hydrography and helping shape the sampling plan to achieve Argo calibration goals.

After the first test cast, the rosette came onboard in rough shape: one Niskin failed to close, two were completely unseated, and many leaked out of the lower endcaps. Onboard science tech Grace Fulton replaced all top venting screws which seemed to be ill fitted to the Niskins, replaced the o-rings on the venting screws, and replaced some of the lanyard components. We (Deb, Grace, and I) learned then (from onboard boson Rodney) that Niskin #1 has been repeatedly not closing, he stated it was a magnet problem in the pylon. We let that go – we worked around the persistent failure of Niskin #1. The fixes by Grace helped. On the next cast, the 11 Niskins closed properly, the venting screws were better fitted, and there was no leaking out of bottom end caps. However: nearly all petcocks, when opened and the venting screw closed, had a very slow but persistent drip indicating a complete seal of the water inside the Niskins had not happened. We made the call to sample anyway. The second cast was the same. There were no attempts or suggestions by Grace to fix this problem, and not enough time in the 12 weekend hours between casts to get help from shore (WHOI).

H Furey had conversation with L Houghton (WHOI) post cruise. Leah has been onboard the Pelican, and after hearing the description of the problem, felt that the lanyards connecting the top and bottom caps were not holding enough tension to properly seal the Niskin bottles. In fact, H Furey had noted that the tension was not as great as experienced on other ship's systems. This was not something that Grace felt needed correction while we were aboard. H Furey subsequently contacted Grace with a description and possible fix to the leaking Niskins for future Pelican cruises.

Table 3. Hydrographic stations.

CTD#	Date/Time [GMT]	Latitude (°N)	Longitude (°W)	Cast depth (m)	Sampling scheme
1	01-OCT-2022 21:00	28.489	89.815	500	Test sampling, test data acquisition, rosette controller firing, and Niskin closing
2	02-OCT-2022 18:37	26.497	86.988	2020	4 samples at each of 3 Niskins at 2000 m; 4 samples at each of 2 Niskins at 1700 and 1400m
3	03-OCT-2022 08:12	25.000	86.000	2020	4 samples at each of 3 Niskins at 2000 m; 4 samples at each of 2 Niskins at 1700 and 1400m

5. Profiling Float Deployments

Nine Argo Floats were deployed in and around the Loop Current. All the floats measure pressure, temperature, and conductivity and report 2-dbar binned data for pressure [dbar], temperature [°C], and salinity [psu]. Eight of the floats, the 'UGOS floats', were deployed using a modified Argo mission with a 5-day cycle drifting at 1500 dbar and profiling from 2000 dbar. These eight are MRV S2A floats equipped with a SBE41CP CTD. The ninth float, the 'WHOI Argo' float, is a MRV ALTO equipped with an RBR CTD. The RBR float was deployed with a standard 10-day Argo mission – drifting at 1000 dbar and profiling from 2000 dbar. Deployment information is provided in Table 4.

Table 4. Floats Deployed.

	WMO s/n	WHOI s/n	AOML s/n	Date/Time [GMT]	Latitude	Longitude	Comments
1	4903472	11151	8939	02-OCT-2022 08:49	26.96758 N	87.65997 W	ALTO RBR 10 days, 1000 dbar
2	4903470	7742	8937	02-OCT-2022 20:22	26.487537 N	86.971582 W	S2A SBE 5 days, 1500 dbar
3	4903466	7701	8933	03-OCT-2022 04:42	25.49936 N	85.99913 W	S2A SBE 5 days, 1500 dbar
4	4903469	7729	8936	03-OCT-2022 09:53	24.993767 N	85.993705 W	S2A SBE 5 days, 1500 dbar
5	4903465	7700	8932	03-OCT-2022 13:39	25.249197 N	86.497638 W	S2A SBE 5 days, 1500 dbar
6	4903464	7690	8931	03-OCT-2022 17:24	25.000255 N	86.999680 W	S2A SBE 5 days, 1500 dbar
7	4903467	7703	8934	03-OCT-2022 20:30	25.500032 N	86.998913 W	S2A SBE 5 days, 1500 dbar
8	4903471	7755	8938	04-OCT-2022 00:30	25.752247 N	87.497180 W	S2A SBE 5 days, 1500 dbar
9	4903468	7726	8935	05-OCT-2022 03:47	26.001975 N	87.900268 W	S2A SBE 5 days, 1500 dbar

Filming was conducted during this cruise to provide video instructions for deploying WHOI Argo floats. Three mp4 videos were produced. The first video covers how to startup a WHOI Argo float. The second video covers preparing a float for deployment and deploying a float using straps and a water release. The water release deployment method is the preferred method especially when there is a large freeboard. The third video covers preparing a float for deployment and deploying the float without straps and a water release, nick-named the 'burrito roll'. This method of deployment was developed by

Christopher Berg from Scripps Institute of Oceanography. The 'burrito roll' should only be used when there is a shorter freeboard.

The three videos can be found:

(1) Startup - http://argo.whoi.edu/argo/deployment/WHOI_Argo_startup.mp4
(2) Water Release Deployment – http://argo.whoi.edu/argo/deployment/WHOI_Argo_deployment_water_release.mp4
(3) Burrito Roll Deployment – http://argo.whoi.edu/argo/deployment/WHOI_Argo_deployment_roll.mp4

Photo: Deb West-Mack and AB Skylar Lebouef deploy a float using the 'burrito method' – a non-water release method developed by Christopher Berg, SIO. (H. Furey)

6. Surface Drifter Deployments

Four surface drifters were deployed for USCD Scripps Ocean Institute Global Drifter Program under the direction of Martha Sconau (supervised by Luca Centurioni) from USCD. Deployment information is provided in Table 5.

Table 5. Surface drifters deployed.

	IMEI s/n	Date/Time [GMT]	Latitude (°N)	Longitude (°W)
1	*9630	02-OCT-2022 20:27	26.487	86.971
2	*9880	03-OCT-2022 00:33	25.753	87.498
3	*9760	03-OCT-2022 03:50	26.004	87.901
4	*9880	03-OCT-2022 03:50	26.004	87.902

7. Currents

This cruise was notable in that we crossed the Loop Current twice and travelled northward through the eastern wall of a recently pinched Loop Current Eddy (Eddy Yazoo). The intensity of the Loop Current Eddy currents delayed our return to port by about a day. Some plots of the currents are presented in Figures 3 and 4, for curiosities sake.

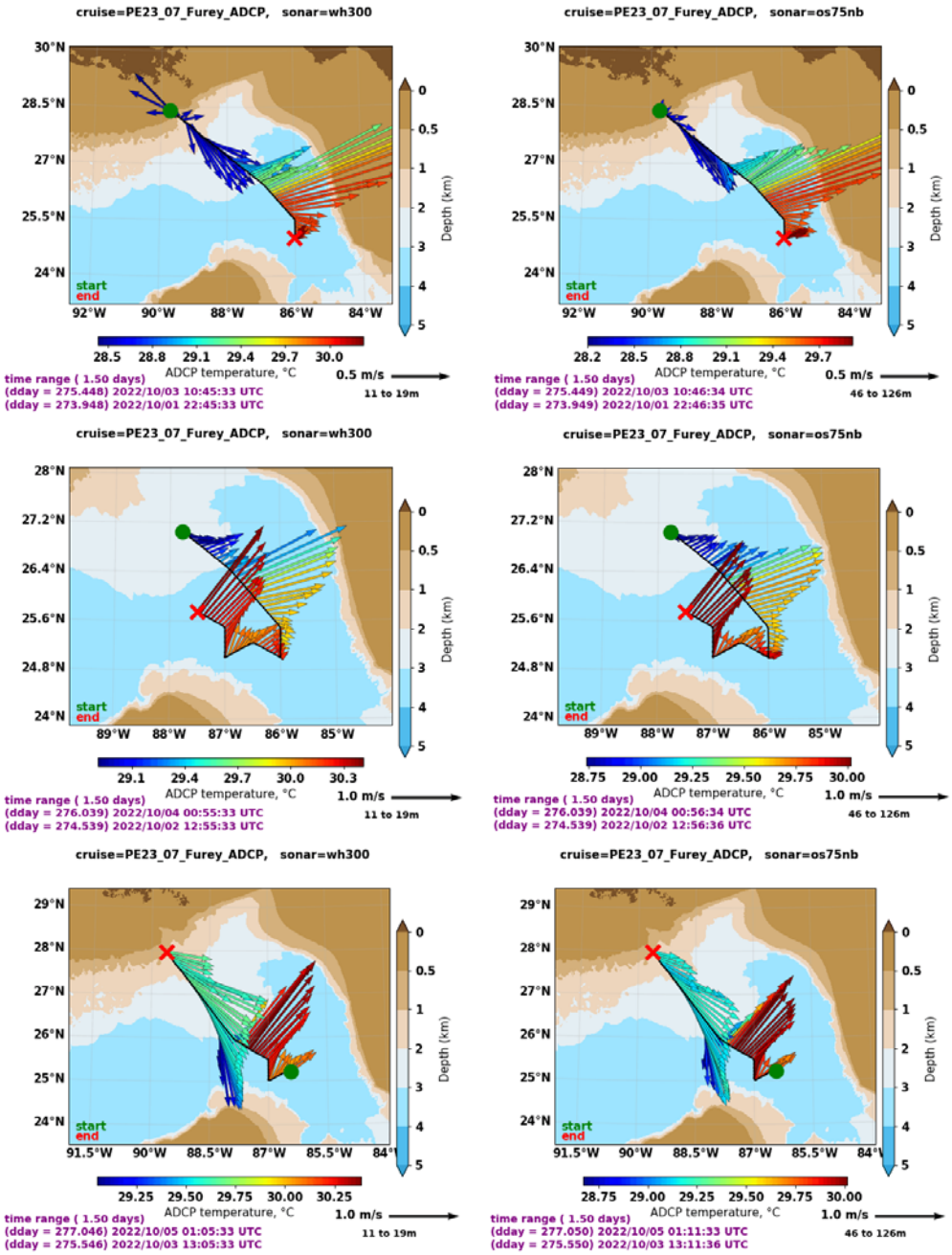

Figure 3. Progression over time of 11-19 m averaged currents (left panels) and 46-126m averaged currents (right panels). Note scale factors change between top row and bottom two rows.

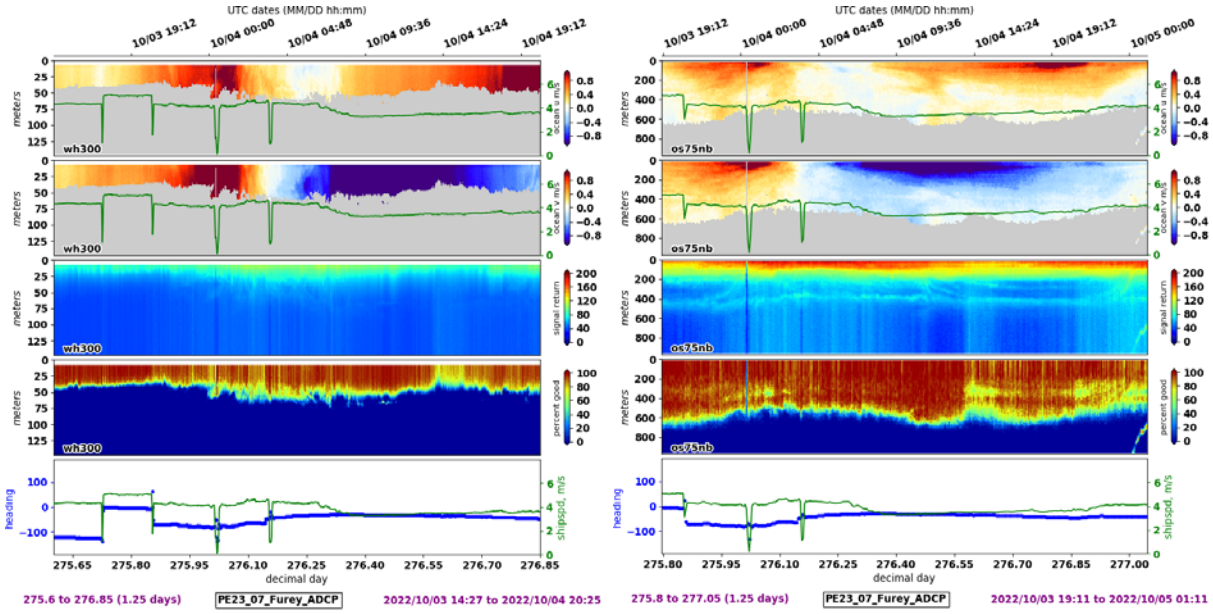

Figure 4. Hovmöller diagram of wh300 (left panel) and os75nb (right panel) ADCP data during the west-northwest crossing of Loop Current, transition zone ("saddle"), and north-northwest crossing Loop Current Eddy.

8. Notes for next cruise, lessons learned.

- Put profiling floats into "quick double profile" mission before shipment. The floats were deployed in target locations of saddle between Loop Current and Loop Current Ring. The hydrographic properties that would illustrate the dynamical processes in this location (such as interleaving) are unique. Because the floats take ~5 days to perform the first complete profile, the floats may no longer be in this saddle location. All floats should be set to have the alternate GOM mission of two full profiles before 5-day drift formatted mission. This should be uploaded prior to shipment for cruise.
- Lanyards on Niskin bottles and rosette performance assessment. The rosette and Niskins were not performing well. There was one Niskin (out of a 12-bottle rosette) that was not working at all. This could have been assessed prior to cruise. We did not need 12-Niskins of water but I and also the marine science technician should have known this prior to departure. Additionally, the top and bottom caps of the Niskins did not seem to seal entirely properly – there was a very small leak in the system, on each Niskin, which may have been attributable to loose lanyards.
- Bring printouts of Leah McRaven's expected accuracy of temperature and conductivity sensors, so we can compare Pelican CTD output against what is 'best'. Spend more time in prep prior to cruise if doing hydrography.
- Measure the freeboard and determine if deploying floats by hand is feasible and safe. If the R/V Pelican is used again for deploying floats, the floats boxes can be equipped with hand holds and the floats lowered into the water from the gangway space in the railing. The ship will need to slow down to ~1 knot, but this should make deployment simpler.

9. Acknowledgements.

This work was funded through National Academy of Science Grant #200013145 from the Understanding Gulf Ocean Systems' 'GODEEP' program. D. West was additionally funded by the NOAA grant number NA19OAR4320074.

UGOS GODEEP Station and Sampling Log ~450m

UGOS Site: test
Cruise #: PE23-07
Cast #: 001
Date: 01 October 2022
Operator: west / Fmy
SeaBird Filename: .hex

S
Lat: 28. 4903
Lon: 89-8111
Water Depth: 494 m
CTD Depth: 0 m
UTC Time: 21:17

B
Lat: 28.4890
Lon: 89. 8151
Water Depth: 499 m
CTD Depth: 472 m
UTC Time: 21:32
Altimeter: not functioning

E
Lat: 28°. 4883
Lon: 89. 8179
Water Depth: ~489 m
CTD Depth: 0 m
UTC Time: 21:44

						Oxygen	DIC/TA/pH		Salts	Nitrate	Chlorophyll				
Niskin #	Target Depth	Trip Depth	Time	Potential Temp	Salinity	Bottle #	pH Bottle #	DIC/TA Bottle #	Bottle #	Bottle #	Brown Bottle #	Filter Sample #	Brown Bottle Volume	LN Tube	Comments
1	~~4900~~	472	21:35	8.22	34.978										did not fire
2	~~4900~~	472	21:35												
3	~~4900~~	472	21:35												did not set
4	~~4900~~	472	21:35												did not set
5	~~4900~~														leaker
6	~~4900~~								B1						
7															leaky
8									B2						
9									B3						
10									B4						
11									B5						
12									B6						

Notes:

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10. Appendix: Scans of sampling logs and deployment sheets.

27hours + 29hours (@9knots

UGOS GODEEP Station and Sampling Log

UGOS Site: "C"
Cruise #: PE23-07
Cast #: 003
Date: 03-OCT-2022
Operator: Fulton/Forey/West
SeaBird Filename: .hex

S Lat: 25.000
T Lon: 86.000
A Water Depth: 3294 m
R CTD Depth: 0 m
T UTC Time: 08:12

B Lat: 24.997
O Lon: 85.997
T Water Depth: 3294~ m
T CTD Depth: 2020 m
O UTC Time: 08:48
M Altimeter: not deep enough.

E Lat: 24.994
N Lon: 85.994
D Water Depth: 3294~m
D CTD Depth: 0 m
UTC Time: 09:43

primary

						Oxygen	DIC/TA/pH		Salts	Nitrate	Chlorophyll				
Niskin #	Target Depth	Trip Depth	Time	Potential Temp	Salinity	Bottle #	pH Bottle #	DIC/TA Bottle #	Bottle #	Bottle #	Brown Bottle #	Filter Sample #	Brown Bottle Volume	LN Tube	Comments
1	~~2006~~ ~~1900~~	~~2000~~							BAD NISKIN						
2	~~2000~~ ~~1400~~	2001	08:51	4.309	34.961				Z1, Z2, Z3, Z4						slow leak
3	~~2000~~ 1700	2001	08:52	4.309	34.961				Z5, Z6, Z7, Z8						
4	~~2000~~ ~~1700~~	2002	08:54	4.309	34.961				Z9 —						
5	2000	2002	08:55	4.309	34.961				—						
6	2000	2002	08:56	4.309	34.961				Z9, Z10, Z11, Z12						very slow leak
7	1700	1701	09:04	4.337	34.958				Z13, Z14, Z15, Z16						slow leak
8	1700	1701	09:05	4.337	34.958				Z17, Z18, Z19, Z20						
9	1700	1701	09:07	4.337	34.957				—						
10	1400	1401	09:14	4.565	34.947				Z21, Z22, Z23, Z24						very slow leak
11	1400	1401	09:15	4.564	34.947				—						slow leak
12	1400	1401	09:16	4.564	34.947				Z25, Z26, Z27, Z28						very slow

Notes:

UGOS GODEEP Station and Sampling Log

UGOS Site: "A"
Cruise #: PE23-07
Cast #: 002
Date: 02-OCTOBER-2022
Operator: Fulton/Wen/Fur
SeaBird Filename: .hex

START — Lat: 26.500; Lon: 87.000; Water Depth: 2750 m; CTD Depth: 0 m; UTC Time: 18:37

BOTTOM — Lat: 26.497; Lon: 86.988; Water Depth: 2765 m; CTD Depth: 2020 m; UTC Time: 19:20; Altimeter: not applicable, but seems to be working

END — Lat: 26.492; Lon: 86.975; Water Depth: 2765 m; CTD Depth: 0 m; UTC Time: 20:14

Niskin #	Target Depth	Trip Depth	Time	Potential Temp (primary sensor)	Salinity (primary sensor)	Oxygen Bottle #	DIC/TA/pH pH Bottle #	DIC/TA Bottle #	Salts Bottle #	Nitrate Bottle #	Chlorophyll Brown Bottle #	Filter Sample #	Brown Bottle Volume	LN Tube	Comments
1	2000	2000	19:21	4.284	34.962				BAD NISKIN						
2	2000 (1400 crossed out)	2000	19:22	4.284	34.962				B1, B2, B3, B4						4 slow leak
3	2000 (1700 crossed out)	2000	19:23	4.284	34.962				B5, B6, B7, B8						8 slow leak
4	2000 (1700 crossed out)	2000	19:24	4.284	34.962				B9, B10, B11, B12						12 slow leak
5	2000	2000	19:25	4.284	34.961				—						spare
6	2000	2000	19:26	4.284	34.961				—						spare
7	0	1700	19:34	4.287	34.959				B13, B14, B15, B16						16
8	1700	1701	19:35	4.287	34.959				B17, B18, B19, B20						20
9	1700	1702	19:36	4.287	34.959				—						spare good
10	1400	1401	19:44	4.348	34.955				B21, B22, B23, B24						24 slow leak
11	1400	1401	19:45	4.348	34.955				B25, B26, B27, B28						28
12	1400	1400	19:46	4.348	34.955				—						spare

Comments margin note: just slow drops, "ok" "rolling enough"

Notes: new racbreed valves, o-rings, new hose caps.

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SOLO-2 Deployment Log

Float S/N	Start: Date/Time of Start-Up	Deployment: Date, Time GMT	Deployment Position	Notes:	Shockwatch Triggered? Y/N	SBD Message Received	Depth Check
11151	29-SEPT-2022	02-OCT-2022 13:49	26.967575N 087.65997W	RBR sensor Alto float	N	✓	2833 m
7742	29-SEPT-2022	02-OCT-2022 20:26	26.487537N 86.971582W	S2A UGOS GODEEP	N	✓	2750 m
7701	29-SEPT-2022	03-OCT-2022 04:42 GMT	25° 29.962N 85° 59.948W	S2A UGOS GODEEP	N	✓	✓
7729	29-SEPT-2022	03-OCT-2022 09:53	24.993769N 85.993705W	S2A UGOS GODEEP	N	✓	✓
7700	29-SEPT-2022	03-OCT-2022 13:39	25.249197N 086.497638W	S2A UGOS GODEEP	N	✓	
7690	29-SEPT-2022	03-OCT-2022 17:24	25.000255N 086.999680	S2A UGOS GODEEP	N	✓	
7703	29-SEPT-2022	03-OCT-2022 20:30	25.500032N 086.998913	S2A UGOS GODEEP	N	✓	
7755	29-SEPT-2022	04-OCT-2022 00:30 GMT	25.752247N 87.497180W	S2A UGOS GODEEP	N "burrito roll"		
7726	29-SEPT-2022	04 OCT-20 03:47	26.001975N 87.900268W	S2A UGOS GODEEP	N	✓	

DRIFTER DEPLOYMENT INSTRUCTIONS
WAVE DRIFTERS

1) Before deployment, remove **ONLY** the plastic shipping label on the box.
2) **DO NOT OPEN** the cardboard box.
3) Record the ID number of the buoy. This is listed on the box as well as on this document.
4) Deploy the entire cardboard box from the stern, at lowest possible deck (preferably less than 10 meters, including heave), into the sea. The ship may be traveling between 1 and 20 knots. The cardboard will dissolve, releasing the buoy.
5) Record the date, time (GMT), coordinates at deployment, and deployment details, then email this information to the Global Drifter Program.

Thank you kindly for your assistance!

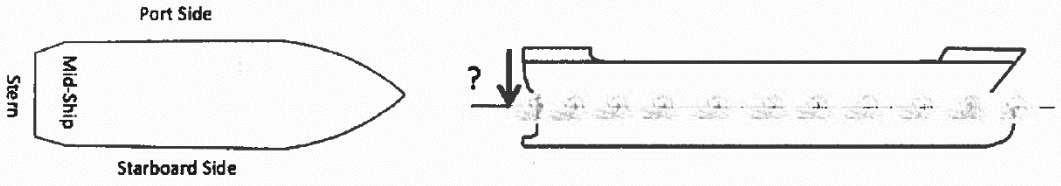
Log Sheet

Ship Name: RV Pelican

Drifter ID #	Date	Time (GMT)	Latitude	Longitude
xxxxxxxxxx	mm/dd/yy	hh:mm	DD mm.mm N/S	DDD mm.mm E/W
6894976 0	10/04/2022	03 : 50	26.003687 N	87.901392 W

Deployed From: Starboard / Port
Mid-Ship / Stern

Ship Speed: _____knots
Height Above Mean Sea Level: ____meters



Submit deployment information to:

Lucia Bertero
Lagrangian Drifter Lab
Global Drifter Program
Scripps Institution of Oceanography
9500 Gilman Drive , #0213
La Jolla, CA 92097, USA
Tel: 858-534-8595
Email: LDL_Drifter@ucsd.edu
Web link:
https://gdp.ucsd.edu/apps/projects/ldl/deployment.html

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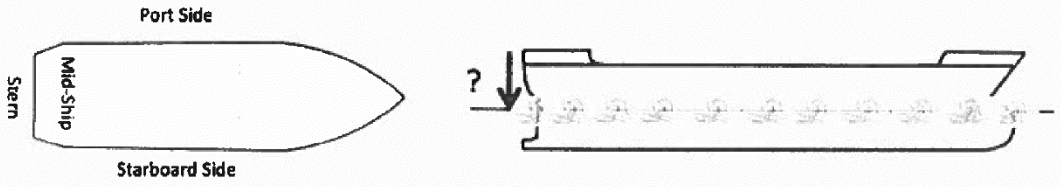
Log Sheet

Ship Name: RV Pelican

Drifter ID # xxxxxxxxxx	Date mm/dd/yy	Time (GMT) hh:mm	Latitude DD mm.mm N/S	Longitude DDD mm.mm E/W
68949640	10/04/2022	03:50	26.003852 N	87.901533 W

Deployed From: Starboard / Port
Mid-Ship / Stern

Ship Speed: _____knots
Height Above Mean Sea Level: ____meters



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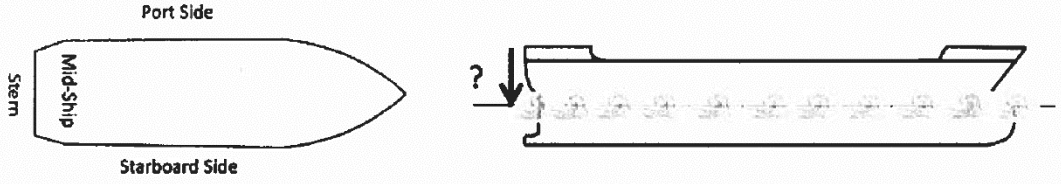
Log Sheet

Ship Name: Pelican

Drifter ID #	Date	Time (GMT)	Latitude	Longitude
xxxxxxxxxx	mm/dd/yy	hh:mm	DD mm.mm N/S	DDD mm.mm E/W
9880	10/04/2022	00:33 GMT	25.753257N	87.497598 W

Deployed From: Starboard / Port
Mid-Ship / Stern

Ship Speed: ____knots
Height Above Mean Sea Level: ____meters



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5) T), coordinates at deployment, and deployment details, then email this ifter Program.

Buoy #2
26.486650°
86.971235°
@
3:27:01 10/2/22

Thank you kindly for your assistance!

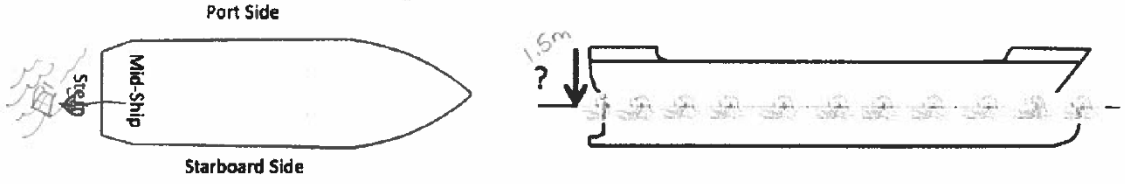
Log Sheet

Ship Name: R/V Pelican

Drifter ID # xxxxxxxxxx	Date mm/dd/yy	Time (GMT) hh:mm	Latitude DD mm.mm N/S	Longitude DDD mm.mm E/W
#9630	10/02/2022	20:27	26.4867	086.9712

Deployed From: Starboard / Port
(Mid-Ship) / (Stern)

Ship Speed: 2 knots
Height Above Mean Sea Level: 1.5 meters



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