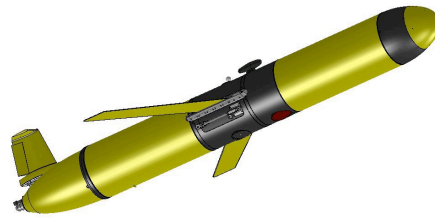
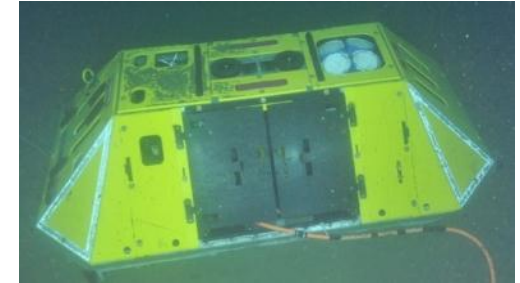




Ocean Observatories Initiative



Oct 29, 2018



The Endurance Array

Ed Dever (EA Principal Investigator/Project Scientist),
Jon Fram (EA Project Manager/Systems Engineer), Chris Wingard (EA Data Lead), Jack Barth
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Craig Risien, Linda Fayler, Stuart Pearce, David Neiman, Russ Desiderio, Johna Winters, Jeff
Woods, Jonathan Whitefield, Ian Black

... in collaboration with our WHOI (PMO, buoys, design, etc.), UW (cabled infrastructure) and
Rutgers/Raytheon (CyberInfrastructure) colleagues

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Endurance Array Turn Cruise

10

R/V Sally Ride



Endurance Array Platform Status

Operating

Not telemetering, but sampling

Not deployed or not working

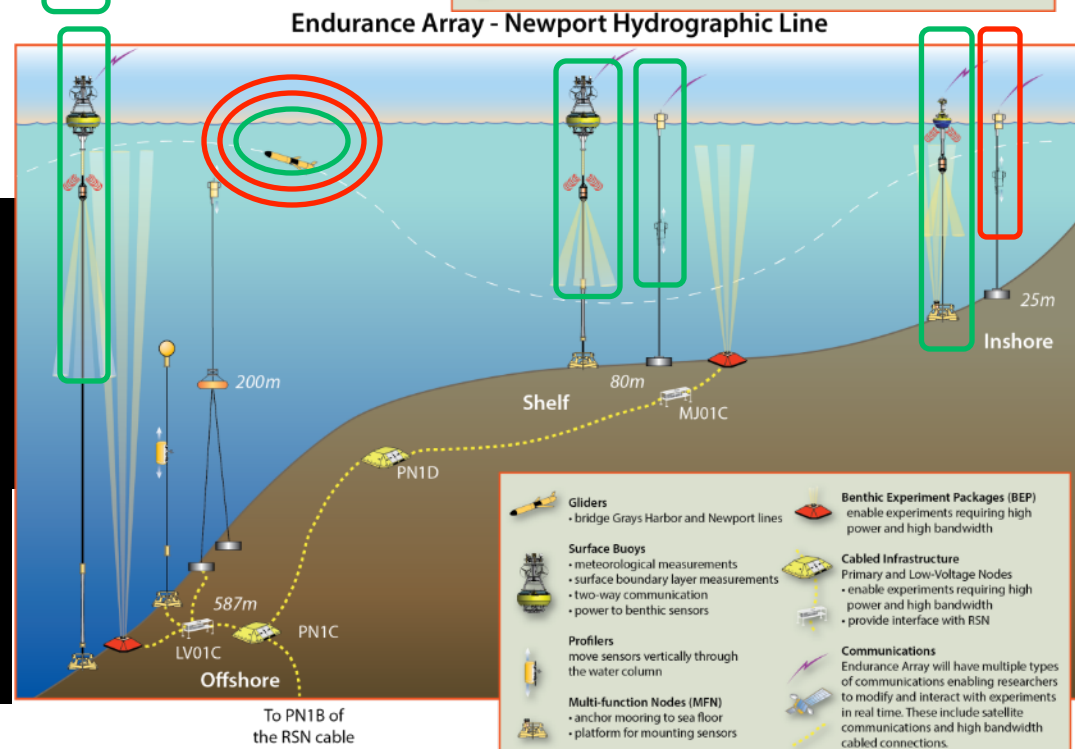
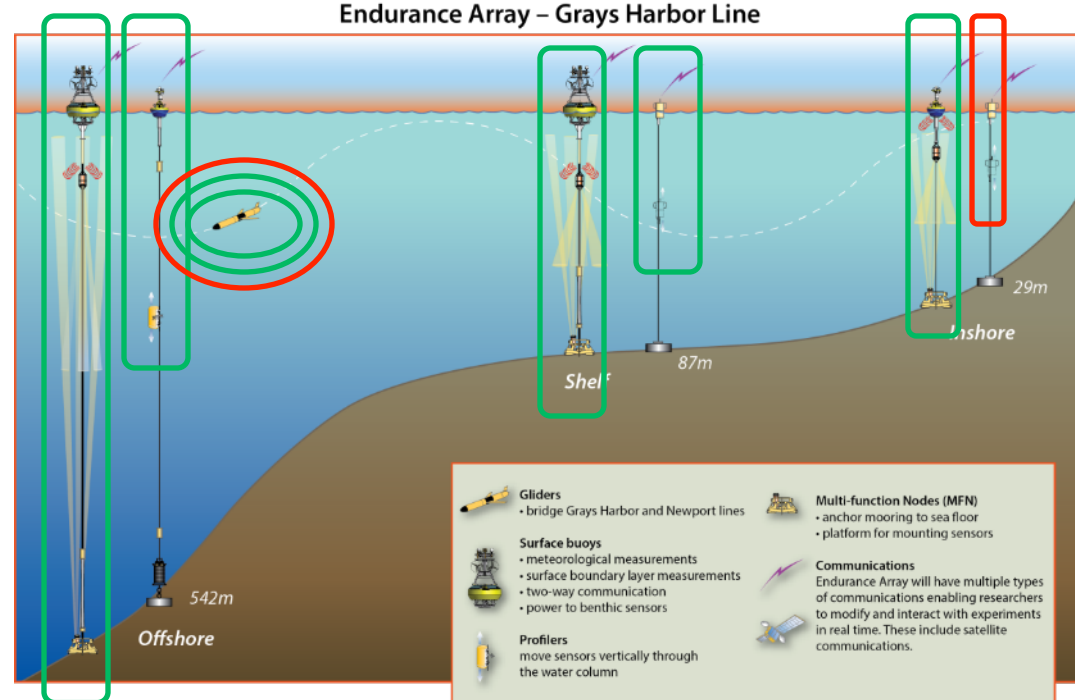
- Platforms deployed with full complement of instruments except CAMDS on CE01ISSM, CE06ISSM (failed pre-deployment testing)
- Of telemetering mooring instruments, 2 of 114 deployed instruments not working properly CE06ISSM NSIF CTD, CE04OSSM NSIF PHSEN.

Not telemetering, but presumed sampling

- CE01ISSM MFN CTD, DOSTA, ZPLSC, PC02W
- CE07SHSM MFN PRESF, ADCP, PC02W, PHSEN, CTD, DOSTA, CAMDS, ZPLSC
- CE09SHSM MFN CAMDS

Deployed, failed

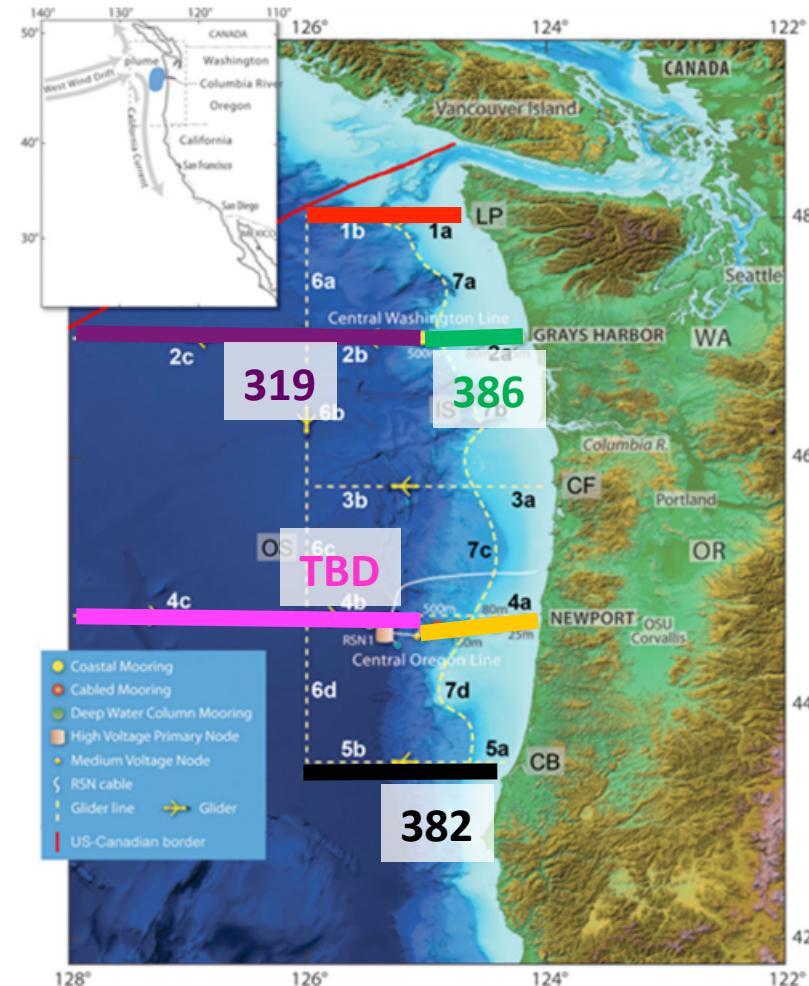
- CE01ISSM MFN DCL37: OPTAA
- CE07SHSM CPM3 DCL36 DCL 37: MFN VEL3D, OPTAA



Endurance Array Glider Coverage

Since May 2018 meeting:

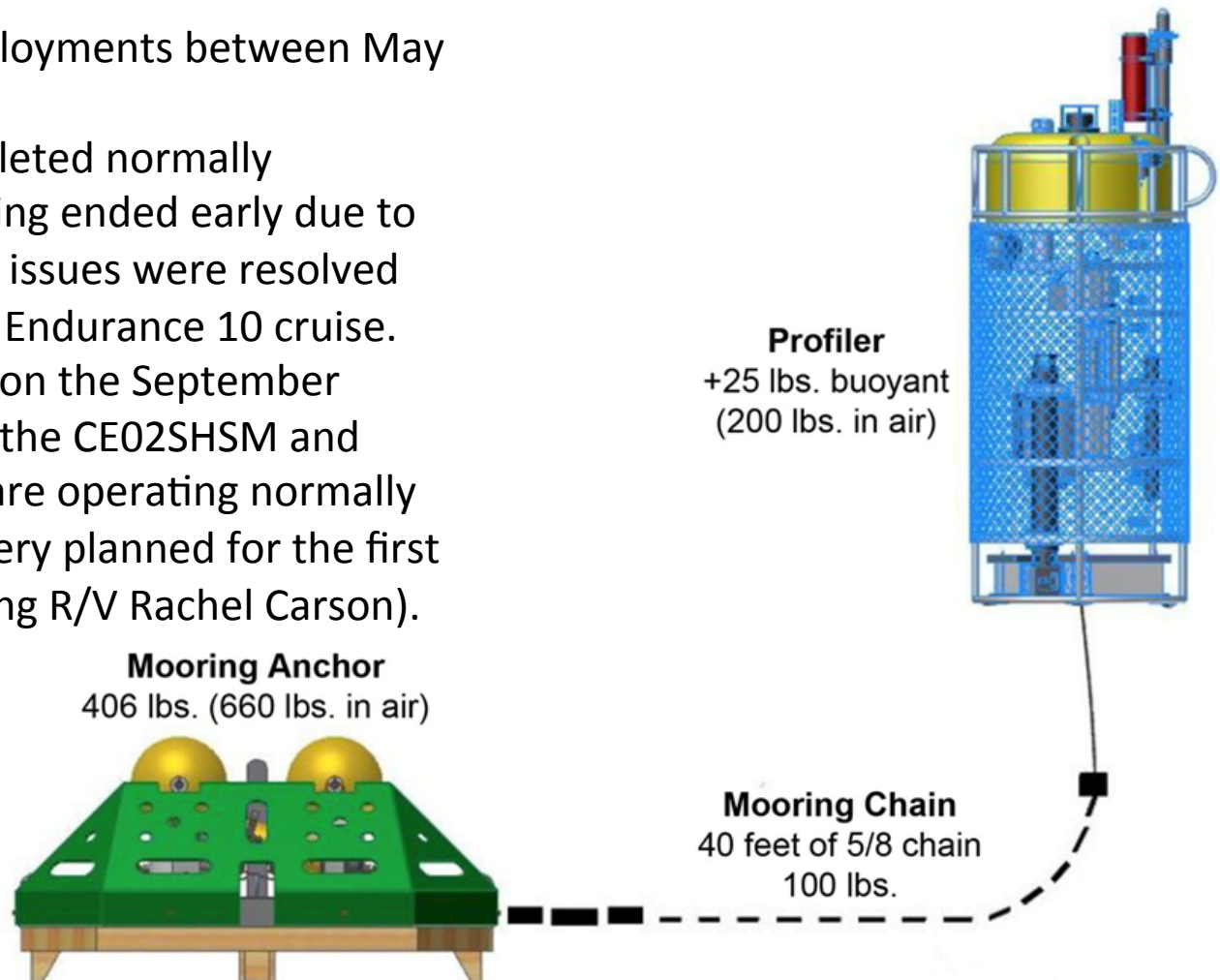
- 10 gliders deployed between 3 May and 17 Oct
- 3/10 deployments to full duration
- 3/10 deployments deployed and operating normally (well past infant mortality)
- 4/10 gliders leaked (O-ring leaks not the issue)
 - 2 aft leaks (June, Oct)
 - 2 200 m pump forward leaks (June)
- Based on leaks above
 - Service schedule on 200 m pump shortened based on the leaks above
 - Additional deep pump purchased
 - Two additional hull sections purchased
- One glider to be deployed this week weather permitting (1 Nov)
- One glider and three tail sections sent to TWR at start of OOI 2.0 after funding received. Tracking towards \$250k MoN limit



Endurance Array CSPP deployment summary

Since May 2018 meeting:

- 6 operational CSPP deployments between May and Oct
- 1/6 deployments completed normally
- 3/6 deployments profiling ended early due to firmware issues. These issues were resolved prior to the September Endurance 10 cruise.
- 2/6 deployments were on the September Endurance 10 cruise at the CE02SHSM and CE07SHSM sites. They are operating normally as of 26 Oct with recovery planned for the first week of December (using R/V Rachel Carson).



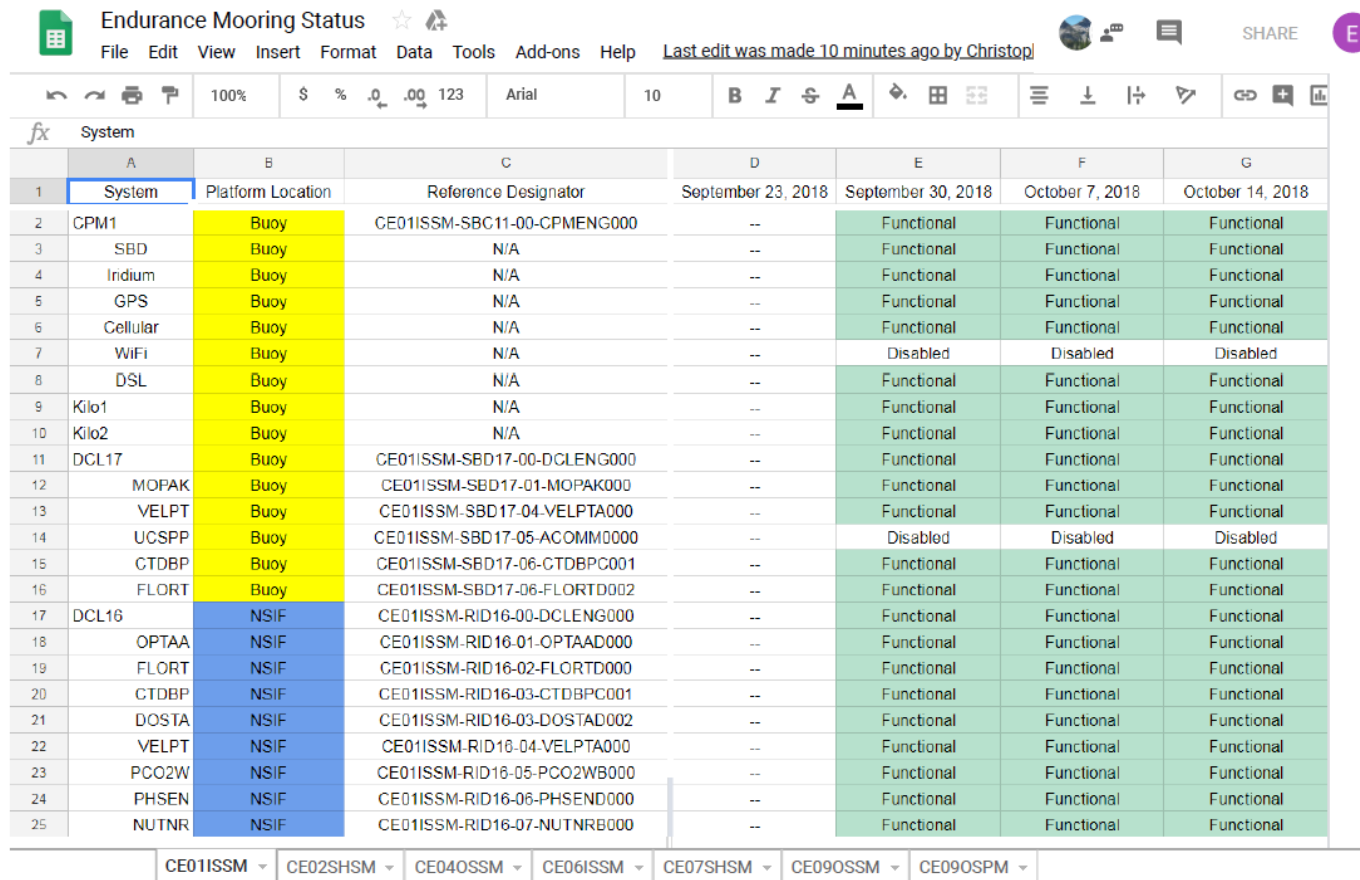
EA Weekly Status Logging (started Spring 2017)

Since May meeting:

- Transition to OOI 2.0
- Endurance 10 cruise during transition
- Transfer of asset management and ingestion responsibilities to MIO's
- Issue identified with telemetry of ingested data, affects all uncabled assets

10/25/2018

Endurance Mooring Status - Google Sheets



The screenshot shows a Google Sheet titled "Endurance Mooring Status" with a menu bar (File, Edit, View, Insert, Format, Data, Tools, Add-ons, Help) and a toolbar. The sheet contains a table with columns A through G. Column A is labeled "System" and contains various mooring system names. Column B is labeled "Platform Location" and contains "Buoy" or "NSIF". Column C is labeled "Reference Designator" and contains alphanumeric codes. Column D is labeled "September 23, 2018" and contains "--". Column E is labeled "September 30, 2018" and contains "Functional" or "Disabled". Column F is labeled "October 7, 2018" and contains "Functional" or "Disabled". Column G is labeled "October 14, 2018" and contains "Functional" or "Disabled". The table is filtered by "CE01ISSM" in the bottom filter bar.

System	Platform Location	Reference Designator	September 23, 2018	September 30, 2018	October 7, 2018	October 14, 2018
GPM1	Buoy	CE01ISSM-SBC11-00-GPMENG000	--	Functional	Functional	Functional
SBD	Buoy	N/A	--	Functional	Functional	Functional
Iridium	Buoy	N/A	--	Functional	Functional	Functional
GPS	Buoy	N/A	--	Functional	Functional	Functional
Cellular	Buoy	N/A	--	Functional	Functional	Functional
WiFi	Buoy	N/A	--	Disabled	Disabled	Disabled
DSL	Buoy	N/A	--	Functional	Functional	Functional
Kilo1	Buoy	N/A	--	Functional	Functional	Functional
Kilo2	Buoy	N/A	--	Functional	Functional	Functional
DCL17	Buoy	CE01ISSM-SBD17-00-DCLENG000	--	Functional	Functional	Functional
MOPAK	Buoy	CE01ISSM-SBD17-01-MOPAK000	--	Functional	Functional	Functional
VELPT	Buoy	CE01ISSM-SBD17-04-VELPTA000	--	Functional	Functional	Functional
UCSPP	Buoy	CE01ISSM-SBD17-05-ACOMM0000	--	Disabled	Disabled	Disabled
CTDBP	Buoy	CE01ISSM-SBD17-06-CTDBPC001	--	Functional	Functional	Functional
FLORT	Buoy	CE01ISSM-SBD17-06-FLORTD002	--	Functional	Functional	Functional
DCL16	NSIF	CE01ISSM-RID16-00-DCLENG000	--	Functional	Functional	Functional
OPTAA	NSIF	CE01ISSM-RID16-01-OPTAAD000	--	Functional	Functional	Functional
FLORT	NSIF	CE01ISSM-RID16-02-FLORTD000	--	Functional	Functional	Functional
CTDBP	NSIF	CE01ISSM-RID16-03-CTDBPC001	--	Functional	Functional	Functional
DOSTA	NSIF	CE01ISSM-RID16-03-DOSTAD002	--	Functional	Functional	Functional
VELPT	NSIF	CE01ISSM-RID16-04-VELPTA000	--	Functional	Functional	Functional
PCO2W	NSIF	CE01ISSM-RID16-05-PCO2WB000	--	Functional	Functional	Functional
PHSEN	NSIF	CE01ISSM-RID16-06-PHSEND000	--	Functional	Functional	Functional
NUTNR	NSIF	CE01ISSM-RID16-07-NUTNRB000	--	Functional	Functional	Functional

CE01ISSM CE02SHSM CE04OSSM CE06ISSM CE07SHSM CE09OSSM CE09OSPM

Notable Technical Progress

- New Power System Controllers for all four Coastal Surface Moorings (CSMs) deployed on Endurance 10 Fall 2018
- Replaced CSM buoy steel ballast with lead to facilitate VELPT compass function
- Moved anemometer around halo to prevent damage during deployment
- Found and fixed PCO2A tubing problem (Batryn)
- Many incremental changes not listed



Ancillary/data verification activities

Added biofouling settling plates to Endurance moorings as part of a study by Linsey Haram of the Marine Invasions Lab at the Smithsonian Environmental Research Center.

She is part of a NASA project to explore biofouling organisms on offshore moorings, and had identified a couple of NDBC buoys in the Pacific Northwest area that could potentially be part of the study. Similar plates are being placed on regional Canadian and NANOOS moorings. OOI personnel will photograph, remove and preserve plates on recovery and send to her for analysis.

Science Results

- Contributions to Three articles in OceanObs 19 collection of white papers
- Jack Barth continues collaboration on hypoxia with Francis Chan (OSU) and Oregon Department of Fisheries and Wildlife
- Clare Reimers continues microbial fuel cell work near Endurance Array
- Workshop Proceedings of the March 2018 NATIONAL COASTAL ECOSYSTEM MOORINGS WORKSHOP (McManus *et al.*) convened by the Alliance for Coastal Technologies being completed (Dever participated for OOI)

AWP 1 Budget reductions of \$199k to support increase in CI scope

- **Mooring refurbishment materials:** Reduced by \$58k. Will utilize spares and continue to investigate how long we can use each part. Reusing instead of replacing parts will add risk.
- **Glider refurbishment materials:** Reduced the budget by the cost of 2 glider battery packs (\$50k) because we plan to have 5 instead of the planned 6 gliders in the water for the first half of PY1 as the glider vendor works through its service backlog for our gliders.
- **Mooring instrument refurbishment ODC:** Reduced the budget by \$59k because we will no longer have the CAMDS vendor service cameras and we will not deploy a ZPLSC at CE09OSSM until the vendor responds to pressure case leaks. The CAMDS vendor has failed to service cameras to a deployable state. We are pursuing replacing these cameras with those from another vendor, but we will not request a budget for this replacement until after our spring cruise, when we will have a better understanding of our costs to complete PY1. The ZPLSC has flooded at CE09OSSM 3 times. It is the deepest site for this instrument in OOI (coastal or global).
- **CSPP refurbishment ODC:** Reduced the budget by one full CSPP service (\$32k) because we will extend the time between service from 12 to 18 months for 2 CSPPs. This is possible because these two units will see only 6 months of at sea time in 18 months due to firmware delays in OOI 1.0. We plan to deploy the full suite of CSPPs in OOI 2.0 PY1.

Other Challenges

- Instruments
 - Continued CAMDS issues. Kongsberg has sold the camera division to Imenco. Kongsberg servicing uncertain.
 - OPTAA service continues to be slow. SeaBird recently hired additional technicians.
- Glider leaks in summer 2018
 - Purchased one new 1000 m pump
 - Sending 200 m pumps back to TWR after every deployment
 - Purchased two new hull sections
 - Spare sensors integrated into bays and shipped to OSU, WHOI
 - Tail section servicing backlog
- UNOLS ship costs higher than budgeted. Will work with UNOLS ship scheduling to update and reduce length of Spring 2019 Endurance cruise (R/V Sikuliaq) by 2-3 days to remain within budget
- Heavy Lift Winch used successfully on Fall 2017, Spring 2018, and Fall 2018 cruises. Some continuing issues with lineout readouts.