

Axial 2020 Cruise Report

Axial Seamount, Juan de Fuca Ridge

TN383

R/V Thompson

September 1 – 20, 2020

Newport, OR to Newport, OR

ROV Jason Dives J2-1293 - 1297

AUV Sentry Dives 562 - 568

Chief Scientist: Bill Chadwick

R/V Thompson Captain: Russell Devaney

ROV Jason Expedition Leader: Tito Collasius

AUV Senty Expedition Leader: Zac Berkowitz

Cruise Report prepared by: Bill Chadwick

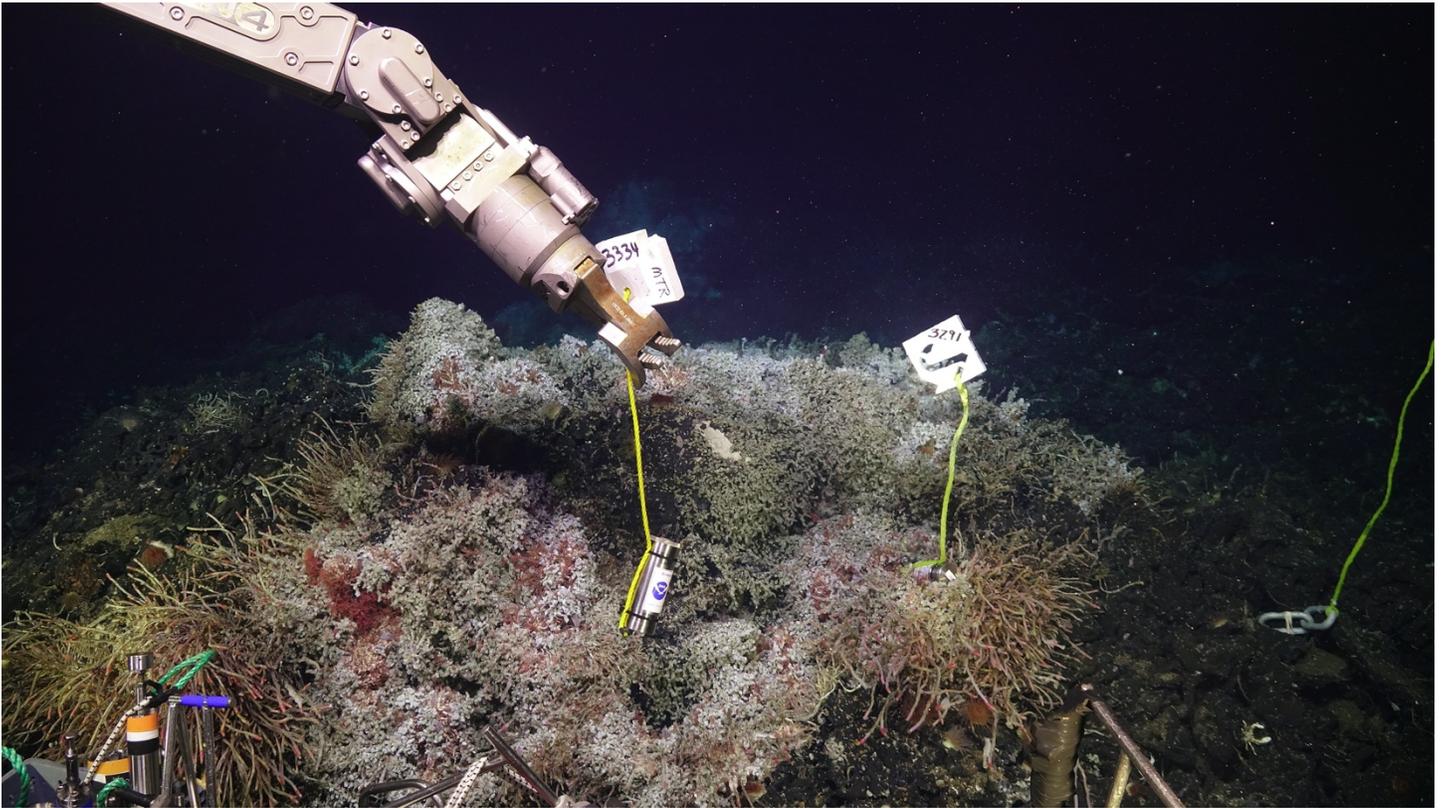


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Axial 2020 Expedition Cruise Report
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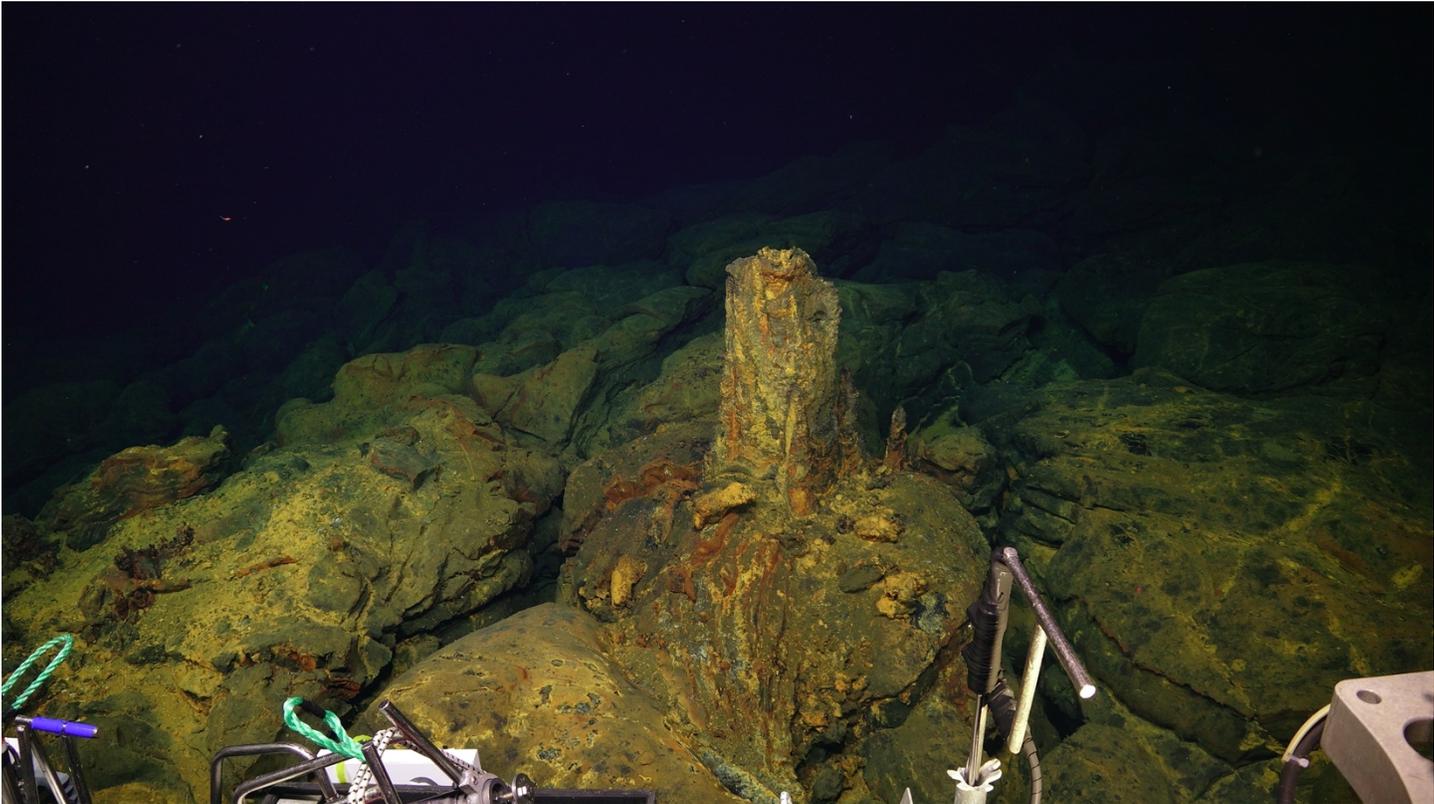
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Placing MTR temperature recorders at Anemone vent in the ASHES vent field on ROV Jason dive J2-1293.



Fathead Sculpin fish seen near Anemone vent in the ASHES Vent field during ROV Jason dive J2-1293.



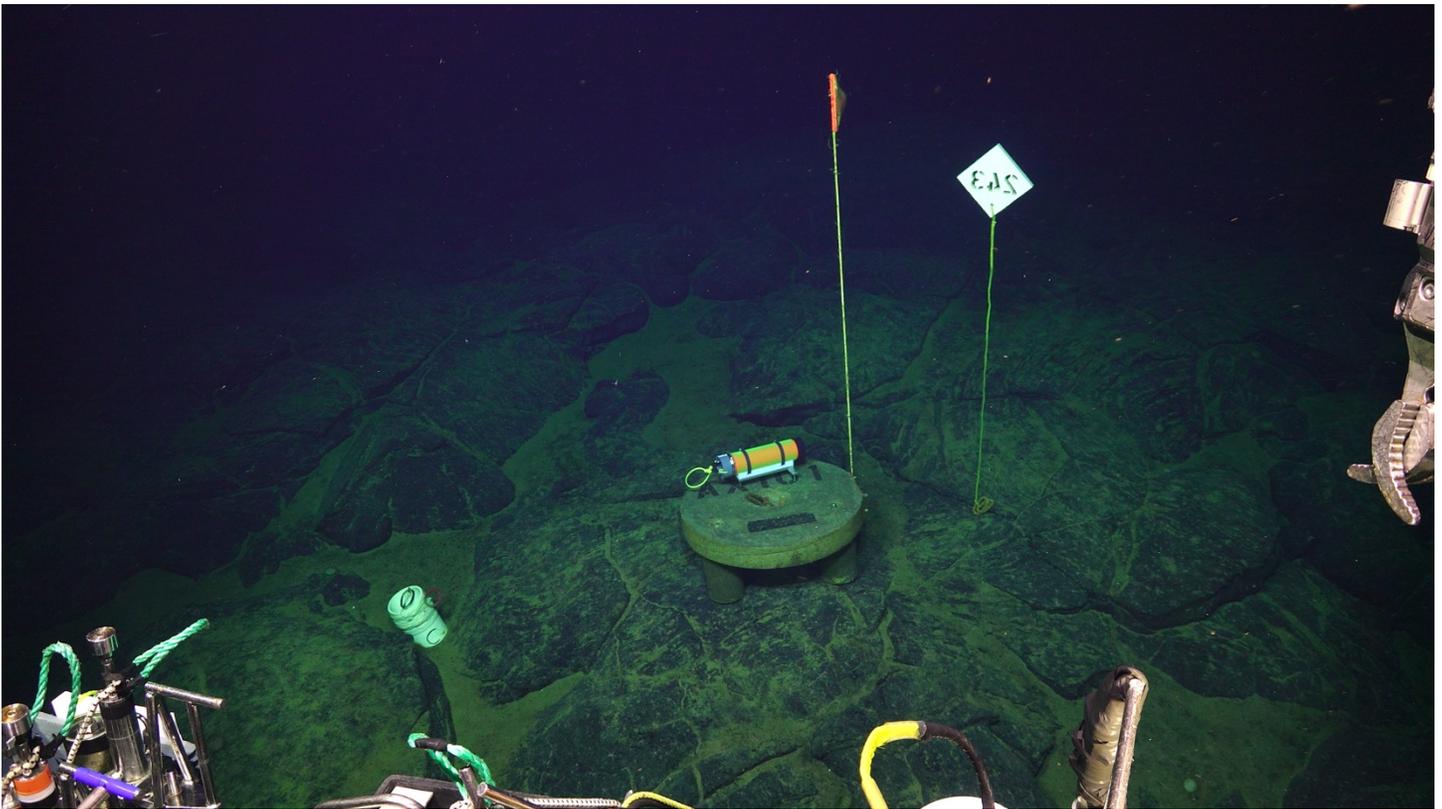
Inactive mini-smoker chimney on 2015 lava flow on Axial's north rift zone, that had been active in 2016 & 2017, seen during ROV Jason dive J2-1294.



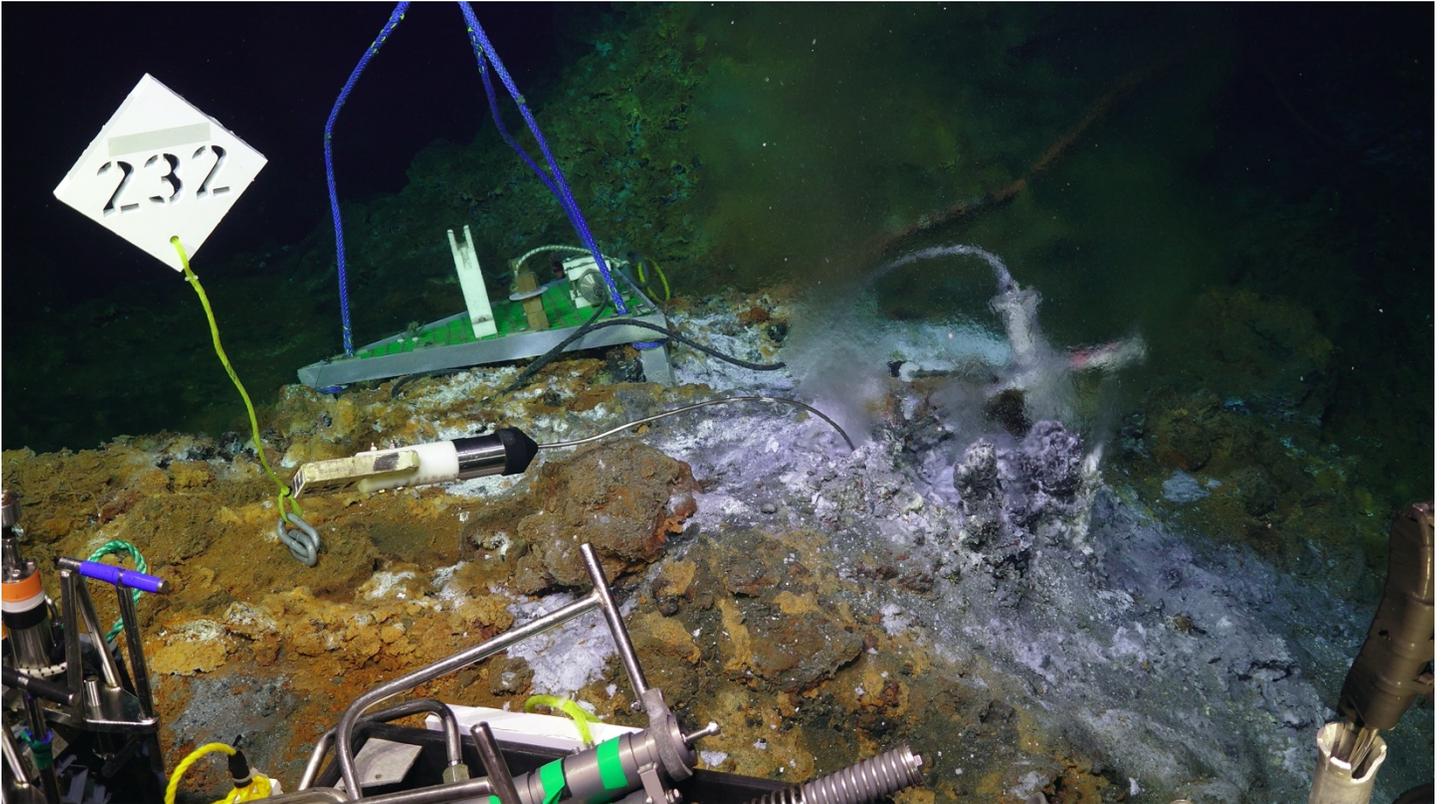
Inactive mini-smoker chimneys seen during ROV Jason dive J2-1294 on 2015 lava flow on Axial's North Rift Zone.



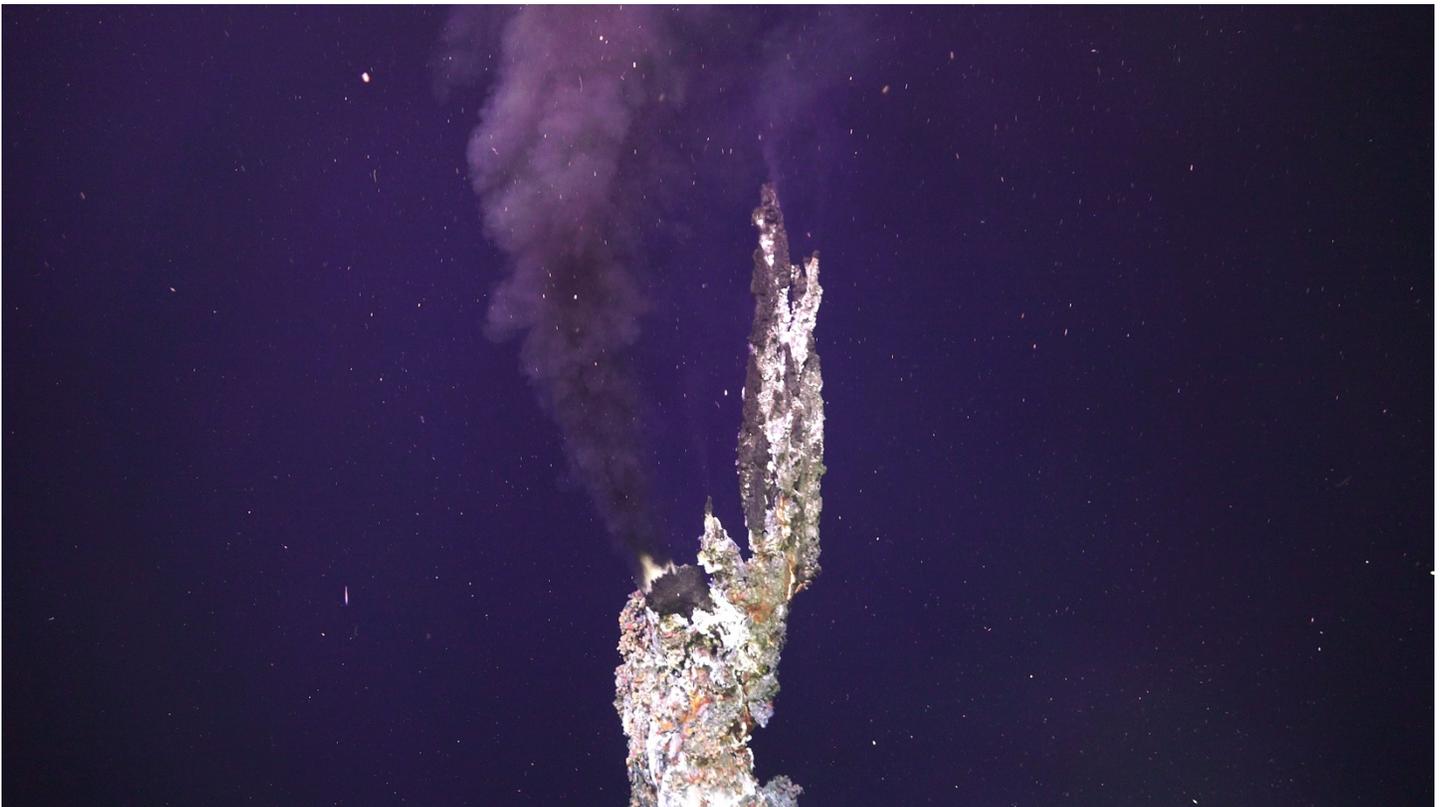
Nudibranch and string of eggs seen on a hydroid growing on the flag at pressure benchmark AX-307 during ROV Jason dive J2-1295. Lonny Lundsten of MBARI thinks this may be *Cuthona methana*, but we'd need to collect a specimen to know for sure (next time?).



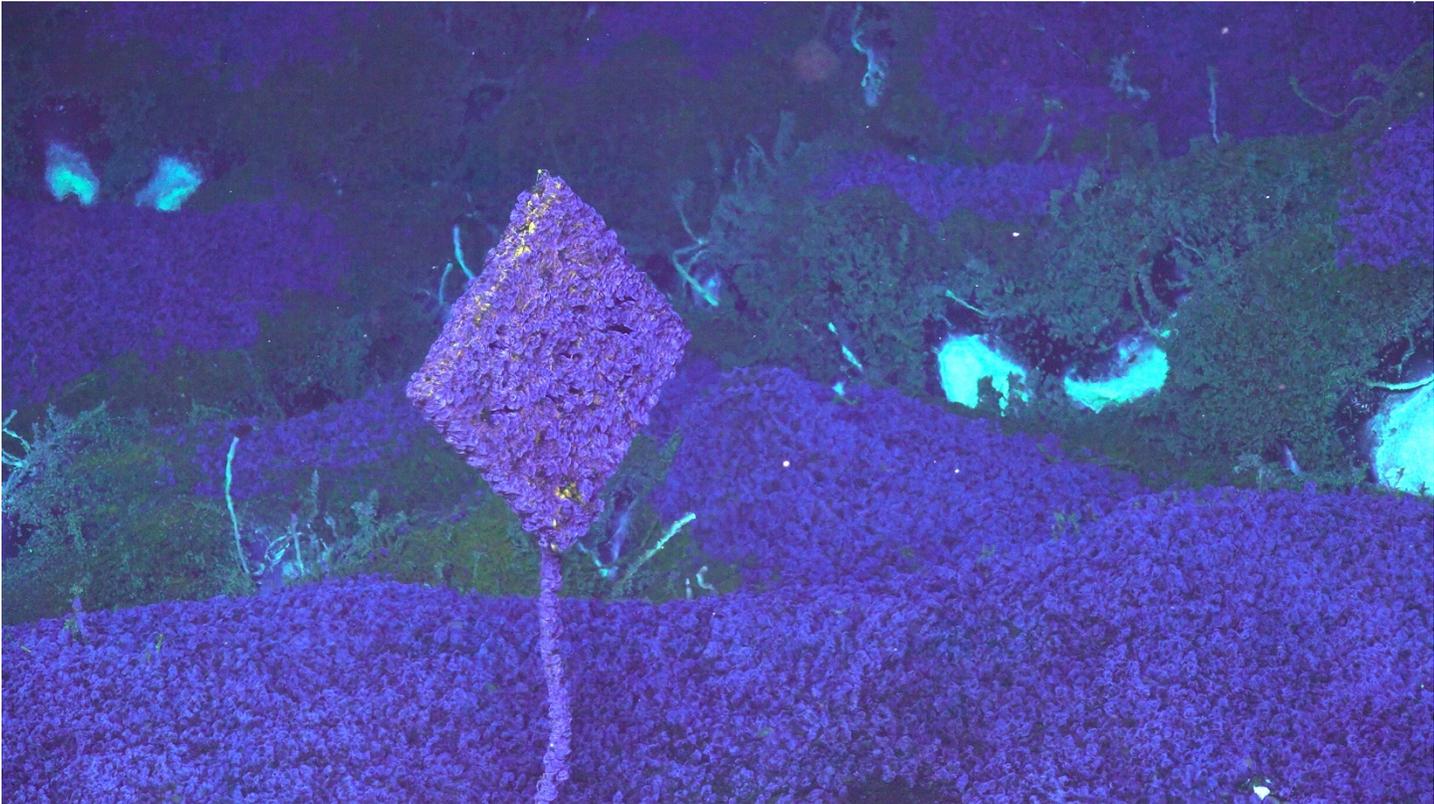
Approach to pressure benchmark AX-101 at the center of the caldera during ROV Jason dive J2-1295. A mini-BPR is already on the benchmark. White bucket to the left is a tephra sampler.



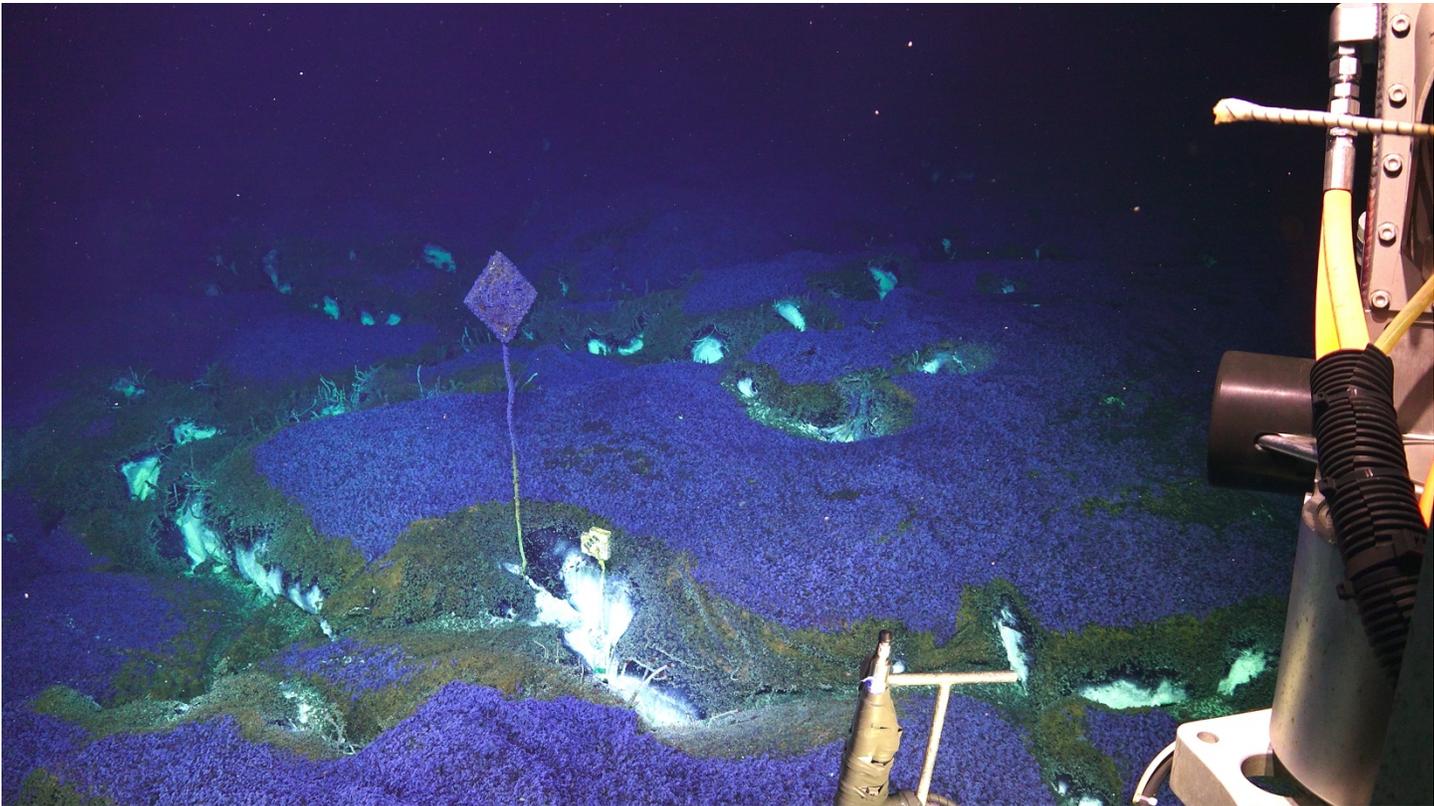
New HOBO temperature probe and marker 232 at Diva vent in the International District vent field seen on ROV Jason dive J2-1296.



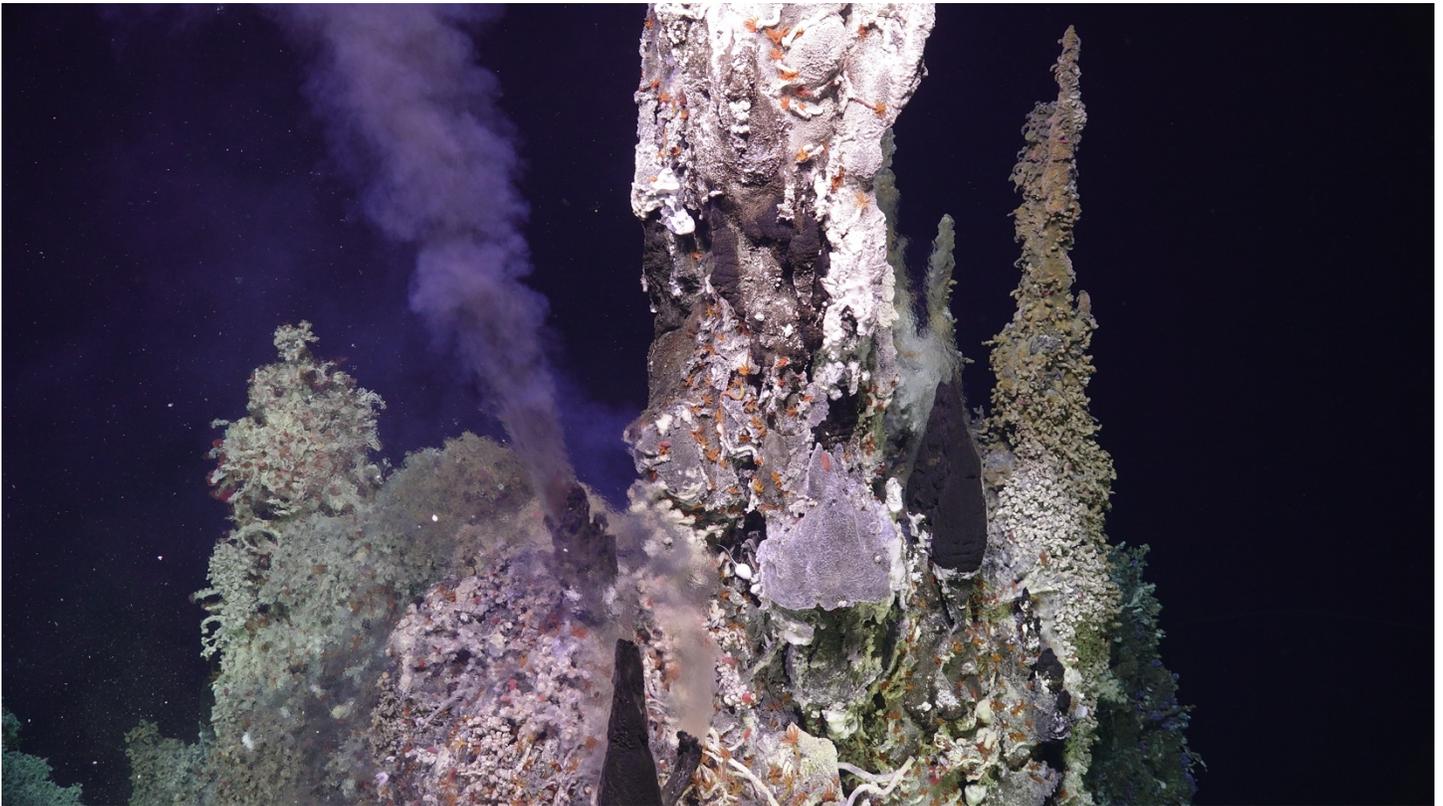
Top of El Guapo black smoker chimney in the International District vent field, seen during ROV Jason dive J2-1296.



Incredible blue mat (a ciliate protozoan, *Folliculinopsis* sp. as described by Kouris et al. 2007) seen at Marker N3 vent during ROV Jason dive J2-1296.



A wider view of the blue mat at Marker N3 vent, seen during ROV Jason dive J2-1296.



Top of Inferno black smoker chimney in the ASHES vent field seen during ROV Jason dive J2-1297.



Sulfide worms and scaleworms on the side of Inferno chimney in the ASHES vent field seen during ROV Jason dive J2-1297.

1 - Axial 2020 Cruise Summary

Bill Chadwick, Chief Scientist

This being the year of COVID-19, our research cruise to Axial Seamount almost didn't happen. It was originally scheduled to occur on *R/V Revelle* in August 2020, after ship yard work in the late spring. However, those plans were upended by the pandemic, which caused UNOLS to suspend all sea-going operations indefinitely on March 13, 2020. On March 30, UNOLS extended the stand-down to July 1st, with the possibility of operations starting thereafter. However, it soon became apparent that *Revelle's* ship yard work was going to be delayed and that it would not be able to host NE Pacific cruises in the summer of 2020. On the other hand, *R/V Thompson* had been recalled to its home port in Seattle from Fiji, and so it was suddenly available. After a process of risk evaluation and science prioritization, NSF & UNOLS re-built the ship schedules and in mid-late April our cruise was tentatively rescheduled on *R/V Thompson* between September 1-20, 2020, with ROV *Jason* and AUV *Sentry* on board, and was the 4th of 4 cruises in and out of Newport. For many months it was still uncertain if it would really take place, but eventually it did.

Many COVID-19 mitigation measures were enacted, including minimizing the size of science parties, requiring a strict 14-day pre-cruise quarantine with COVID testing at the beginning and end of that period, and the requirement that any public travel to meet the cruise would have to be done *before* the quarantine. That last requirement made it difficult or impossible for some colleagues to join the cruise, unfortunately (including Scott Nooner and Dave Caress). As partial compensation, NSF & UNOLS made enhanced satellite internet bandwidth available for the NE Pacific cruises on *Thompson*, which made it possible to live-stream ROV video during *Jason* dives (via a UW web site), and easier to communicate and exchange data from ship to shore.

The Axial 2020 cruise had the following main objectives: conducting pressure measurements with ROV *Jason* at seafloor benchmarks, turning around moored bottom pressure recorder instruments between ROV *Jason* dives, collecting repeat bathymetry with AUV *Sentry* - all to document depth changes due to volcanic inflation and deflation in Axial Seamounts eruption cycle. In addition, another important goal was the testing and implementing Terrain Relative Navigation (TRN) software developed at MBARI on AUV *Sentry*, to improve our ability to conduct the repeat bathymetric surveys when the AUV is outside of acoustic communication with the ship. This work was funded by NSF award OCE-1736926 to PI's Nooner, Chadwick, and Caress. A separate NSF grant (OCE-1924024 to Spahr Webb) supported a piggybacked project to deploy and recover new crustal compliance instruments in the summit caldera of Axial Seamount using the ship and ROV *Jason*. Other objectives included collecting time-series vent fluid samples for chemical analysis, turning around temperature probes at select vents, collecting seawater samples with Niskin bottles during CTD casts and ROV *Jason* dives to sample for e-DNA in hydrothermal plumes, and collecting repeat ship-based multibeam data over the summit and rift zones of Axial Seamount (these were for collaborating PIs Butterfield, Baumberger, Beeson, and McAllister from NOAA/EOI & OSU/CIMRS & UW/CICOES). We also collected a short multibeam sonar survey over the ASHES vent field with the new Kongsberg EM2040 sonar on ROV *Jason* as a test for colleague Guangyu Xu at UW/APL to see if useful information about hydrothermal plumes could be derived from the recorded water-column data.

Despite 5 days when high winds and seas prevented us from diving with *Jason* and *Sentry* during the cruise, we were able to accomplish all our major science objectives. We made 5 ROV *Jason* dives, 7 AUV *Sentry* dives, 9 CTD casts, 5 instrument mooring turn-arounds, and collected useful multibeam sonar data.

The pressure measurements at our array of seafloor benchmarks were accomplished during one long ROV *Jason* dive (J2-1295) this year. We found the center of the caldera had risen 48 cm since the last survey in 2018, and 2.1 m since the end of the 2015 eruption. That means the volcano has recovered over 80% of the 2.54 m of deflation that occurred during the last eruption. However, the rate of inflation has been decreasing with time since the 2015 eruption, and especially since a distinct slow-down in May 2019, and consequently our eruption forecast window has also moved forward in time. Currently, it looks like the next eruption won't be due until sometime between 2022 and 2026, depending on how the inflation rate varies between now and then. We are monitoring the rate of inflation using the real-time data from the OOI Cabled Observatory, and we will be attempting to refine our eruption forecast as it gets closer.

The AUV *Sentry* dives were made to resurvey previously run multibeam sonar lines to document depth changes between this year's survey and previous ones, which complement the pressure measurements that we make on the seafloor. The AUV resurveys have lower resolution for detecting depth change, but we can make them quickly and over a much larger area than is practical to cover with the pressure measurements. This year's AUV surveys repeated the spider-web pattern, including crisscrossing lines inside the caldera, radial lines extending outside the caldera, and two sets of circumferential ovals at different distances outside the caldera. This year we added some extra lines further to the south and southeast to see how far the deformation field extends in those directions. These data will help us model the subsurface magma storage and supply system at Axial Seamount.

Deb Kelley and the OOI team at University of Washington were very helpful to our Education and Outreach efforts during the Axial2020 cruise by allowing us to host live ship-to-shore video from the ship to their Interactive Oceans web site, allowing us to use their video streaming hardware and voice-over-IP phones on the ship, and by hosting a cruise blog on their web site:

<https://interactiveoceans.washington.edu/09/2020/>

Especially in this year of COVID-19, we are grateful to UNOLS and the National Science Foundation for supporting this research and for helping make the cruise happen. We also appreciate the support from the University of Washington, the captain and crew of *R/V Thompson*, the National Deep Submergence Facility at the Woods Hole Oceanographic Institution, and the ROV *Jason* and AUV *Sentry* teams. And a personal thanks to our smaller-than-usual science party at sea, and our collaborators on shore for all your contributions to making the Axial 2020 cruise so successful.



Some oddities of this year's cruise: Short-eared owl that visited ship, and sunset through fire smoke (both photos by Croy Carlin).

2 – Science Participants

Science Party	Affiliation	Expertise
Bill Chadwick	Oregon State U.	Geology
Jeff Beeson	Oregon State U.	Geology
Spahr Webb	Lamont	Geophysics
Pete Lilijgren	Lamont	Geophysics
Ted Koczynski	Lamont	Geophysics
Chris Holm	Oregon State U.	Mooring tech
Bill Hanshumaker	Oregon State U.	Watch stander
Leland Wood	U. Washington	Watch stander
Kelly Chadwick	U. Washington	Watch stander
Emily Norton	U. Washington	CTDs/E-DNA
AUV Sentry Team		
Zac Berkowitz	AUV Sentry group	Expedition Leader
Justin Fujii	AUV Sentry group	Sentry
Stefano Suman	AUV Sentry group	Sentry
Amanda Sutherland	AUV Sentry group	Sentry
Joe Garcia	AUV Sentry group	Sentry
ROV Jason Team		
Tito Collasius	ROV Jason group	Expedition Leader
Rose Wall	ROV Jason group	Jason
Jim Varnum	ROV Jason group	Jason
Scott McCue	ROV Jason group	Jason
James Pelowski	ROV Jason group	Jason
Chris Lathan	ROV Jason group	Jason
Korey Verhein	ROV Jason group	Jason
Danik Forsman	ROV Jason group	Jason
Summer Farrell	ROV Jason group	Jason
Drew Bewley	ROV Jason group	Jason
UW Marine Techs		
Croy Carlin	U. Washington	Marine Tech.
Steve Jalickee	U. Washington	Marine Tech.

3 – Operations Log

date UTC	time UTC	date local	time local	Description
9/1/2020	20:30	9/1/2020	13:30	Depart Newport
	21:00		14:00	Started logging EM302 multibeam sonar data (water column data logging started about 5-10 minutes later). Outgoing survey includes WPs 1-4. Survey speed = 8 kts
9/2/2020	05:00		22:00	End of multibeam survey. Water column logging turned off. Speed = 12 kts
	21:30	9/2/2020	14:30	Arrive at Axial Seamount at BPR-Center site
	21:40		14:40	Sent release command to BPR-Center and thought it was released but it was not. After multiple attempts, it returned a "not released" signal while ranging was enabled. We then disabled the release, and sent the release command again, and this time it released.
	23:10		16:10	15:50 BPR-Center at the surface, 16:10 on deck.
	23:30		16:30	Sent release command to BPR-West. 16:50 on surface.
9/3/2020	00:10		17:10	BPR-West on deck.
	00:45		17:45	CTD cast #1 at ASHES - at surface starting down
	02:20		19:20	CTD cast #1 at ASHES - end of cast, CTD at surface
	05:00		22:00	Transit to 1200-m long hydrophone mooring deployment site (for Bob Dziak)
	06:30		23:30	Started deployment of hydrophone mooring
	08:17	9/3/2020	01:17	Hydrophone mooring released
	10:00		03:00	Acoustic survey of hydrophone mooring location completed
				Transit to deployment site for Sentry dive #562
	13:48		06:48	Sentry launched - BEGIN DIVE 562 (1st engineering dive)
	21:10		14:00	Sentry Wave Glider launched
	23:45		16:45	Sentry recovered - END DIVE 562
				Transit to Jason dive site for J2-1293
9/4/2020	02:40		19:40	Deployed 1st Webb compliance instrument & cover at Webb-4 site
	03:50		20:50	Jason launched - BEGIN DIVE J2-1293 (deploy Webb instruments & ASHES)
	09:30	9/4/2020	02:30	Ship recovered float from 1st Webb instrument (Jason then sampled at ASHES)
	21:04		14:05	Deployed 2nd Webb cover at Webb-6 site
	21:50		14:50	Deployed 2nd Webb compliance instrument at Webb-6 site
9/5/2020	01:47		18:47	Ship recovered float from 2nd Webb instrument
	05:10		22:10	Deployed 3rd Webb compliance instrument at Webb-5 site (without beacon)

	09:10	9/5/2020	02:10	Deployed 3rd Webb cover at Webb-5 site
	14:45		07:45	Ship recovered float from 3rd Webb instrument
	17:15		10:30	Jason recovered - END DIVE J2-1293
	17:50		10:50	Sentry launched - BEGIN DIVE 563 (1st science dive)
9/6/2020	00:50		17:50	Sentry recovered - END DIVE 563
				Transit to Jason dive site for J2-1294 on NRZ
	03:15		20:15	Jason launched - BEGIN DIVE J2-1294 (Explore mini-smoker site on NRZ)
	15:15	9/6/2020	08:15	Jason recovered - END DIVE J2-1294
	16:40		09:40	Start EM302 multibeam survey of NRZ @ 5 knots
	20:10		13:10	End of EM302 multibeam survey of NRZ
	21:40		14:40	OBH-Center mooring released (13:45) and recovered on deck (14:40)
	23:15		16:15	BPR-South-2 mooring released (15:30) and recovered on deck (16:15)
9/7/2020	02:09		19:15	CTD cast #2 at International District - at surface starting down
	03:36		20:36	CTD cast #2 at International District - CTD back on deck
	09:20	9/7/2020	02:20	Start EM302 multibeam survey of SRZ @ 5 knots
	16:00		09:00	End of EM302 multibeam survey of SRZ
				Transit back to caldera for CTD cast
	21:00		14:00	CTD cast #3 at Vixen vent - at surface starting down
	22:00		15:00	CTD cast #3 at Vixen vent - CTD back on deck
9/8/2020	15:30	9/8/2020	08:30	BPR-Southeast mooring deployed
	16:30		09:30	Survey of BPR-Southeast mooring
	20:00		13:00	CTD cast #4 at CASM vent - at surface starting down
	21:20		14:20	CTD cast #4 at CASM vent - back on deck
	23:00		16:00	Ship rendezvous with Sentry Wave Glider for visual inspection
9/9/2020	00:40		17:40	Survey of BPR-West mooring
	01:55		18:55	Survey of BPR-East mooring
	15:00	9/9/2020	08:00	CTD cast #5 at SRZ - at surface going down
	16:30		09:30	CTD cast #5 at SRZ - back on deck
	19:30		12:30	Made approach with ship to Sentry Wave Glider, but didn't recover
	23:00		16:00	Ready for Sentry #564 launch, but ended up delayed due to sonar issues
9/10/2020	01:20		18:20	Float deployed for recovery of Webb instrument at Webb-5 site
	01:40		18:40	Jason launched - BEGIN DIVE J2-1295 (Webb recoveries & Pressure dive)
	07:30	9/10/2020	00:30	Webb-5 instrument on deck

	11:10		04:10	Float deployed for recovery of Webb instrument at Webb-4 site
	14:40		07:40	Webb-4 instrument on deck
	16:35		09:35	Float deployed for recovery of Webb instrument at Webb-6 site
	20:00		13:00	Webb-6 instrument on deck
	20:45		13:45	Sentry launched - BEGIN DIVE 564 (2nd science dive)
9/11/2020	15:25	9/11/2020	08:25	Sentry recovered - END DIVE 564 (2nd science dive)
9/12/2020	04:20		21:20	Sentry launched - BEGIN DIVE 565 (3rd science dive)
	13:40	9/12/2020	06:40	Sentry recovered - END DIVE 565 (3rd science dive)
9/13/2020	13:40	9/13/2020	06:40	Sentry launched - BEGIN DIVE 566 (4th science dive)
9/14/2020	03:00		20:00	Jason recovered - END DIVE J2-1295 (pressure dive)
	04:10		21:10	Sentry recovered - END DIVE 566 (4th science dive)
	05:30		22:30	CTD cast #6 at NRZ - at surface going down
	07:00	9/14/2020	00:00	CTD cast #6 at NRZ - back on deck
				(Heavy weather - no science ops)
9/15/2020	15:45	9/15/2020	08:45	CTD cast #7 at Dymond - at surface going down
	17:45		10:45	CTD cast #7 at Dymond - back on deck
9/16/2020	01:00		18:00	CTD cast #8 at mid-NRZ - at surface going down
	02:30		19:30	CTD cast #8 at mid-NRZ - back on deck
	15:00		08:00	Sent release command to BPR-North (had position slightly wrong, so took longer)
	16:10	9/16/2020	09:10	BPR-North on deck
	17:20		10:20	Deployed 1st Webb cover at Webb-2 site
	17:50		10:50	Deployed 1st Webb compliance instrument & float at Webb-2 site
	19:15		12:15	Jason launched - BEGIN DIVE J2-1296 (2nd Webb instrument deployments)
	22:55		15:55	Float recovered
	23:30		16:30	Sentry launched - BEGIN DIVE 567 (5th science dive)
9/17/2020	01:00		18:00	Deployed 2nd Webb cover at Webb-2 site
	01:45		18:45	Deployed 2nd Webb compliance instrument & float at Webb-2 site
	05:10		22:10	Float recovered
	15:40	9/17/2020	08:40	Sentry recovered - END DIVE 567 (5th science dive)
	23:00		16:00	Jason recovered - END DIVE J2-1296
	23:50		16:50	BPR-North mooring deployed
9/18/2020	03:50		20:50	Sentry launched - BEGIN DIVE 568 (6th science dive)
	07:00	9/18/2020	00:00	Jason launched - BEGIN DIVE J2-1297 (ASHES, 2nd Webb instrument recoveries)
	18:30		11:30	Float deployed at Webb-2
	22:00		15:00	First float + instrument + cover on deck

	23:45		16:45	Sentry recovered - END DIVE 568 (6th science dive)
9/19/2020	00:45		17:45	Float deployed at Webb-2
	04:30		21:30	Jason recovered - END DIVE J2-1297
	05:15		22:15	Second float + instrument + cover on deck
	05:30		22:30	Start multibeam survey of Western south rift zone
	12:45	9/19/2020	05:45	End multibeam survey of Western south rift zone
				Start transit to Newport (logging multibeam; speed = 12 knots)
	16:05		09:05	CTD cast #9 - background - at surface going down
	17:30		10:30	CTD cast #9 - background - back on deck
				Resume transit to Newport (logging multibeam; speed = 12 knots)
9/20/2020	06:20		23:20	Started logging EM302 multibeam sonar with water column data. In-coming survey includes WPs 5-9. Survey speed = 8 kts
	13:55	9/20/2020	06:55	End of multibeam survey. Water column logging turned off.
	16:00		09:00	Arrive Newport

4 – Discipline Summaries

4.1 - Pressure Measurements to Monitor Volcanic Deformation at Axial Seamount

Bill Chadwick, Scott Nooner, and Jeff Beeson

We have made ROV-based campaign-style pressure measurements with a “mobile pressure recorder” (MPR) on seafloor benchmarks at Axial Seamount since 2000 to monitor vertical movements of the seafloor due to volcanic inflation and deflation caused by magma movements beneath the volcano. We currently have 10 seafloor benchmarks in the MPR array. In addition, we have deployed various kinds of continuously-recording bottom pressure recorders (BPRs) throughout the caldera. We are using 3 kinds of BPRs: (1) Moored BPRs that are battery-powered and record internally for 1-3 years at a time (4 of these were turned around in 2020). (2) Four others are BPR/Tilt instruments (BOTPT) that are connected to the OOI Cabled Array and transmit data to shore in real-time. Each is near one of our MPR benchmarks. (3) In addition, we use “mini-BPRs” (aka TG11’s built by Scripps) that are deployed and recovered by ROV on some of the MPR benchmarks (we recovered 5 of these and deployed 8 new ones in 2020). The aim is to have both campaign-style and continuous pressure measurements at all of our pressure monitoring sites (the array of 10 seafloor benchmarks). Where the MPR measurements are co-located with a BPR, then the MPR data can constrain the instrumental drift of the BPR, so the BPR data can be drift-corrected. This section summarizes this year’s MPR & BPR operations and results.

MPR measurements

The MPR measurements provide a precise depth for each benchmark *relative* to the reference site AX-105, which is located ~10 km south of the center of the caldera. Note, however, that a new Self Calibrating Pressure Recorder (SCPR) was deployed on the OOI Cabled Array in July 2018 at the center of the caldera, and this could be used as an alternative reference. It is currently funded to stay deployed on the OOI-CA until the summer of 2024. This year, MPR pressure measurements were made at the benchmarks during *Jason* dive J2-1295, which lasted about 4 days. We ended the dive earlier than planned due to weather, but the measurements were adequate for a good survey.

This year ROV *Jason* was operating in single-body mode (without *Medea*) on *R/V Thompson*. This meant that *Jason* could only transit between sites at a speed of 0.5 knot, instead of being able to go up to 1 knot when in two-body mode (as in 2018). This made the pressure dive less time-efficient, particularly on the longest transits to and from the reference benchmark AX-105. On dive J2-1295, we started at benchmark AX-308 and did one full round-trip transect, moving clockwise down to AX-105 and then counter-clockwise back up to AX-308. We had originally planned to do a second full round trip, but changed our plan due to encroaching bad weather. Instead, from AX-308 we transited directly back south to AX-105 (to get an important second measurement there), then transited back north to make our final measurement at benchmark AX-104. At the end of the dive we made the short transit to the Coquille vent field and sampled fluids at Casper and Vixen vents. In the end, all benchmarks got 2 repeat measurements, except AX-104, which got 3 repeats.

As in previous years, each measurement was made by placing the MPR on top of a benchmark and recording for 20 minutes. Data were recorded on a laptop PC in the *Jason* control room. The two Paros pressure gauges that we have used in the past (s/n 43535 and 62201) were again used in the MPR this year. The MPR pressure data were converted to depth then corrected for ocean tides using data recorded by the OOI BOTPT BPR instrument at the caldera center (MJ03F). Instrument drift was calculated during the survey and was removed. The uncertainty in the pressure measurements was determined by the scatter of repeated measurements at each benchmark and was ± 0.5 cm this year. The 2018-2020 MPR results show uplift (inflation) at all stations relative to AX-105, but at a decreased rate from previous years.

Table 4.1.1 - Cement Benchmark Locations

AXIAL CEMENT BENCHMARK NAMES	LAT	LON	Depth	LAT DEG	LAT MIN	LON DEG	LON MIN
AX-101 Caldera Center	45.95520	-130.00987	1532	45	57.312	-130	0.592
AX-104 Bag City	45.91617	-129.98950	1534	45	54.970	-129	59.370
AX-105 Pillow Mound	45.86317	-130.00376	1718	45	51.790	-130	0.225
AX-106 Ashes	45.93445	-130.01160	1542	45	56.067	-130	0.696
AX-302 Trevi	45.94642	-129.98378	1522	45	56.785	-129	59.027
AX-303 Marker 33 site	45.93346	-129.98225	1516	45	56.008	-129	58.935
AX-307 Magnesia West	45.94535	-130.00906	1544	45	56.721	-130	0.544
AX-308 BPR-South1	45.93160	-129.99880	1533	45	55.896	-129	59.928
AX-309 RSN-PN	45.93835	-129.97208	1527	45	56.301	-129	58.325
AX-310 Intern. District	45.92580	-129.97787	1531	45	55.548	-129	58.672

Table 4.1.2 - Depth changes from August 2018-September 2020 at MPR benchmarks. Uncertainty is ± 0.5 cm.

BENCHMARK NAME	Depth change (cm)
AX-101 Caldera Center	48.36
AX-104 Bag City	23.34
AX-105 Pillow Mound	0.0
AX-106 Ashes	33.18
AX-302 Trevi	29.20
AX-303 Marker 33 site	30.87
AX-307 Magnesia West	44.74
AX-308 South1	37.84
AX-309 RSN-PN	22.82
AX-310 Intern. District	26.16

OOI Cabled Array BPR drift

The results from the MPR survey allow us to constrain the drift rates of the OOI Cabled Array bottom pressure/tilt instruments (BOTPTs), which all have MPR benchmarks located near them. This is the third time we have been able to do this since the original three BOTPT instruments were powered up in September 2014 (although only the second time for the fourth BOTPT instrument that was deployed at ASHES in August 2017). Using the five-year record from 2015-2020, in particular, provides the best signal-to-noise yet with which to constrain these drift rates. The calculated drift rates are all less than 0.5 cm/yr for the 2015-2020 time period (far right column in the table below). Thus, we consider the drift “essentially zero”, considering the errors. The drift calculations over shorter time periods (2015-2017, 2017-2018, 2018-2020) are less precise, because there is more error in picking a single depth from the BPR data at the beginning and end of each time interval, which are overprinted with non-geophysical oceanographic and barotropic effects. For example, in the table below, the calculated drift rates from 2017-2018 are the highest, because that is also the shortest time interval (just 1 year), with the highest error and worst signal to noise. The bottom line is that we conclude again that no drift corrections need to be made to the OOI NANO-BPR data from the BOTPT instruments on the cabled observatory inside the summit caldera, because their drift rates are very low, and essentially zero.

Table 4.1.3 - Drift Rates of OOI BOTPT NANO-BPRs Determined by Comparing with MPR Surveys

BOTPT Name & Location & Nearest MPR benchmark	Drift rate 2015-2017 (cm/yr)	Drift rate 2017-2018 (cm/yr)	Drift rate 2018-2020 (cm/yr)	Drift rate 2015-2020 (cm/yr)
BOTPT-A301-MJ03F Central Caldera (AX-101)	-0.682	+3.376	-1.635	+0.206
BOTPT-A302-MJ03E Eastern Caldera (AX-309)	-0.839	+6.023	-1.372	+0.435
BOTPT-A303-MJ03D International District (AX-310)	-0.892	+3.011	-1.538	-0.119
BOTPT-A304-MJ03B ASHES (AX-106)	n/a	+2.099	-2.521	+0.001*

* The long-term drift rate for the OOI NANO-BPR at ASHES in the right-most column is calculated from August 2017-September 2020

Autonomous BPR moorings

In September 2020, we recovered the four autonomous BPR moorings that were deployed in August 2018 (West, North, Center, and South2) and they all had recorded data successfully. All the moored BPRs are built by NOAA/PMEL and record pressure every 15 seconds in psi, which is converted to depth by multiplying by 0.670 m/psi. Below, is a first-look summary of the data from each autonomous BPR mooring.

BPR-Center was located near benchmark AX-101 at the center of the caldera (and provided redundancy for the OOI BPR there) and shows about 10 cm of net inflation (lower than the actual amount of inflation due to instrument drift). The inflation is more rapid from Aug 2018 to May 2019, when a deflation event & long pause occur (seen on all BPRs), followed by a period of slower inflation, then another flat period near the end (summer of 2020). This BPR (the same instrument in about the same place) had a big (unexplained) offset in the record from 2017-2018, so I'm glad we didn't see that again, which means that the instrument itself is OK and the offset in the previous record was probably due to site instability. Note: we re-deployed this instrument to the east of the caldera in September 2020, because we now have a mini-BPR on the AX-101 benchmark as redundancy for the OOI-BOTPT BPR at the caldera center.

BPR-South-2 shows a similar pattern to the record from BPR-Center, but with slightly more inflation (~15 cm). This instrument provided a continuous record for the nearby AX-104 (Bag City) benchmark. However, in September 2020 we re-deployed this instrument further to the SE (but within the Arnulf magma chamber outline), because we now have a mini-BPR on the AX-104 benchmark.

BPR-North was located about 2 km NNW of BPR-Center and shows the same pattern, but with even more (apparent) inflation (~40 cm), but this sensor is known to have higher drift than the others from previous years. This is the instrument whose acoustic release reported that it was "horizontal" (meaning tilted >45°), so I'm happy to see the record looks reasonable (no obvious signs of site instability). Unfortunately, we don't have a benchmark up here, so we won't be able to constrain and remove the drift. But having an instrument here would be valuable to catch the subsidence associated with the next eruption.

BPR-West shows a strong deflationary or subsidence signal of >50 cm, which is a lot! The 2017-2018 BPR (same instrument in about the same place) showed a similar subsidence signal of ~40 cm over 1 year. That was our first year of data from this instrument, so I wasn't sure what to make of it. There is a lot of sediment up there on the rim of the caldera, so perhaps this means we can't use these BPRs in sediment. We re-deployed this same BPR up on the west rim again this summer, but further south, (and another on the east rim - relocating BPR-Center - so we'll see). We don't have any other data to confirm what is happening here (no MPR benchmark). Still, it could catch an interesting signal there if/when the next eruption occurs. Or if the same kind of signal is seen after the instrument is recovered next, perhaps it would be better to deploy it somewhere else next time.

By comparing the BPR-Center and BPR-South2 data with the 2018-2020 MPR survey at benchmarks AX-101 (Center) and AX-104 (South-2), we can determine the drift rate of these two autonomous moored BPRs. How those rates compare with previous years' data is shown in the following table.

Table 4.1.4 - Autonomous Moored BPR Drift Rates Determined by Comparing with MPR Surveys

Name & s/n	Dynamic range (psi)	Drift rate 2018-2020 (cm/yr)	Drift rate 2017-2018 (cm/yr)	Drift rate 2015-2017 (cm/yr)	Drift rate 2013-2015 (cm/yr)	Drift rate 2011-2013 (cm/yr)
BPR-Center s/n 103402	10,000	-18.870	-18.060	-15.365	-20.101	-8.576
BPR-South2 s/n 125320	3,000	-3.085	-1.278	-3.514	-5.048	n/a

This shows that (1) the same BPR deployed in the same location can have a somewhat different drift rate from deployment to deployment, and (2) BPRs with larger dynamic ranges tend to have larger drift rates. Note, we cannot constrain the drift of the BPR-West and BPR-North instruments, because there is no MPR benchmark nearby. All four BPRs were turned-around at sea and redeployed, but the BPR-Center and BPR-South2 were redeployed in new locations to the East and Southeast, respectively (see Figure 4.1.2 below).

Table 4.1.5 - BPR Mooring Deployment Locations in 2020 (all acoustically surveyed, except BPR-North)

Name	Lat Deg	Lat Min	Lon Deg	Lon Min	Lat	Lon	Depth
BPR-East*	45	56.718	-129	57.540	45.945302	-129.959008	1540
BPR-Southeast**	45	53.872	-129	57.515	45.897872	-129.958582	1659
BPR-West	45	56.472	-130	01.858	45.941207	-130.03096	1411
BPR-North†	45	58.669	-130	01.124	45.977823	-130.018734	1574

* formerly BPR-Center, ** formerly BPR-South2, † drop position only, not acoustically surveyed on the seafloor

Mini-BPRs (TG11s)

During Jason dives J2-1295 and J2-1296 this year, we recovered 5 Mini-BPRs (aka TG11s, built at Scripps) that were deployed on MPR benchmarks in 2018 (see table below). They were deployed with small tripods on their undersides to make them stable and they weigh ~5 pounds in water. Unfortunately, we learned after the cruise that none of the Mini-BPRs recorded for the entire period, due to a quirk in their software and poor documentation. Basically, the memory cards needed to be erased before they were deployed in 2018, but they were not, and even though there was plenty of memory on the cards, the firmware stopped the instruments from recording after a certain number of records were saved on the SD memory cards. (To avoid this in the future, the memory cards need to be erased before every deployment; we will also seek to correct this in the firmware in the future; the Mini-BPRs deployed in 2020 will not have this problem because they were new and have fresh SD memory cards). The table below lists the dates & times that the individual Mini-BPRs were placed on and recovered from the MPR benchmarks, and the 5th column shows the last date that data were recorded. Unfortunately, three of the five Mini-BPR instruments stopped recording in the summer of 2019, including the one at our reference benchmark, AX-105.

Table 4.1.6 - MINI-BPRs RECOVERED in 2020 (date/times are when instrument was on the benchmark)

Inst. ID S/N	Benchmark	Deploy date/time/JD	Recover date/time/JD	Data end date/JD	Clock after recovery
2016-10 137990	AX-303	08/24/2018 22:11 (JD=236)	09/11/2020 13:38 (JD=255)	06/22/2020 22:49 (JD=173)	98 sec slow†
2014-13 132674	AX-105	08/25/2018 04:50 (JD=237)	09/12/2020 02:30 (JD=256)	06/22/2019 22:49 (JD=173)	50 sec slow
2014-08 127329	AX-308	08/21/2018 21:10 (JD=233)	09/10/2020 22:52 (JD=254)	08/21/2020 (JD=234)	unknown*
2014-09 127331	AX-307	08/22/2018 01:58 (JD=234)	09/11/2020 02:20 (JD=255)	06/27/2019 21:10 (JD=178)	74 sec fast
2014-12 132673	AX-302	08/23/2018 10:16 (JD=235)	09/11/2020 09:21 (JD=255)	06/27/2019 22:58 (JD=178)	34 sec fast

* The clock state in Mini-BPR 2014-08 is not known because the batteries were dead on recovery. This same instrument had also drained its battery during a 2015-2017 deployment, and is being examined by Glenn Sasagawa at Scripps.

† The Mini-BPR 2016-10 had recorded valid data, but with an unexplained offset which changed the data values to unreasonable numbers. This was apparently due to a problem with the DL5 internal data logger (not the Paros gauge).

The Mini-BPRs report pressures in kPa every 100 seconds (1 min 40 sec). The pressure was converted from kPa to psi using $1\text{ kPa} = 0.14503773800722\text{ psi}$ and then to depth in meters using $1\text{ psi} = 0.670\text{ meters}$. All the non-cabled BPR data this year were de-tided by subtracting predicted tides provided by Rick Thomson at the Institute of Ocean Sciences in Sydney, BC, based on the first year of OOI BPR data from instrument BOTPT-A301-MJ03F on the OOI Cabled Array (located at $45.954850^\circ -130.008753^\circ$, at the Central Caldera). In other words, he used real data to calculate the tidal constituents for Axial.

The table below shows where Mini-BPRs were deployed in 2020 during Jason dive J2-1295. All these Mini-BPRs were new. We decided to deploy 8 Mini-BPRs at 7 benchmarks, with two deployed at our reference site AX-105, for redundancy. Mini-BPRs were deployed at benchmarks AX-101 (Caldera Center) and AX-104 (Bag City) for the first time, to replace Moored BPRs that we had deployed nearby in previous years. This allowed us to re-deploy the Moored BPRs elsewhere this year (to the east and southeast). We plan to recover these in summer of 2022.

Table 4.1.7 - MINI-BPRs (TG11's) DEPLOYED in 2020
(date/times are when instrument was placed on the benchmark)

Inst. ID	Benchmark	Deploy date	Deploy time	Julian day
2020-01	AX-308	09/10/2020	23:24	254
2020-02	AX-101	09/11/2020	06:27	255
2020-03	AX-105	09/12/2020	03:01	256
2020-04	AX-302	09/11/2020	10:03	255
2020-05	AX-104	09/11/2020	19:50	255
2020-06	AX-307	09/13/2020	02:47	257
2020-07	AX-303	09/12/2020	15:47	256
2020-08	AX-105	09/12/2020	03:01	256

The 8 new Mini-BPR (TG11) instruments that we purchased from Scripps this year had some of the same two-digit IDs as ones that we bought in previous years, so we decided to add the year they were built to the ID names in order to avoid confusion. Below is a list of all the Mini-BPRs we own (between OSU and UNCW) and where they are currently.

Table 4.1.8 - Mini-BPR (TG11) ID List for instruments used at Axial Seamount

Unit ID	Paros s/n	Model #	PSI range	Owned by	DL5 ID	Current location
2020-01	140958	43K-302	0-3000	OSU	58	Axial
2020-02	140959	43K-302	0-3000	OSU	59	Axial
2020-03	140960	43K-302	0-3000	OSU	60	Axial
2020-04	140961	43K-302	0-3000	OSU	61	Axial
2020-05	140962	43K-302	0-3000	OSU	62	Axial
2020-06	140963	43K-302	0-3000	OSU	63	Axial
2020-07	140964	43K-302	0-3000	OSU	64	Axial
2020-08	140965	43K-302	0-3000	OSU	65	Axial
2016-02	137987	43K-101	0-3000	OSU		UNCW
2016-04	137988	43K-101	0-3000	OSU		UNCW
2016-05	137989	43K-101	0-3000	OSU		UNCW
2016-10	137990	43K-101	0-3000	OSU	41	Newport
2014-08	127329	43K-101	0-3000	UNCW	2	Newport
2014-09	127331	43K-101	0-3000	UNCW	7	Newport
2014-12	132673	46K-101	0-6000	UNCW	10	Newport
2014-13	132674	46K-101	0-6000	UNCW	3	Newport

We have not yet determined the drift rate on individual mini-BPRs deployed between 2018-2020, because the data are still being processed. It may not be possible to determine the drift as precisely as we'd like, since most of the instruments stopped recording more than a year before the 2020 MPR measurements. However, it may be possible to estimate the Mini-BPR drift by comparison with the OOI BPR data, for which we have both the drift and uplift constrained.

Overall Results of the Pressure Measurements

The data from the 2020 MPR survey and the BPRs that were recovered show that by September 2020 Axial Seamount had re-inflated about 80% of the total amount of deflation that occurred during the 2015 eruption (2.0 m of post-eruption re-inflation compared to 2.54 m of co-eruption deflation). However, the rate of re-inflation since the 2015 eruption has been gradually decreasing with time, suggesting that the magma supply rate to Axial is also decreasing substantially. Another feature of the post-2015 re-inflation is that there have been multiple short-term deflation events (1-3 cm over 1-3 weeks), during which the seismicity also decreases markedly. After one of these short-term deflation events in May 2019 there was ~2 months of no inflation and low seismicity before re-inflation finally resumed, and after that the average rate of inflation was less than half of its previous value. Because of all this, our eruption forecast window has moved forward in time, currently to 2022-2026, based on extrapolating the average long-term rate of inflation (https://www.pmel.noaa.gov/eoi/axial_blog.html). We will continue to adjust the forecast window using the real-time BPR data from the OOI Cabled Array (<https://www.pmel.noaa.gov/eoi/rsn/>), and hopefully narrow the forecast window as the eruption nears.

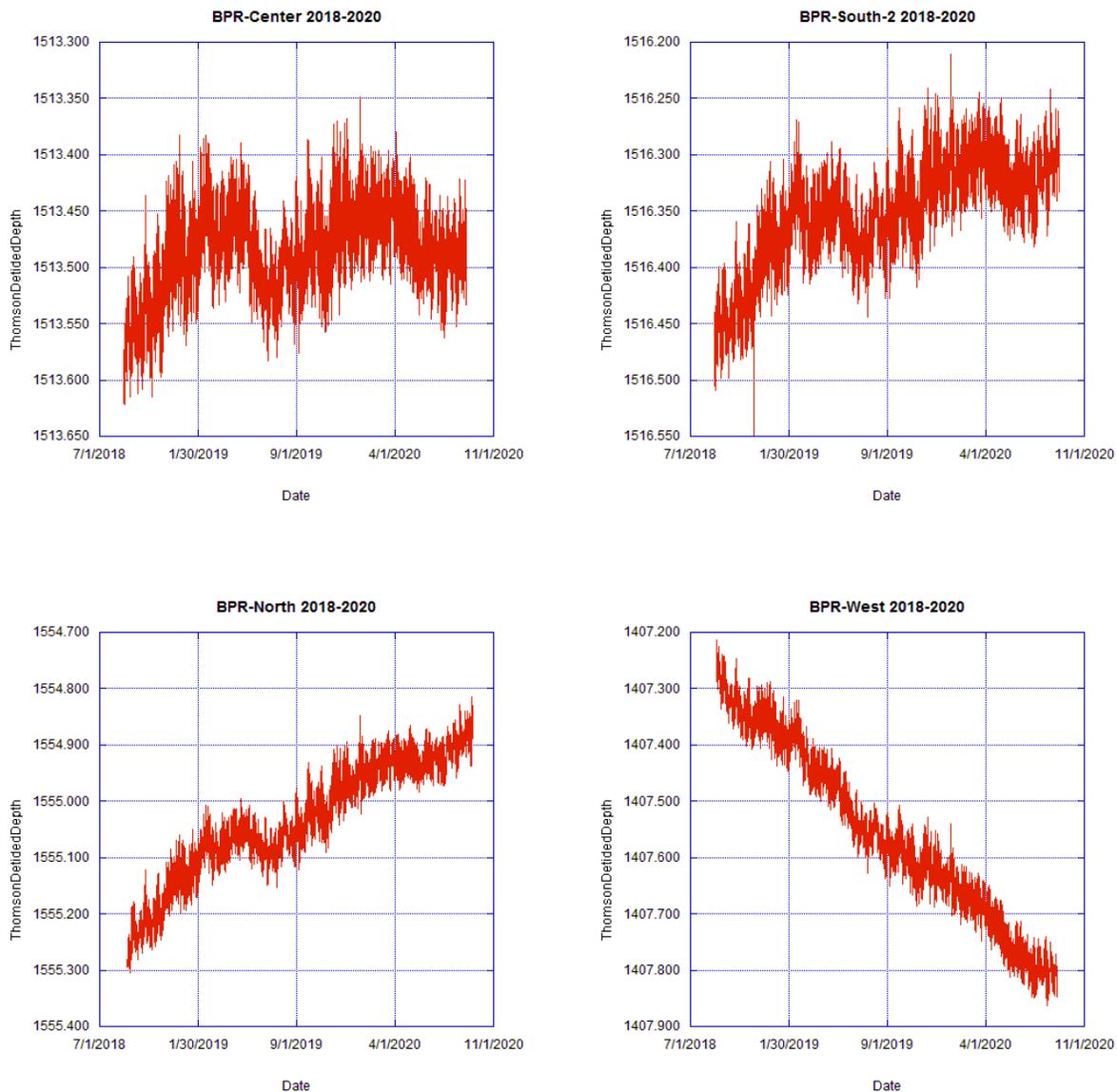


Figure 4.1.1 - Plots of data from the Moored BPRs deployed between 2018-2020 (not drift corrected).

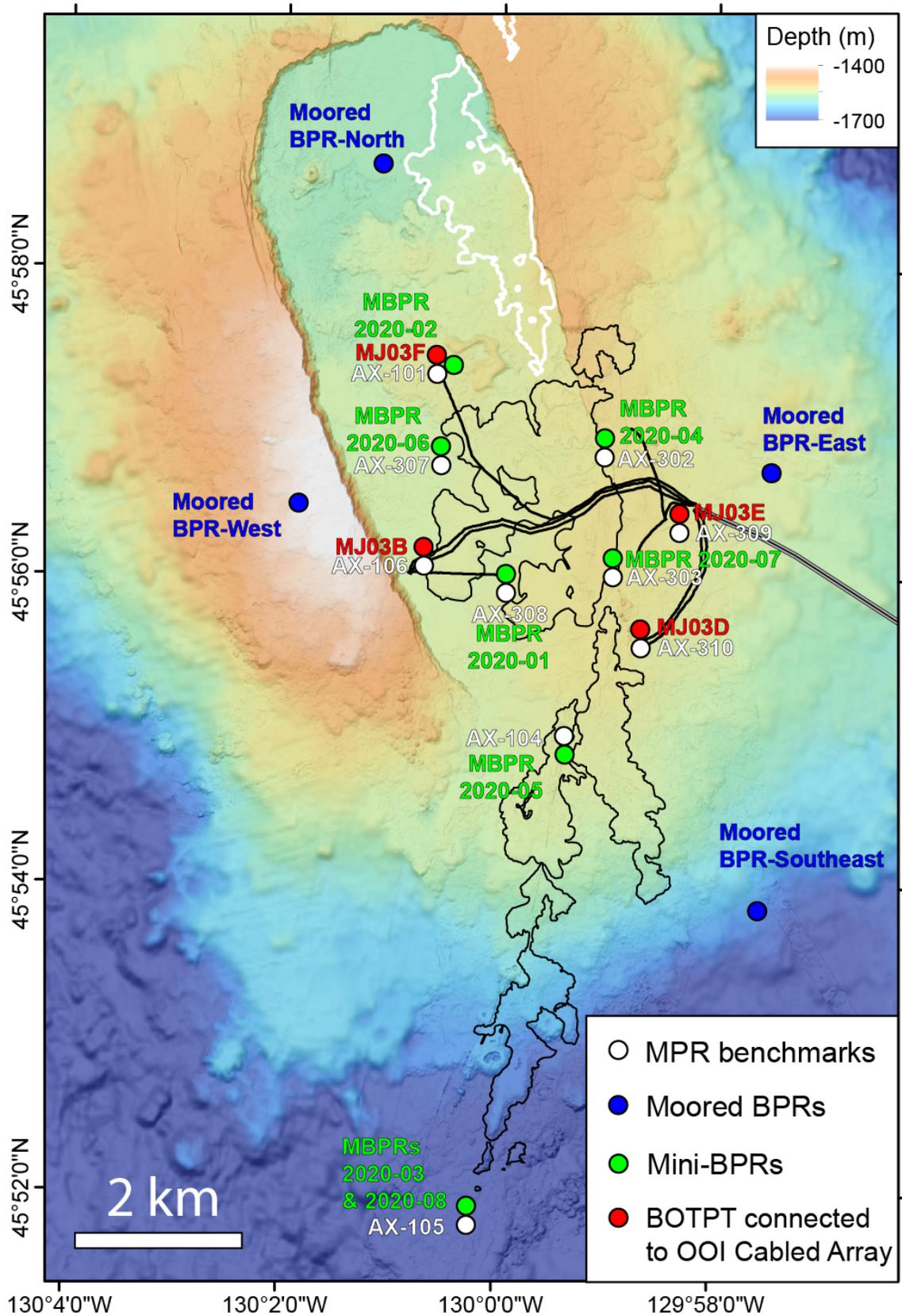


Figure 4.1.2. - Map showing MPR benchmarks and co-located BPRs (after the 2020 cruise).

4.2 - Vent Fluid Chemistry

Axial Seamount Hydrothermal Time Series

Earth Ocean Interactions, PMEL/CICOES

Sampling by Jeff Beeson

Reporting by Dave Butterfield and Jeff Beeson

Planning by Dave Butterfield, Jeff Beeson and Tamara Baumberger

4.2.1 - Background

PMEL EOI/VENTS has been studying Axial Seamount since 1986 and has maintained a nearly annual time-series for hydrothermal vent fluid and plume chemistry since 1998. Vent fluid chemistry gives information about magma degassing, water-rock reaction conditions, salt balance and brine storage, and thermodynamic energy supply for chemosynthetic organisms. The vent fluid time-series at Axial is probably the longest and most extensive ever collected, so we try to extend it whenever there is an opportunity. Microbiology has been a big part of the Axial time-series. This year, we are trying to extend our knowledge of the plume microbial communities over the different vent fields on Axial and also develop the tool of eDNA to characterize vent fauna with water samples from the CTD. For this 2020 NSF-funded cruise, Bill Chadwick has offered us a chance to extend the time series with vent fluid sampling and vertical CTD casts, as well as collecting Niskin samples on the ROV for work on microbial and eDNA. Jeff Beeson and Emily Norton will participate to conduct vent fluid sampling and CTD operations.

4.2.2 - Vent Fluid Sampling Goals

Prior to the start of the expedition, we targeted high-temperature vents with long time-series as the top priority. We put the NRZ hot vents in the primary category because they are so unusual. The small chimneys were the primary sampling target on the NRZ, but no active vent were seen on the dive to the NRZ, so no samples were taken. Other less-sampled sites (e.g. Dymond and CASM) sites are in the secondary category, and were not expected to be visited. The table lists the sample sites in order of priority and the number of gas-tights and majors we would like to collect from each site. Collecting 1 major and 1 gas-tight from each vent is the main goal. Any additional majors help to define the endmember and reduce uncertainty.

Priority	Sample Site (field)	# GTs	#Majors	Note
1	Virgin (ASHES)	1	1	1° long-term site; high gas
2	Inferno (ASHES)	1	2	1° long-term site; smoker
3	El Guapo (Int Dist)	1	2	1° long-term site; smoker
4	Diva (Int Dist)	1	1	1° long-term site; high gas
5	Castle (Int Dist)	1	1	1° long-term site; high gas
6	Vixen (Coquille)	1	2	1° long-term site; high gas
7	NRZ	2	4	Sampled 2017; important site
	Subtotal primary sites	8	13	
8	CASM T&S	1	2	2° long-term site
9	Dymond	1	4	Sampled 2013;
10	Hell	1	2	1° long-term site; smoker
11	Trevi	1	2	2° long-term site
12	Skadi chimney	1	2	3° site; hot clear fluid
	Subtotal secondary	5	12	
	Overall total	13	25	

4.2.3 - Vent fluid processing and analysis

Jeff Beeson generously agreed to take charge of the vent fluid sampling effort on board. The general sampling plan, lab setup and processing methods were discussed before the cruise. We held a virtual training session in cleaning, assembling and using titanium major samplers before the cruise. Detailed written instructions and advice were provided, but we will not include those here. Brief comments about lab setup and sample processing are given as they are relevant to the chemistry.

4.2.3.1 - Lab Setup

The lab setup for chemistry consisted primarily of a table for assembling and processing titanium major samplers. The only analysis done shipboard was sample pH. For that we used the Metrohm 'Titrino' titrator instrument as a pH meter, with Brinkmann glass pH electrode.

The titanium major samplers were provided by the Jason ROV group.

BenchKote paper was taped to the table top to provide a clean surface for processing samples. No laminar flow hood was available for this cruise.

4.2.3.2 - Sample splitting

Some samples have extremely high gas content and we tried to orient the sampler so that gas would escape out of the sample inlet of the major sampler in order to avoid losing most of the water during gas exsolution. This will have an effect on sample pH and gas content, but we are not analyzing gases from the major samplers. The intent was to process the high-gas content samples first if possible.

The priority (not the sampling order) of sub-samples from major samplers is: 1) major ions 2) trace metals 3) H₂S 4) pH 5) Si 6) Syringe 7) unfiltered extra. If there was not enough water for everything, the plan was to eliminate the unfiltered extra and the syringe sample first, and try to collect priorities 1-5 on every sample.

Samples were kept cold until ready to process. For major samplers, the spring and T-handle were removed and a piece of acid-cleaned silicone tubing to the sampler outlet. The piston was compressed by hand to express sample into syringes or bottles. We used 2 plastic syringes per major sample, one for measuring 10-ml volumes for H₂S and the other 60ml syringe for filtering. The sample draw was as follows:

1. **Rinse** a 20-ml syringe with about 5 ml of sample to clear the tube, discard rinse water.
2. **H₂S**. The goal is to precipitate the dissolved sulfide as ZnS with minimal loss of gas and minimal air mixed into the sample. Insert the 20-ml syringe again, open valve and take up 15ml into the syringe. Label two glass vials that have already had 1ml of Zinc Acetate 10% (wt/vol) solution pipetted into them. Add 15 ml of sample to each vial, cap, invert to mix. A white Zn sulfide precipitate will form. This preserves the sample for shore-based analysis. Note the volume of sample and Zn Acetate on the sample processing checklist. Keep labeled samples in a box in a lab refrigerator. Pack securely for return shipment. If possible, Emily should transport these samples back to Seattle in her car and drop off at the PMEL lab.
3. **Dissolved silica**. Put a few ml of sample (to use for pipetting) into a clean test tube. With a pipet, accurately transfer 0.5ml of sample into a 30ml bottle that has been pre-filled (and pre-weighed) with 10ml of dilute (0.02N) hydrochloric acid. Clearly label the bottle with the sample number and how much sample was added (+0.5ml). This preserves the sample for silica analysis on shore.

4. **Major ions.** Wrap a piece of label tape all the way around the barrel of a 60ml acid-cleaned syringe, at the plunger end and label with the sample number. Rinse the 60ml syringe with 5-10 ml of sample, discard. Fill the 60ml syringe again all the way full (about 65 ml). Attach a new syringe filter, filter the entire volume into a 60ml bottle labeled for major ions, leaving little or no headspace in the bottle. Cap tightly.
5. **pH.** Refill the syringe with 40ml for pH; Attach the small (3-4" long, 1/8"OD) piece of tubing with the Luer fitting and fill a 30ml bottle from the bottom using this tube, fill it all the way to the top and cap it with no air headspace. If you expect to wait more than 2 hours before making pH measurements, store the pH samples in a ziplock bag in the refrigerator. Allow all pH samples to come to room temperature before making a pH measurement with the electrode/meter. Run them in a batch at the same time (see analysis section).
6. **Syringe sample:** Refill the 60-ml syringe (labeled w sample ID). If the sample is not degassing, fill the syringe to 60ml. If the sample is actively degassing, take in about 30ml of water, allow it to degas in the syringe, expel some of the gas to relieve pressure and close off the stopcock valve. Label the syringe and store in the lab refrigerator or in a cooler kept in the walk-in cold room. We may do alkalinity titrations on these back in the lab.
7. **Unfiltered (If the sample has degassed a lot and lost some water, you can skip this sub-sample).** Put 100 ml into a 125ml bottle.
8. **Trace Metals.** Remove the trigger bolt by loosening the retaining screws on the side cylinder, place it aside, flop the pin away from the piston rod to allow full travel; this is to allow you to push the piston all the way to the bottom of the cylinder. Put on clean gloves. The best technique is to have the sample bottle open for as short a time as possible and avoid proximity or touching anything metallic except the titanium sampler. Remove a 500-ml trace metal bottle from the package; label it. Securely hold the sampler and position it to allow yourself to push the piston down while directing the sampler outlet directly into the TM bottle. When ready, open the TM sample bottle and place the lid on a clean kimwipe, open side up or inside a clean ziplock bag. Express the entire remaining sample into the TM bottle, cap, label, and store in a Ziploc bag, put into one of the plastic sample storage boxes. There should be almost no water left in the sampler.

4.2.3.3 - Labeling

For majors and gas-tights, there is a dive sample number, and there is a serial number stamped permanently on the titanium samplers. We normally include both numbers in the metadata, in case there might be a problem with a particular major sampler, for example. The dive sample number is the most important, since it is tied to the sample log. That number usually has the following short format:

Dive#-SampleType-Sample# (e.g. J1699-Major-07 for the 7th overall sample collected on dive 1699; J1699-Nisk-08 and J1699-GT-09). Please write this form of sample number on every sub-sample container. When making labels for sub-sampling the major samplers, add a suffix or separate line for the type of sample, e.g.

J1699-Maj-07-pH
 J1699-Maj-07-H2S
 J1699-Maj-07-TM
 J1699-Maj-07-majors
 J1699-Maj-07-Si

For Niskin samples, we will only be saving trace metal samples, so
 J1699-Nisk-08-TM

4.2.3.4 - Sample Log

There will be a written ROV sample log during the dive. It should have the date, time, lat/long, depth, temperature, vent name and/or marker#. Major samplers are usually used as single bottles and may be identified with colored electrical tape. Make sure that the identifying color is put in the sample log. The color can also be added to the sub-sample container labels, J1699-Maj-07-red. We filled out the "Major Sampler Processing Checksheet" with as much information as possible for every sample. The identifying color and serial number were added to that sheet when the sampler was processed. Volumes taken for each sub-sample were recorded.

Niskins taken on the ROV are usually identified by position, J1699-Nisk-08-Fwd (Aft, Mid), or possibly port-mid-stbd depending on how they are mounted. That information should be put on the trace metal sample label.

4.2.3.5 - Shipboard Analysis

pH

The only analysis done on board was pH. We used the Metrohm/Brinkmann titrator as a pH meter for this cruise, with a new glass pH electrode.

Electrodes were stored in a plastic sleeve with 3M KCl solution when not in use. Prior to making pH measurements, electrodes were soaked for 10-15 mins in seawater. The Brinkmann pH electrode was standardized with buffers 3,4,7,8 by recording mV values for each at room T. Make sure buffers and samples are at the same temperature (it will take a couple hours for pH bottles in air to reach room T; if you're in a hurry, you can put pH buffers and samples in a container of water at room T and they will equilibrate faster). Record that data in your notebook and enter in a spreadsheet (Axial2020pH) to do a linear regression of pH vs mV reading. Recording the mV readings is the primary and preferred method of calibration. Keep used buffers in 30ml bottles and use them to rinse the electrode, then dump and fill pH buffer bottles with fresh buffer for calibration. Keep stirrer on a constant setting. Put small plastic dish (from vinyl tape holder) on top of stirrer under pH bottles to contain overflow and spills. For sample pH measurement, remove the cap from the full pH bottle, put on a dry cap with hole drilled through it for the electrode, add a micro stir bar to the bottle, fit electrode down into the hole (catch overflow sample in beaker or tray) sealing loosely around the electrode body. Record after stable mV reading is reached at room T (the Brinkmann electrodes are usually very fast, so this should only take a few seconds). If the sample is degassing, the pH reading will not be stable, so record the mV value after the first few seconds to reflect the un-degassed composition as well as possible.

When shifting between samples or pH buffers, rinse the electrode wetted end with the DIW squirt bottle and dab the end lightly with a small KimWipe right before putting the electrode into the next sample or buffer. In evaluating vent fluid sample quality, if you have a mV reading of >100, you have a pretty good sample. If you have a reading of +170 mV or higher, you have a near-endmember quality sample. A value less than zero mV means you have mostly seawater.

Record in your notebook and spreadsheet the date and time of calibration, room/sample temperature, time period that samples were measured, sample ID and mV reading.

4.2.4

Major Sampler Processing Checksheet Axial Seamount September 2020

Sample # _____ Date collected _____ Time _____
Color/SN _____ Latitude _____ Longitude _____
Depth _____ Max Vent Temp °C _____ Vent Name _____ Mkr _____

Sub-sample draw (write volumes as taken). Is sample actively degassing? y/n _____

Rinse _____ pH _____ Comments:
H2S _____ Majors _____
Silica _____ Syringe _____
Unfiltered _____ Trace Metal _____



Sample # _____ Date collected _____ Time _____
Color/SN _____ Latitude _____ Longitude _____
Depth _____ Max Vent Temp °C _____ Vent Name _____ Mkr _____

Sub-sample draw (write volumes as taken). Is sample actively degassing? y/n _____

Rinse _____ pH _____ Comments:
H2S _____ Majors _____
Silica _____ Syringe _____
Unfiltered _____ Trace Metal _____

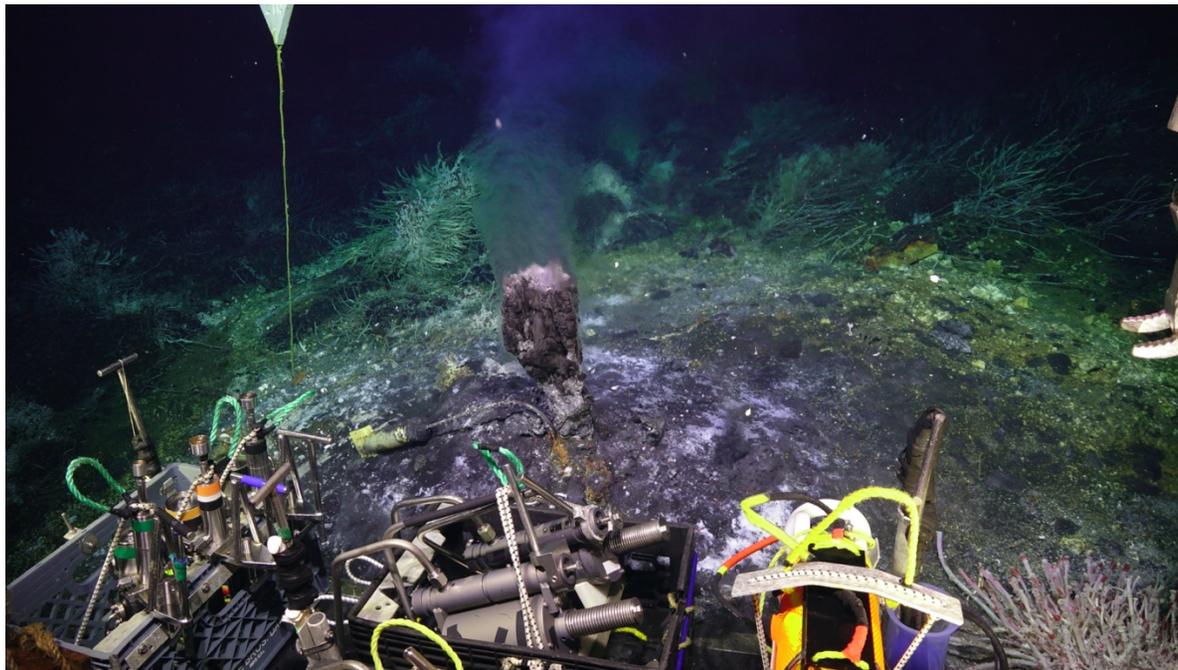
4.2.5 - Vent Fluid Samples Collected

Fluid samples were obtained from select high-temperature vents using ROV JASON's MAJOR bottles.

Table 4.2.1 - Major Fluid Samples Collected with Ph Measurements

Dive	Location	Date	Time	Lat	Lon	Head	Depth	Comment	pH Smp. Name	pH
1293	Inferno Vent	2020/09/04	15:36:54	45 56.015300	130 0.823843	242.23	1537.12	Black Major. Top of Inferno chimney. No temp.	J2-1293-Major-1-pH	3.68
1293	Inferno Vent	2020/09/04	15:42:23	45 56.015493	130 0.823151	242.55	1537.16	Green Major. Top of Inferno chimney. No temp.	J2-1293-Major-2-pH	3.73
1293	Virgin Vent	2020/09/04	16:32:00	45 56.0195	130 0.793	n/a	1540	White Major. Virgin vent. No temp. NOTE: THERE WAS NO VV LOGGING WHILE AT VIRGIN VENT DUE TO REQUESTED DOD VIDEO/IMAGERY EMBARGO BETWEEN 16:03-16:57.	J2-1293-Major-4-pH	4.695
1293	Trevi Vent	2020/09/05	12:55:06	45 56.774086	129 59.032346	151.66	1517.42	Red Major that previously failed to trigger with the ram. This time used Jason "finger" on arm to trigger. No temp. In retrospect, not sure snorkel was in the fluid flow. (Logged in virtual van as Sample 9)	J2-1293-Major-10-pH	5.53
1295	Vixen Vent	2020/09/14	00:39:43	45 55.034995	129 59.579812	356.95	1531.26	White Major. Vixen vent. Temp = 323°C from Jason temp probe.	J2-1295-Major-1-pH	4.09
1295	Vixen Vent	2020/09/14	00:42:06	45 55.035098	129 59.578216	356.88	1531.25	Black Major. Vixen vent. Temp = 323°C from Jason temp probe.	J2-1295-Major-2-pH	3.96
1295	Casper Vent	2020/09/14	01:32:02	45 55.036775	129 59.582218	23.30	1531.86	Red Major. Casper vent. During first attempt at tripping the bottle Jason's ram slipped off the plunger almost immediately but it appeared the spring had not yet begun to extend. The ram and bottle were re-aligned and the snorkel repositioned in the vent and the 2nd attempt was successful and the spring extended fully. Temp = 295°C from Jason temp probe.	J2-1295-Major-6-pH	5.17
1295	Casper Vent	2020/09/14	01:37:38	45 55.039036	129 59.584499	22.91	1531.87	Green Major. Casper vent. Temp = 295°C from Jason temp probe.	J2-1295-Major-7-pH	4.31
1296	Diva Vent	2020/09/14	00:39:43	45 55.034995	129 59.579812	356.95	1531.26	Green Major. Diva vent. Temp = 304°C from Jason temp probe	J2-1296-Major-1-pH	4.58

1296	Castle Vent	2020/09/17	10:16:07	45 55.566170	129 58.804123	359.19	1514.62	White Major. Castle vent. Temp = 247°C from Jason temp probe	J2-1296-Major-3-pH	5.40
1296	El Guapo Vent	2020/09/17	11:23:43	45 55.592759	129 58.779793	102.76	1500.35	Black Major. El Guapo vent. Temp = 338°C from Jason temp probe. This Major did not trigger at first - had to be fired 3 times to find the perfect angle.	J2-1296-Major-5-pH	3.78
1296	El Guapo Vent	2020/09/17	11:29:54	45 55.592057	129 58.779497	102.74	1500.30	RED Major. El Guapo vent. Temp = 338°C from Jason temp probe	J2-1296-Major-6-pH	3.80
1297	Hell Vent	2020/09/18	13:12:17	45 55.997655	130 0.833302	34.06	1535.78	Green Major. Hell vent. Temp = 310°C from Jason temp probe	J2-1297-Major-2-pH	3.95
1297	Hell Vent	2020/09/18	13:17:43	45 55.997821	130 0.832081	33.98	1535.71	Black Major. Hell vent. Temp = 310°C from Jason temp probe	J2-1297-Major-3-pH	3.58
1297	Inferno Vent	2020/09/18	13:46:24	45 56.014432	130 0.816441	201.24	1535.94	White Major. Inferno vent. Temp = 318°C from Jason temp probe	J2-1297-Major-5-pH	3.78
1297	Inferno Vent	2020/09/18	13:51:48	45 56.014498	130 0.816256	201.59	1535.93	Red Major. Inferno vent. Temp = 318°C from Jason temp probe	J2-1297-Major-6-pH	3.69



Vixen vent in the Coquille vent field, visited at the end of ROV Jason dive J2-1295.

4.3 - Gas Sampling

Tamara Baumberger with sampling at sea by Jeff Beeson and Bill Chadwick

In total, 8 pre-evacuated titanium gas-tight bottle samplers (GTB; sampler volumes between about 150 and 165 ml) were sent to Axial Seamount on board the R/V Thompson in September 2020. All were used at sea to collect high-temperature vent fluid samples according to a priority list previously put together by David Butterfield and Tamara Baumberger. Jeff Beeson and Bill Chadwick were responsible for collecting the samples at sea after getting instructions by Tamara Baumberger via a pre-cruise video call.

In each of the dives J-1293, J-1295, J-1296 and J-1297, 3 GTBs were placed in a milk crate type basket mounted on the ROV Jason porch. One of the manipulator arms was set up with a hydraulic RAM for triggering the bottles during sampling. Before the bottles were deployed, the titanium snorkels were mounted and filled with background seawater to avoid dead sampling volume and air contamination. Samples were collected at Ashes (2x Inferno, 1x Virgin, 1x Hell), International District (1x Diva, 1x Castle, 1x El Guapo) and at Vixen (1x). All samples were taken from the strongest venting focused high temperature chimneys where access allowed. A complete sampling list can be found in Table 1. Sampling was co-located with a temperature measurement (not available in dive J-1293) and collection of vent fluid with major samplers for chemistry.

There was no extraction line at sea. Subsampling of the GTBs was done by Tamara Baumberger in the NOAA PMEL Helium Isotope Laboratory in Newport, OR between Sept 24 and Oct 5 2020. Subsampling was conducted into splits of 3 cc aluminosilicate ampules for later helium and neon isotope analysis and in 35 cc Pyrex ampules for later total gas concentration and carbon/hydrogen isotope analysis. Seven of the 8 GTB samples can be expected to generate good data, whereas the GTB used at Hell was empty (J-1297-GTB-04-GT17). The most likely reason is that the trigger did not push far enough down during sampling due to a loose grip in the manipulator. However, this is not obvious from re-watching the dive video. It remains unclear what caused the empty bottle.

Gas Tight Summary subsampling Axial 2020

#	Sample ID	GT	Tape color	Vent - Site	Latitude	Longitude	Depth	T (C)	Extraction date
1	J-1293-GTB-03-GT9	9	red	Inferno - Ashes	45.933577	-130.013745	1537	n/a	24. Sept 2020
2	J-1293-GTB-05-GT10	10	blue-orange	Virgin - Ashes	45.933659	-130.013217	1540	n/a	1. Oct 2020
3	J-1295-GTB-03-GT5	5	black	Vixen	45.917237	-129.992955	1531	323	25. Sept 2020
4	J-1296-GTB-02-GT18	18	black-white-orange	Diva – Int. District	45.926319	-129.978938	1519	304	2. Oct 2020
5	J-1296-GTB-04-GT16	16	green	Castle – Int. District	45.926074	-129.979866	1514	247	28. Sept 2020
6	J-1296-GTB-07-GT7	7	red-green	El Guapo – Int. District	45.926487	-129.979661	1500	338	5. Oct 2020
7*	J-1297-GTB-04-GT17	17	white	Hell - Ashes	45.933278	-130.01393	1536	310	2. Oct 2020*
8	J-1297-GTB-07-GT11	11	purple	Inferno - Ashes	45.933567	-130.013657	1536	318	29. Sept 2020

* not triggered/empty

4.4 – Biological Sampling (eDNA & Organismal)

Axial plume ecology and vent population ecology

Genetics and Genomics Group (PMEL/CICOES)

Sampling by Emily Norton and Jeff Beeson

Reporting by Sean McAllister

Planning by Sean McAllister, Dave Butterfield, and Matt Galaska

The broad goals of this expedition: 1) extend knowledge of plume microbial communities over different vent fields, comparing main caldera with rift zones and the Dymond vent site (CTD and ROV Niskin), 2) characterize vent fauna eDNA in vertical (plume; CTD) and lateral (near vent to down current; ROV Niskin) transects to better understand eDNA transport from the vent, 3) Take organism samples of opportunity to compliment ongoing projects in population ecology, targeting *Calyptogena* sp., tube worms, and brittle stars.

CTD Casts:

Vertical CTD casts were performed at 1) ASHES, 2) International District, 3) Vixen, 4) CASM, 5) the South Rift Zone (SRZ), 6) the North Rift Zone (NRZ), 7) Dymond, 8) Mid-NRZ, and 9) Background cast three hour transit east of Axial on way to Newport. All CTDs, except the background cast, targeted 10 depths. CTD cast 1 sampled those 10 depths with duplicate Niskins (20 bottles; biological replicates), with each bottle also sampled in duplicate as a technical replicate. Subsequent casts (2-8) dropped the technical replicate and instead added a third biological replicate Niskin bottle at these depths: deepest sample, bottom of plume, middle plume (or other spike of interest), and top of plume. The background cast targeted four depths in duplicate. Sampling consisted of filtering 2 L of Niskin water directly onto a 0.22 μm sterivex cartridge filter using a peristaltic pump and sterilized tubing. This was conducted as soon as possible after recovery of the CTD, though filtering took a long time: 8.7 hours (cast 1), 4.9 hours (cast 2), 4.3 hours (cast 3), 4.2 hours (cast 4), 4.5 hours (cast 5), 3.8 hours (cast 6), 4.0 hours (cast 7), 3.5 hours (cast 8), and 1.7 hours (cast 9). After sampling, each sterivex cartridge was filled with 3 mL of 95% ethanol, capped, inserted into a whirlpak, and stored at -20°C . At the beginning of the cruise and after each CTD cast, a negative control was taken, filtering 2 L of ship RO water across a 0.22 μm sterivex filter and preserved in the same way. A trace metal sample (TDMe) was taken at each depth of the CTD casts in order to estimate the relative hydrothermal contribution within the plume. Both eDNA filters and TDMe samples are indicated in the CTD log sheets from the CTD operations discipline summary.

ROV Niskin Sampling:

On each of dives J2-1293 (Anemone; ASHES), J2-1295 (near Vixen), J2-1296 (El Guapo), and J2-1297 (Anemone; ASHES), three ROV Niskin samples were attempted (often only two worked), starting over the vent and progressing down-current 25 m and 200 m. Each Niskin was sampled in duplicate (technical replicates), filtering 2 L onto a 0.22 μm sterivex filter (as above). TDMe samples were taken for each Niskin in addition to a subsample for pH analysis. Sample processing recorded in Table 4.4.1.

Table 4.4.1: ROV Niskin sample processing.

Dive	Sample Name	Nisk. No.	Location	eDNA	TDMe	pH
1293	J-1293-Niskin-7	3	Over Anemone vent	2X	X	7.42
1293	J-1293-Niskin-8	2	25m down current Anemone (to N)	2X	X	?
1293	J-1293-Niskin-9	1	FAILED			
1295	J-1295-Niskin-4	1	Over Vixen vent	2X	X	6.44
1295	J-1295-Niskin-5	2	25m down current Vixen (to N)	2X	X	7.52
1295	Not logged	3	FAILED			
1296	J-1296-Niskin-8	1	Over El Guapo vent	2X	X	7.28
1296	J-1296-Niskin-9	2	25m down current El Guapo (to S)	2X	X	7.54
1296	Not logged	3	FAILED			
1297	J-1297-Niskin-8	3	Over Anemone vent	2X	X	7.57
1297	J-1297-Niskin-9	2	25m down current Anemone (to SE)	2X	X	7.54
1297	J-1297-Niskin-10	1	200m down current Anemone	2X	X	7.59

Organismal Sampling:

Organisms were collected by opportunity, with the potential to add them to ongoing projects in population ecology. We were aiming for 10-15 individuals per vent, to be dissected to collect a 0.5 g sample from gill and muscle (tube worms) or the foot (clam) or the arm (brittle star) to be loaded into tubes for 95% ethanol (E), RNALater (R), or direct -80°C freeze (C; cryo) preservation. Ethanol samples were placed in the fridge overnight after dissection, then the ethanol was exchanged the next day and stored at -20°C. RNALater samples were left at room temperature overnight and then stored the next day at -80°C (except for organisms from J2-1296, which were accidentally immediately stored at -80°C). Cryo tubes (C) were immediately stored at -80°C. For tube worms: after dissection, the organism was split in half to separate the trophosome from the rest of the body (including plume), and both halves were stored at -80°C. Positive identification to species will be conducted at a later time from individual photographs and frozen specimen.

Table 4.4.2: Info on sampling events/grabs leading to specimen collection

Dive	Sample Name	Date	Location	Taxa (No. individuals)
1293	J-1293-BIO-6	9/4	Near Anemone vent	Tubeworm (15); Polychaete (21)
1293	J-1293-BIO-11	9/5	Near Trevi vent in sediment	Clam (15); Polychaete (5)
1296	MTR3028	9/17	45.93327N, -129.98218E, 1513 m, 16:50	*Limpet (15); Polychaete (1)*
1296	MTR3201	9/17	45.94376N, -129.98505E, 1520 m, 18:44	Tubeworm (3); *Limpet (15); Polychaete (1)*
1297	J-1297-Bio-1	9/18	Bare rock near base of Hell vent	Brittle star (11)

Unknown whether mobile organisms are from MTR3028 or MTR3201. Both MTRs placed in same biobox on collection; organisms sampled from biobox.

Table 4.4.3: Info for preservation of individuals from J2-1293-BIO-6.

Tube No.	Organism No.	E	R	C	Taxa	Tissue
002	Org2	X	X	X	Tubeworm	Gills

003	Org2	X	X	X	Tubeworm	Muscle
004	Org2			X	Tubeworm	Top (near gill)
005	Org2			X	Tubeworm	bottom
006	Org3	X	X	X	Tubeworm	Gills
007	Org3	X	X	X	Tubeworm	Muscle
008	Org3			X	Tubeworm	Top
009	Org3			X	Tubeworm	Bottom
010	Org4	X	X	X	Polychaete	Muscle/tail (E); mid (R); head/top (C)
011	Org5	X	X	X	Tubeworm	Gills
012	Org5	X	X	X	Tubeworm	Muscle
013	Org5			X	Tubeworm	Top
014	Org5			X	Tubeworm	Bottom
015	Org6	X	X	X	Polychaete (alive)	Top/mouth (E); mid (R); bottom/tail (C)
016	Org7	X	X	X	Polychaete	
017	Org8	X	X	X	Polychaete	
018	Org9	X	X	X	Tubeworm	Gills
019	Org9	X	X	X	Tubeworm	Muscle
020	Org9			X	Tubeworm	Top
021	Org9			X	Tubeworm	Bottom
022	Org10	X	X	X	Tubeworm	Gills
023	Org10	X	X	X	Tubeworm	Muscle
024	Org10			X	Tubeworm	Top
025	Org10			X	Tubeworm	Bottom
026	Org11	X	X	X	Tubeworm	Gills
027	Org11	X	X	X	Tubeworm	Muscle
028	Org11			X	Tubeworm	Top
029	Org11			X	Tubeworm	Bottom
030	Org12	X	X	X	Tubeworm	Gills
031	Org12	X	X	X	Tubeworm	Muscle
032	Org12			X	Tubeworm	Top
033	Org12			X	Tubeworm	Bottom
034	Org13	X	X	X	Tubeworm (alive)	Gills
035	Org13	X	X	X	Tubeworm	Muscle
036	Org13	X	X	X	Tubeworm	Body
037	Org13			X	Tubeworm	Top
038	Org13			X	Tubeworm	Bottom
039	Org14	X	X	X	Tubeworm	Gill (plume and vestimentum)
040	Org14	X	X	X	Tubeworm	Muscle (body wall)
041	Org14			X	Tubeworm	Top
042	Org14			X	Tubeworm	Bottom
043	Org15	X	X	X	Tubeworm	Gill
044	Org15	X	X	X	Tubeworm	Body

045	Org15			X	Tubeworm	Top
046	Org15			X	Tubeworm	Bottom
047	Org15	X	X	X	Tubeworm	Vestimentum
048	Org16	X	X	X	Tubeworm (alive)	Gill/Vestimentum
049	Org16	X	X	X	Tubeworm	Body
050	Org16			X	Tubeworm	Top
051	Org16			X	Tubeworm	Bottom
052	Org17	X	X	X	Tubeworm (alive)	Gill/Vestimentum
053	Org17	X	X	X	Tubeworm	Body
054	Org17			X	Tubeworm	Top
055	Org17			X	Tubeworm	Bottom
056	Org18	X	X	X	Tubeworm	Gill/Vestimentum
057	Org18	X	X	X	Tubeworm	Body
058	Org18			X	Tubeworm	Rest of body
059	Org19	X	X	X	Tubeworm	Gill/Vestimentum
060	Org19	X	X	X	Tubeworm	Body
061	Org19			X	Tubeworm	Top
062	Org19			X	Tubeworm	Bottom
063	Org20	X	X	X	Tubeworm	Gill/Vestimentum
064	Org20	X	X	X	Tubeworm	Body
065	Org20			X	Tubeworm	Top
066	Org20			X	Tubeworm	Bottom
	2 Ziploc bags			X	Tubeworm	FULL BODY
067	Org21	X	X	X	Polychaete	Head (E)
068	Org22	X	X	X	Polychaete	
069	Org23	X	X	X	Polychaete	
070	Org24	X	X	X	Polychaete	
071	Org25	X	X	X	Polychaete	
072	Org26	X	X	X	Polychaete	
073	Org27	X	X	X	Polychaete	
074	Org28	X	X	X	Polychaete	
	1 whirlpak			X	Poly2s	FULL ORGANISM
	1 whirlpak			X	Extra Polys	FULL ORGANISM
	1 whirlpak			X	Unknown snail	FULL ORGANISM
075	Org29	X	X	X	Polychaete	
076	Org30	X	X	X	Polychaete	
077	Org31	X	X	X	Polychaete	
078	Org32	X	X	X	Polychaete	Poly2
079	Org33	X	X	X	Polychaete	Poly2
080	Org34	X	X	X	Polychaete	Poly2
095	Org49	X	X	X	Polychaete	Poly3
096	Org50	X	X	X	Polychaete	Poly3
097	Org51	X	X	X	Polychaete	Poly3

Figure 4.4.1: Tubeworms attached to MTR3201, collected on dive J2-1296.



Figure 4.4.2: Photographs of representative tubeworms from J2-1293-BIO-6. Scale bars 1 cm.

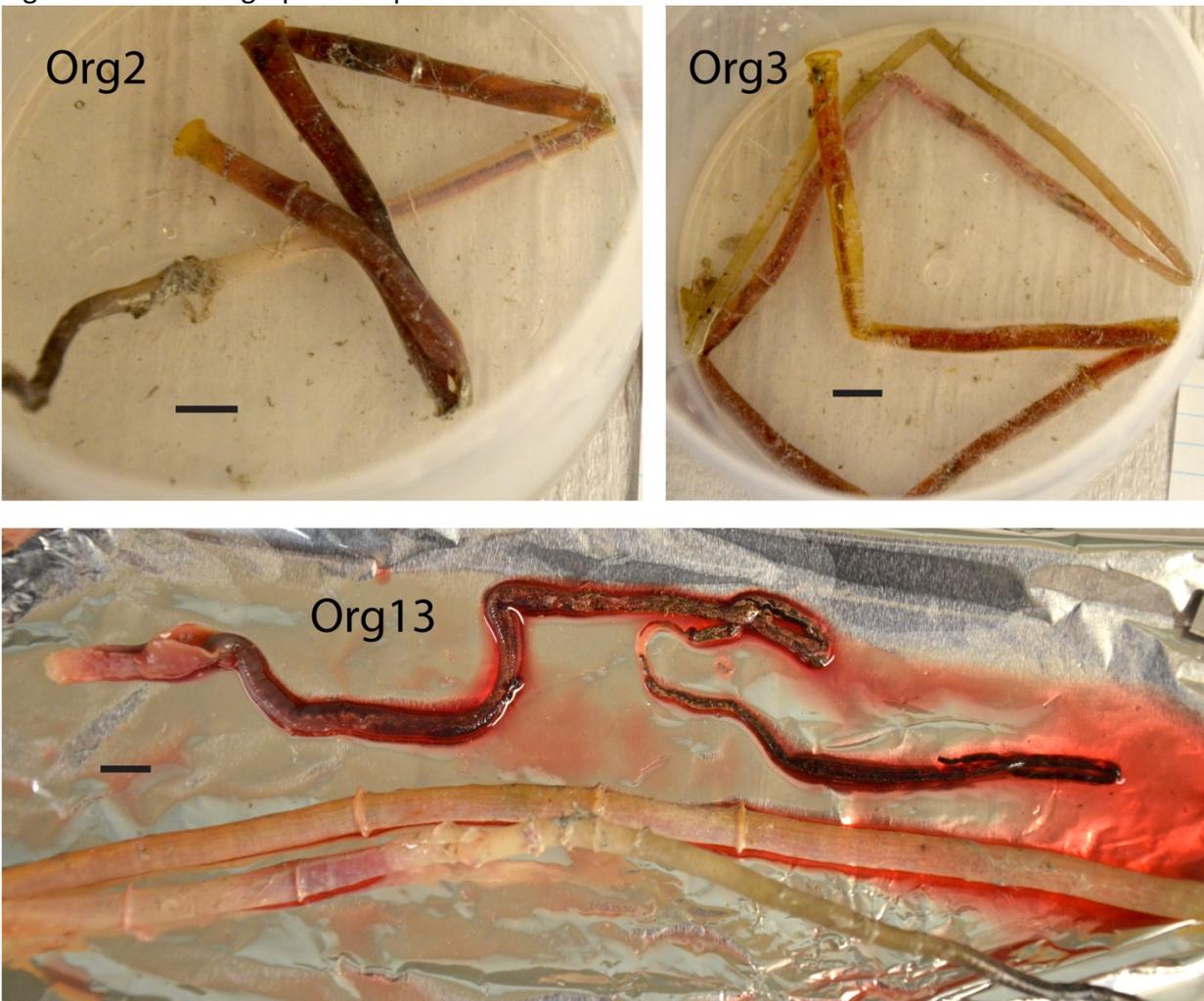


Figure 4.4.3: Photographs of representative polychaetes (Poly1) from J2-1293-BIO-6. Scale bars 1 cm.

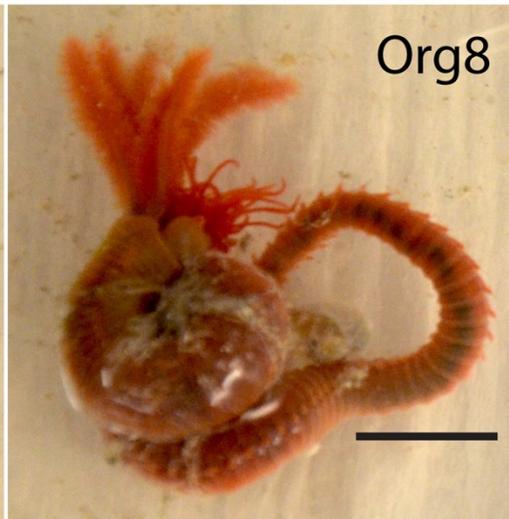


Figure 4.4.4: Photographs of representative polychaetes (Poly2) from J2-1293-BIO-6. Scale bars 1 cm.

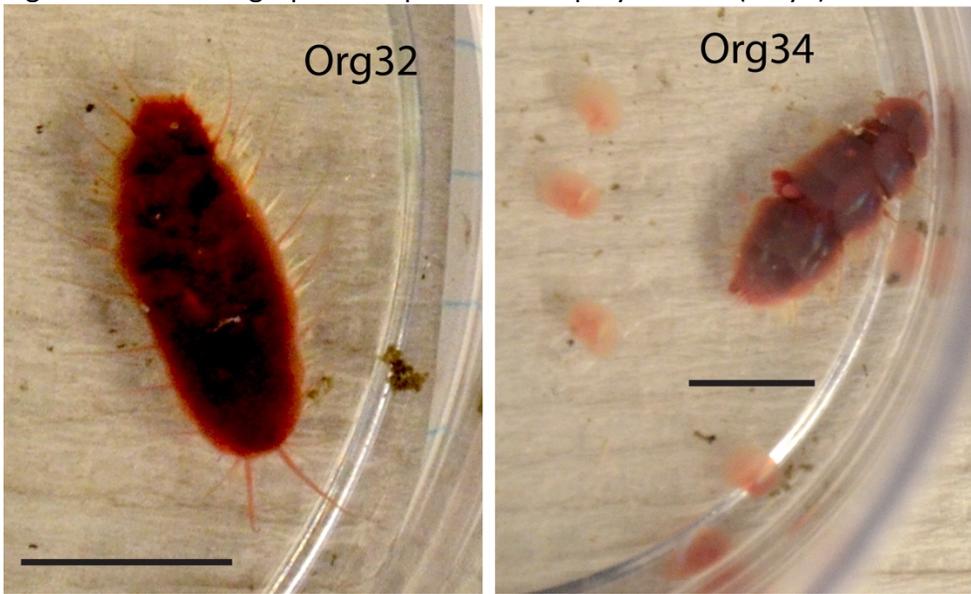


Figure 4.4.5: Photographs of rep. polychaetes (Poly3) from J2-1293-BIO-6. Scale bars 1 cm.

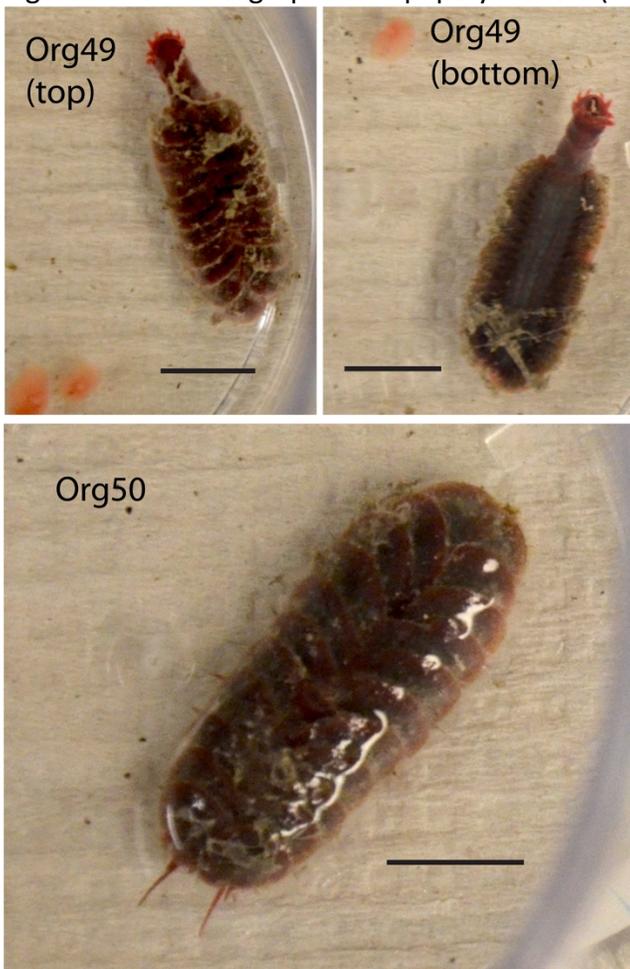


Table 4.4.4: Info for preservation of individuals from J2-1293-BIO-11. Note that clam sample log states all organisms were still alive at the time of dissection.

Tube No.	Organism No.	E	R	C	Taxa	Tissue
001	Org1	X	X		Clam	½ org into each preservative
081	Org35	X	X	X	Clam	
082	Org36	X	X	X	Clam	
083	Org37	X	X	X	Clam	
084	Org38	X	X		Clam	
085	Org39	X	X	X	Clam	
086	Org40	X	X	X	Clam	
087	Org41	X	X	X	Clam	
088	Org42	X	X	X	Clam	
089	Org43	X	X	X	Clam	
090	Org44	X	X	X	Clam	
091	Org45	X	X	X	Clam	
092	Org46	X	X		Clam	
093	Org47	X	X	X	Clam	
094	Org48	X	X	X	Clam	
	Ziplock			X	Clams	FULL ORGANISM
098	Org52	X	X	X	Polychaete	Poly4
099	Org53	X	X	X	Polychaete	Poly4
100	Org54	X	X	X	Polychaete	Poly4
101	Org55	X	X	X	Polychaete	Poly4
102	Org56	X	X	X	Polychaete	Poly4

Figure 4.4.6: Photographs of representative *Calyptogena* sp. clams from J2-1293-BIO-11. Scale bars 0.5 cm.

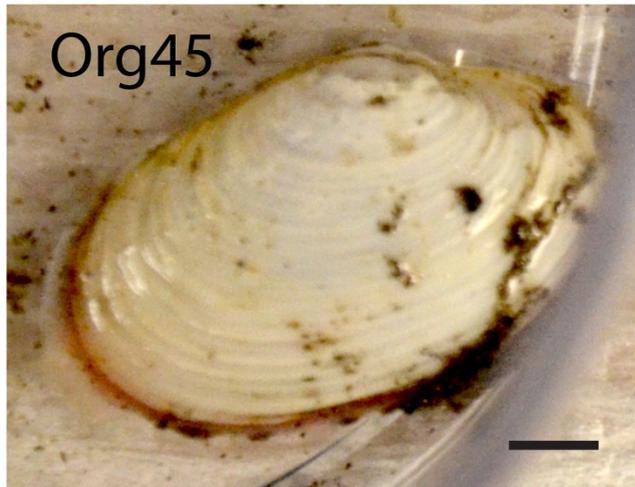
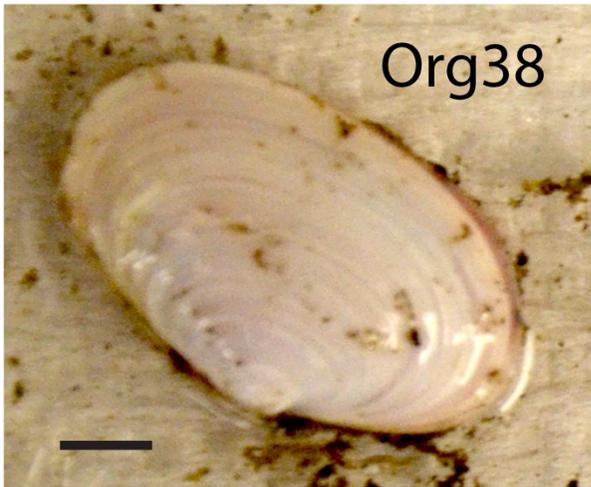
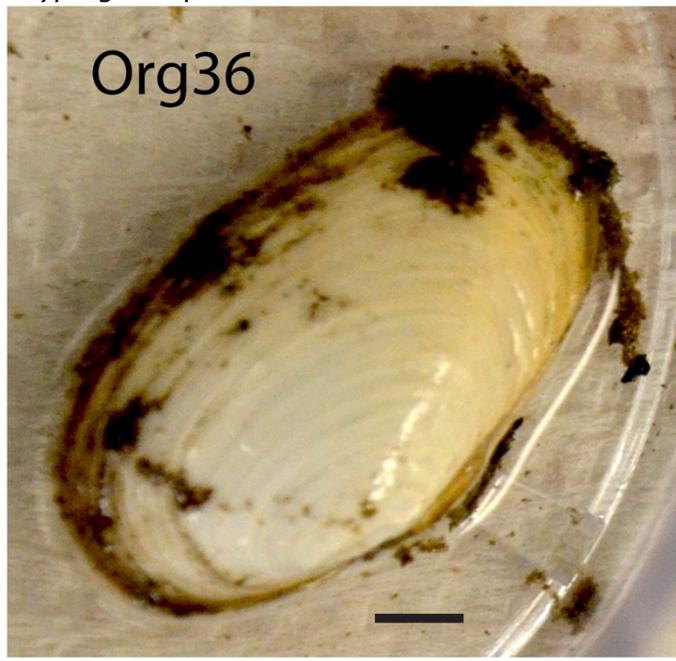
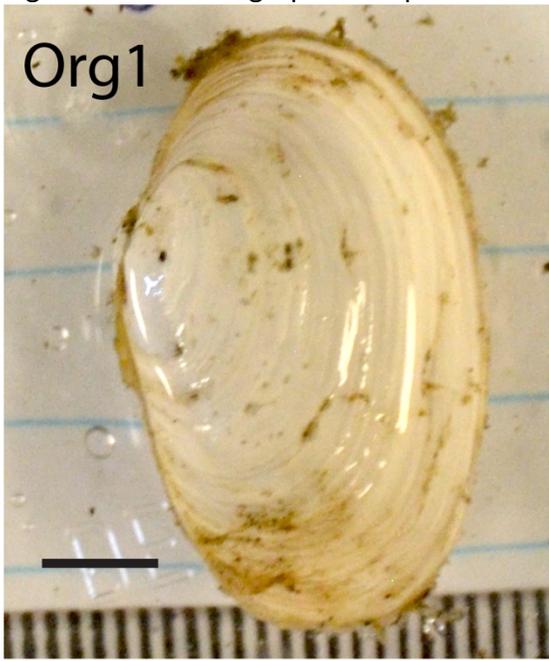


Figure 4.4.7: Photographs of representative polychaetes (Poly4) from J2-1293-BIO-11. Scale bars 1 cm.



Table 4.4.5: Info for preservation of individuals from J2-1296. Mobile critters could have come from either MTR3028 OR MTR3201, which were recovered in the same bio box. Tube worms were affixed to MTR3201.

Tube No.	Organism No.	E	R	C	Taxa	Tissue
103	Org57	X			Limpet	Whole organism
104	Org58	X			Limpet	Whole organism
105	Org59	X			Limpet	Whole organism
106	Org60	X			Limpet	Whole organism
107	Org61	X			Limpet	Whole organism
108	Org62	X			Limpet	Whole organism
109	Org63	X			Limpet	Whole organism
110	Org64	X			Limpet	Whole organism
111	Org65	X			Limpet	Whole organism

112	Org66	X			Limpet	Whole organism
113	Org67	X			Limpet	Whole organism
114	Org68	X			Limpet	Whole organism
115	Org69	X			Limpet	Whole organism
116	Org70	X			Limpet	Whole organism
117	Org71	X			Limpet	Whole organism
118	Org72	X	X		Polychaete? "scale worm"	
119	Org73	X	X		Tubeworm	Gill
120	Org73	X	X		Tubeworm	Body
121	Org74	X	X		Tubeworm	Gill
122	Org74	X	X		Tubeworm	Body
123	Org75	X	X		Tubeworm	Whole organism
	1 whirlpak				Limpets	Whole organisms

Figure 4.4.8: Photographs of representative limpets from MTR3028 OR MTR3201. Scale bars 0.5 cm.

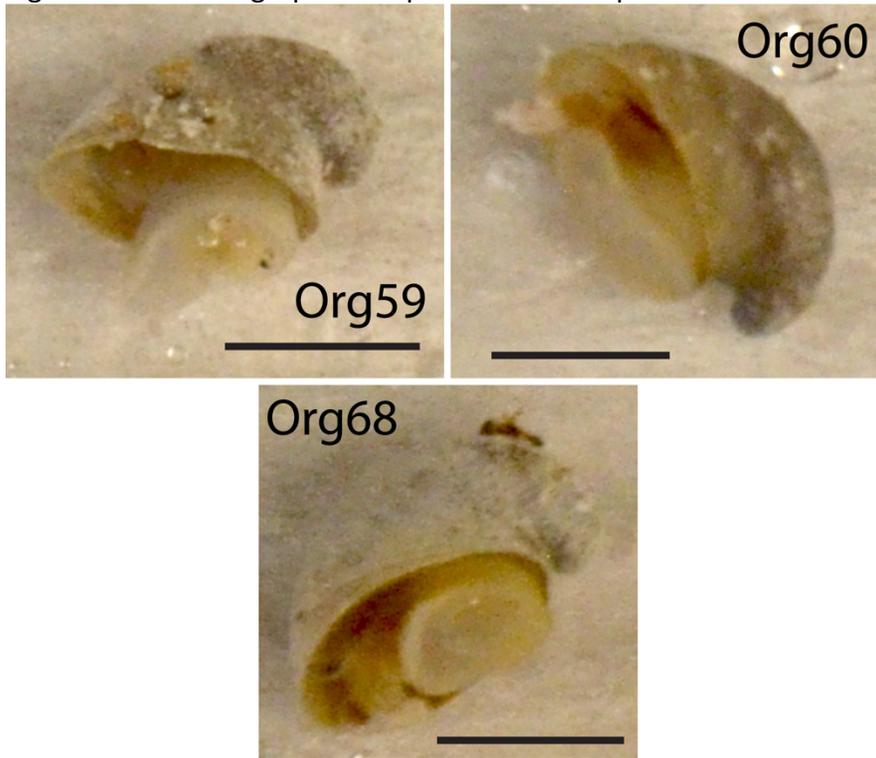


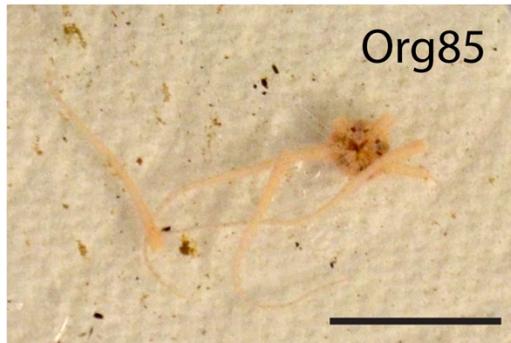
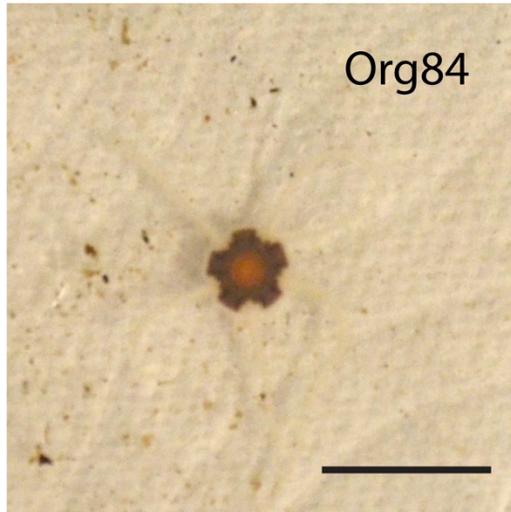
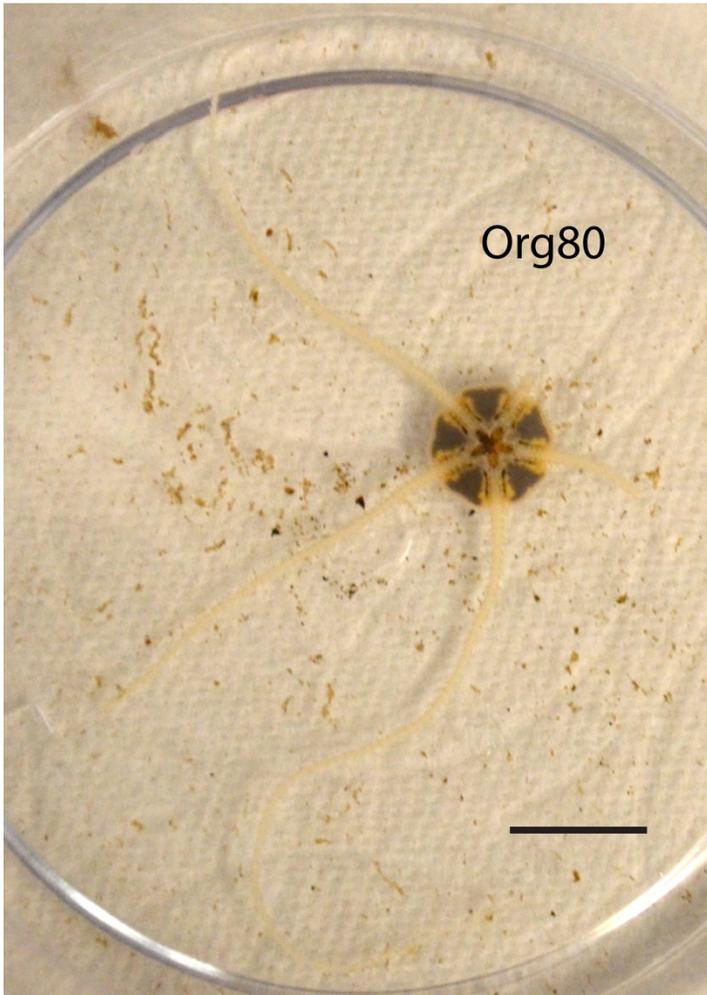
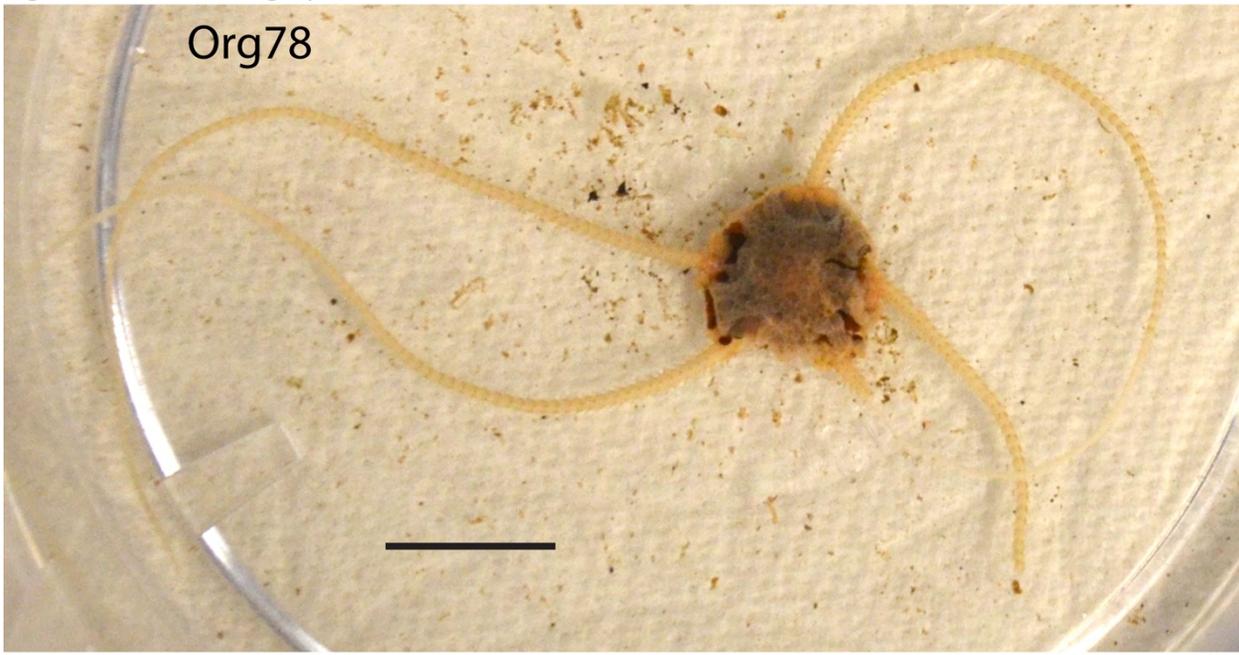
Figure 4.4.9: Photograph of representative tubeworm from MTR3201. Scale bar 1 cm.



Table 4.4.6: Info for preservation of individuals from J2-1297-Bio-1. All brittle stars dead prior to start of dissection except the last one.

Tube No.	Organism No.	E	R	C	Taxa	Tissue
124	Org76	X	X		Brittle star	Body/3stumps (E); 1 leg (R)
125	Org77	X	X	X	Brittle star	
126	Org78	X	X	X	Brittle star	
127	Org79	X	X		Brittle star	
128	Org80	X	X	X	Brittle star	
129	Org81	X	X	X	Brittle star	
130	Org82	X	X		Brittle star	All stumps for arms
131	Org83	X	X		Brittle star	
132	Org84	X	X		Brittle star	
133	Org85	X	X		Brittle star	
134	Org86	X			Brittle star (alive)	Whole organism; tiny <1mm diameter

Figure 4.4.10: Photographs of brittle stars from J2-1297-Bio-1. Scale bars 1 cm.



4.5 - Crustal Compliance Instrument Deployments and Recoveries

Spahr Webb & Bill Chadwick

This was an NSF-funded project (Spahr Webb, PI) piggybacked on the Axial 2020 cruise with the aim of testing three newly-built instruments to measure crustal compliance at Axial Seamount. The goal was to deploy the three instruments and let them record for several days on the seafloor, then recover them, with one deployment at the beginning of the cruise and a second one near the end of the cruise. Each instrument had a separate cover to shield it from bottom currents while it was deployed on the seafloor, which had to be deployed & recovered separately.

The deployments were accomplished as follows:

- Before the cruise, specific deployment sites for the instruments were picked in the summit caldera where very flat areas of lineated sheet flow existed, based on high-resolution AUV bathymetry, to ensure maximum instrument stability on the seafloor.
- Each instrument was deployed over the side of the ship and free-falled to the bottom with a descent weight below and a counter-balance float pack above (a syntactic foam disk, provided by the Jason group) so that it could be repositioned on the bottom with ROV Jason, again to ensure maximum site stability.
- A cover was then free-fall deployed from the ship in the same location with a descent weight. Both the instrument and cover had USBL navigation beacons on them to aid in finding them quickly with ROV Jason on the bottom.
- Once both the instrument and cover were on the bottom, ROV Jason located each one and moved them (individually) to one of the pre-picked flat area deployment sites, and placed them side-by-side. After the instrument was deemed to be optimally sited, the beacon on the cover was moved to the float pack (still attached to the instrument) for recovery. Then the float pack was released from the instrument by a pull-pin and was recovered at the surface by the ship.
- Once Jason was back on the bottom at the instrument site, the cover was carefully placed over the instrument (aided by windows and handles on the cover, and a rope with markings on the seafloor with markings to get the cover properly positioned without disturbing the instrument). Finally, the descent anchor that had been attached to the cover was placed on top of the cover to help hold it down.
- Then this all was repeated for the next instrument. Each Webb instrument deployment took about 9 hrs.

The recoveries were more-or-less the opposite:

- A float pack with a descent weight was free-fall deployed from the ship with a USBL beacon attached near one of the Webb instruments to be recovered.
- ROV Jason then located the float pack on the bottom and moved it to the Webb instrument that was to be recovered.
- ROV Jason then carefully removed the cover from the instrument, and attached lines from the instrument to the cover and from the instrument to the float pack.
- Finally, ROV Jason released the float + instrument + cover assembly from the anchor with a pull-pin, and the entire package was recovered at the surface by the ship.
- Then this all was repeated for the next instrument. Each recovery took about 5 hrs.

There were 6 pre-picked deployment targets for the Webb instruments that we named informally “Webb-1” through Webb-6”, but we ended up not using targets “Webb-1” and “Webb-3”, so they are not included in the table below. The 3 instruments were deployed at targets Webb-4, Webb-6, and Webb-5 during the first ROV Jason dive (J2-1293). Vent fluid sampling and temperature probe deployments & recoveries were mixed in at ASHES and Trevi vent during that dive. After recording for several days, the three Webb instruments were then recovered at the beginning of the long pressure dive (J2-1295), before we started the pressure measurements. For the second deployment of the Webb instruments, we decided to

only deploy 2 of the 3 instruments, and they were deployed near each other, at the target named “Webb-2”, instead of in separate locations, to be more time-efficient. The second deployment occurred during ROV Jason dive J2-1296, which also included fluid sampling at International District vent field, MTR deployments at Marker 33 vent and recovery of one Mini-BPR at the benchmark near Trevi vent. The Webb instruments at the “Webb-2” site were then recovered on the last Jason dive (J2-1297) following a multibeam survey and fluid sampling in the ASHES vent field.

Table 4.5.1 - Targets and actual deployment sites for the Webb instruments

Targets for Webb inst	LAT	LON	Depth
WEBB-4 (2011-lava)	45.94870	-130.00338	1532
WEBB-6 (N of AX-308)	45.93633	-129.99795	1539
WEBB-5 (near Trevi)	45.94722	-129.98353	1517
WEBB-2 (SW of ID)	45.92408	-129.98240	1523
Actual deployment sites for Webb instruments on the seafloor			
WEBB-4 (2011-lava)	45.94863	-130.00334	1533
WEBB-6 (N of AX-308)	45.936707	-129.99783	1540
WEBB-5 (near Trevi)	45.947097	-129.98343	1518
WEBB-2a (SW of ID)	45.924086	-129.98241	1523
WEBB-2b (SW of ID)	45.923871	-129.98226	1523
Actual deployment times (GMT) when cover was put on			
Dive	Date	Time	Inst name
J2-1293	09/04/2020	13:12	Comp A1 @ WEBB-4
J2-1293	09/05/2020	02:47	Comp A2 @ WEBB-6
J2-1293	09/05/2020	16:18	Comp A3 @ WEBB-5
J2-1296	09/17/2020	07:36	Comp B1(A2) @ WEBB-2
J2-1296	09/17/2020	07:55	Comp B2 (A3) @ WEBB-2

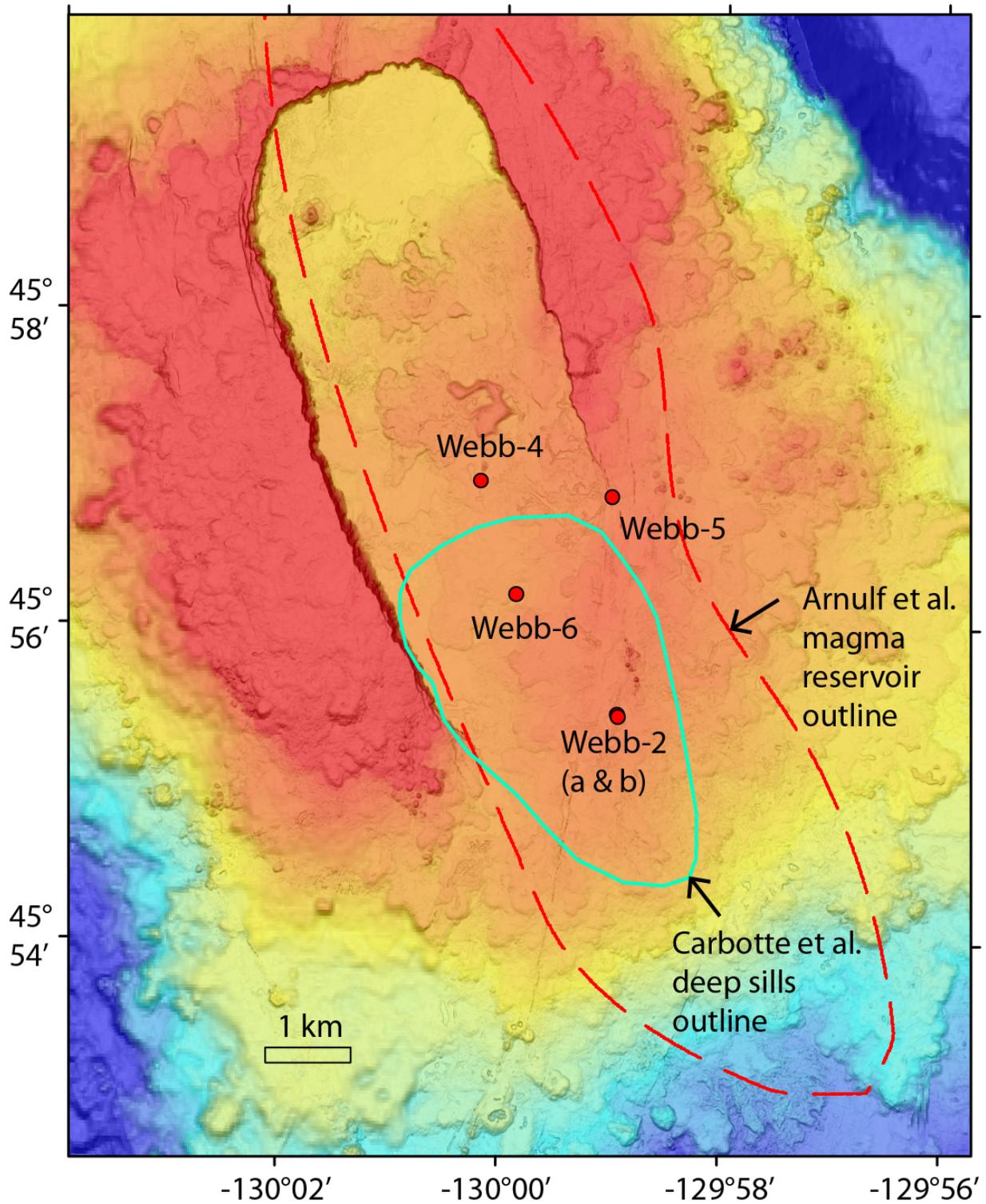


Figure 4.5.1 - Map showing Webb Crustal Compliance instrument deployment locations.



Figure 4.5.2 - ROV Jason images of the Webb Crustal Compliance instruments being deployed on the seafloor.

Detailed Summary

Three compliance instruments were test deployed during this leg. The instruments consist of a base carrying the components of the compliance sensor and a separate large pyramidal shield that is placed over the base to shield the sensor from the direct force of near seafloor current. The base carries a three component Horizon seismic sensor mounted within a gimbaling system, a differential pressure gauge (DPG) and an absolute pressure gauge (APG). The seismic data and DPG data are logged by a Nanometrics Pegasus logger. The APG has a separate logging system. All data are logged at 100 Hz.

The compliance instruments were only completely assembled in the week before the cruise as the engineers were prevented from working at LDEO for several months in the spring and early summer of 2020 due to COVID concerns. Webb debated whether to cancel participation in the cruise because of these delays, but concluded we could profitably test many components of the project (particularly the deployment scenario) even if the instrumentation was incomplete. Participation in the cruise ended up being very productive although we will still need to complete further testing of the instrumentation to confirm achievable noise levels on a subsequent cruise before a long term deployment to measure variations in magma content of the Axial volcano magma chamber can be attempted.

The first testing of the assembled complete systems was done within a room near the pier provided to us on the dock by NOAA MOC-P just before the cruise. This arrangement also allowed quarantining before the cruise, as the room provided isolation from any other personnel. The leveling control system with its tilt meter sensors used a rough prototyping board as there was not time to design and test the system otherwise due to delays from COVID. This proved to be the weak point of the system along with the gimbaling system, which was also tested for the first time a few days before the cruise. We were also not able to test the interaction between the centering system of the seismic sensor and the leveling system adequately before the cruise. All three instruments were started and each collected data over one or more nights (on shore). Data quality was good. Spectra calculated on these data showed fairly high ambient noise levels associated with the adjacent harbor and waves impacting the nearby coast but otherwise the system was working well.

A series of potential dive sites were selected that offered flat bathymetry. Bill Chadwick provided excellent guidance in selecting sites, and all deployments ended up on very flat extensive sheet flows providing good locations for installation of the sensors and their shields (covers). The instrument IDs were as follows:

A1 - APG 118385; A2 - APG 114623; A3 - APG 129509

First set of deployments Dive J2-1293 9/4/20- 9/10/20

The first set of deployments were conducted during Jason dive J2-1293, starting 9/4/2020 @ 0250Z. Before the Jason was put in the water, the shield with a tracking beacon attached to it and with two additional dive weights hung on a rope was dropped over the side above the chosen deployment site WEBB-4 (45° 56.922', -130° 00.203', Z=1532 m). The base from compliance instrument #1 was hung from a single float pack system (with tracking beacon) and then free deployed to land on the seafloor near the chosen site. The shield drifted 120m and the instrument base drifted about 320m (in somewhat different directions) with the current during descent. The instrument base dropped too slowly and thus drifted significantly more than the shield. For this reason, in subsequent deployments a double extra weight was attached by a short rope to the base to make the instrument base more negatively buoyant.

Jason was then deployed and steered to find the base. Jason grabbed the top of float and lifted the entire system to move the instrument base back to the near the chosen site (45.9485059, -130.00341387 @0612Z). A flat site near the original target site was selected and the base deployed and oriented on the seafloor. A short line attached to the midpoint of the front piece was stretched out perpendicularly to the front bar (after pulling the pin shock cord holding it in place) to enable accurately locating the shield on the

seafloor with respect to the base when the shield was placed over the base. A fiducial mark on the rope allowed determination of the proper distance to place the front of the shield in front of the base. Jason returned to locate the shield and bring it back to the location of the base. The extra weight was first removed from the shield by cutting its rope and the tracking beacon was removed and placed in the Jason basket along with the extra weight. Jason then used the wooden cross beams attached to the front of the shield to move the shield to near the base. The float was released and recovered by the ship (0719Z-0910Z). Jason returned to the site. Arriving at the instrument base Jason maneuvered to place the shield over the base such that the shield was centered over the base with plenty of room separating the cover from the instrument inside. Jason then placed the extra weight from the shield on top of the shield to more firmly hold the shield to the seafloor (1257Z). Jason then flew around the site to check the deployment and centering of shield over base. Jason then (1302Z) transited to several vent sites and conducted several measurements at each site.

The ship was eventually overhead site WEBB-6. The operations described at the first site were then repeated here using the second shield and compliance instrument #2 (Shield in water at 9/4/2020 @ 2023Z, operations completed 9/05/2020 @ 0243Z). Distances between deployment site and locations on seafloor after the drop were 134m to base, 119m to shield. The shield and then the base were deployed, located, moved and oriented on the seafloor to near the chosen site, the float recovered, and the cover placed over the instrument base installed on a flat sheet flow on the seafloor. Final location was (45.93668249, -129.99781672, 1573m). The only additional step beyond the deployment of #1 was the extra weights attached to the instrument base had to be cut off before the base was moved into position.

This was followed by some additional Jason operations near Trevi vent. The operations described for the first deployment were then repeated using the third shield and compliance instrument #3 at site WEBB-5. A major exception was the shield was deployed without a tracking beacon by mistake, so a search was required to locate the shield on the seafloor. The shield and the base were deployed, located, moved and oriented on the seafloor to near the chosen site, the float recovered, and the cover placed over the instrument base installed on a flat sheet flow on the seafloor. Final location was 45.947132, -129.9835549, 1684m.

First deployment recoveries 9/10/2020 J2-1295

The instruments were recovered during dive J2-1295. Before Jason was deployed, the float pack with two floats was deployed 9/10/2020 @ 0131Z (on bottom 0155Z). Jason was placed in water and found the float on the seafloor at 0250Z. Instrument #3 at site WEBB-5 was located at 0252Z nearby. Jason moved to instrument, and removed extra weight from top (0255Z), then removed the shield (0308Z). Jason then pulled the several pull pins on the base front bar to retrieve the line that will go from base to shield (0331Z). This was then attached to the shield eye with Jason hook (0426Z). Note this operation was both tricky and dangerous because the line was discovered to be a floating line (spectra line - whoops). Jason then moved to the float and released pull pins for the blue line and connected it from the float base to the instrument base top harness (0450Z). Jason pulled the pull pin to release the anchor from float. Shield was off bottom at 0457Z. Jason pulled back quickly after instrument release to avoid any unpleasantness. Bridge had visual on float at 0624Z. Instrument on deck at 0717Z. Shield on deck at 0727Z. Note instrument was dragged up the side of the ship during recovery. The flotation appeared to be marginal and a third float was added to the recovery float for subsequent recoveries. Later recoveries were completed beautifully and carefully with no impact on the instruments under direction of the bosun and mates.

The crane was tall enough to put the instrument base near the rail with the float high off the deck, a line was attached to the rope down to the shield and cleated on rail. The line was attached to a D-Ring, 1 m from the instrument base dividing the line from the base to the shield into a 6m and 1m piece. The two lines were shackled into this D ring. Float and instrument base were lowered to deck and moved. Then crane was used to recover the shield.

Second recovery at WEBB-4, float in water at 1111Z, on bottom 1138Z. Float moved adjacent 1210Z. Shield removed 1228Z. Remove pull pins holding shield rope. Rope (hooked) attached between instrument and shield, 1248Z. Hook attached between float and instrument base 1239Z. Pull pin to weights pulled at 1324Z, then up, up and away. Float on surface 1406. Instrument on deck 1427Z, float on deck. Shield on deck 1438Z.

Third recovery at WEBB-6. Float in water at 1637Z. Float on bottom 1704Z, Jason sights float at 1711Z. Move to instrument, removes shield at 1733Z. Attached line instrument to shield at 1800Z. Float hook on instrument 1830Z. Released weight pull pin 1837Z. Float on surface at 1913Z. Instrument on deck at 1945Z. Shield on deck at 1955Z. Jason Dive continued with other operations following a Sentry recovery.

Post Mortem after first deployment

On initial examination of data, the DPGs looked fine, but the seismometer channels were all near the rail most of the time but with occasional large transitions. Brief, occasional periods of intermediate values following leveling attempts, suggested the system got near level, but then quickly drifted off level. The engineers concluded that it was likely the leveling system had failed to level sensors sufficiently accurately and also that the recentering command was likely accomplished too late following leveling. The leveling system was likely creeping off level fairly quickly, permitting short intervals when leveling was almost adequate.

After the first deployment, it was decided to redeploy following a series of changes to the system. First, a series of washers were added to the system to stiffen the leveling system so that it would not drift off level. Weighting was changed to make system more balanced(?). The Pegasus had been programmed to send a recentering command every hour (when non-level) for the first 20 years (limit of what the system would do) during first deployment.

Instrument #1 seemed to have the V channel stuck with a large offset voltage (0.93V). This was the instrument dragged up the side of the hull. So this instrument was not redeployed. As of 1/15/2021, all three instruments now appear to be working correctly without large offset- so, no permanent damage occurred).

Second Deployment 9/17/2020 during Jason J2-1296

Instrument #2 and Instrument #3 were redeployed, both at site WEBB-2 to save time and allow comparison of data. Instrument 2 was dropped at 1717Z 9/16/2020. Jason in water around 1920Z. Found and moved instrument base by 2054Z. Shield placed adjacent to base 2127Z. Beacon removed. Float on surface 2237Z. Float recovered 2303. Sentry launched. Second shield deployed 9/17/2020 0057Z. They decided to wait until the shield was at 1000m before deploying instrument base for some reason. Jason pulled out the alignment string on the first instrument base, and looked at some tube worms while waiting. Second base in water 0244Z. Moved shield #2 adjacent to first instrument base while waiting for second instrument base to hit bottom (0251Z). Found and moved second instrument base (compliance #3) into place adjacent to compliance #2. Instrument in place, float pack released at 0356Z. Float on deck at 0510Z. Shield placed 0731Z. 2nd shield placed at 0750Z.

Second Recovery 9/18/2020 during Jason dive J2-1297

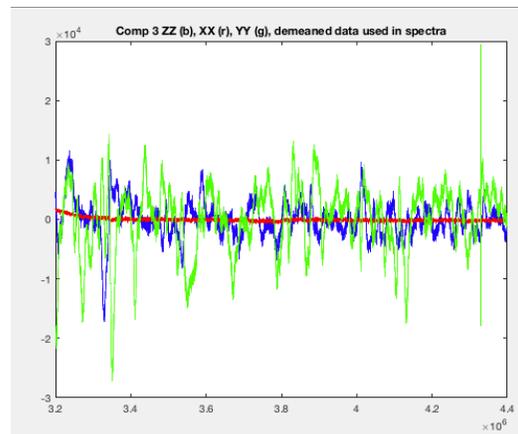
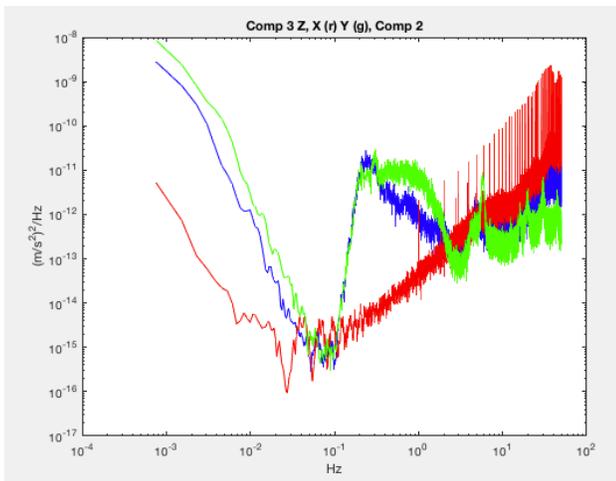
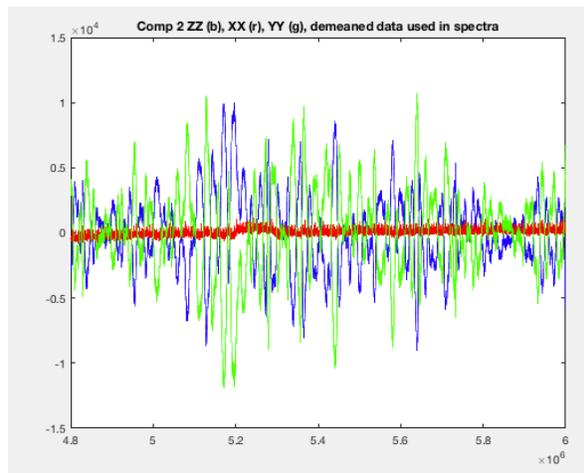
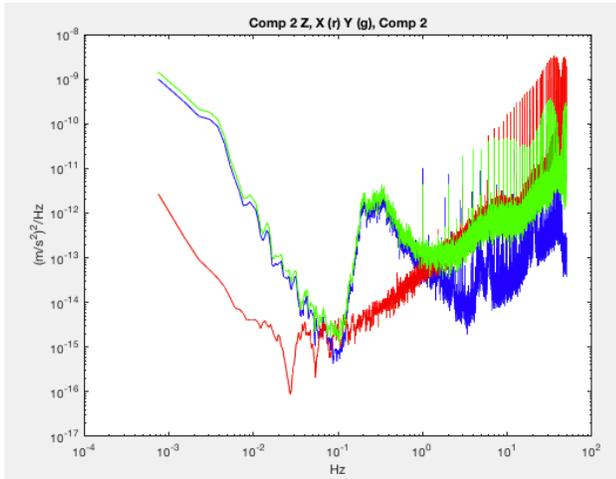
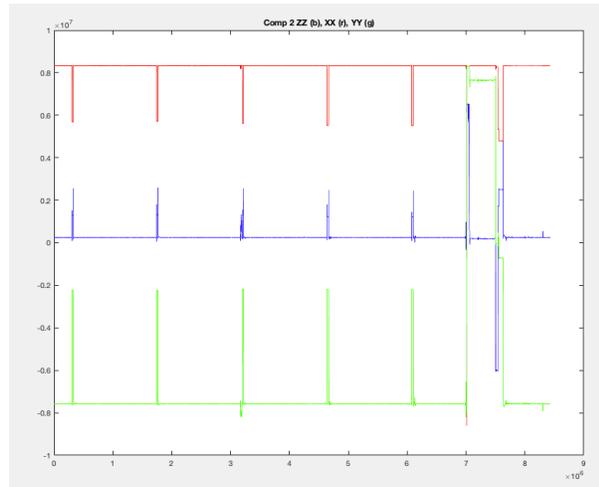
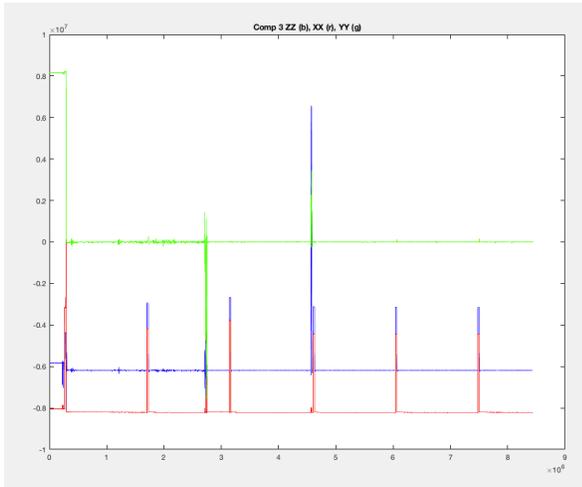
Jason in water at 0700Z 9/18/2020. Did a bunch of vent operations. In sight of WEBB-2 @ 1819Z. Float in water 1834Z. Float attached and released by 2027Z. First compliance instrument on board at 2210Z. Float redeployed at 0045Z 9/19/2020. Float attached, released 0216Z. Jason on deck at 0430Z. Second instrument & cover were recovered after Jason, all on deck by 0515Z.

Post Mortem after second deployment

Channels Z and Y were more on scale, but still have some offset. X channel shows very small amplitude, little signal. Data from both compliance instruments produces OK results, except noisy at long period. X

channel is bad, it appears it never really leveled in that axis, and thus Z channel is noisy from tilt noise from the X channel which cannot be removed. (X axis leveling appeared to have failed and data are bad. Some data on Z, Y). APG is good on both instruments #2 and #3.

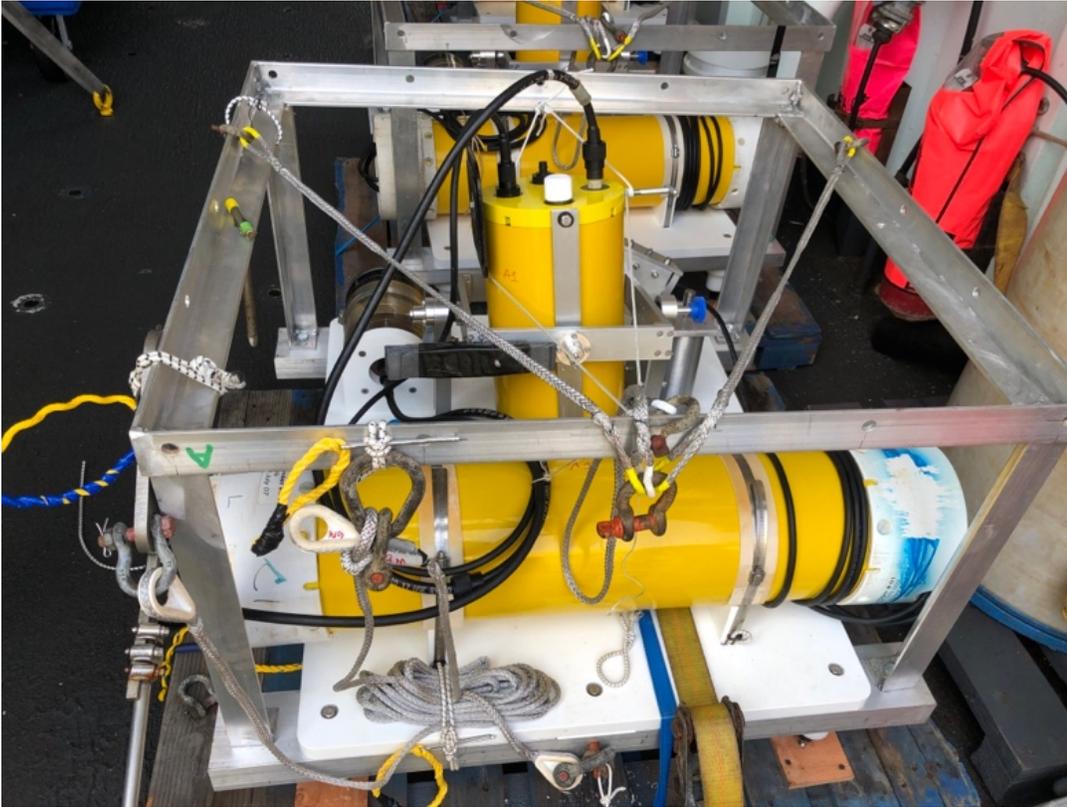
Horizontal noise levels on X are quite good at long period (about $10\text{-}12 \text{ (m}^2/\text{s}^2)/\text{Hz}$ at 0.01 Hz), 15 to 30dB less than some comparables - OSN-1 seafloor is about 15dB higher which is a quiet site). Shields seem effective.



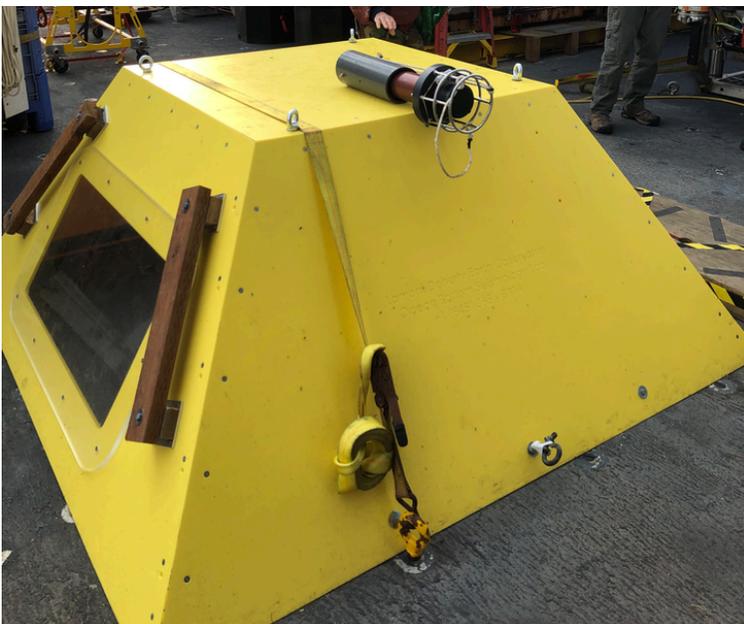
Items to make sure Jason has:

- 1) Multiple beacons on board (more would be better). Need at least two.
- 2) Three float pack, with football floats above. Or do we need to bring some blocks of syntactic?

Hooks to connect float to instrument base and from instrument base to shield for recovery.

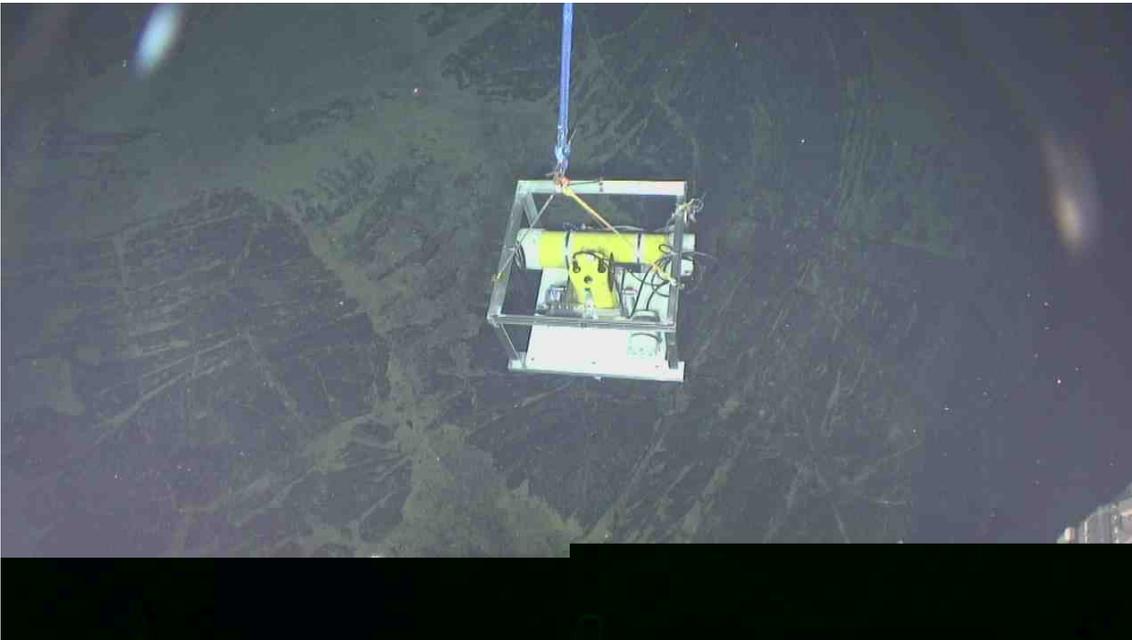


Instrument ready for deployment. Line to shield held in place by shock card with pull pin on upper bar. Hook held to frame with leftmost pull pin. Short fiducial line with shackle at end to allow alignment of shield over instrument base is lower pull pin. Harness is draped on top.

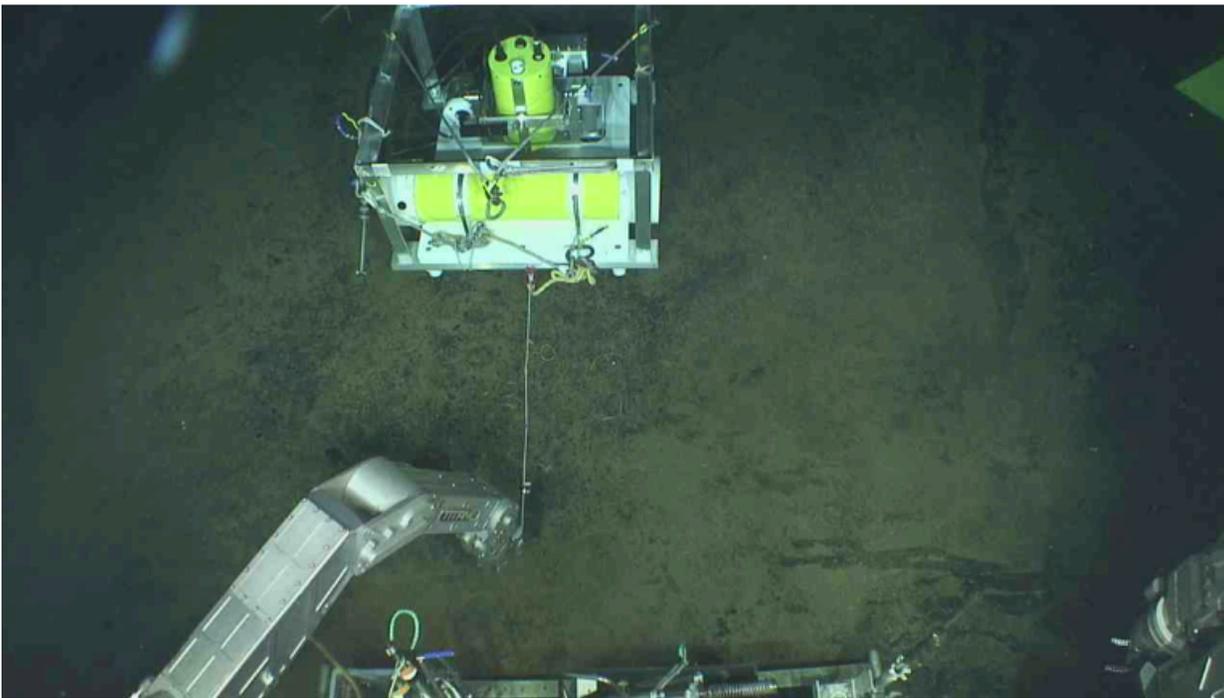


Shield pre-deployment with USBL beacon. Need to change front bars to something that doesn't get destroyed by Jason arms. Extra Jason weight attached to eye on panel on back side to speed fall (not visible). Eye for hook from instrument base to shield is on right front panel edge- need to consider changing that to make it easier for Jason to hook in to (so it doesn't flop around as it tried to hook- use U bolt?).

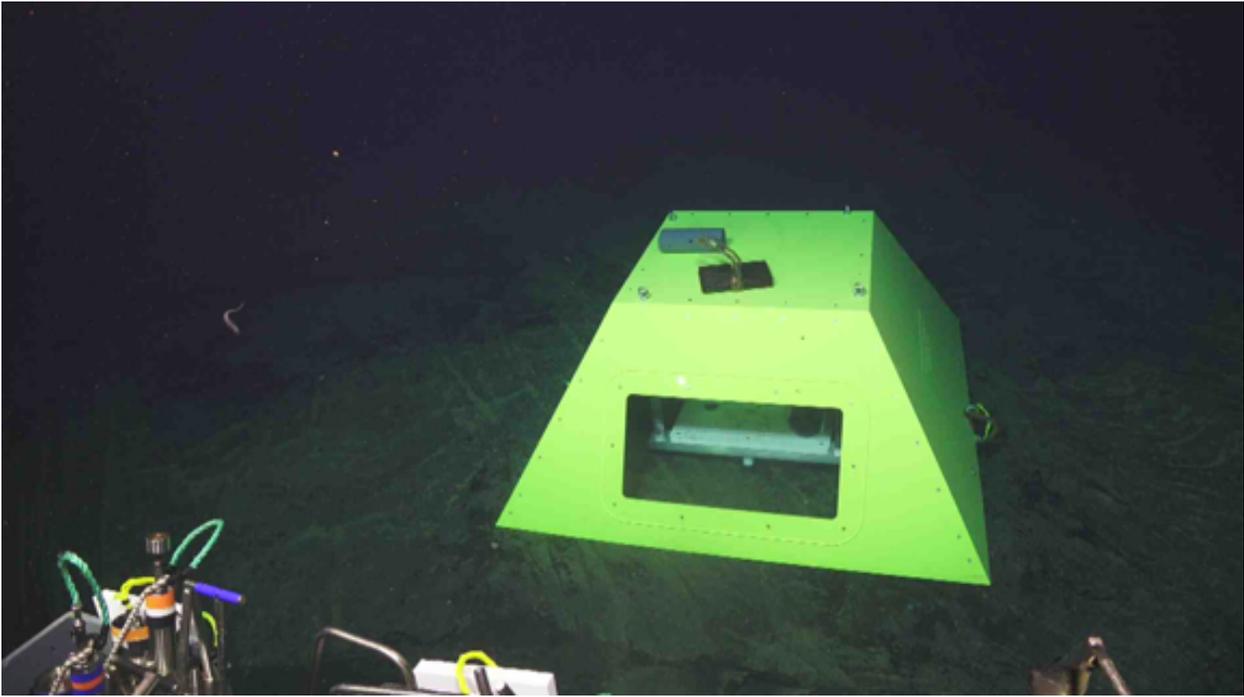
Instrument with single float over top during deployment by free drop. Pete holds short manila line to two Jason weights (30lbs) to speed fall rate. Beacon is mounted on float. There was a football float on float pack line to speed recovery in later deployments.



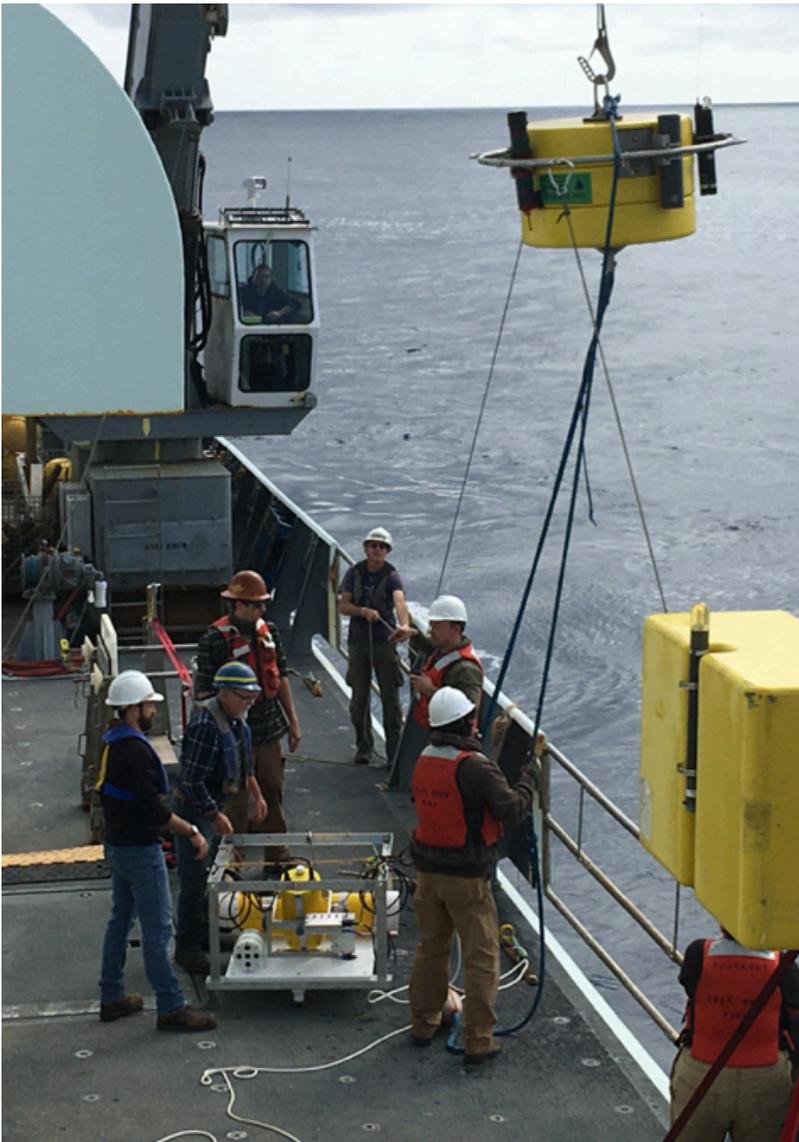
Instrument hanging from float on nice sheet flows. Two extra weights to speed fall were removed before float pack & instrument were moved into position.



Jason pulling out fiducial line. Need to make point where Jason drops edge of shield a little easier to see, but otherwise this seems to work well.



Shield on bottom with extra weight on top. Instrument is centered.



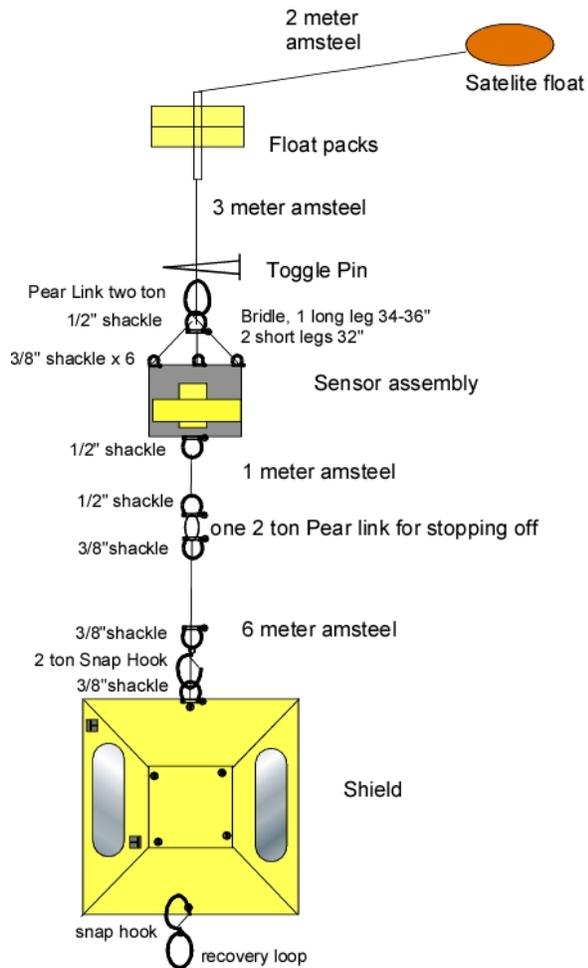
Three float package for instrument recovery. There should be a football float on short line to float to aid recovery. Note there are two lines here- the line that originally attached the float to a massive drop weight for the trip down and the second line that was bungied to the float during deployment. This line with a hook was used to connect to the instrument base harness. A third line connects the instrument base to the shield (hooked in by Jason as part of recovery procedure). The shield is currently hanging beneath ship (having been tied off to cleat on rail). Float and instrument base are placed on deck, then shield is recovered separately by crane.



Drop weight stack for float pack counted 25 plates per deployment (24 x 15lbs = 360lbs).



Shield coming out of water. Note Jason hook in eye at top (as well as a tag line hook). Line to instrument base is hanging down. Is the shield without the extra S/S plate along edge? (on we added Jason weight added somewhere- do we need to replace this with a S/S plate on third one?)



Mod's. 5 Sept. 2020 added rigging hardware

Date:	2 Sept. 2020	By:	TAK
Filename:	Recovery Axial.cvx	Software:	Canvas 14
Name:	Recovery schematic	Project/Cruise:	OBS Lab Axial Sept 2020

Above is a drawing Ted. K. did on 5 Sept. 2020. He later increased to 1.5 meters the line length between the pear link shield stopper to the instrument during the cruise. He thinks this should be increased to be 2 to 2.5 meters as the instrument was still too close on recoveries. Original line lengths, both shield to pear link, and distance between pear link and instrument were suggested by Brian as Ted asked him about free-board height and generally how the ship rides in Beaufort 3-4 seas.

Lessons

- 1) Replace floating line used to connect shield and float for recovery with sinking line. 1m+5m= 6m? longer line between shield and float with D-ring at 1m? from instrument? How long should it be? Change eye where Jason hooks in for recovery on shield and harness to make easier to hook? U bolt?
- 2) Deployment: put 2 weights on cuttable line to instrument base below one float pack to insure sink rate is fast enough.
- 3) Put 1 Jason weight (15lb?) on line below shield. Jason puts this on top of shield after it's deployed to fix it more firmly to seafloor.
- 4) Replace wooden cross beams on front of shield with metal - probably a strong beam on each side of window? Maybe T bolts for stability carrying shield around?
- 5) Recovery 3 float pack. 3m (check?) line from float pack to instrument (provided by Jason?). Change how line connects to instrument harness? How long is line from float pack to drop weights?
- 6) make sure we have plenty of shackles/line etc.
- 7) need to add stainless plate to third shield missing it currently.
- 8) Change order of channels in Pegasus so Z is Z.
- 9) Jason had a hard time pulling pin to release float recovery weight because it was so heavy (360lbs).

4.6 Hydrothermal Vent Temperature Recorders

Bill Chadwick

During this year's ROV Jason dives, we recovered HOBO-style high-temperature probes (aka MISO) which had been deployed since August 2018 at Castle, Trevi, and Vixen hydrothermal vents (all anhydrite chimneys). An additional HOBO temperature probe that we deployed at Diva Vent in 2018 was mistakenly recovered in July 2019 by UW colleagues during an OOI operations & maintenance cruise (on Jason dive J2-1189).

Unfortunately, this means there is no temperature data from Diva vent from July 2019 to September 2020. Low-temperature MTR recorders were recovered from Marker N3 Vent and Marker 33 Vent.

The following temperature probes were deployed in 2018 (or 2017) and recovered in 2020:

Table 4.6.1 – Temperature probe recoveries in 2020

Vent name	Probe ID	Dive deployed	Dive recovered
Diva	MISO 102	J2-1105	J2-1189
Trevi	MISO 103	J2-1105	J2-1293
Vixen	MISO 101	J2-1105	J2-1295
Castle	MISO 129	J2-1105	J2-1296
Marker N3 Vent	MTR 3201	J2-967 (2017)	J2-1296
Marker-33 Vent	MTR 3028	J2-1105	J2-1296

From these new data we have updated long-term plots from the high-temperature vents. In each plot, the excursions to lower temperature should be ignored, because they are largely due to the probes falling out of the vents. The two colors in parts of the plots are from probes with two independent temperature sensors.

Observations:

- The Castle and Vixen records are the longest (2001-2020). Both showed rising temperature leading up to the 2011 eruption, but generally decreasing temperatures leading up to the 2015 eruption. The Castle record is very noisy and incomplete, because it is difficult to keep a probe in the vent there. The Vixen record showed a co-eruption temperature decrease at the time of the 2015 eruption. The apparent steep decline at Vixen from 2015-2017 was probably due to the probe being on the edge of the fluid flow, because the 2018-2020 record was very steady at 322-325°C.
- The Diva and Trevi records extend from 2010-2020, except the probe at Diva was mistakenly recovered in summer 2019 by colleagues at UW. Diva was one of two probes showing a sudden temperature decrease during the 2011 eruption (the other was Casper). The temperature at Diva rose before both the 2011 and 2015 eruptions and was lower afterward, although the record has many gaps. The 2017-2018 record at Diva was relatively noisy, probably due to the probe being on the edge of the fluid flow, because the 2018-2019 record shows a much cleaner record and a steadily rising temperature from 300-322°C. At Trevi, the temperature increased after the 2011 eruption and then has apparently been decreasing since 2013. The record at Trevi has been quite noisy since 2014 (including the 2018-2020 record), again probably due to the probe not being well situated in the vent or the fluid flow.

We currently have HOBO probes in the following vents: Virgin, Trevi, Vixen, Diva, and Castle.

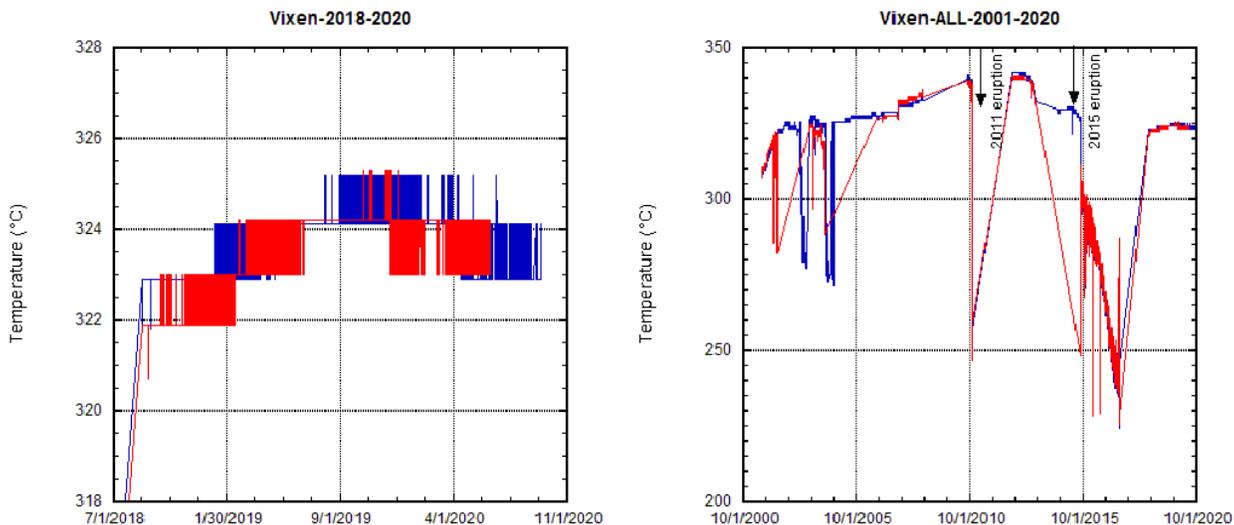
The following table shows the temperature probes that were deployed in 2020:

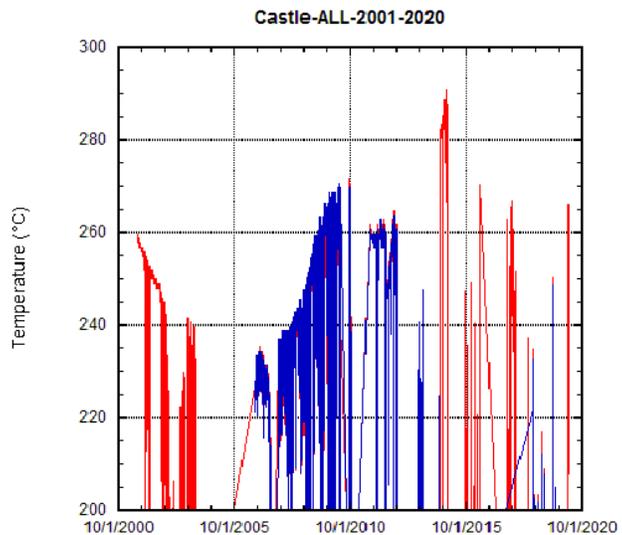
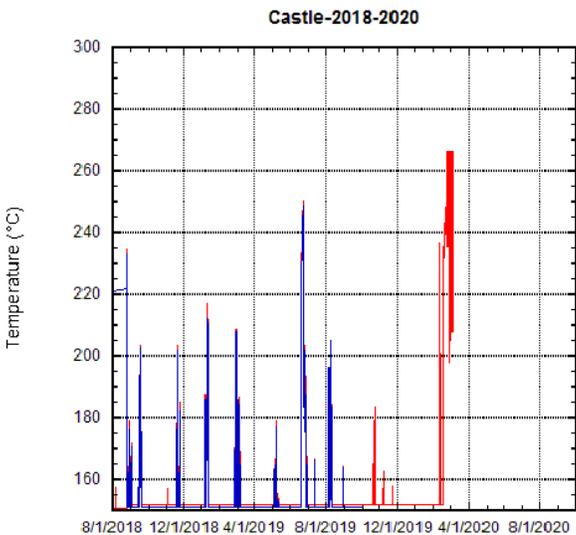
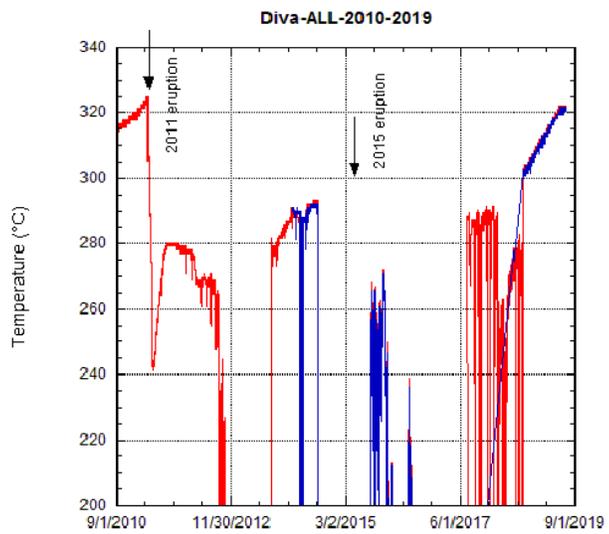
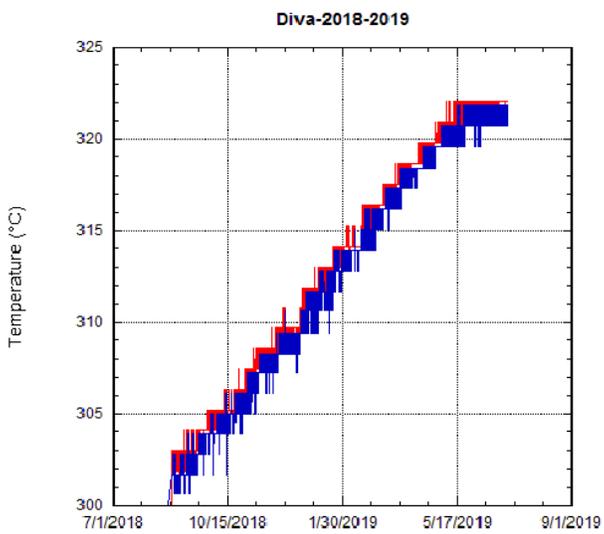
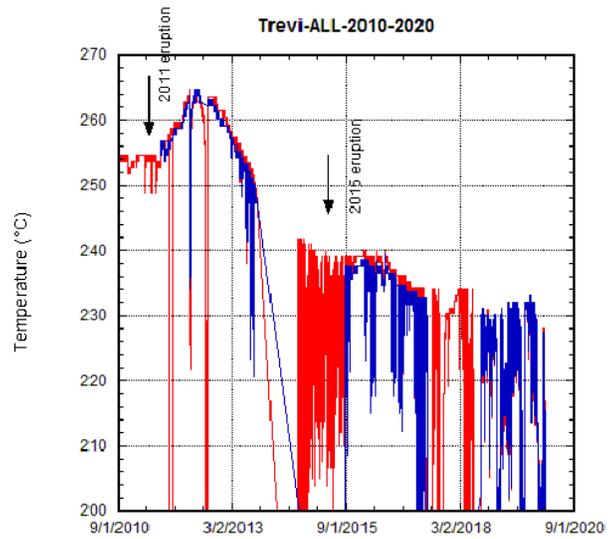
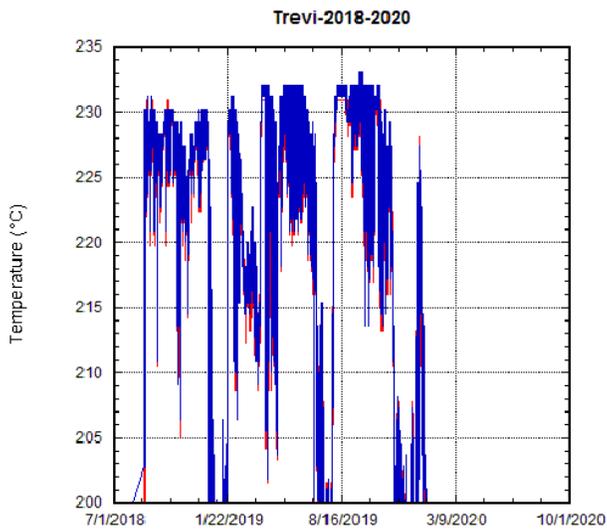
Table 4.6.2 – Temperature probe deployments in 2020.

Vent name	Probe ID	Dive Deployed
Virgin	MISO 141	J2-1293
Trevi	MISO 104	J2-1293
Vixen	MISO 103	J2-1295
Diva	HOBO 153	J2-1296
Castle	MISO 101	J2-1296
Marker-33 Vent / Mkr 166	MTR 3317	J2-1296
Marker N3 Vent / Mkr 135	MTR 3321	J2-1296
Anemone Vent / Mkr 205 (right)	MTR 3291	J2-1293
Anemone Vent / Mkr 205 (left)	MTR 3334	J2-1293

One practical note about the older-vintage MISO temperature probes that we own and that were deployed this year. The model of 3.6V lithium replacement battery that had been used in previous years on the Onset circuit boards (Tadiran battery model TL-5186) has been discontinued by the manufacturer. The only alternative is a similar model with a slightly different form factor. Therefore, the replacement batteries we purchased this year were Tadiran model TL-2450 (from DigiKey) which are slightly larger in diameter and slightly thicker. Because of this, only one battery can be placed on the two back-to-back (redundant) circuit boards inside our MISO probes and still fit inside the small pressure cases. Therefore, in the MISO probes we deployed in 2020, only one of the two circuit boards have a battery installed (instead of two, in previous years, with the smaller batteries). This does not affect the older HOBO temperature probes, because they only had one circuit board, and they still fit with the new batteries.

Figure 4.6.1 - The plots below show the temperature records from the last deployment (2018-2020) on the left, and the long-term record on the right for Vixen, Trevi, Diva, and Castle vents. We also have long-term records at Casper and Virgin, but have not collected data at those since 2013.





Miniature Temperature Recorder (MTR) recoveries:

Contributed by Sharon Walker

Two Miniature Temperature Recorders were recovered during TN383. MTR-3201 had been deployed in 2017 and both the main battery and back-up battery had died by the time it was recovered, so no data was retained in the instrument. The main battery for MTR-3028 had died, but sufficient voltage in the back-up battery preserved the data.

Table 4.6.3 - Deployment and recovery details for MTR-3028 and MTR-3201

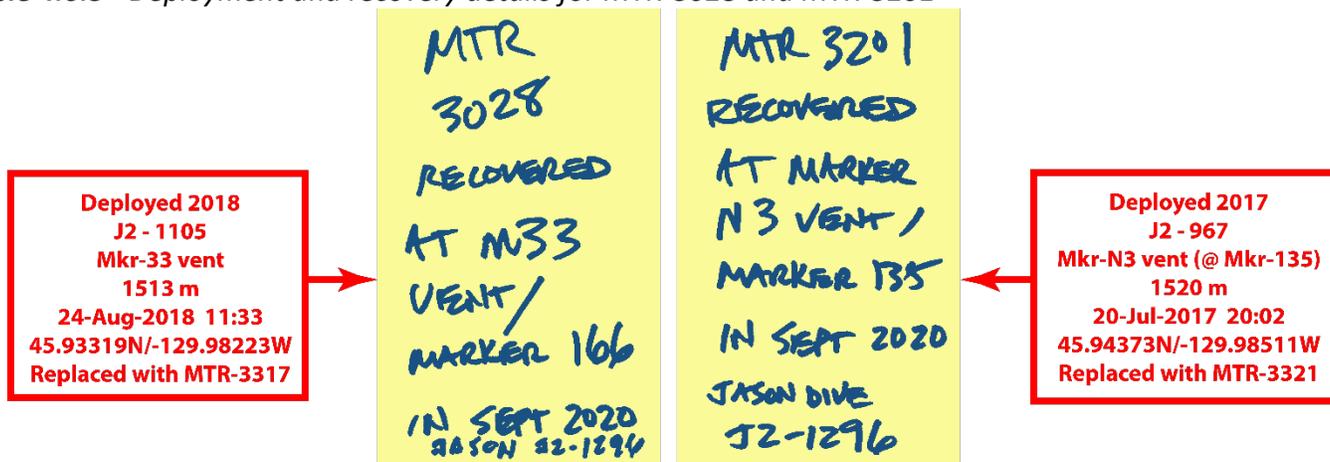
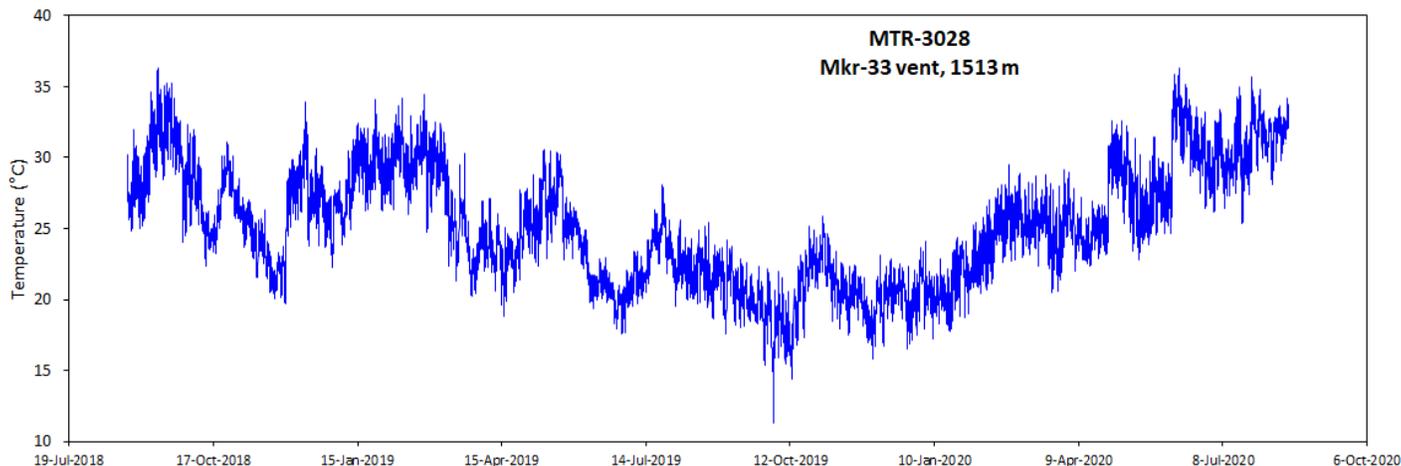


Fig. 4.6.2 - MTR-3028 recorded temperatures at Mkr-33 vent from 24-Aug-2018 to 17-Aug-2020.



4.7 – AUV Sentry Operations

Bill Chadwick, Dave Caress, Scott Nooner, and Jeff Beeson

The primary goal of the AUV Sentry surveys was to collect multibeam sonar data along tracklines inside and outside the caldera that will be compared to past and future surveys to document depth changes due to volcanic deformation. These repeat bathymetric surveys are used to augment and expand the deformation monitoring at Axial Seamount conducted by the seafloor pressure measurements. The pressure data have a higher vertical resolution (± 1 cm) and are continuous in time, but are spatially sparse, only being made at 10-15 measurement points. In comparison, the depth changes between AUV bathymetric resurveys have lower vertical resolution (± 20 cm) and are campaign-style (once a year at the most), but are spatially continuous along long tracklines and can extend over a much larger area to places where no pressure data exist. Thus these two methods form a powerful and complementary combination.

The AUV Sentry repeat mapping dives were conducted such that: (1) the survey altitude was 65-70 meters for 1.5 meter lateral resolution on the seafloor, (2) the survey speed was ~ 1.8 - 2.0 knots (~ 1 m/s), (3) dive durations were between 7-20 hours, (4) AUV Sentry came back into acoustic communication range of the ship for navigation updates periodically, and (5) a battery powered and internally recording PMEL MAPR instrument was mounted on AUV Sentry for all dives. The MAPR data collection on Sentry are discussed in a separate section of this report.

We made 7 successful AUV Sentry dives (Figures 1-8) during this cruise (dives 562-568), the first being an engineering dive. Each of the subsequent dive missions was designed as a series of waypoints in consultation with Sentry Expedition Leader Zac Berkowitz. Each dive track was designed to coordinate with the planned movements of the ship and ROV Jason. Vehicle configurations, sensor performance, vehicle statistics, and post-dive summaries are detailed in the Sentry operations report “2020-chadwick-cruise-report.pdf” provided by the Sentry team. The multibeam sonar on the vehicle is now a 200-400 kHz Kongsberg EM2040, which replaced the previously used 400 kHz Reson 7125 in October 2019, and had been used on one prior science expedition. USBL updates were given periodically throughout each mission when the AUV was within range of the ship and these were incorporated into the AUV navigation in post-processing. The Sentry shipboard team completed their usual preliminary processing of the multibeam sonar data at sea, but the complete raw dataset was transferred onshore to MBARI shortly following each mission, and immediately processed by Dave Caress. Complete processing of the multibeam bathymetry continues, including navigation adjustment to co-locate the new surveys with the large network of prior AUV surveys at Axial Seamount dating from 2006. Both the Sentry team and the MBARI seafloor mapping group use MB-System (<https://www.mbari.org/products/research-software/mb-system/>) for processing AUV survey data.

In general, AUV Sentry performed well, with these exceptions:

- One of Sentry's five battery packs failed during the first engineering dive (Sentry562), and so we had to operate at 20% reduced battery capacity during the remainder of the dives, meaning that dive durations were typically on the order of 17 hours instead of 24 hours. Despite this limitation, we were still able to accomplish our main science objectives, but obviously we would have been able to do more mapping with longer dives.
- Two of Sentry's wings were sheared off during the first vehicle recovery, due to the inexperience of the ship's crew with the vehicle. This led to the next dive being only 7 hours in duration so that the vehicle

could be launched and recovered in daylight, and so the Sentry Expedition leader could regain confidence in the ship's crew.

- The SVP sensor was stuck at a value of 1450 m/s during Sentry562. Although this error was corrected in post-processing, the realtime bathymetry accessed by TRN was badly warped, resulting in failure of the TRN algorithm to localize relative to the pre-existing map. However, the data path and robustness of the TRN implementation was successfully demonstrated during this first test. This error was not repeated in later missions.
- After the first mission, Sentry's multibeam projector array began intermittently reporting errors during pre-dive checkouts. The ensuing debugging efforts resulted in several dive delays of as much as a day, though the data quality was good when missions were successfully started. The problem was resolved after the projector head was replaced before mission Sentry566. It often happens that pressure tolerant multibeam projector and receiver heads experience gradual failures following a significant physical shock, so these problems may have resulted from damage sustained during the poor first recovery. As of January 2021, we have not been apprised of the Kongsberg findings about the nature and cause of the transmit array failure.
- We had a Liquid Robotics Wave Glider (WG) on-board to allow two-way communication with Sentry when the ship was out of acoustic range, but the WG had limited communication via Iridium because of a flooded connector. Due to marginal weather and the difficulty and awkwardness of recovering the WG from Thompson, the Sentry Expedition Leader chose to leave the WG in the water until late in the cruise when the weather had improved. Thus, we had very limited benefit from the WG during this cruise.
- The Wave Glider also lost its ability to hold station during the storm on September 14th, and began drifting rapidly down-wind. The likely need to follow and recover the WG once the weather improved threatened our ability to complete the critical ROV and Sentry dives in the remaining time on station. Fortunately, control was regained after emergency communication with shore and intervention from engineers at Liquid Robotics.

Overall, AUV Sentry and the Sentry team performed very well and we accomplished all of our major science goals.

AUV Sentry Dive Summaries

The first Sentry dive (562) was an engineering dive. The following five dives (563-567) were all parts of the overall repeat mapping pattern for measuring deformation at the summit of Axial Seamount between surveys that had been done in previous years. The final dive (568) collected bathymetric data over new survey lines to the south and east of the other surveys, in order to test if there is additional volcanic deformation in these areas (particularly over a secondary magma reservoir imaged by the multichannel seismic surveys of Arnulf et al.). This work continues a time series begun with the MBARI Mapping AUV in 2011, 2014, 2016, and 2018, and by AUV Sentry surveys in 2015, 2017, and now 2020.

TN383 Sentry Tracklines

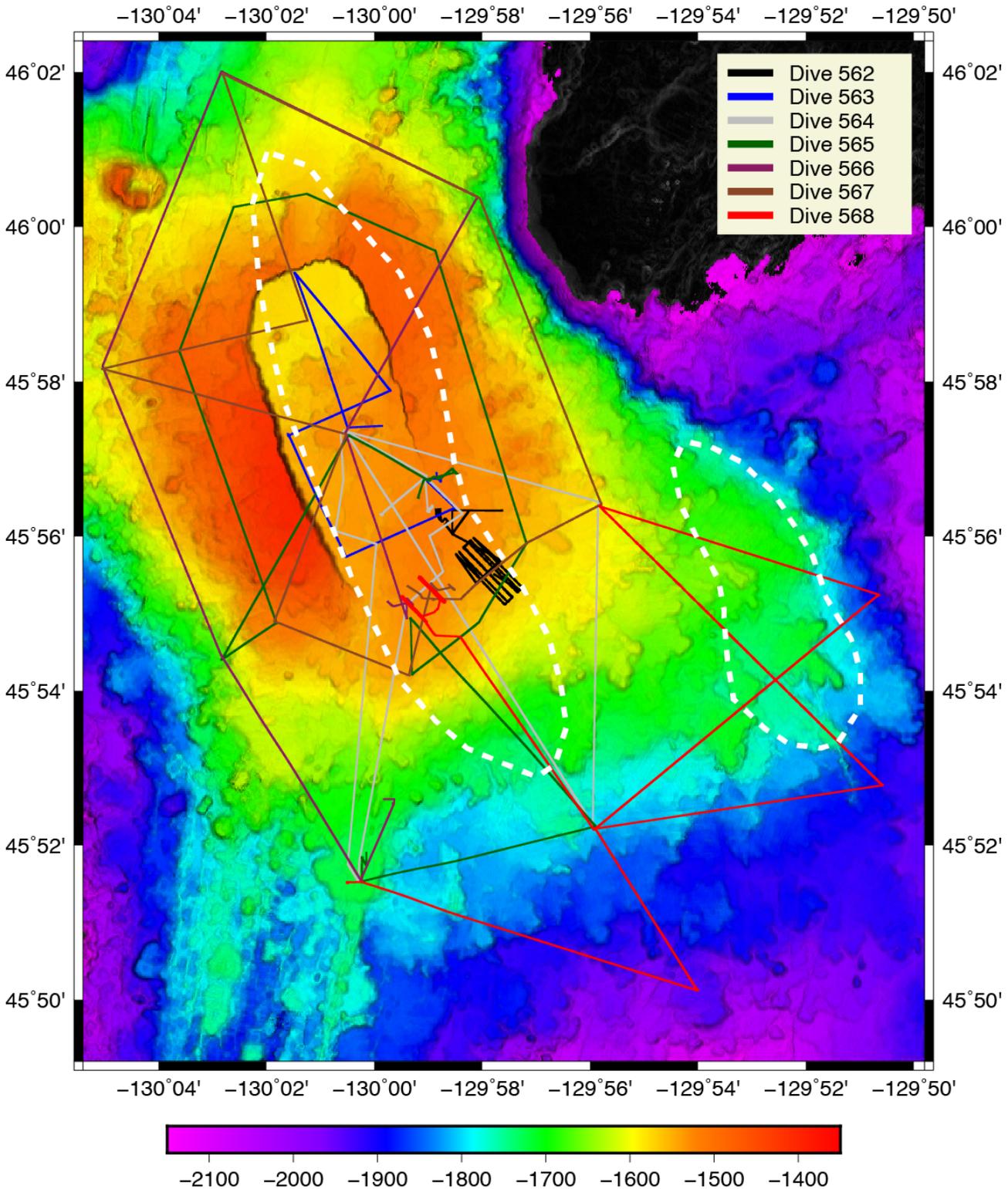


Figure 4.7.1 - Map showing tracklines of the 7 AUV Sentry dives (color-coded according to dive number). Dive 562 was an engineering dive. The white dashed lines are outlines of magma reservoirs as determined from the multi-channel seismic surveys of Arnulf et al. Sentry dive 568 included new lines designed to cross the secondary magma reservoir to the east of the summit.

Table 4.7.1 - TN383 AUV Sentry dive statistics

<p>Sentry 562 (Engineering dive; some damage to vehicle on recovery): Sentry in water: 2020/09/03 13:16:00 Sentry on deck: 2020/09/03 23:13:42 survey time: 8.3 hours deck-to-deck time: 9.8 hours distance travelled: 24.20 km</p>
<p>Sentry 563: (shorter than usual so that both deployment & recovery were in daylight) Sentry in water: 2020/09/05 17:51:35 Sentry on deck: 2020/09/06 00:43:20 survey time: 5.4 hours deck-to-deck time: 6.9 hours distance travelled: 19.54km</p>
<p>Sentry 564: Sentry in water: 2020/09/10 20:46:13 Sentry on deck: 2020/09/11 15:21:18 survey time: 16.9 hours deck-to-deck time: 18.6 hours distance travelled: 57.31km</p>
<p>Sentry 565: Sentry in water: 2020/09/12 04:21:00 Sentry on deck: 2020/09/12 21:48:15 survey time: 15.9 hours deck-to-deck time: 17.5 hours distance travelled: 56.34km</p>
<p>Sentry 566: Sentry in water: 2020/09/13 13:41:37 Sentry on deck: 2020/09/14 03:46:24 survey time: 12.6 hours deck-to-deck time: 14.1 hours distance travelled: 44.47km</p>
<p>Sentry 567: Sentry in water: 2020/09/16 23:29:47 Sentry on deck: 2020/09/17 15:37:36 survey time: 14.6 hours deck-to-deck time: 16.1 hours distance travelled: 52.58km</p>
<p>Sentry 568: Sentry in water: 2020/09/18 03:47:56 Sentry on deck: 2020/09/18 23:40:50 survey time: 18.2 hours deck-to-deck time: 19.9 hours distance travelled: 62.49km</p>

Sentry 562 - September 3, 2020

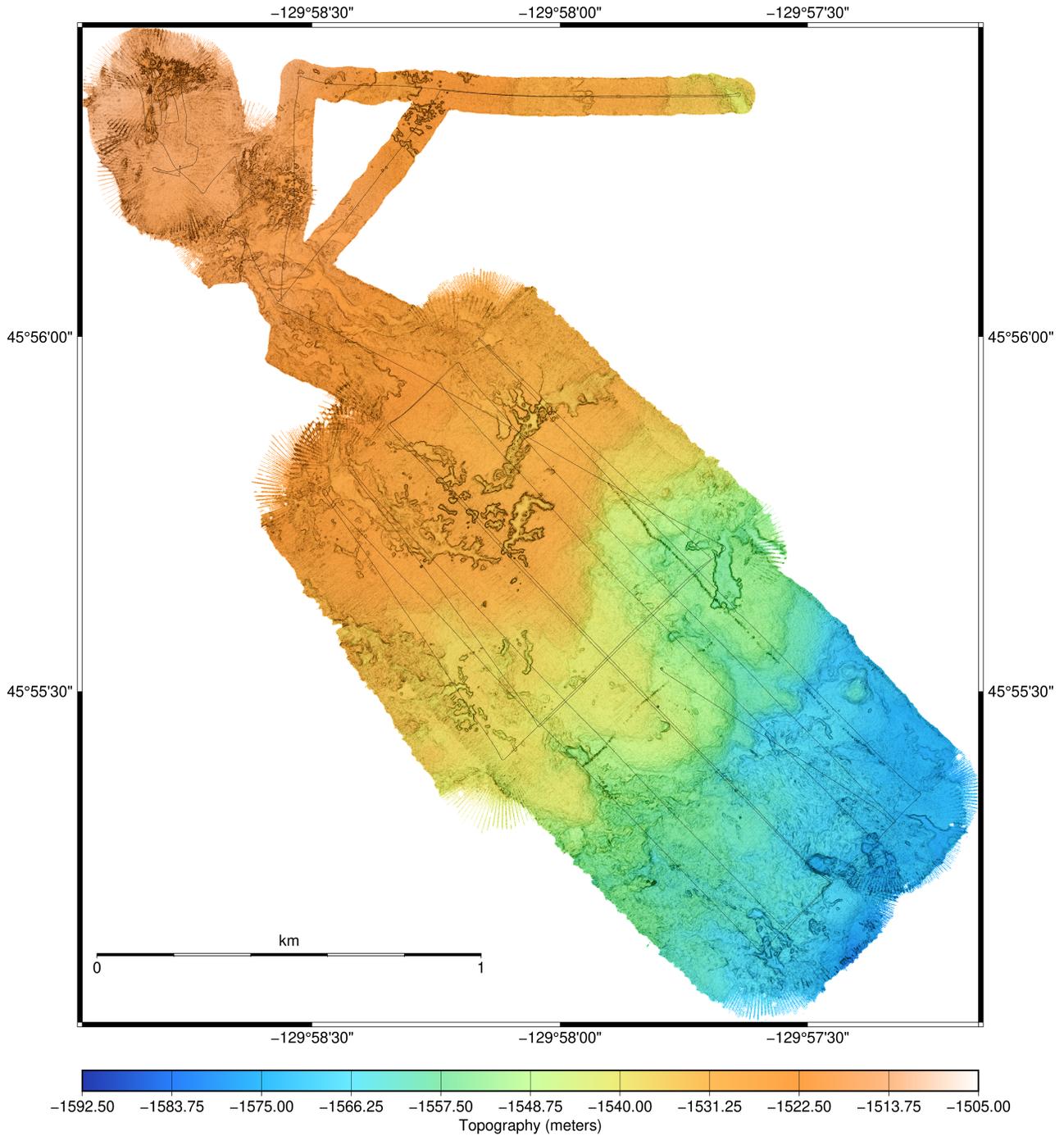


Figure 4.7.2 - Multibeam bathymetry from Sentry562 following processing. This was an engineering test mission. The speed of sound value used for beamforming was incorrect, but this has been corrected in post processing.

Sentry 565 - September 12, 2020

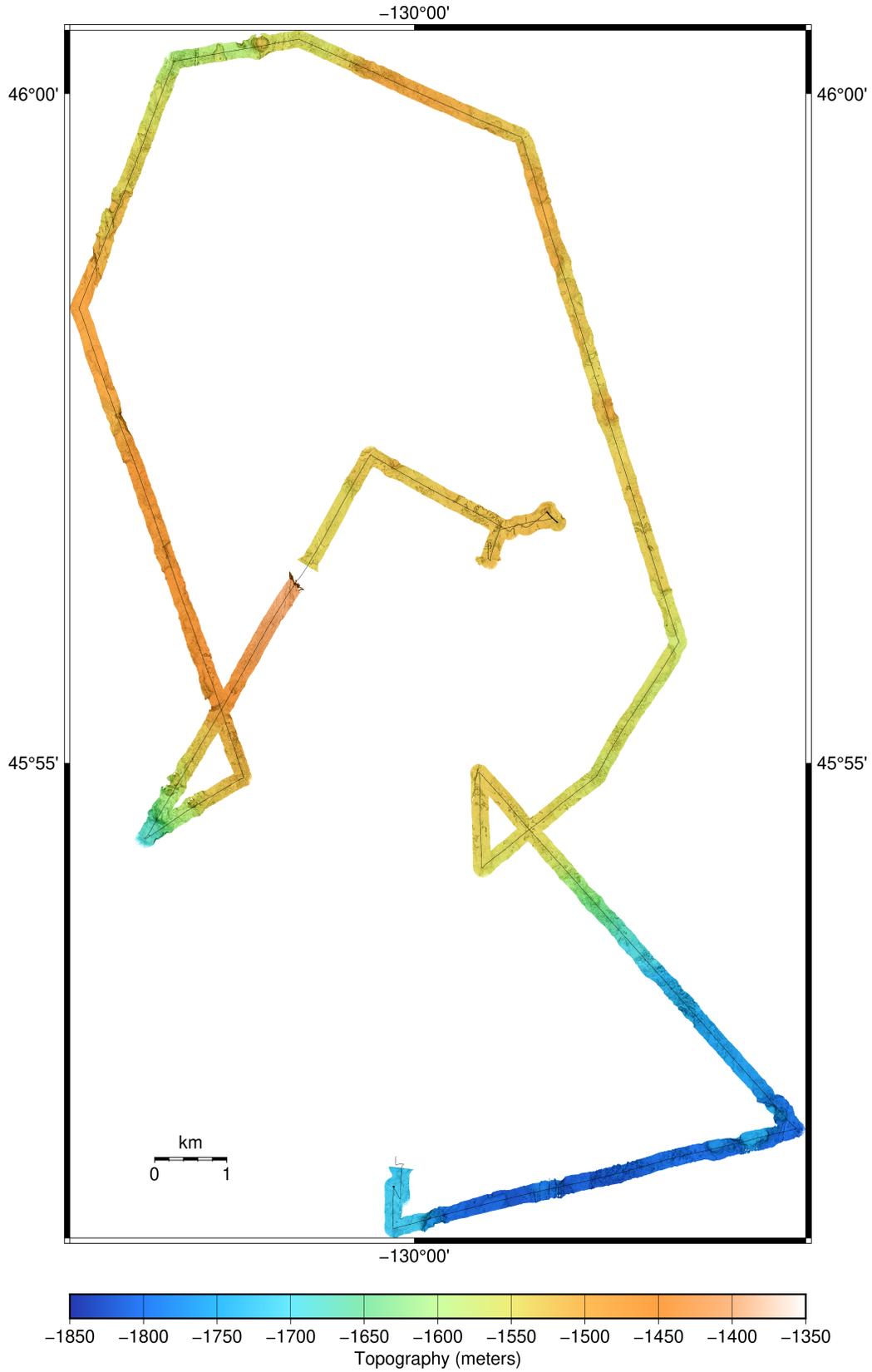


Figure 4.7.5 - Multibeam bathymetry from Sentry565 following processing.

Sentry 566 - September 13, 2020

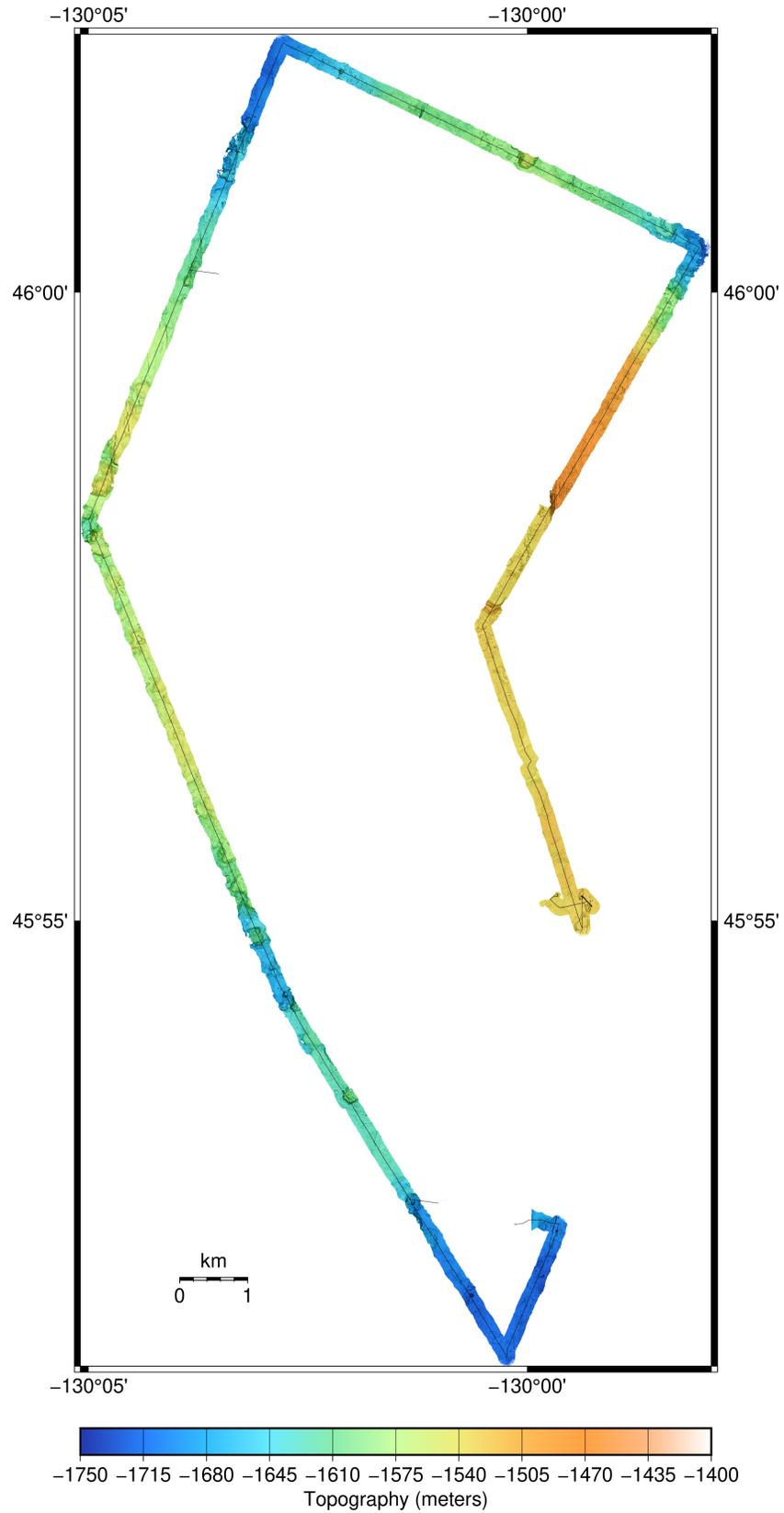


Figure 4.7.6 - Multibeam bathymetry from Sentry566 following processing.

Sentry 568 - September 18, 2020

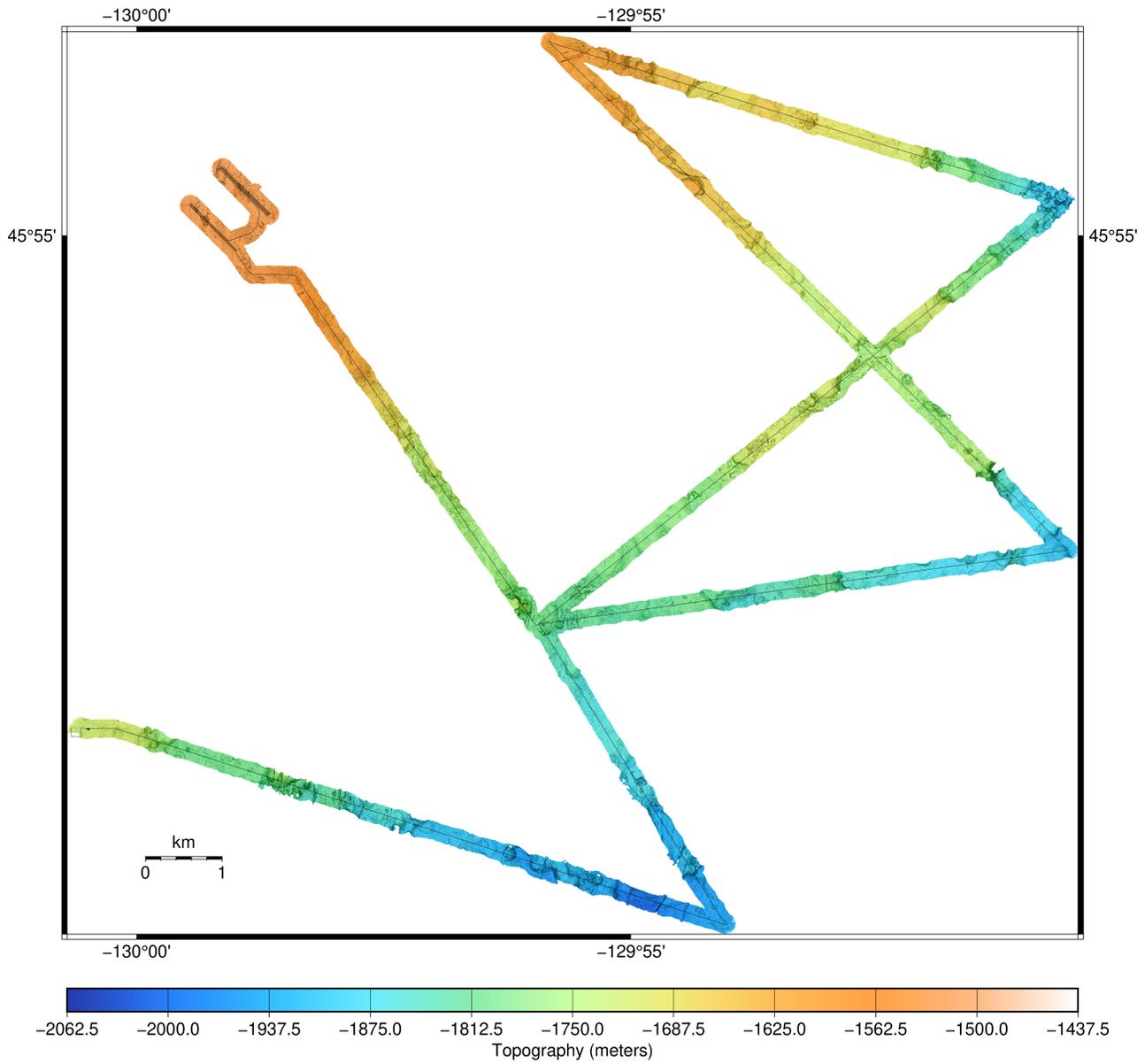


Figure 4.7.8 - Multibeam bathymetry from Sentry568 following processing.

TN383 AUV Sentry Surveys - Axial Seamount - September 2020

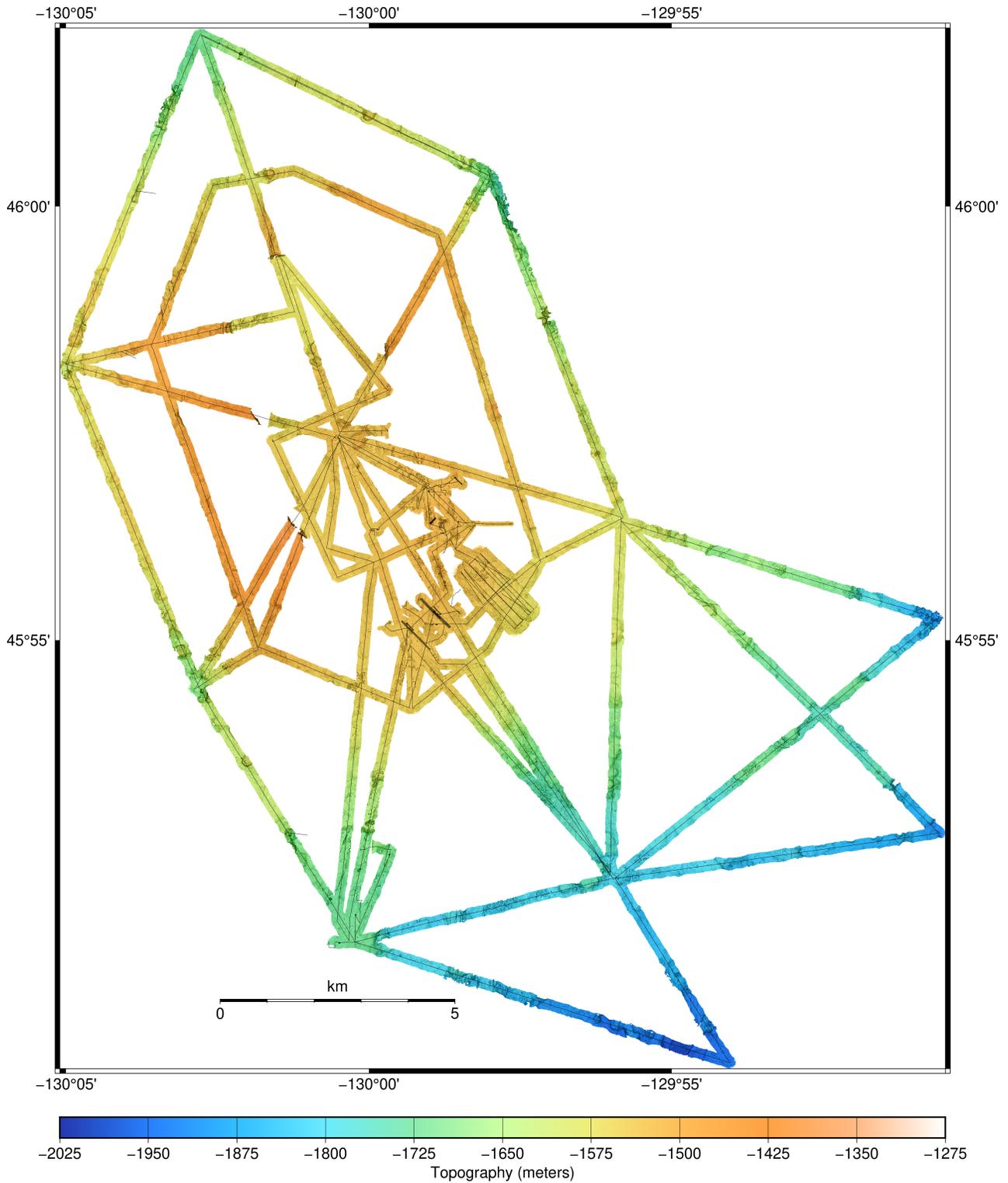


Figure 4.7.9 - Multibeam bathymetry from all seven Sentry surveys following processing. The navigation has been adjusted so that features match wherever swaths overlap or cross.

Testing of Terrain Relative Navigation (TRN) software on AUV Sentry

An additional component of the AUV Sentry operations during TN383 was the implementation and testing of Terrain Relative Navigation (TRN) software. This effort was funded by NSF as part of the Nooner, Chadwick, and Caress repeat mapping project, and additional effort was supported by the Packard Foundation.

TRN is a method for using realtime bathymetry data to determine a vehicle's position relative to an existing topographic map. The TRN algorithm ported to Sentry has been developed over several years by Steve Rock of Stanford, his students, and Rob McEwen and Rich Henthorn of MBARI. Prior uses have been to allow AUVs without high grade inertial navigation to use simple echosounder or DVL soundings to navigate relative to a 1-meter scale map generated by a multibeam-equipped AUV. For this project, the goal is to enable a survey AUV to closely follow previous survey lines by using realtime multibeam data to locate the AUV relative to a pre-existing map. The problem being addressed is that INS navigational drift during long survey lines can grow to as much as 100 m (or more when things go badly). When two repeat surveys follow exactly the same track, differencing the bathymetry compares center beam data with center beam data and is relatively insensitive to errors in the multibeam roll bias. If navigational drift causes the repeat surveys to only partially overlap, then outer beam data from both swaths are compared, a calculation that is biased by any roll bias errors for either or both surveys. Thus, failure of a repeat survey to follow the prior survey lines within 30 m or so degrades the precision of the change observed by bathymetric differencing. If we can use TRN to ensure that AUVs precisely follow the previous tracklines being repeated, we eliminate the possibility of failing to achieve any overlap and improve the quality of our measurements of the vertical change between surveys.

The Rock et al TRN algorithm is a particle filter that evaluates how a subset of soundings from each multibeam ping matches with the reference map by calculating misfit for a large number of randomly distributed hypotheses for the sensor location - these hypotheses comprise the "particles". As subsequent pings are evaluated, poorly matching hypotheses are discarded and replaced. Over time, the surviving hypotheses tend to converge to a small region around the actual location. When the distribution of particles is sufficiently compact, the location of the sensor relative to the reference map is said to be converged or localized, and the standard deviation of the distribution provides a measure of the uncertainty in the relative position estimate.

TRN has been integrated into the MB-System software package by Kent Headley, Dave Caress, Rich Henthorn, and Rob McEwen of MBARI. In an AUV context, the MB-System TRN tool `mbtrnpp` calculates a navigation offset estimate following each multibeam ping; this offset is the difference between the realtime vehicle navigation and the localized position on the reference map. This offset is communicated to the AUV control software, along with the standard deviation and a flag indicating whether `mbtrnpp` regards this offset estimate as reliable. The reliability flag reflects both the magnitude of the standard deviation (must be less than a threshold value to be converged) and the stability of the estimate (must have been converged for at least a minimum number of consecutive pings). On the AUV side, if use of the TRN navigation offset estimate is enabled, then the control software will drive the vehicle using navigation values that are the sum of the realtime navigation and the most recent converged and reliable TRN navigation offset. If the survey waypoints have been defined using the reference map, then the application of this offset will enable the AUV to precisely fly the desired survey lines, regardless of inertial navigation drift. At the mission's start, before TRN arrives at a stable convergence, the most recent offset estimate for the AUV will be zero. If stable convergence is achieved but then lost, then the AUV control software will continue to use the most recent good estimate until it is superseded by a new stably converged estimate.

TRN was installed in Sentry on a Debian Linux "datapod" computer. The MB-System tool `mbtrnpp` combined the TRN algorithm with network based i/o capability. Running throughout the Sentry missions, `mbtrnpp` accessed all realtime multibeam data, input decimated and filtered soundings from each ping to TRN to calculate navigation offset estimates, and then communicated those estimates to the AUV control software. The datapod was booted and `mbtrnpp` started by the MBARI team as part of each pre-dive checkout. The testing strategy was to first run the TRN software in the background, getting input from the sonars and estimating the AUV's position from preexisting data, without enabling the use of the offset estimates by Sentry. In this way, the TRN and associated Sentry control software was incrementally

fine-tuned and validated in both realtime and in post processing over the course of the seven Sentry missions. Post processing validation showed that during the last three surveys, all of the TRN navigation offset estimates identified as stably converged were in fact accurate. During the last two Sentry surveys, near the end of the missions the Sentry team enabled the realtime use of the TRN offset estimates, and validated that the AUV followed the desired lines when utilizing those offsets. This included returning to the desired lines after significant navigation errors were introduced manually. The soundings input to TRN from each ping were median filtered ($n_across=7$, $n_along=3$, $threshold=0.05$) and decimated to 21 valid beams taken from the inner 90° of the swath. The TRN parameters used for the successful full tests include using 10,000 particles, a convergence standard deviation threshold of 3 m, and a convergence stability requirement of 1200 pings (corresponding to 600 seconds or 10 minutes).

Implementing the TRN software on AUV Sentry involved extensive pre-cruise discussions and coordinated software development between the MBARI and Sentry teams before and during the expedition. Dave Caress had intended to come on the cruise to lead the Sentry mapping and the TRN testing and evaluation. However, he was unable to join the ship because his pre-cruise Covid isolation was broken when his neighborhood was evacuated due to a wildfire. Instead, he, Kent Headley, and Hans Thomas from MBARI joined the expedition remotely via satellite communication to and from the ship. The MBARI team was able to have long term remote logins to computers on AUV Sentry, move significant amounts of data from and code to the ship, communicate efficiently with the Sentry team, and actively participate in all of the Sentry pre-dive operations. NSF facilitated this remote work by funding a high bandwidth connection for this expedition. We thank everyone involved for enabling an effort that would have been challenging under normal circumstances, and we particularly thank the Sentry team for their willingness to work through this complicated development and testing process. In the overall context of this expedition, the successful testing and implementation of the TRN software on Sentry by the MBARI and Sentry teams was a remarkable accomplishment.

Figure 4.7.10 (next page) - TRN performance during Sentry566. The waypoints for this survey were defined to match tracklines of previous surveys on a reference map combining all previous AUV surveys of the Axial Seamount summit region. The black line shows the realtime Sentry inertial navigation that was embedded in the realtime multibeam data read by mbtrnpp. The Sentry team manually set a navigation offset of 424 m west and 57 m north based on USBL tracking at mission start, and the AUV controls ran the survey lines using that offset. The red dots show the locations of TRN position estimates when the TRN filter was judged to be stably converged. The purple dots show position estimates for which TRN was converged, but had not been converged long enough (10 minutes) to be considered stable. Some of the unstable position estimates were erroneous, but all of the position estimates thought to be stable and therefore usable were correct. The swath bathymetry is shown using navigation derived from a post-cruise comprehensive solution combining all of the AUV surveys since 2006, and so the offset between the TRN navigation and the new navigation model shows the change to the reference map that will be used for TRN during our 2021 surveys with MBARI Mapping AUVs.

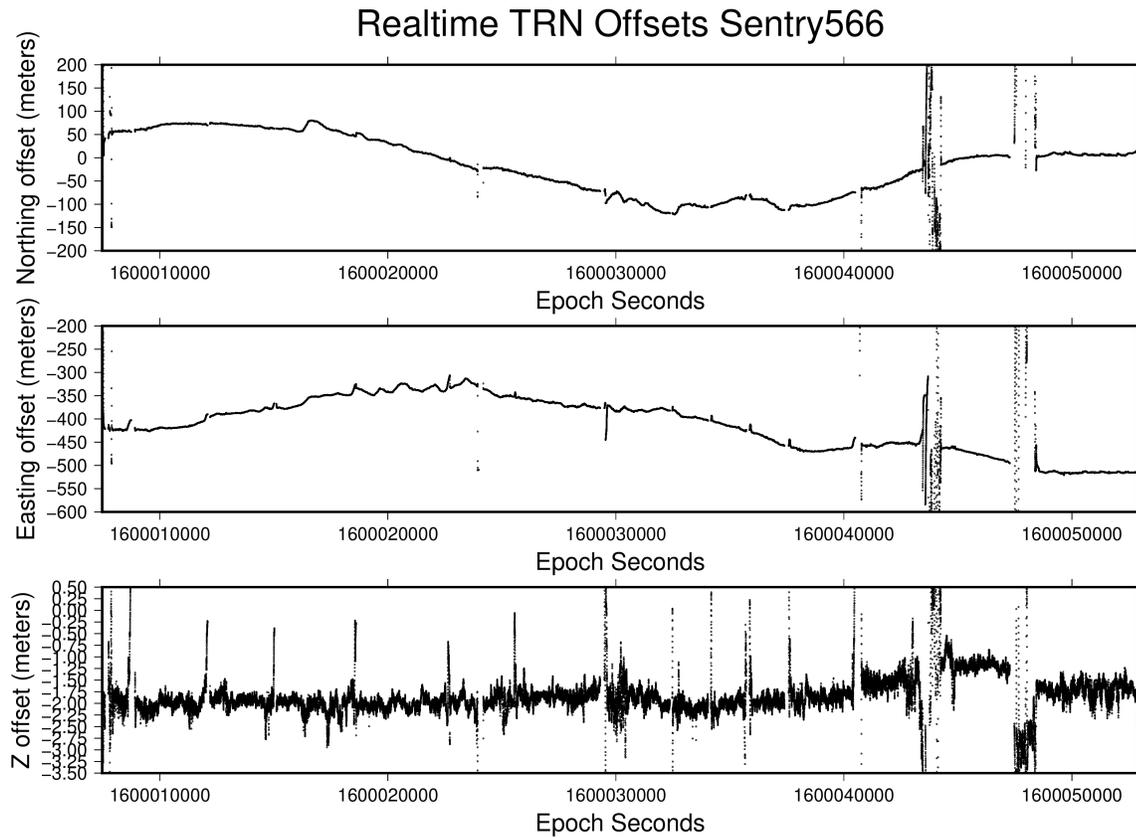
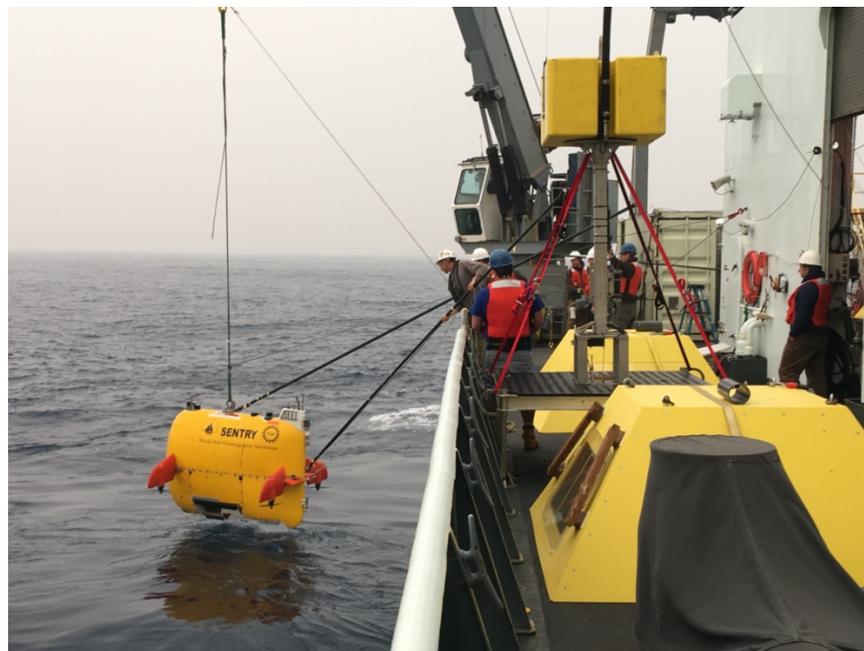


Figure 4.7.11 - Time series of northing, easting, and vertical TRN navigation estimate offsets for Sentry566. The excursions coincide with times where the TRN particle filter was not converged. The Sentry team manually set a navigation offset of 424 m west and 57 m north based on USBL tracking at mission start, and the AUV controls ran the survey lines using that offset. The inertial navigation drift away from the initial navigation offset documented here demonstrates the benefit of continuously localizing the vehicle position using the realtime multibeam data.



4.8 - CTD Operations & MAPR Deployments: Plume Surveys and Water Column Sampling

Contributed by Sharon Walker and Emily Norton

A total of 9 CTD casts were completed during the 2020 Axial expedition (TN383). Emily Norton managed operations at sea, while Sharon Walker participated from shore. CTD casts were conducted using the ship's Seabird *9plus* CTD enhanced with one optical backscatter sensor (Seapoint high-sensitivity turbidity meter) and one PMEL oxidation-reduction potential (ORP) sensor, which were both supplied, along with the required cables, by PMEL (Sharon Walker). A Seabird pH sensor was included as one of the analog sensors for the first 4 casts, then removed for the remainder of the expedition.

Water samples from up to 24 Niskin bottles per cast were taken for total dissolved trace metals (TDM_e) and microbial eDNA analyses (see relevant sections of this report for further information regarding discrete samples from CTD casts). An Excel file containing CTD data at the time the bottles were tripped is included as supplementary material to this report (*file name: TN383-Axial2020-CTD-BottleFiles.xlsx*).

Table 4.8.1 - Summary of CTD cast locations.

Cast#	Station Name	Lat (°N)	Lat (min)	Lon (°W)	Lon (min)	Site
1	TN383-CTD-01	45	56.0221	130	0.8006	ASHES
2	TN383-CTD-02	45	55.5830	129	58.7980	International District
3	TN383-CTD-03	45	55.0300	129	59.5780	Vixen
4	TN383-CTD-04	45	59.3460	130	1.6210	CASM
5	TN383-CTD-05	45	52.0350	130	0.1260	SRZ (South of caldera)
6	TN383-CTD-06	46	7.1820	129	58.1690	NRZ
7	TN383-CTD-07	45	52.7470	129	48.2000	Dymond
8	TN383-CTD-08	46	4.4870	129	59.6490	mid-NRZ flow
9	TN383-CTD-09	45	31.2960	129	4.9710	background

Hydrothermal plumes are commonly defined by the plume tracers of turbidity and ORP, which indicate the presence of hydrothermal particles and reduced chemical species, respectively. Data from these tracers are displayed in real-time to aid sampling through the plume and in the water column above and below the plume.

Optical backscatter data is presented as Δ NTU, the anomaly of dimensionless Nephelometric Turbidity Units (NTU) above a non-plume mid-water minimum value (blue lines in Fig. CTD-1). The ORP sensor responds to dissolved reduced hydrothermal chemicals (i.e., Fe²⁺, H₂S, and H₂) with rapidly decreasing voltage (reported in millivolts (mV)). The hysteresis seen in ORP profiles is typical and due to slow “recovery” of values after encountering a plume (red and pink in profiles below are from the down and up portion of each cast, respectively).

During the Axial 2020 expedition, the particle plume over the International District vent field was more intense (maximum Δ NTU=0.328, plume depth ~1440 m) than at any other location (Δ NTU~0.02 to 0.05) in 2020, and was more intense than for any other year at the International District since 2010, with the exception of the 2011 post-eruption plume.

Fig. 4.8.1 - Full water column CTD profiles of turbidity (ΔNTU , blue) and ORP (red=downcast, pink=upcast) during TN383. Niskin samples are indicated by the yellow diamond symbols overlaid on the ΔNTU profiles and black "+" symbols overlaid on the ORP profiles to show the relationship of each bottle sample to the plume distribution of each tracer.

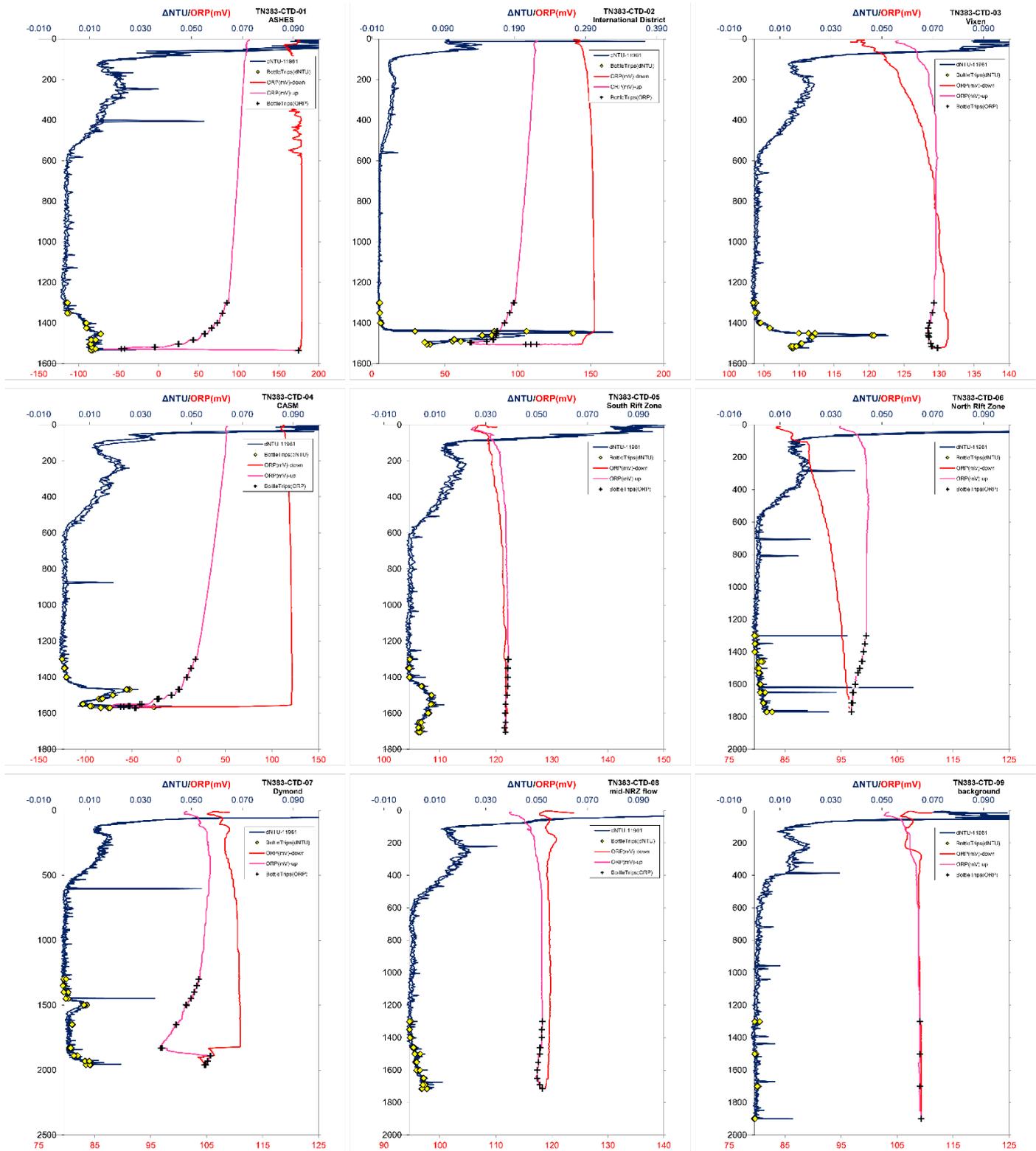
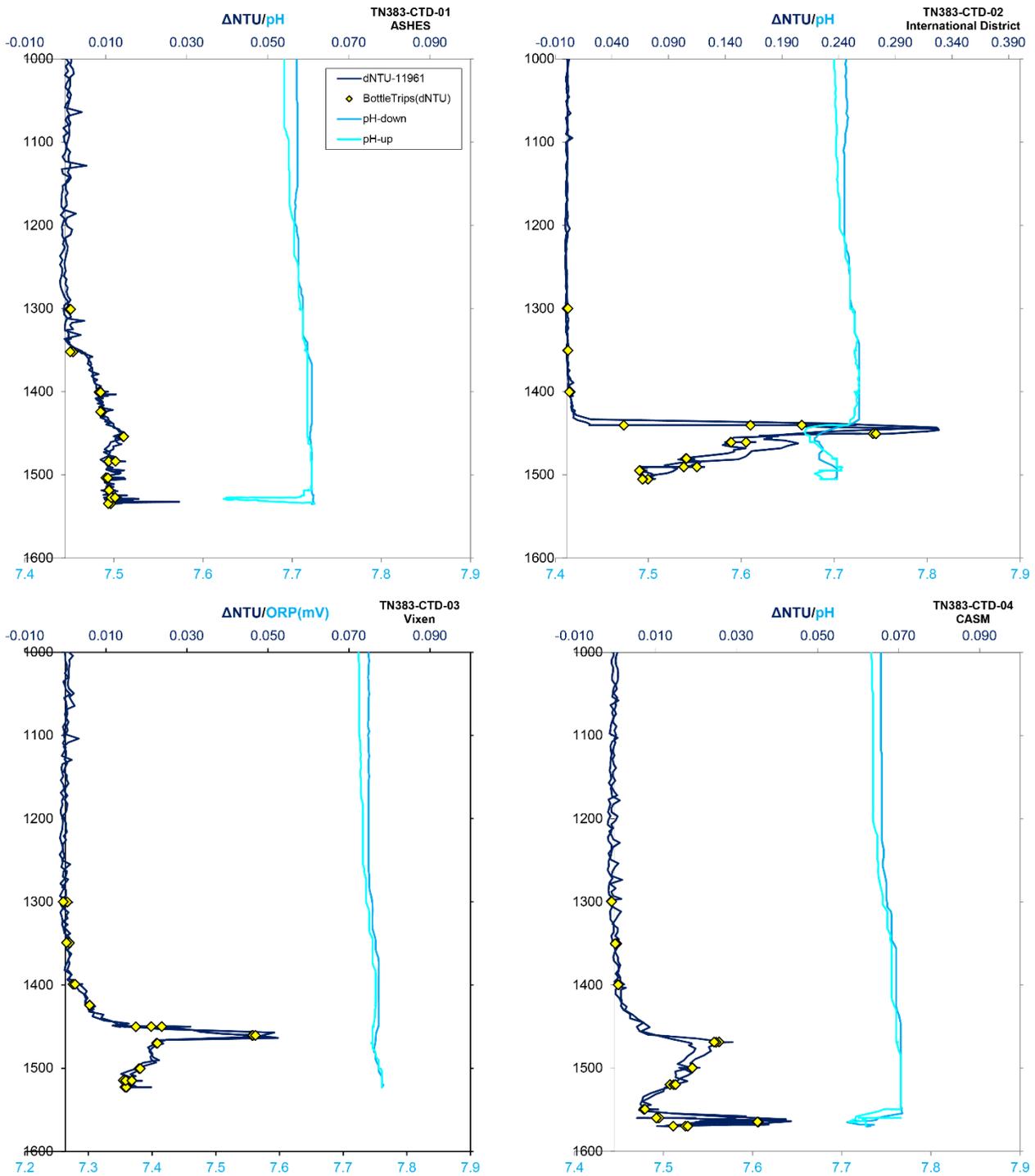


Fig. 4.8.2 - CTD profiles, for depths >1000 m, of turbidity (ΔNTU , navy blue) and pH (medium blue=downcast, cyan=upcast) during TN383. Niskin samples are indicated by the yellow diamond symbols overlaid on the ΔNTU profiles. Due to depth rating limitations, the Seabird pH sensor was only included on the CTD for casts CTD-01 through CTD-04. No water samples from the Niskin bottles on the CTD were analyzed in the lab for pH. The legend shown in the first profile (TN383-CTD-01) is the same for all profiles.



Miniature Autonomous Plume Recorder (MAPR) deployments:

Contributed by Sharon Walker

Miniature Autonomous Plume Recorder (MAPR) instruments were provided by PMEL (Sharon Walker) to mount on AUV *Sentry* and ROV *Jason* during dives. MAPRs measure temperature, pressure, optical backscatter, and oxidation-reduction potential (ORP). MAPR optical backscatter and ORP sensors are identical to those used on the CTD, and provide full water column profiles of these plume tracers during every descent and ascent of the vehicles. Additionally, MAPRs provide regional plume distributions along dive tracklines. AUV *Sentry* surveys are typically conducted at an altitude of 60-70 m above bottom, while ROV *Jason* dives generally maintain an altitude of <5 m above bottom, except while transiting between positions at altitudes of 20-70 m above bottom.

Table 4.8.2 - Locations of full water column MAPR profiles from AUV-*Sentry* and ROV-*Jason* deployments. [NOTE: there are no data for the ascent at the end of *Jason* dive 1296 because the batteries died prematurely. There are also no MAPR data for *Sentry* dives 565 and 566 due to incorrect instrument configuration].

Dive#	Profile direction	Lat (°N)	Lat (min)	Lon (°W)	Lon (min)	Comments
J2-1293	descent	45	56.8550	130	0.1980	
J2-1293	ascent	45	56.8260	129	59.0142	
J2-1294	descent	46	7.2108	129	58.2235	
J2-1294	ascent	46	6.9885	129	58.3656	
J2-1295	descent	45	56.8435	129	59.0199	
J2-1295	ascent	45	55.0390	129	59.5807	
J2-1296	descent *	45	55.3034	129	59.2022	* no ascent data (batteries died)
J2-1297	descent	45	56.0160	130	0.8146	
J2-1297	ascent	45	55.4150	129	59.0204	
S-562	descent	45	56.2188	129	58.7955	
S-562	ascent	45	55.5120	129	57.7860	
S-563	descent	45	56.8181	129	58.8434	
S-563	ascent	45	57.4269	129	59.8397	
S-564	descent	45	56.2841	129	59.9068	
S-564	ascent	45	56.3080	129	58.9700	
S535 & 566						No MAPR data (did not record)
S-567	descent	45	55.3587	129	59.3921	
S-567	ascent	45	55.3807	129	58.6262	
S-568	descent	45	51.5152	130	0.4796	
S-568	ascent	45	55.3036	129	58.8938	

Fig. 4.8.3 - Turbidity (ΔNTU , navy blue=descent, light blue=ascent) and ORP (red=descent, pink=ascent) profiles from each ROV Jason dive during TN383.

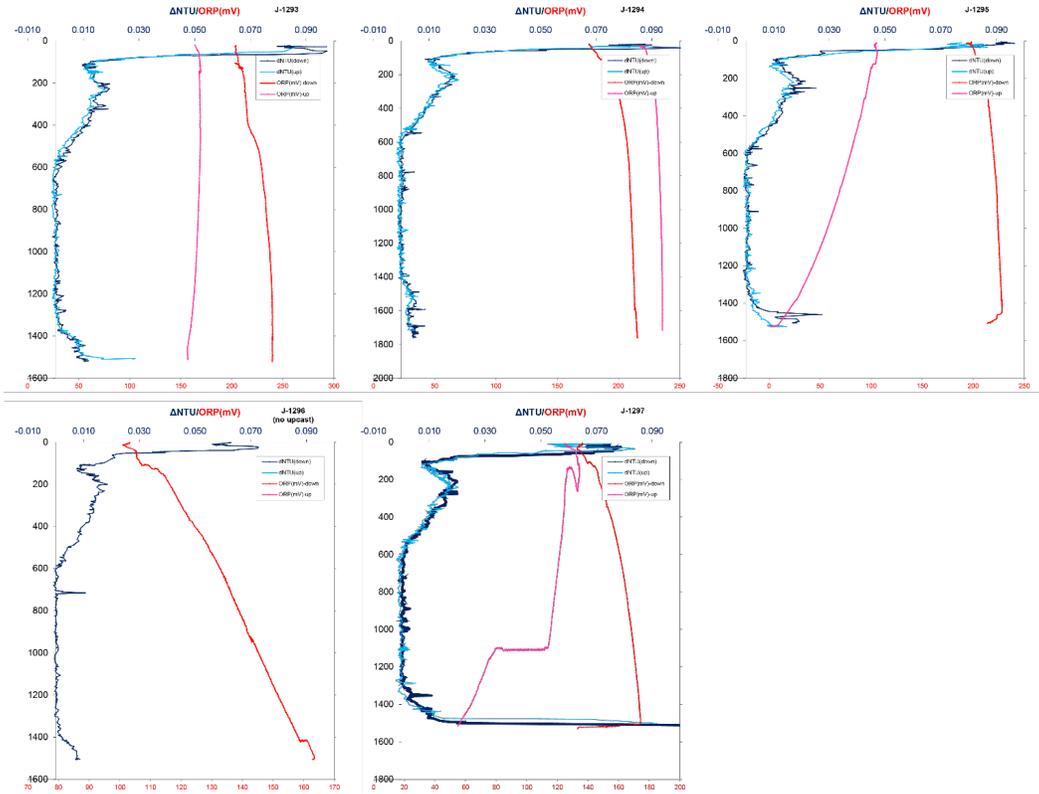


Fig. 4.8.4 - Turbidity (ΔNTU , navy blue=descent, light blue=ascent) and ORP (red=descent, pink=ascent) profiles from each AUV Sentry dive during TN383.

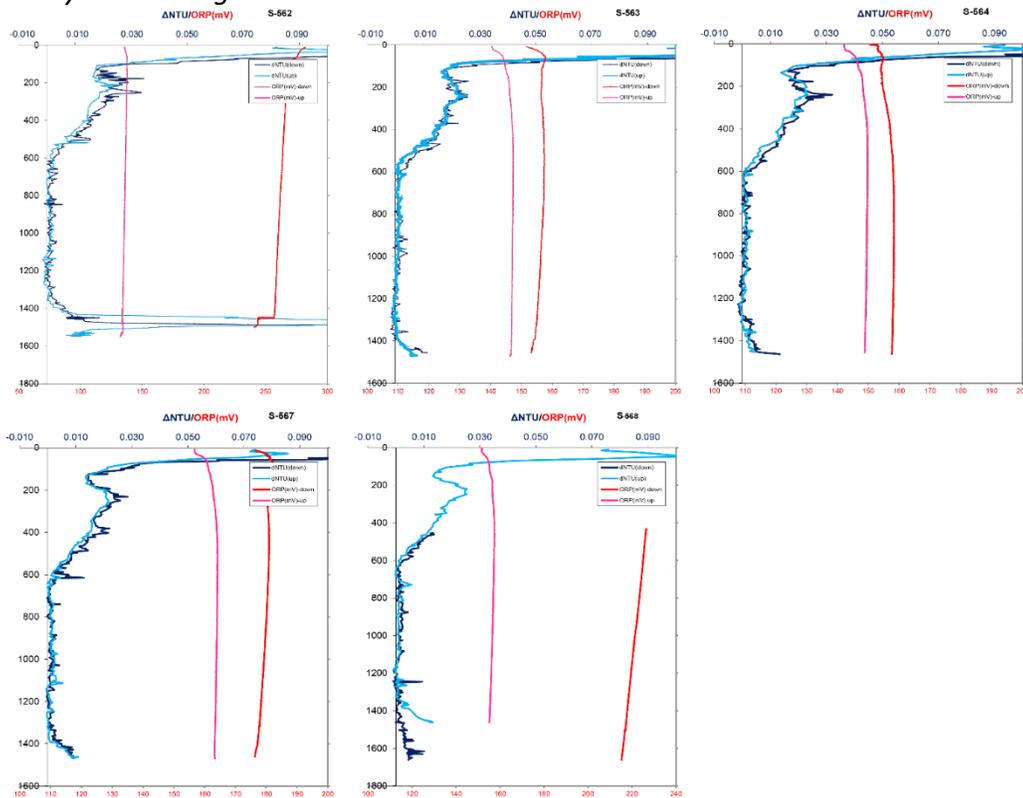


Fig. 4.8.5 - Temperature and ORP anomalies over the NRZ 2015 lava flow (dive J2-1294). No high temperature venting remained at this location by 2020, but the elevated temperatures and ORP anomalies indicate where low temperature, diffuse flow is still present.

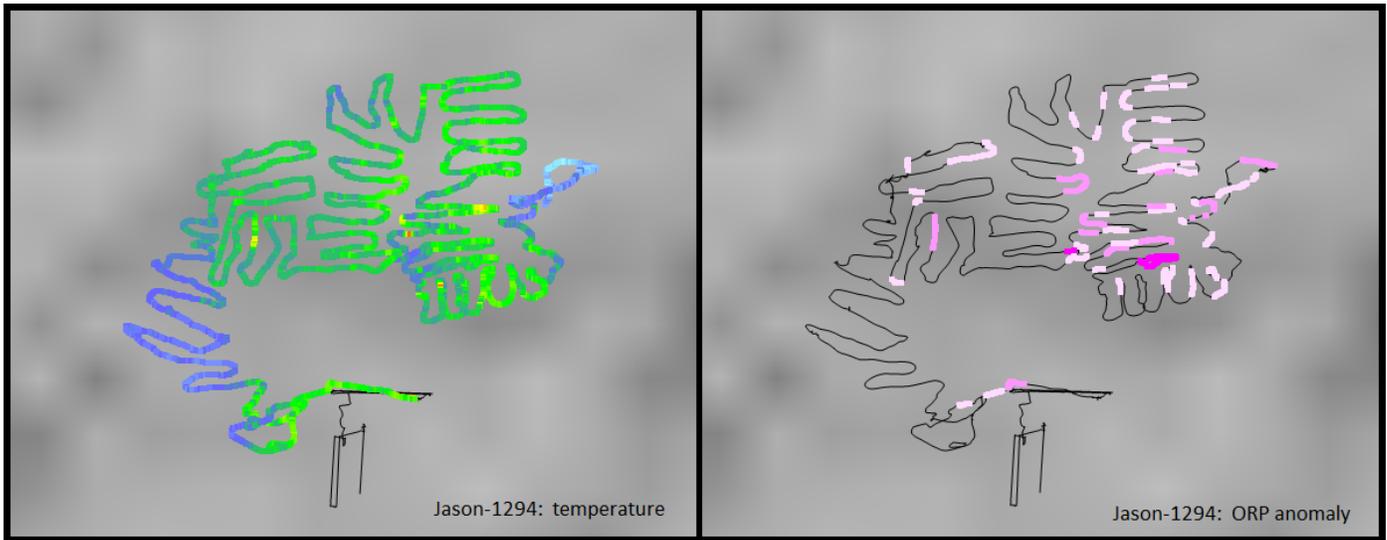
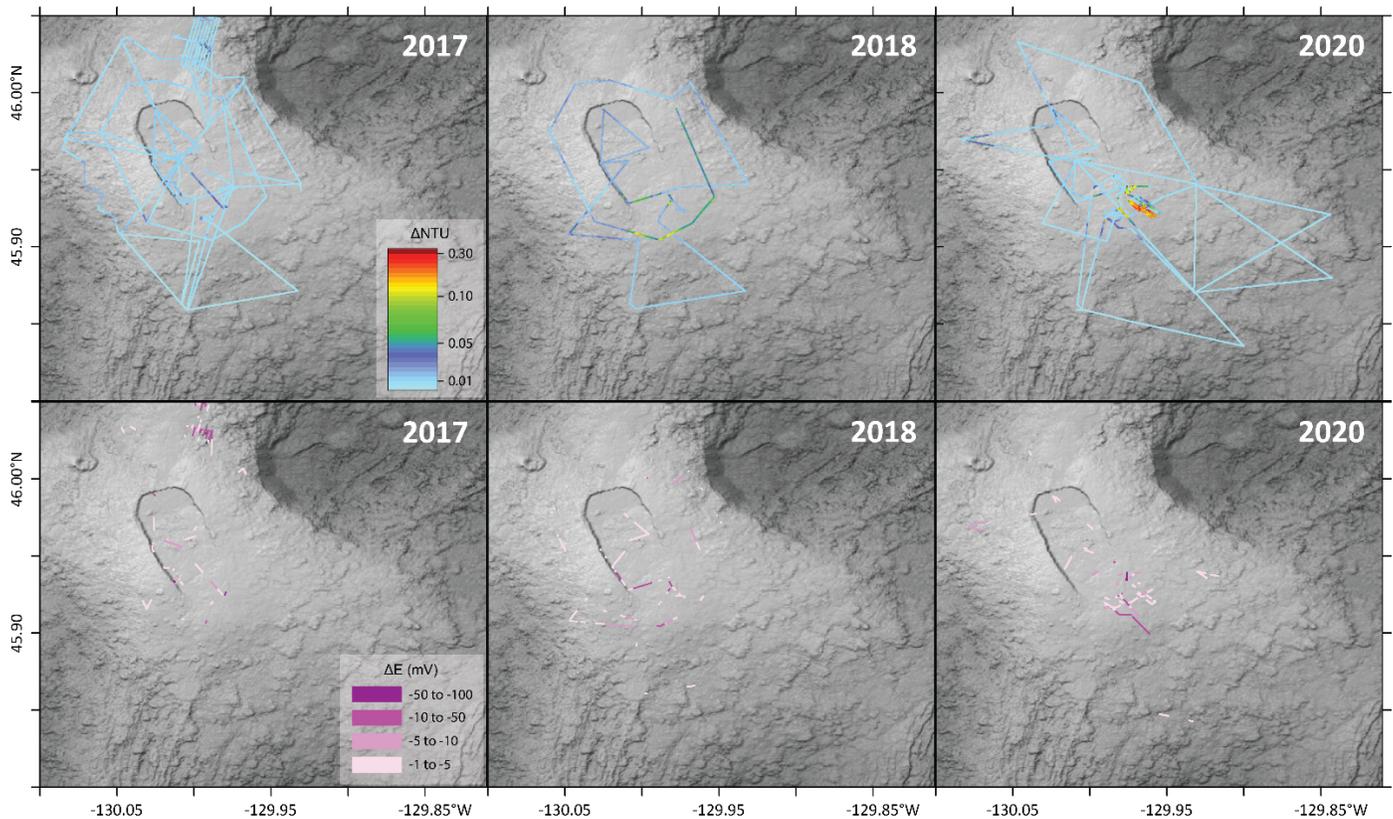


Fig. 4.8.6 - Turbidity (ΔNTU , top images) and ORP anomalies (ΔE , bottom images) for regional AUV surveys conducted in 2017, 2018 and 2020. Plumes near the International District vent field were significantly more intense in 2020 than in 2017 and 2018. [Color scales shown in 2017 frames are the same for 2018 and 2020.]



4.9 - Mooring Operations

Chris Holm and Bill Chadwick

Objectives:

Recover 4 Bottom Pressure Recorders (BPRs) (BPR-South, BPR-Center, BPR-West, BPR-North)
Recover 1 Ocean Bottom Hydrophone (OBH) short mooring at Caldera Center
Service and replace BPR Mooring Hardware & Service 4 BPR Instruments
Deploy 4 BPR Moorings and one long hydrophone mooring & acoustic survey of mooring locations

BPR Recoveries

We arrived on site at 1430 2020-09-02 PDT. Combined seas were 3.1 m with 20 knt N wind with gusts to 25knts. The ship was instructed to set up 0.25 NM from the mooring location and hold station with dynamic positioning, the enable code was sent to confirm good communications with the acoustic release, after a successful response was returned the release code was sent and mooring release was confirmed by ranging on the acoustic release. The ships transducer was used. The deck box was set up in main lab and a 3-pin male Amphenol to 5-pin male Amphenol adapter was used to plug into the ship's transducer. This adapter was provided by the R/V Thompson. The send power was set to 2 and the receive sensitivity was set to 4. After release it took about 20 minutes on average before the glass balls were spotted off the bow.

BPR-Center was first and was sent the release code (acoustic release S/N 33135), but did not release, returns were 2 seconds apart for 15 pings indicating not released but vertical. This 2 second timing was missed on the first attempt and a spurious value was given during ranging that made us believe it had released, after waiting for it to come up we ranged again and found it was still at the 1635m slant range it had been before release. A release command was sent twice more this time taking note of the 2 second returns each time, meaning still not released. The release was disabled and pinged to make sure other releases were not in the area giving strange range results. Nothing returned after it was disabled. The release command was sent again (with ranging still disabled), and this time returned 1 second pings, confirming release. The release was enabled and after ranging the release was confirmed with multiple ranges in the 1500 and then 1400m ranges. BPR-West was released without issue, after some lessons were learned from BPR-Center, mainly paying better attention to the timing of the returns and getting multiple range returns to confirm release rather than one.

BPR-Center and BPR-West moorings were recovered on 09/02/2020 PDT using the ships starboard crane. A 15m pendant of 3/8" amsteel was attached to a snap hook rated to 1500lbs and fixed to the end of a 20' pole. Two grappling hooks were also at the ready as the ship brought the glass balls down the starboard side. BPR-Center was recovered first using a grapple and after bringing the package closer the snap hook was hooked in near the set of 4 glass balls. The other end of the pendant was attached to the crane and lifted until the swivel was at the height of the bull works. Once up the crane brought the line near the rail and a stopper line was attached just below the swivel. The package was lowered, and the top swivel shackle was broken, and the glass balls were brought on board. Once the glass balls were out of the way the crane was hooked back into the package at the swivel using a 4' round sling and lifted on board. The mooring was broken down and moved out of the way.

The OBH-Center mooring and BPR-South mooring were recovered on 09/06/2020 using the ships starboard crane. The release of both moorings was done using the ships transducer and no issues were encountered. The OBH mooring was first, the additional length on the yalex line and wire rope added some additional complication to this recovery. The mooring was hooked and lifted just above the second set of glass balls which left the flag set of glass balls hanging below the rail after the mooring was lifted to the pear link above the nylon rope. The mooring was tied off at the pear link, broken out, and lowered to the deck. Then the yalex was tied off and broken out. The remaining mooring was hooked up to the crane at the pear

link using a 4 foot sling and shackle however the flag set of glass balls were in the way so they were lifted by hand using the cleat to stop off and brought on board. Because of the length of the wire rope, the mooring was then lifted to the top of the swivel and again tied off. The nylon was broken out and the crane was hooked up at the top of the wire rope. The mooring was recovered just in front of the crane base to use all available height. BPR-South was recovered without issue in much the same way as the first two with the glass balls being lifted to the swivel, the load transferred and then the rest of the mooring craned on board.

The acoustic release for BPR-North during the 2018 survey of its location indicated that it was horizontal by responding with 7 pings. The plan was to go by the mooring on one of the Jason dives to look and if necessary, intervene in some way should we believe that the mooring would not release. Weather delays meant that this was no longer a luxury we could afford, and an attempt was made to release it before having a look. On 09/16/2020 at 14:48 UTC we enabled the release and it again responded with 7 pings at a 2 second spacing, meaning it was still horizontal (or at an angle greater than 45°). The range was consistent at 1601m. The first release code was sent at 14:55 UTC with no response. We tried the enable again with success (7 pings at 2 sec). The release code was sent again at 15:01 UTC and it responded with 15 pings at a 1 second period meaning it had released and was upright already. We ranged again and indeed the mooring was on its way to the surface. Due to a slightly incorrect longitude given to the bridge, the ship wasn't quite set up in the right location, so it took a while to find the glass balls on the surface but eventually they were spotted, the ship re-positioned, and the mooring was recovered exactly as earlier BPR moorings and was on deck at 16:05 UTC.

Mooring Refurbishment and Deployment

BPR-Center and BPR-West were recovered back-to-back on 09/02/2020. A few days later on 09/06/2020 the BPR-South mooring was recovered along with the OBH-Center mooring. "BPR-West" and "BPR-East" (the former BPR-Center instrument deployed in a new location east of the caldera) were deployed shortly after the recoveries of the OBH-Center mooring and BPR-South on 09/07/2020. The next day BPR-South was turned around and re-deployed as "BPR-Southeast" on 09/08/2020 (again, same instrument but in a new location). The BPR-North recovery was initially held back until Jason could inspect the mooring as it indicated it was horizontal. On 09/16/2020 that plan was abandoned and the mooring was successfully released and recovered despite indicating it was horizontal. "BPR-North" was then refurbished and re-deployed on 09/17/2020.

Hydrophone Mooring

The 1200-m long hydrophone mooring, to be deployed east Axial's North Rift Zone, was assembled according to the mooring diagram with a 40 inch orange syntactic foam float and loop of poly line at the top of the mooring followed by 0.5 meters of chain, 50m of nylon, the hydrophone, 1012m of vectran, 200m of yalex, 18m of nylon, 1m of chain, swivel and the acoustic release & anchor. Length of the recovered mooring will be about 1280m. The float was brought out through the A-frame and released using a brailer style release. Followed by the 50m of nylon that was laid out in lines on the edge of the back deck and allowed to come up on the hydrophone which was tied off on a slip line. With the boat making about 1 knot, the hydrophone was hooked up and deployed through the A-frame using the brailer release and the slip line was used to control the transfer to the vectran on a spool and spool stand. The spool stand was tied down to the deck and a 2 x 4 was used as a brake on the spool. Conditions were excellent with very little current making this somewhat uncontrolled pay out off the spool possible. As connections came off the spool a slip line was used to stop off the mooring while cotter pins were inserted into the shackles and taped off. All shackles that could be broken out were greased with Aqua Shield as well. Some shackles were used to stop off the mooring and therefore received no grease but did get a cotter pin. At the swivel connection the release was hooked up and the rest of the mooring was taken off the spool and laid out on the deck with the anchor on center line. The release was picked up with the A-frame and put over the side and released with the brailer release using a small rope

loop. The mooring was towed to the drop site with all gear trailing off the anchor hooked up on deck to the brailer release. At the site the anchor was deployed and released using the A-frame. The mooring was dropped at 09/03/2020 08:17 UTC with a bottom depth of 2151m.

BPR-East (formerly BPR-Center)

BPR-Center's acoustic release was replaced with SN 46932. The BPR appears to have recorded reasonable data for the entire deployment. During refurbishment it received new desiccant, o-rings, band clamps, and battery. Recovered battery voltage was 14.599V and 14.168V under 150 ohm load. New battery voltage was 17.01V under 150 ohm load and all series circuits measured >16.5V. After the card was reformatted it did not start recording at the correct sector (2010) so the card was replaced. All proof of life tests were passed and the data appeared to be stable. This mooring was renamed "BPR-East" for re-deployed in a new location east of the caldera, with a recovered set of glass balls except for the flag section which was a replacement set. The non-glass ball sections of 0.5m chain, shackles, line, and wire rope were all replaced. All shackles were greased with Aquashield, hand tightened and cotter pinned, shackles near line sections were taped with electrical tape, leaving obvious pull tabs at the end of the tape. The mooring and cotter pins were double checked against the mooring diagram before deployment. In addition, all release codes were confirmed to be correct and the release was operational. This mooring has an older style table with slightly shorter legs so while on a standard BPR anchor the clevis bolt required ~1-2" of the end cut off in order to have room to be properly tightened. All the release hardware (3/8"-16 x 2.75" 316SS) was replaced including the delrin isolation washers. The 3/8"-16 316SS u-bolts holding the BPR were in ok condition and re-used along with the hardware. Some of the better used release hardware was used to replace the worst looking washers and nuts. The legs are held on with 3 1/4"-20 flat head screws 316SS with unknown length (they were not removed), they are in good condition. The mooring was deployed using the ship's A-Frame. The flag section was pushed off the deck on a slip line followed by the rest of the glass balls on a second slip line. The lines were cleared as soon as the balls hit the water without issue. A Brailer style release provided by OSU OOI was used to lift and release the anchor once it reached the water. The anchor was deployed at 09/07/2020 01:24. This mooring was upright and the release was disabled upon deployment and after the survey.

BPR-West

BPR-West's acoustic release was replaced with SN 52409. The BPR appears to have recorded reasonable data for the entire deployment. During refurbishment it received new desiccant, o-rings, band clamps, and battery. The card was reformatted. All proof of life tests were passed and the data appeared to be stable. The recovered battery measured 14.579V and 14.150V under 150 ohm load. The new battery voltage was 17.78V and 17.01V under 150 ohm load. All parallel cells in series measured greater than 16.5V under 150 ohm load. All release codes were confirmed and the release was tested. This mooring was deployed with a replacement set of glass balls with the exception of the steel pipe flag section. The steel pipe appeared to be in reasonable condition as the best available was selected from the recovered sets. The BPR table was a newer style but the 1/2"-13 x 3.75" galvanized steel leg bolts were replaced with 1/2"-13 x 4.00" 316SS hardware from an older replacement table as the galvanization was gone. The 316 SS BPR U-bolts appeared to be in reasonable condition and were re-used. The release hardware 3/8"-16 x 2.75" 316SS was all replaced including the delrin isolation bushings. The shackles, line, wire rope, and intermediate chain sections were all replaced. All shackles were greased with Aquashield, hand tightened and cotter pinned, shackles near line sections were taped with electrical tape, leaving obvious pull tabs at the end of the tape. The mooring and cotter pins were double checked against the mooring diagram before deployment. As with the other moorings the glass balls were slipped off the deck on a slip line and a Brailer release provided by OSU OOI and secured to the pear link immediately above the acoustic release was used to overboard the anchor and instrument platform through the A-Frame. The anchor was released at 09/07/2020 00:21 UTC. This mooring is upright and the release was disabled.

BPR-Southeast (formerly BPR-South)

BPR South's acoustic release was replaced with SN 33947 which was tested on deck before deployment. The BPR appears to have recorded reasonable data for the entire deployment (although on closer inspection after the cruise one day-long interval of bad data was discovered). This instrument was re-named BPR-Southeast for deployment in a new location. During refurbishment it received new desiccant, o-rings, band clamps, and battery. The card was reformatted. All proof of life tests were passed and the data appeared to be stable. The old battery voltage was 14.051V and 13.581V under 150 ohm load. The new battery voltage was 17.801V and 17.01V under 150 ohm load. All cells measured greater than 16.5V under 150 ohm load. This mooring received replacement glass balls. The shackles, line, wire rope, and intermediate chain sections were all replaced. The BPR platform was also a newer style with ½"-13 x 3.75" galvanized steel bolts for the legs. These were replaced with ½"-13 x 4.00" 316SS as the galvanization was very worn. The 3/8"-16 U-Bolts are grade 2 Titanium and in excellent condition. I did replace a few nuts as they had signs of galling. Having a 3/8"-16 die available to chase the threads on the u-bolt wouldn't hurt next time but not critical. A molybdenum based grease was used on the nuts to help prevent future galling. Care should be taken to have extra 3/8"-16 Titanium nuts and washers available for this mooring on future turns, as stainless hardware should not be used on the Titanium U-Bolts should the hardware be dropped or lost on disassembly. All of the 3/8"-16 x 2.75" 316SS bolts, hardware, and isolation bushings fastening the release were replaced. All shackles were greased with Aquashield, hand tightened and cotter pinned, shackles near line sections were taped with electrical tape, leaving obvious pull tabs at the end of the tape. The mooring and cotter pins were double checked against the mooring diagram before deployment. This mooring was deployed the same as the previous two and the anchor was released at 09/08/2020 15:33 UTC. This mooring is upright and the release was disabled.

BPR-North

BPR-North's acoustic release was replaced with SN 33945, which was tested and disabled on deck before deployment. The BPR appears to have recorded reasonable data for the entire deployment. During refurbishment it received new desiccant, o-rings, band clamps, and battery. The card was reformatted. All proof of life tests were passed and the data appeared to be stable. Recovered battery voltage was 14.425V and 13.965V under 150 ohm load. New battery voltage is 17.76V and 17.07V under 150 ohm load. All cells measured greater than 16.5V under 150 ohm load. This mooring was deployed with a re-used set of glass balls. The 0.5m sections of chain, shackles, line, and wire rope were replaced. All shackles were greased with Aquashield, hand tightened and cotter pinned, shackles near line sections were taped with electrical tape, leaving obvious pull tabs at the end of the tape. The mooring and cotter pins were double checked against the mooring diagram before deployment. This was the last mooring deployed and we ran out of ½" shackles likely because of an error on the mooring diagram at the wire rope to swivel connection. The diagram calls out only one ½" shackle at this connection however this is impossible. Two ½" shackles were used for all previous moorings at this connection. No other deviations were made on other moorings except for North. On this last mooring, due to the lack of ½" shackles extra 5/8" new shackles were put into both ends of the Yalex connections. Arguably this is less likely to get side loaded than the ½" shackles because they can't rotate in the eye of the yalex like the ½" can. This mooring has an older style table with all 316SS hardware. Legs appear in good shape and appear to be connected with ¼" flat head screws of unknown length. This BPR has 316SS bolts securing the handle to the titanium pressure case, these screws are not in good shape and should be replaced with titanium. They are ¼"-20 x 1.75 socket cap screws. One other BPR has a similar issue, but this detail didn't make it into the notes and therefore which BPR is unknown. One other BPR has a handle with Titanium screws and the fourth has no handle at all. This mooring was deployed exactly like the previous three.

Table 4.9.1: Mooring Recoveries

Instrument	Date (UTC)	Time (UTC) ¹	Depth (m)	Latitude ²	Longitude ²	Date (UTC) ³	Time (UTC) ³
BPR-South-2	2020-09-06	22:36:14	1542	45.970624	-130.009368	2020-09-06	23:12
BPR-Center	2020-09-02	22:36 ⁴	1422	45.953625	-130.012297	2020-09-02	23:12
BPR-West	2020-09-02	23:36	1402	45.945716	-130.036078	2020-09-03	0:10
BPR-North	2020-09-16	14:55	1580	45.879170	-129.803397	2020-09-16	16:05
OBH-Center	2020-09-06	20:50:27	1531	45.951728	-130.002449	2020-09-06	21:42

- 1) Time of release
- 2) Location from Ships log at time of Release
- 3) Time on Deck
- 4) Time of succesful release, first attempt was at 21:37 UTC

Table 4.9.2: Mooring Deployments

Instrument	Date (UTC)	Time (UTC) ¹	Depth (m)	Latitude ²	Longitude ²	Latitude ³	Longitude ³
BPR-Southeast	2020-09-08	15:33	1659	45.899505	-129.958012	45.897872	-129.958582
BPR-East	2020-09-07	1:24	1540	45.945734	-129.958691	45.945302	-129.959008
BPR-North	2020-09-17	23:50	1574	45.977823	-130.018734	NOT SURVEYED	
BPR-West	2020-09-07	0:21	1411	45.942107	-130.031152	45.941207	-130.03096
Hydrophone	2020-09-03	8:17	2151	46.1335502	-129.848224	46.132879	-129.847878

- 1) Time of Anchor release
- 2) Location from Ships log at time of Release
- 3) Surveyed Location

Table 4.9.3: Acoustic Release Codes for instruments deployed in 2020

Instrument	Release S/N	Enable	Disable	Release	Comments
BPR-Southeast	33947	216177	216215	232157	
BPR-East	46932	522163	522201	534667	
BPR-North	33945	216063	216112	232111	
BPR-West	52409	613424	613441	631056	OSU Tag # 328429
Hydrophone	45721	505251	505272	525730	

4.10 - Multibeam mapping from R/V Thompson

Bill Chadwick and Susan Merle

Bathymetric mapping with R/V Thompson's EM302 multibeam sonar system was done during select time windows, including: (1) during the transit from Newport to Axial Seamount and back at full speed (12 knots), (2) during ~60 n.m. subsets of those transits to collect water-column data over the Oregon continental margin to detect any bubble plumes from methane seeps (8 knots), (3) repeat surveys of Axial Seamount's north and south rift zones (separately at 5 knots), and (4) one line west of Axial's south rift zone at the beginning of the return transit to Newport (5 knots), to collect backscatter data over large volume lava flows at the request of MBARI colleague Dave Clague. Below are tables of the multibeam survey waypoints.

Table 4.10.1 - Multibeam survey lines on outbound and inbound transits (~60 n.m. @ 8 knots)

Waypoint	longitude	latitude	Z	ID	Lat Deg	Lat Min	Long Deg	Long Min
wp1	-124.177138	44.620564	53	out	44	37.23	-124	10.63
wp2	-124.961055	44.841823	727	out	44	50.51	-124	57.66
wp3	-124.985671	44.86162	880	out	44	51.70	-124	59.14
wp4	-125.446131	45.023561	2711	out	45	01.41	-125	26.77
wp5	-125.458542	45.068787	2597	in	45	04.13	-125	27.51
wp6	-125.182411	44.95914	1407	in	44	57.55	-125	10.94
wp7	-124.957506	44.869557	766	in	44	52.17	-124	57.45
wp8	-124.821161	44.817531	381	in	44	49.05	-124	49.27
wp9	-124.173963	44.629615	53	in	44	37.78	-124	10.44

Table 4.10.2 - Axial North Rift Multibeam Survey (~20 n.m @ 5 knots = ~4 hrs)

Waypoints	Lat	Long
WP1	46° 11.16' N	129° 54.09' W
WP2	46° 09.75' N	129° 55.58' W
WP3	46° 07.08' N	129° 57.84' W
WP4	46° 03.80' N	129° 59.91' W
WP5	46° 02.59' N	130° 00.56' W
WP6	46° 01.63' N	130° 00.99' W
WP7	45° 58.96' N	130° 01.64' W
WP8	45° 55.00' N	130° 01.66' W

Table 4.10.3 – Axial South Rift multibeam survey (~36 n.m. @ 5 knots = ~7 hrs)

Waypoints	Lat	Long
WP1	46° 02.08' N	129° 56.46' W
WP2	45° 55.97' N	129° 58.63' W
WP3	45° 50.76' N	130° 00.48' W
WP4	45° 46.76' N	130° 01.28' W
WP5	45° 42.21' N	130° 02.20' W
WP6	45° 33.60' N	130° 03.77' W
WP7	45° 26.61' N	130° 05.60' W

Table 4.10.4 - Multibeam sonar survey WEST of Axial's South Rift Zone (~39 n.m. @ 5 knots = ~8 hrs)

Waypoints	Lat	Long
WP1	45° 43' N	130° 14' W
WP2	45° 35' N	130° 14.5' W
WP3	45° 37.5' N	129° 55' W

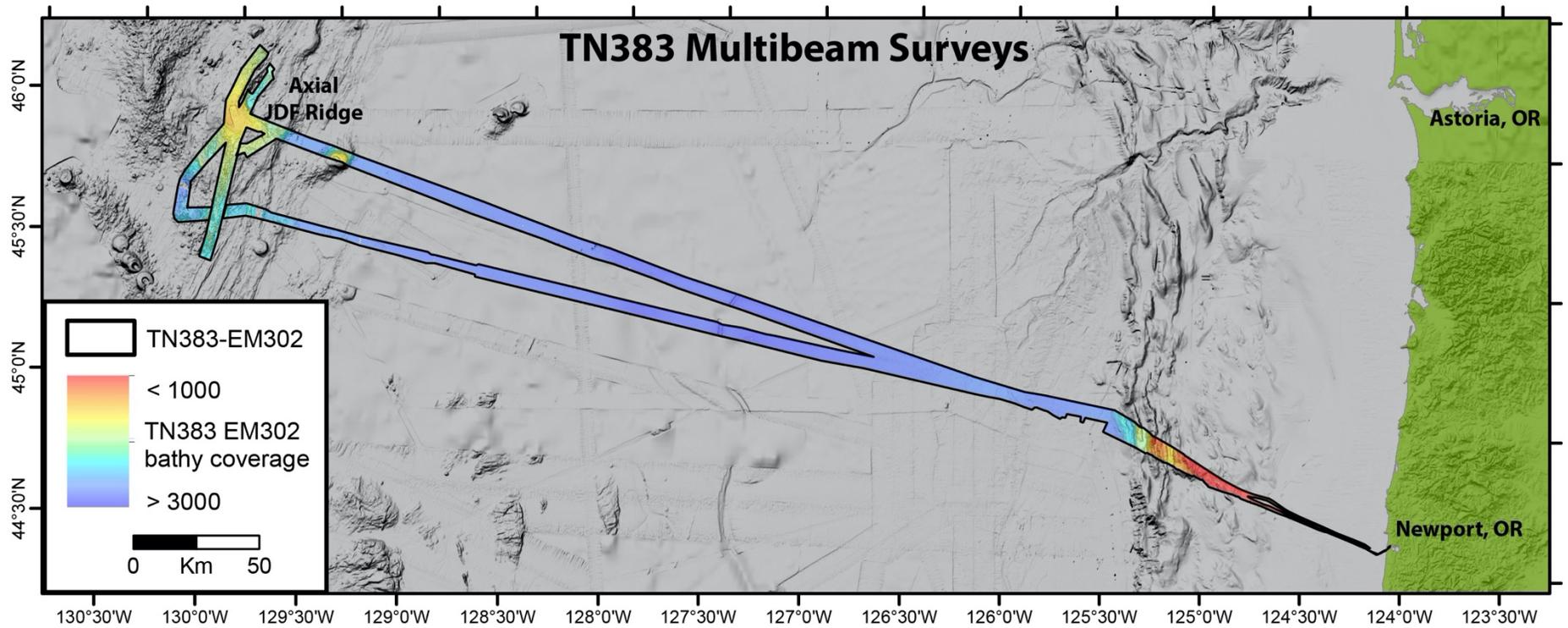


Figure 4.10.1 – Map of EM302 multibeam data collected during TN383.

EM302 multibeam seafloor and co-registered acoustic water column data were collected during dedicated surveys at Axial and on Cascadia margin. Throughout the expedition, 4,700 km² of seafloor were mapped. Data quality was good when the ship was slowed down to 8 knots for targeted surveys. Data quality decreased on the transits to Axial and back to the Cascadia margin, when the speed was increased to 12 knots, introducing more noise to the data.

The acoustic water column data were analyzed on the Cascadia margin. Six new bubble steams were detected, all in areas of high backscatter. White patches in the backscatter data are indicative of harder substrate and may represent areas of carbonates, most likely produced by chemosynthetic methanogenic bacteria. The Cascadia margin surveys were conducted to fill gaps in the multibeam seafloor and co-registered acoustic water column database compiled in Merle et al., 2021 (in press).

Table 4.10.4 - Multibeam sonar survey WEST of Axial's South Rift Zone (~39 n.m. @ 5 knots = ~8 hrs)

Waypoints	Lat	Long
WP1	45° 43' N	130° 14' W
WP2	45° 35' N	130° 14.5' W
WP3	45° 37.5' N	129° 55' W

Table 4.10.5 - Location and description of bubble streams located during Cascadia margin survey on the TN383 expedition

Longitude	Latitude	TN383 Multibeam Line	time-utc	Z TN383 mb grid (m)	Z fledermaus geopick (m)	top of flare	Rise	Description
-124.672507	44.760934	0008_20200901_234724	011204	248	243	157	86	Flares on stbd side - closest to nadir
-124.672200	44.761316	0008_20200901_234724	011204	250	241	174	67	Stbd flare - farther from nadir than previous. This is a larger flare than previous.
-124.672027	44.761530	0008_20200901_234724	011204	248	242	146	96	Brightest flare and farthest from nadir on stbd side. Probably more flares farther out on stbd side but lost in the side lobe.
-124.678885	44.762229	0008_20200901_234724	011416	244	232	88	144	Very bright strong flare at nadir. High rise and intensity. Disappears in the nepheloid layer.
-124.679016	44.762590	0008_20200901_234724	011423	245	232	130	102	Smaller intense flare just to stbd of previous larger flare
-124.922312	44.832632	0011_20200902_011726	013820	496	490	36	454	Large flare on stbd side. Clipped at 36 m below the surface. Just NW of Possible site of Nautilus 2021 dive. NOTE: THERE WERE NO FLARES IDENTIFIED ON THE INCOMING TRANSIT LEG (LINES 215-234)

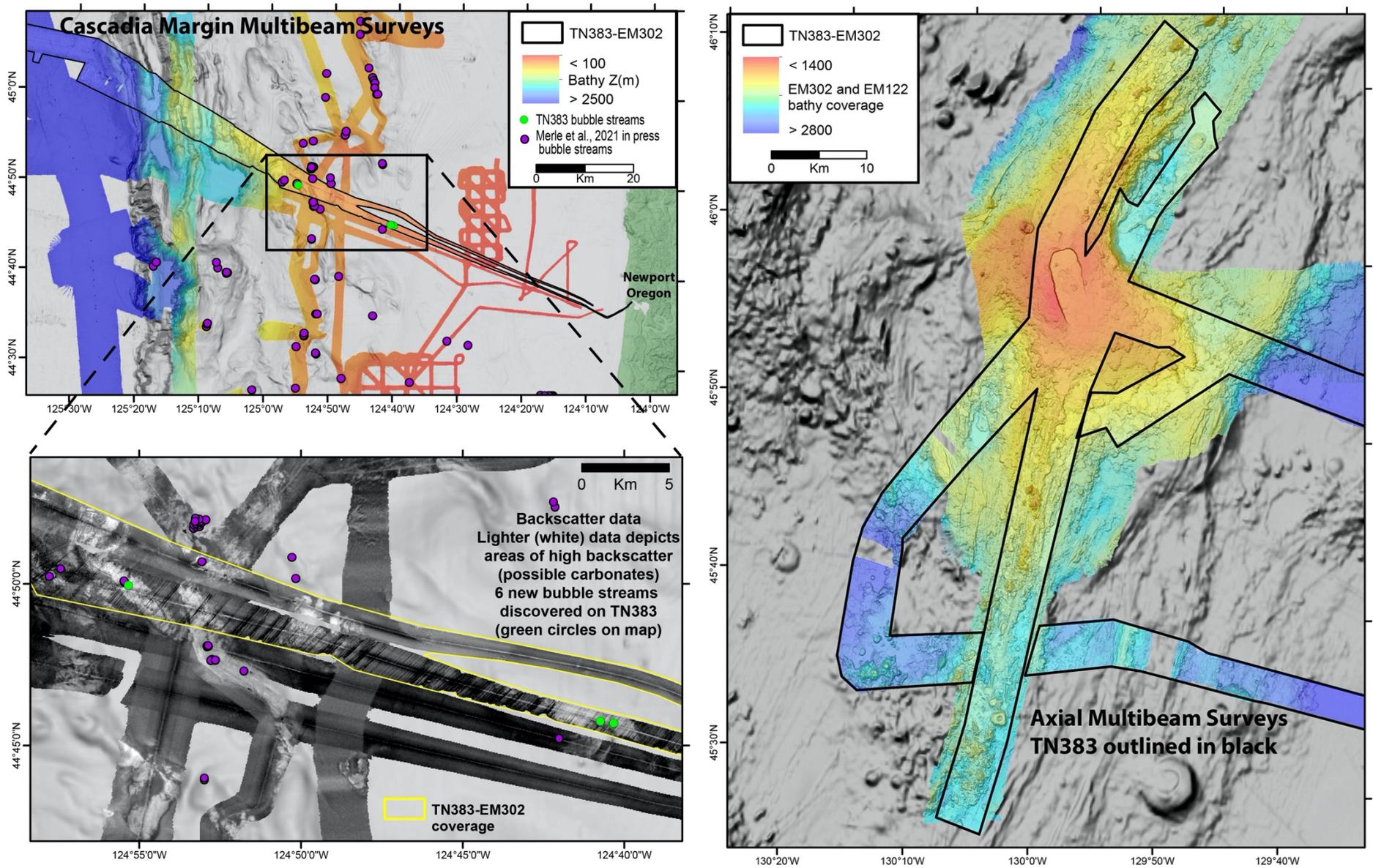


Figure 4.10.2 – (left) Maps of EM302 multibeam data collected on the Cascadia Margin. Green dots show new bubble streams discovered in these new data. (right) Map of EM302 multibeam data collected at Axial Seamount over the summit and along the north and south rift zones.

5.0 - ROV Jason Overview and Notes About Imagery and Data Logging

Bill Chadwick

ROV Jason Overview

In general, ROV Jason and all its standard equipment worked well and we appreciated being able to use the Jason group's Major sampler bottles for vent fluid sampling. One notable change this year was that Jason had a new forward-looking Blueview multibeam obstacle avoidance sonar. Files from this sonar can be saved to file (on demand) and played later with Blueview software. The few problems we had with Jason equipment included the following:

- The Jason temperature probe failed due to ground faults on our first several dives and so was unavailable for temperature measurements during fluid sampling.
- At least one of the three Niskin bottles that we had on Jason failed to close on multiple dives due to either the elastic needing to be replaced or lanyards getting hung up when trying to close.
- The usual Jason altimeter worked on the first dive (J2-1293), but then stopped working during the rest of the cruise, so all altimeter entries into Sealog and Virtual Van were zeros for dives J2-1294-1297 (and so are not included in the dive logs below). In the control van, we had the DVL to provide altitude, but that data did not make it into the logs initially. This was remedied after the cruise (at least in the revised 1-second navigation .ppi files).

ROV Jason Imagery and Data Logging

Issues we encountered with Jason imagery and data logging this year included:

- After the first dive (J2-1293), we discovered by reviewing video and imagery that the H264 video recordings from all 3 cameras that are recorded continuously (SciCam, PilotCam, BrowCam) were being recorded with degraded color. We discovered this because frame grabs acquired manually from the Sulis 4K camera (and automatically within the Virtual Van) had noticeably better and more realistic color than the H264 video recordings (in particular, the bright yellow instruments Webb instruments appeared pale pink in the videos). This problem was traced to the splitters that were used in the Jason control van to direct the video signals to two H264 recorders for each camera (to have redundancy in case one recorder fails). When the splitter was removed, and video was only recorded on one recorder, the problem went away. The color in the Sulis highlight video recordings was fine.
- Also after the first dive (J2-1293), we discovered that the Sulis (SciCam) frame grabs were considerably darker than the Sulis video they were captured from, as seen in real time in the control van and as recorded in the H264 or highlights video. This was true even of well-lighted close-ups, so was not only a case of bad lighting or distance, etc. The Sulis VIDEO IRIS was set to AUTO, and the VIDEO ISO was set to 250 during the dive (and throughout the cruise), whereas the Sulis PHOTO ISO was set to AUTO on the first dive, which turned out to be the problem. The settings for the video and photo modes of the Sulis camera are somewhat independent, so one cannot assume that what you see in the video is what you are getting in the frame grabs. This situation was remedied by changing the PHOTO ISO setting from AUTO to MANUAL, and setting the PHOTO ISO to 200. The Sulis frame grabs were similar in lighting to the Sulis video thereafter. These settings should be carefully set and monitored during future cruises.
- After the first Jason dive, we also discovered that the SAMPLE hot key in Sealog does not transfer information into the Jason Virtual Van. Entries into Sealog only appeared as "Sample" in the Virtual Van, with none of the other metadata about the sample (ID, Description, etc). This is a significant problem. However, the

sample information is retained in Sealog and can be exported from there. In general, I was disappointed that the Sealog & Virtual Van situation is still "kludgy" and much as it was two years ago when we last sailed with Jason. It seems that little progress has been made to complete and finalize the Jason data logging system. Extensive editing of the Virtual Van entries was necessary after the cruise to produce the dive logs in this report.

A note about embargoed video from Virgin Vent

During the first ROV Jason dive (J2-1293), we visited Virgin vent to collect Major and Gastight vent fluid samples and to deploy a temperature probe. There is some hardware at Virgin vent related to a Navy-funded geothermal project that is considered proprietary, and the developers requested that we did not transmit any live video nor capture images that would be publicly available while we were there. Therefore, we shut-down the live video feed while we were in sight of Virgin, turned off the "auto-snap" frame grabbing feature in Virtual Van/Sealog, and we did not do any manual logging in Virtual Van/Sealog (which would have also captured video frame grabs that could become public). The continuous H264 video recordings during that time interval and an 11-minute-long Sulis 4K highlight video clip will be embargoed in the archives as WHOI and will not be publicly available.

H264 Continuous HD Video Recordings

Three 1080i camera streams (SciCam, BrowCam, PilotCam) were recorded to hard drive-based video files. Raw videos are MPEG Transport Stream (.ts) files compressed (output rate was 13 Mbps) using the H.264 codec. Image resolution is 1920x1080 pixels. These are playable using open source video players such as VLC. Filenames include camera name and start timestamp. Automated clip duration was set at 15 minutes. In addition to the video files, metadata broadcast in real-time on the Jason network was captured to subtitle files (.srt format), which can produce a line of text overlain on the video (time, lat, long, heading, depth). These components were merged into a Matroska container file (.mkv). Components are provided in subdirectories in the Jason data.

The following is a listing of the number of H264 files and the total file sizes:

<u>Dive</u>	<u>Number of H264 .mkv files</u>	<u>Total file size</u>
J2-1293	443	520.7 Gb
J2-1293 (embargoed)	15	18.0 Gb (only while at Virgin Vent)
J2-1294	144	168.8 Gb
J2-1295	1140	1.36 Tb (includes long transits during pressure dive)
J2-1296	222	262.3 Gb
<u>J2-1297</u>	<u>260</u>	<u>305.1 Gb</u>
Total	2224	2.635 Tb

Sulis 4K High-Definition video highlights

Highlight video from the SciCam was manually recorded to hard disk (only on demand) at a higher quality format than the H264 recordings. These highlight recordings were recorded in 4K (3840 x 2160 pixels) using the Apple ProRes422 family of codecs at a data rate of 563 Mbit/s. The video files are renamed after each dive so that they indicate lowering ID, start time, and stop time. A summary listing of the highlight video clips are included in the table below. The recordings include time code that is synchronized to the same time reference as the other logging computers in the Jason system.

Dive	Number of .mov files	Total file size
J2-1293	0	0 Gb
J2-1293 (embargoed)	1	51.3 Gb (Virgin vent overview)
J2-1294	0	0 Gb
J2-1295	3	77.2 Gb (SCTA tiltmeter & Vixen vent)
J2-1296	5	88.1 Gb (Blue mat, Castle, El Guapo vents)
J2-1297	6	90.1 Gb (Hell & Inferno vents, Bugs memorial)
Total	1105	1.241 Tb

4K video frame grabs

Frame grabs from Jason video can be captured in 3 different ways and at 3 different resolutions. The highest resolution are 4K frame grabs from the Sulis science camera, which manually captured using a button on the control box at the Watch Leader station in the Jason control van. Each image takes some time to process, so there is a limit to how many images you can capture in a short amount of time. The images are saved as sulis*.jpg files (5968 x 3352 pixels) with date and time in the file name. The files are 3-10 Mb in size. The 4K images are beautifully crisp.

Dive	Number of 4K frame grabs	Total file size
J2-1293	133	642 Mb
J2-1294	77	382 Mb
J2-1295	205	1.12 Gb
J2-1296	178	940 Mb
J2-1297	94	531 Mb
Total	687	3.62 Tb

HD video frame grabs

The two other ways to capture frame grabs are lower resolution. One way is to manually capture TIF images at the Video Logger station (2740 x 1540 pixels from the Sulis SciCam, and are 12.8 Mb in size). The other way is with Data Logger entries into the Virtual Van (1920x1080 pixels, from all 3 cameras on Jason simultaneously, and saved in compressed jpg format). While Virtual Van frame grabs are the lowest resolution, they are also the most frequent, since they are captured automatically every log entry. File names include date and time.

Dive	Number of HD frame grabs	Total file size
J2-1293	12	776 Mb
J2-1294	6	275 Mb
J2-1295	128	6.4 Gb
J2-1296	25	694 Mb
J2-1297	1	12.8 Gb
Total	172	8.16 Gb

6.0 – ROV JASON Dives

6.1 - ROV Jason Dive Statistics

Dive No.	Dates	Max Depth	Hours Descending	Hours Ascending	Hours on Bottom	Hours in water	Time On Deck	Time on Deck not available to science
1293	9/4-9/5	1543	1:18	1:04	35:16	37:38	N/A	0
1294	9/6/2020	1771	1:17	1:56	8:46	11:59	9:52	0
1295	9/10-9/14	1719	1:07	1:05	95:03	97:15	82:24	70.24
1296	9/16-9/17	1525	:58	1:02	25:59	27:59	64:09	52.09
1297	9/18-9/19	1540	1:07	2:01	18:20	21:28	7:59	0

6.2 - ROV Jason Dive Goals and Summaries

J2-1293:

DEPLOYMENT LOCATION: WEBB-4 instrument drop site, 45° 56.922', -130° 00.203', Z=1532 m

Main goals: Deploy 3 Webb instruments with covers from the ship, position them on the bottom with Jason, and collect fluid samples at ASHES vent field.

J2-1294:

DEPLOYMENT LOCATION: NRZ mini-smoker site, 46° 07.241', -129° 58.180', Z=1764 m

Main goals: Collect fluid samples at NRZ mini-smoker vent field. Visually explore more of mini-smoker site. Do patch test with Jason multibeam. Get Jason temp probe working.

J2-1295:

DEPLOYMENT LOCATION: WEBB-5 instrument drop site, 45° 56.833 ', -129° 59.012 ', Z=1517 m

Main goals: Recover 3 Webb instruments deployed with Jason on J2-1293. Make pressure measurements at array of seafloor benchmarks. We will make 4 transects the benchmarks. Collect fluid samples during the last transect.

J2-1296:

DEPLOYMENT LOCATION: WEBB-2 instrument drop site, 45° 55.445', 58.944', Z=1519 m

Main goals: Deploy 2 Webb instruments from ship and position on the seafloor with Jason. Collect fluid samples, exchange HOBOS, collect Niskins at International District vent field. Recover mini-BPR at AX-302 (Trevi vent).

J2-1297:

DEPLOYMENT LOCATION: Inferno Vent, ASHES vent field, 45° 56.014', -130° 00.820', Z=1547 m

Main goals: Collect EM2040 Multibeam sonar survey in ASHES vent field. Collect fluid samples at Hell & Inferno vents, collect Niskins at Anemone vent. Then transit to the Webb-2 site and recover the two Webb instruments from the seafloor with Jason using the recover float, and recover with the ship.

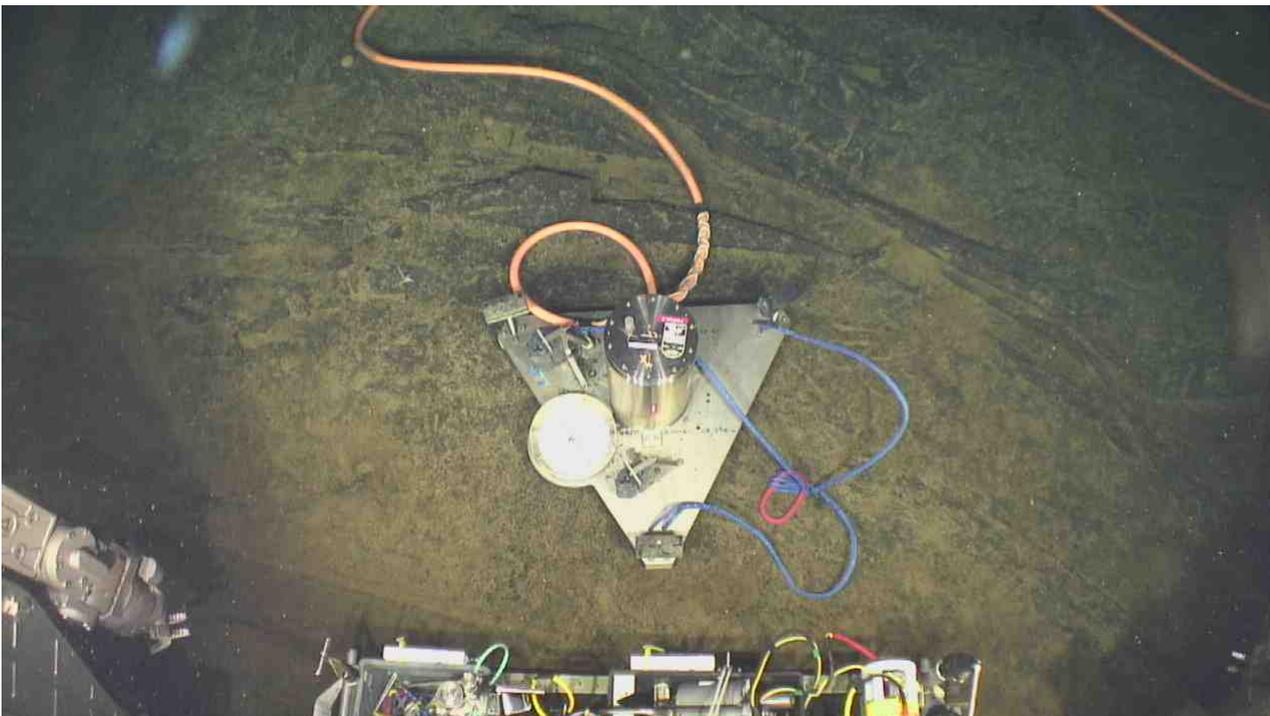
6.3 - Notes about repositioning of the OOI SCTA Tiltmeter

Bill Chadwick

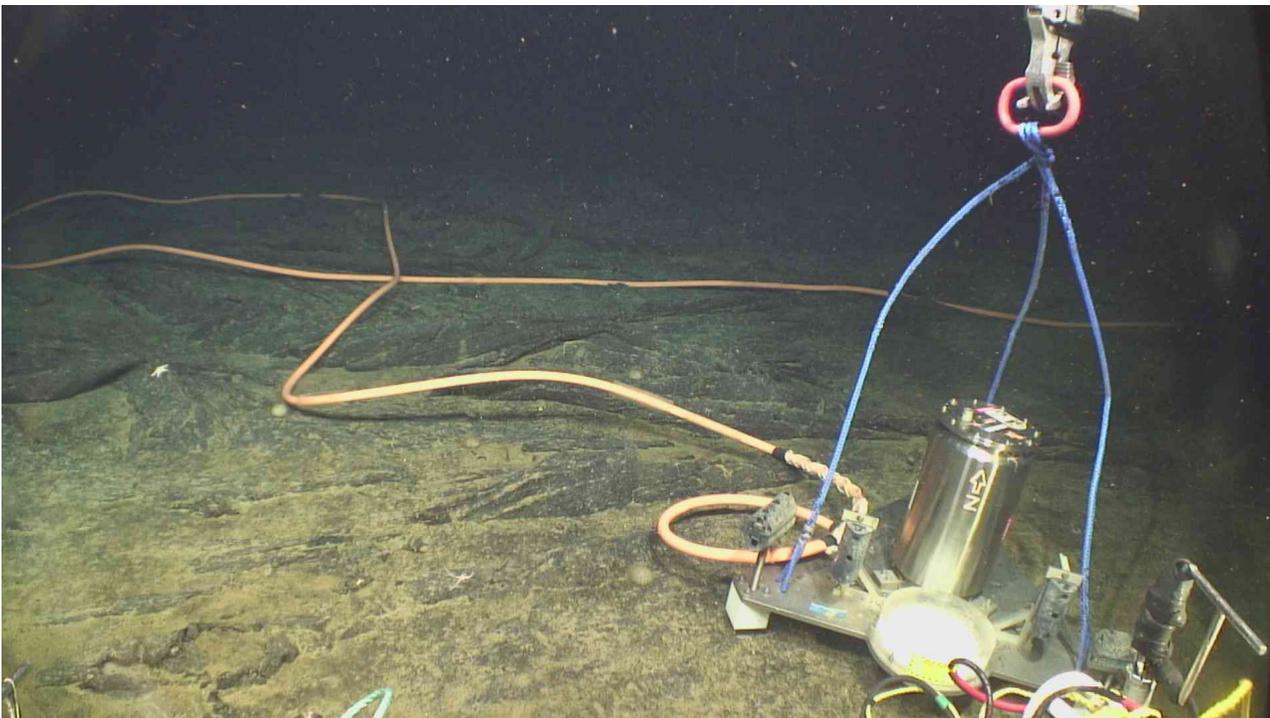
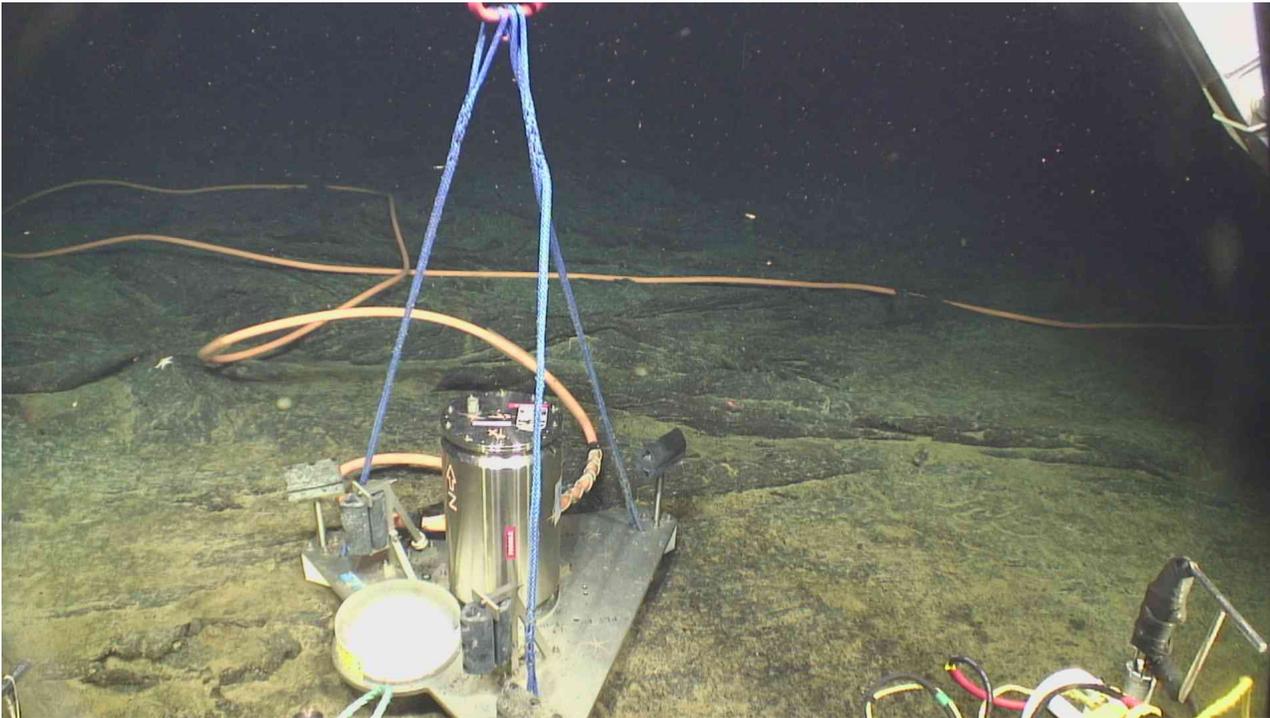
During ROV Jason dive J2-1295, we visited the OOI SCTA Tiltmeter at the Central Caldera site (connected to J-box MJ03F, near our benchmark AX-101) and we re-positioned it while in direct communication with William Wilcock, Erik Fredrickson at UW, and OOI engineers Michael Harrington, Dana Manalang, and James Tilley on shore. This operation was done because it was suspected that one of the legs of the tiltmeter was unstable, and to resolve ambiguity about why the SCTA tiltmeter output did not agree with the LILY tiltmeters on the nearby OOI BOTPT instrument.

We first arrived at the SCTA Tiltmeter at 9/11/2020 @ 04:12 and departed the site @ 05:23 (GMT). The following are my notes about establishing the orientation of the SCTA tiltmeter axes, written soon after the visit:

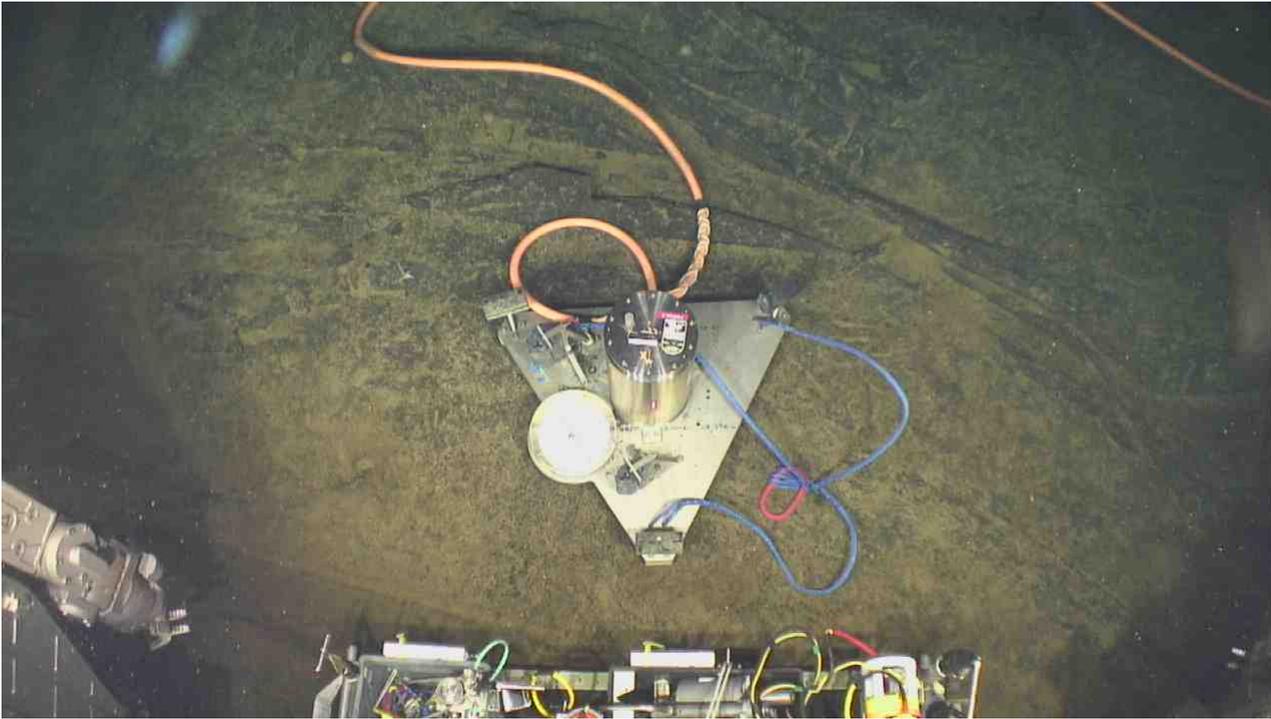
- It can be a little tricky to judge the orientation of things on the seafloor relative to ROV heading, because all of the Jason cameras can pan & tilt, so the cameras are not necessarily pointing in the same direction as ROV heading at any particular moment. Also, the SciCam and PilotCam are off-center on the vehicle so also have parallax. The best view is probably the BrowCam when you can see its orientation relative to the front of the basket, because it is on the centerline of the vehicle.
- The first image below (time = 04:16:06) is from the BrowCam when we first arrived at SCTA (pre-move). Jason's heading was 181 (appended to the end of the file name). This was close to (but not exactly) the -X tilt direction on the SCTA. Comparing this to the annotated images you included in the "SCTA repositioning plan" that you sent me, it appears to me the north arrow in those pictures is incorrect by about 70°. In other words, the Word-doc images imply that the +X axis was pointed to ~060°, whereas my first attached image here implies it is pointed to ~350°.



- The second and third images below (04:34:06 & 04:36:06) are before and after PilotCam views of the move we made with the SCTA. The ROV was on the bottom with a heading of 175, and did not move while we lifted the SCTA and repositioned it to the right. There was a slight rotation of the SCTA during the move, but nowhere near 110°.



- The fourth image below (05:04:06) is after the move & leveling from the BrowCam with an ROV heading of 161° (appended to the file name). This shows that the SCTA was rotated something like 10-20° during the move and that in the new orientation the -X direction is about 160° or perhaps a little less.

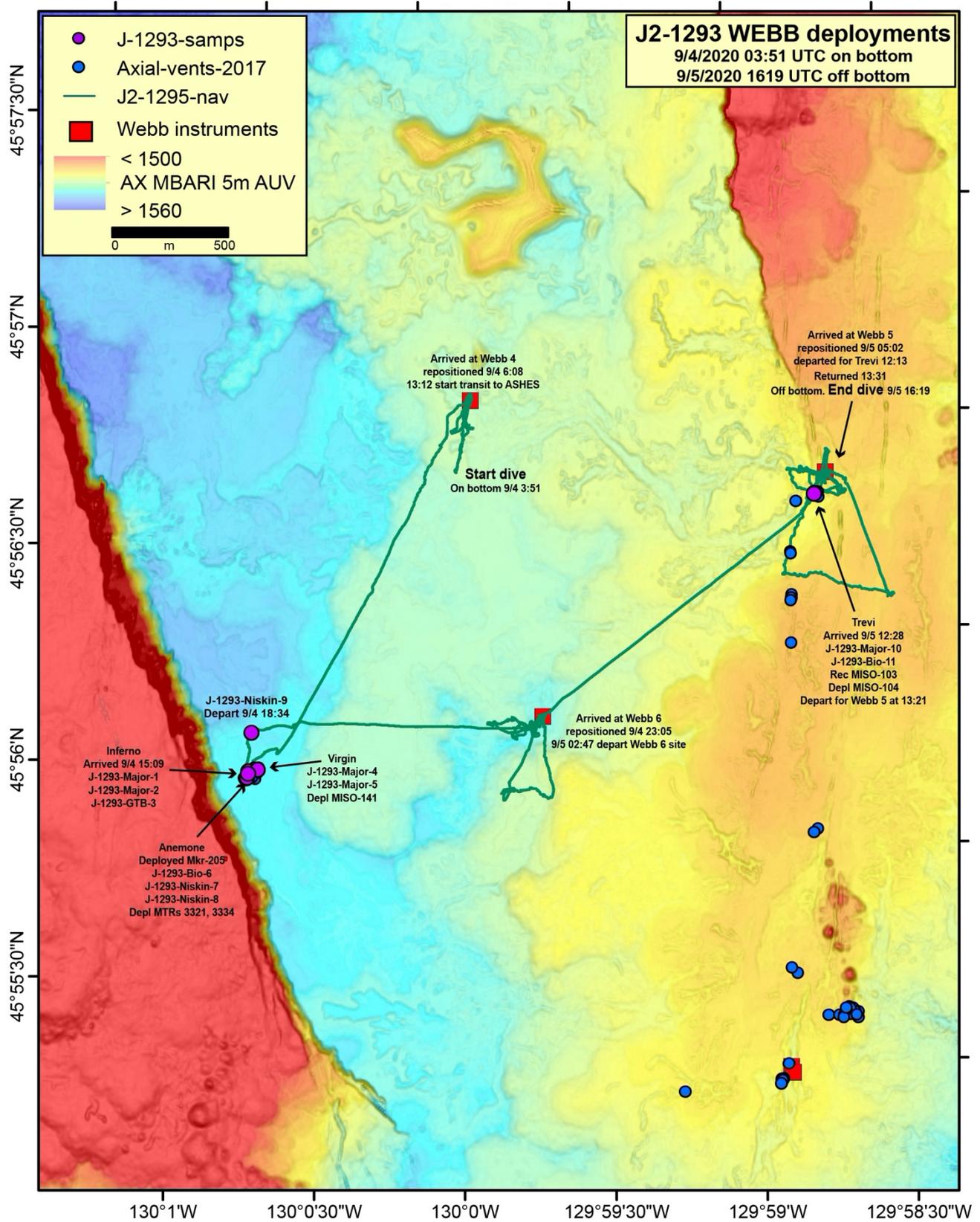


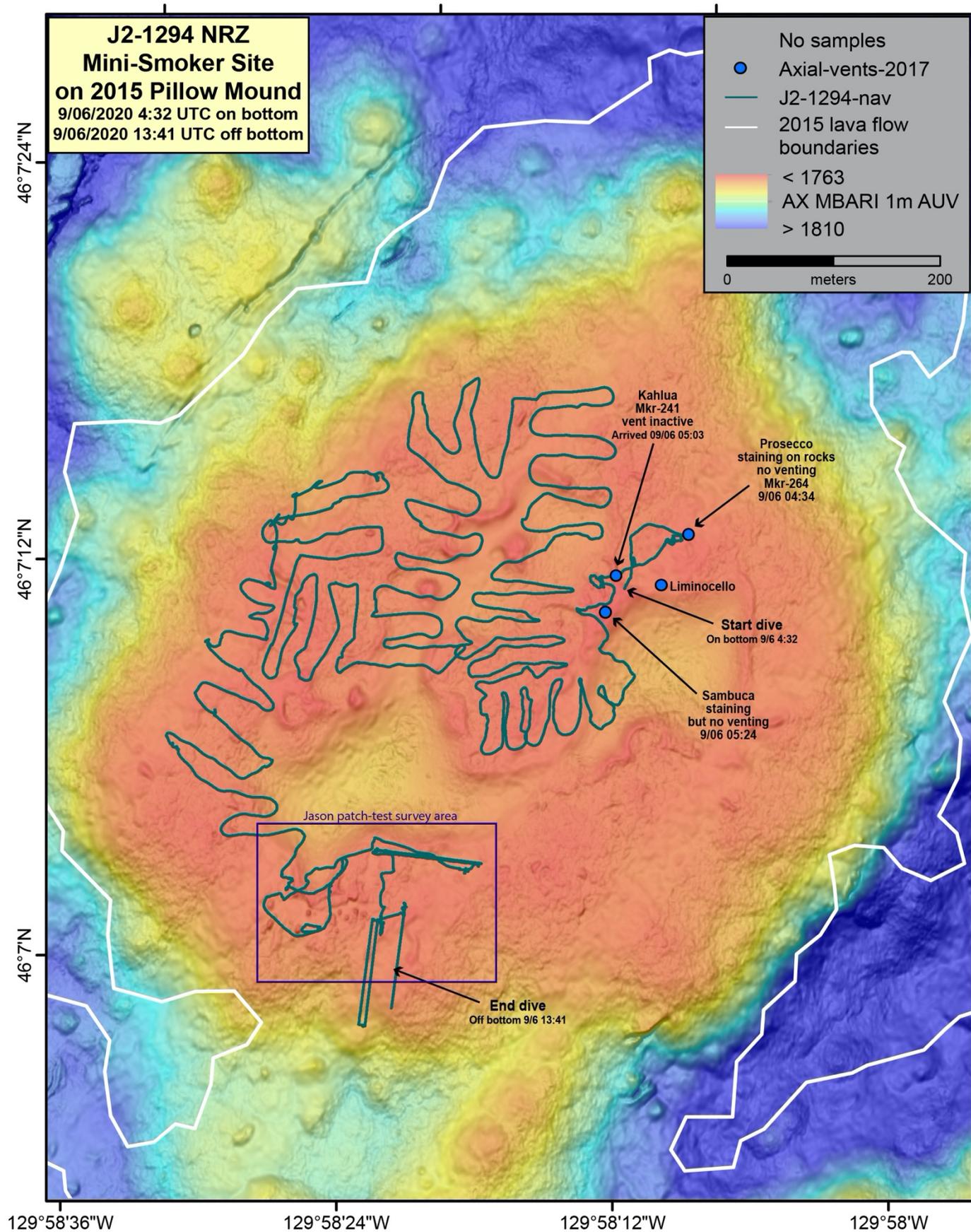
We recorded a 4K highlight video of the OOI SCTA site while Jason flew around it after it was re-positioned and before we left the site.

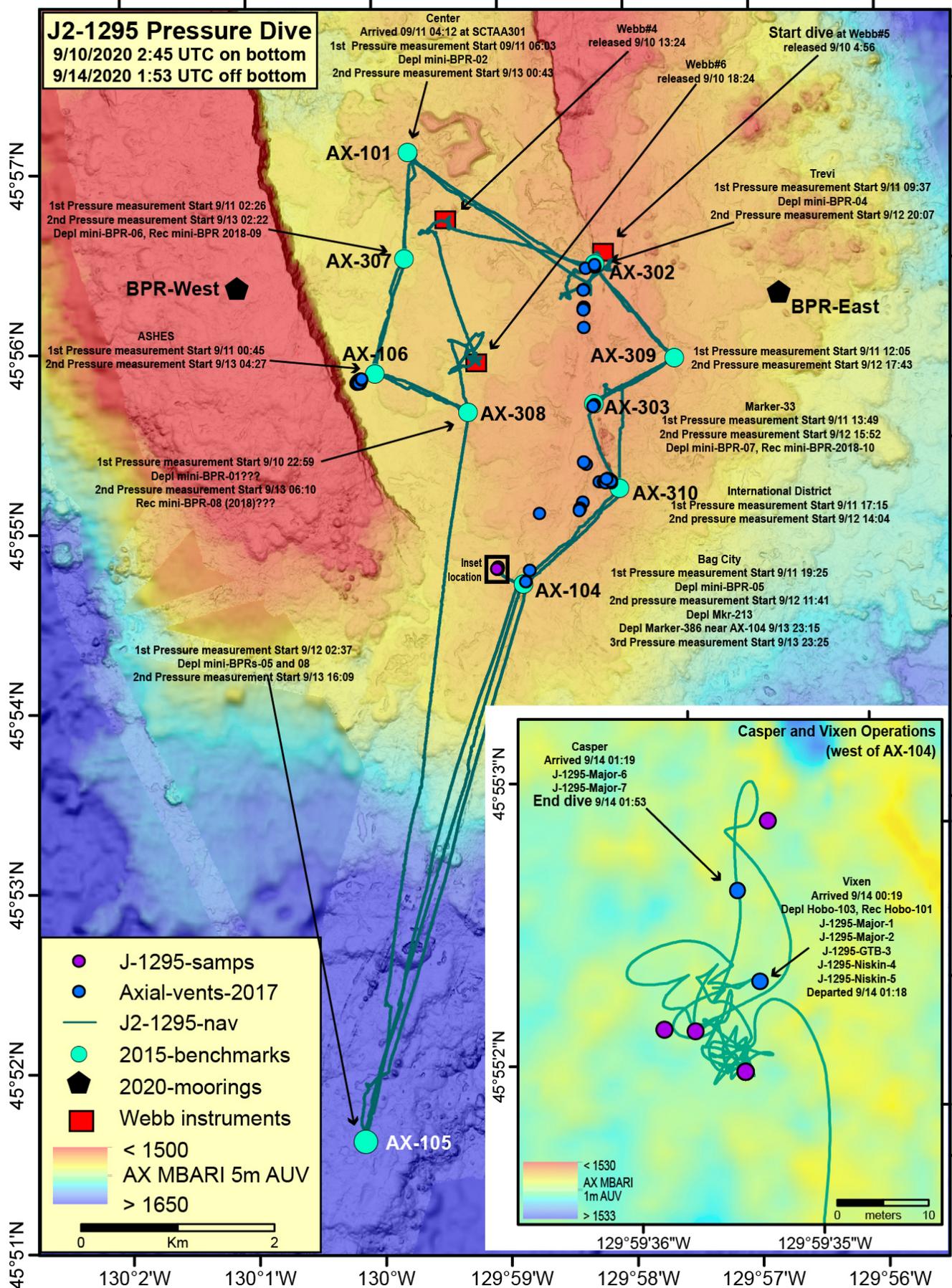
The following was written by Erik Fredrickson (UW) confirming the conclusions above:

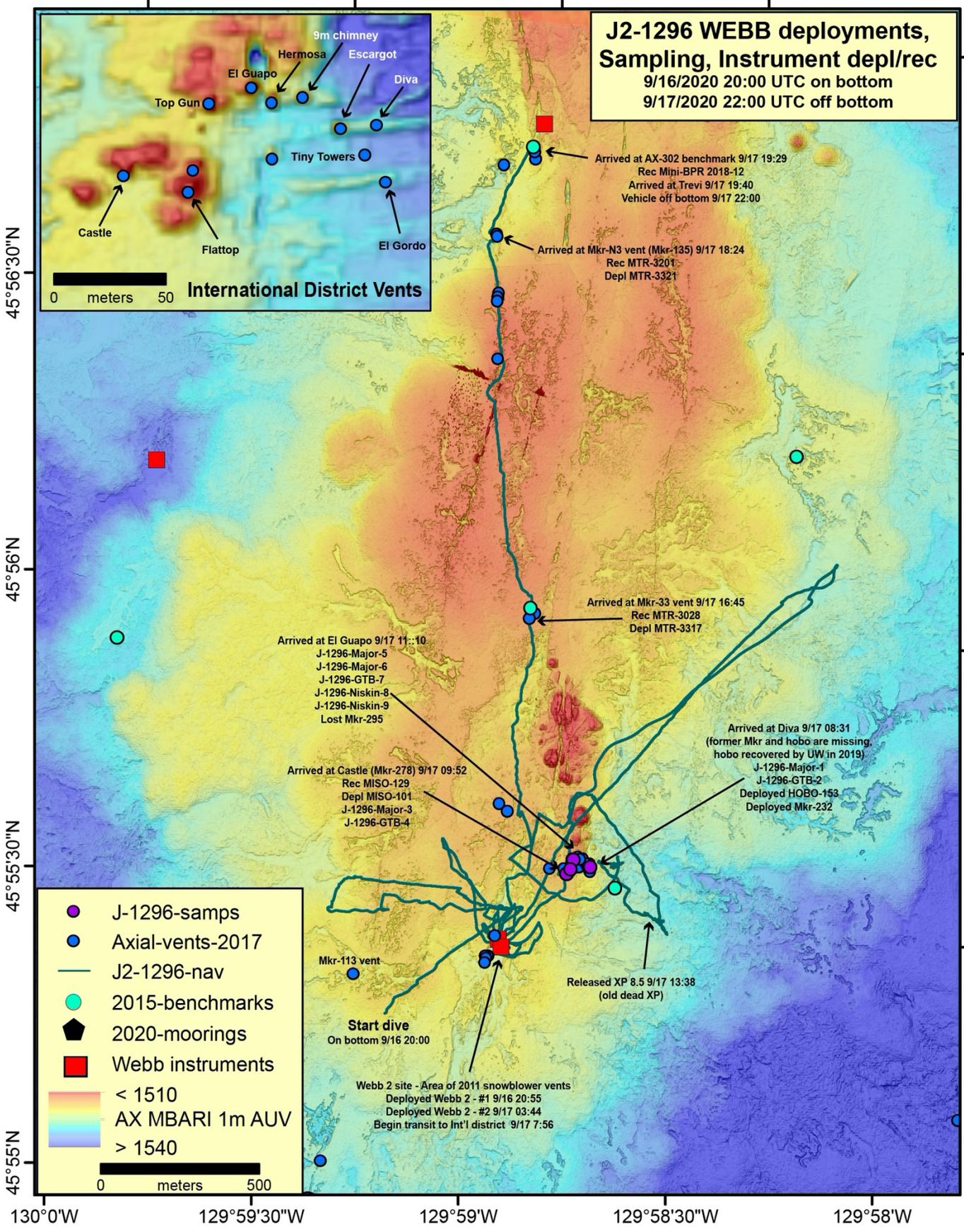
“The SCTA, before we relocated it, was oriented with -X at ~170 deg (+X at ~350). My original understanding of the SCTA's original orientation was that +X had a heading of ~90, which we can now clearly see was incorrect. It seems to have been a coincidence that the "east" tilt of the SCTA agreed so well (ignoring polarity) with the east tilt of the LILY. As you say, correcting the SCTA data for its actual heading, the two sensors show the same direction of tilt, but at very different magnitudes.”

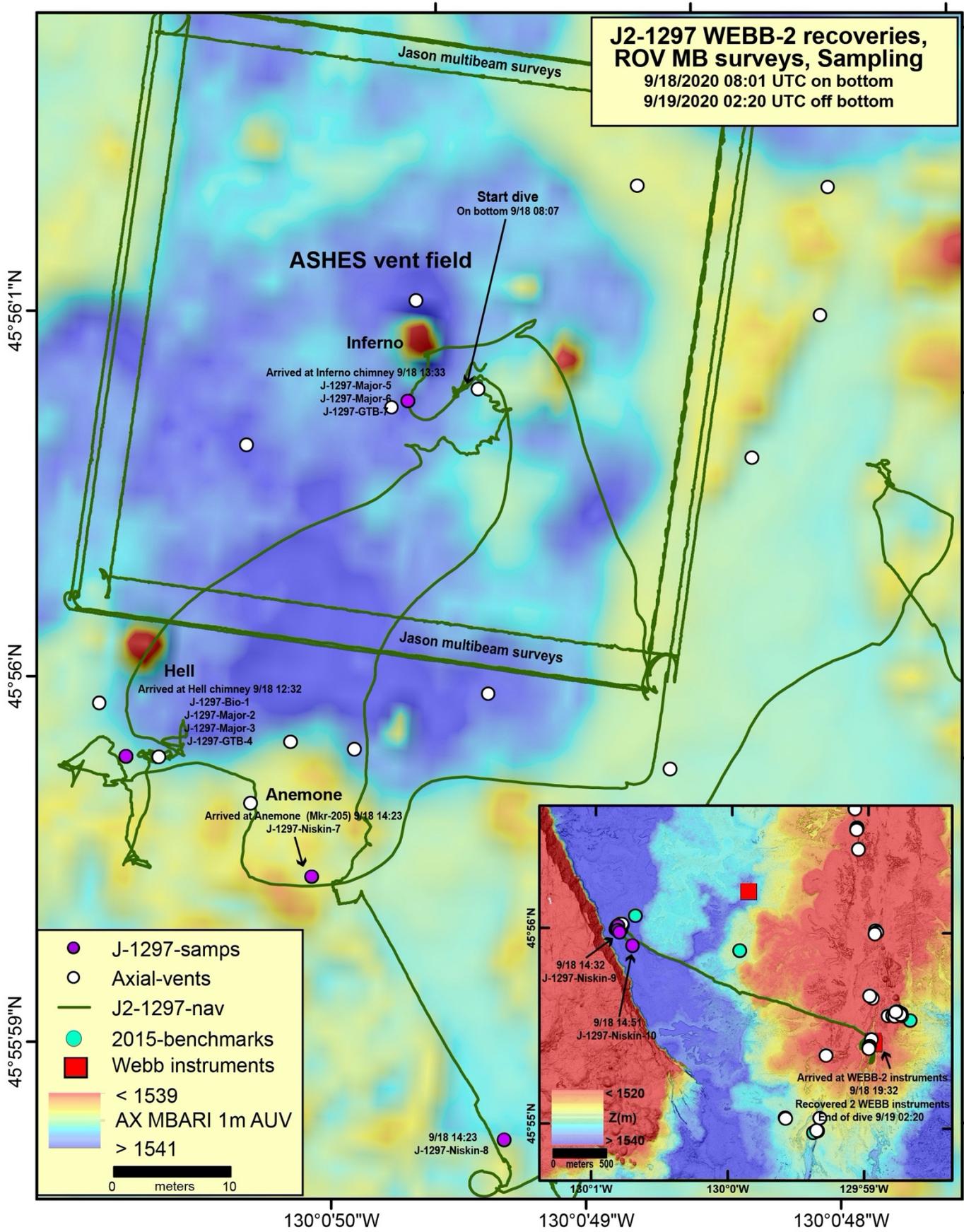
6.4 - ROV Jason Dive Maps











6.5 – ROV Jason Navigation

Navigation of the ROV Jason was accomplished by USBL from R/V Thompson and in general was very good. We had no trouble finding the pressure benchmarks on the seafloor, or re-finding the Webb crustal compliance instruments deployed on previous dives. Some new navigational markers were deployed during the Axial 2020 cruise particularly where older markers were missing or no longer very visible.

A note on old navigation transponders (which are obstacles to navigation)

During the Axial2020 cruise, we took the opportunity to remove the last of the old expendable Benthos TR-6000 navigation transponders (ID= XP LavaNet8.5) in the network in the SE caldera that had been deployed in the 1990's on 200-m long parachute chord tethers, and whose batteries are long dead. That transponder was at the following location, and now there are no other old transponders in that area.

ID	Lat	Lon	Top depth	LatDeg	LatMin	LonDeg	LonMin
XP LavaNet8.5	45.92457	-129.97567	1320	45	55.474	-129	58.540

Note however that three of the old (dead) navigation transponders of the same type are still present in a network centered around CASM vent along the northern caldera rim at the following locations.

ID	Lat	Lon	Top depth	LatDeg	LatMin	LonDeg	LonMin
XP CASM8.0	45.98731	-130.01641	1363	45	59.239	-130	0.985
XP CASM10	45.99880	-130.02655	1306	45	59.928	-130	1.593
XP CASM9.5	45.98653	-130.03729	1277	45	59.192	-130	2.237

Table 6.5.1 – New Marker Deployments

Dive	date	time	latitude	longitude	depth	Comments	Virtual Van #
J2-1293	09/04	17:37:09	45.933303	-130.013921	1541	Marker 205 deployed at Anemone vent (former Mrk129, which was apparently missing)	384
J2-1295	09/12	12:08:28	45.916209	-129.989374	1529	Marker 213 deployed about 10 m south of AX-104 benchmark	4169
J2-1295	09/13	23:16:38	45.916167	-129.989257	1529	Marker 286 deployed about 10 m north of AX-104 benchmark	5345
J2-1296	09/17	09:45:18	45.926319	-129.978319	1518	Marker 232 deployed at Diva vent (replaces Marker 150, which was missing in 2020)	6151
J2-1296	09/17	11:10:06	45.926547	-129.979666	1500	Marker 295 fell out of basket at top of El Guapo when setting up for sampling. Don't know where it landed.	6232

6.6 – ROV Jason Samples

Jason samples were collected on each dive and numbered sequentially as collected. Samples are named by dive, type and their collection number: Dive-type-Number, J-1105-GEO-01 for example. The type in the name indicates the primary purpose of the sample and the description will indicate if there were subsamples of different types (such as rock collected that had biology on it). The time and date are GMT, not local times. Position information was evaluated after the dive to determine the best position within the cluster of fixes while stationary. The VV field is the Virtual Van record ID at the time the sample was being collected.

Table 6.6.1 – ROV Jason sample list

dive	date	time	latitude	longitude	Head	depth	Comments	type	vv
J2-1293	09/04/2020	15:36	45.933577	-130.013745	242	1537	SAMPLE: J-1293-Major-1. Green Major. Top of Inferno chimney. ASHES vent field. No temp.	fluid	323
J2-1293	09/04/2020	15:42	45.933577	-130.013745	242	1537	SAMPLE: J-1293-Major-2. Black Major. Top of Inferno chimney. ASHES vent field. No temp.	fluid	328
J2-1293	09/04/2020	15:52	45.933577	-130.013745	242	1537	SAMPLE: J-1293-GTB-3. Red GTB. Top of Inferno chimney. ASHES vent field. No temp. First 3 samples were all from the same orifice.	gas	339
J2-1293	09/04/2020	16:32	45.933659	-130.013217		1540	SAMPLE: J-1293-Major-4. White Major. Virgin vent. No temp. NOTE: THERE WAS NO VV LOGGING WHILE AT VIRGIN VENT DUE TO REQUESTED DOD VIDEO/IMAGERY EMBARGO BETWEEN 16:03-16:57.	fluid	n/a
J2-1293	09/04/2020	16:38	45.933659	-130.013217		1540	SAMPLE: J-1293-GTB-5. Blue/Orange GTB. Virgin vent. No temp. NOTE: THERE WAS NO VV LOGGING WHILE AT VIRGIN VENT DUE TO REQUESTED DOD VIDEO/IMAGERY EMBARGO BETWEEN 16:03-16:57.	gas	n/a
J2-1293	09/04/2020	17:19	45.933297	-130.013833	313	1541	SAMPLE: J-1293-BIO-6. BIO: Tubeworm grab near Anemone vent (collected on way there). Port biobox.	bio	366
J2-1293	09/04/2020	17:57	45.933326	-130.013773	203	1541	SAMPLE: J-1293-Niskin-7. Right over Anemone vent. Niskin #3 (hydraulic). Alt = 1.4 m. Current going north.	bio	398
J2-1293	09/04/2020	18:06	45.933475	-130.013746	005	1541	SAMPLE: J-1293-Niskin-8. 25 m down-current from Anemone vent. Niskin #2 (aft on stb side). Alt = 3.2 m	bio	408

dive	date	time	latitude	longitude	Head	depth	Comments	type	vv
J2-1293	09/04/2020	18:21	45.935065	-130.013758	005	1541	SAMPLE: J-1293-Niskin-9. 200-m down-current from Anemone vent. Niskin #1 (forward on std side). Alt = 2.8 m. HOWEVER NISKIN DIDN'T CLOSE PROPERLY, SO NO SAMPLE.	bio	416
J2-1293	09/05/2020	12:47	45.946215	-129.983913	152	1517	SAMPLE: J-1293-Major-10. Trevi vent. Red Major that previously failed to trigger with the ram. This time used Jason "finger" on arm to trigger. No temp. In retrospect, not sure snorkel was in the fluid flow. (Logged in virtual van as Sample 9)	fluid	1101
J2-1293	09/05/2020	13:02	45.946182	-129.983919	130	1517	SAMPLE: J-1293-BIO-11. BIO: Clams sampled within sight of Trevi vent living in sediment. Sampled with claw and put in starboard biobox. Collected ~20 clams.	bio	1120
							(no samples collected on dive J2-1294)		
J2-1295	09/14/2020	00:39	45.917237	-129.992955	357	1531	SAMPLE: J-1295-Major-1. White Major. Vixen vent. Temp = 323°C from Jason temp probe.	fluid	5413
J2-1295	09/14/2020	00:42	45.917237	-129.992955	357	1531	SAMPLE: J-1295-Major-2. Black Major. Vixen vent. Temp = 323°C from Jason temp probe.	fluid	5415
J2-1295	09/14/2020	00:49	45.917237	-129.992955	357	1531	SAMPLE: J-1295-GTB-3. Black GTB. Vixen vent. Temp = 323°C from Jason temp probe.	gas	5424
J2-1295	09/14/2020	01:04	45.917272	-129.99303	358	1530	SAMPLE: J-1295-Niskin-4. Front #1 Niskin. Alt = 3.3 m. Tripped above Vixen vent in the plume for e-DNA. (After attempted to trip hydrolic Niskin #3, which did not close properly).	bio	5440
J2-1295	09/14/2020	01:13	45.86349	-129.992955	359	1526	SAMPLE: J-1295-Niskin-5. Aft #2 Niskin. Alt = 7 m. Tripped 25 m down-current (north) from Vixen vent, apparently in the plume for e-DNA.	bio	5447
J2-1295	09/14/2020	01:32	45.917485	-129.993074	023	1532	SAMPLE: J-1295-Major-6. Red Major. Casper vent. During first attempt at tripping the bottle Jason's ram slipped off the plunger almost immediately but it appeared the spring had not yet begun to extend. The ram and bottle were re-aligned and the snorkel repositioned in the vent and the 2nd attempt was successful and the spring extended fully. Temp = 295°C from Jason temp probe.	fluid	5462
J2-1295	09/14/2020	01:37	45.917271	-129.993074	023	1532	SAMPLE: J-1295-Major-7. Green Major. Casper vent. Temp = 295°C from Jason temp probe.	fluid	5468

dive	date	time	latitude	longitude	Head	depth	Comments	type	vv
J2-1296	09/17/2020	09:24	45.926319	-129.978938	092	1519	SAMPLE: J-1296-Major-1. Green Major. Diva vent. Temp = 304°C from Jason temp probe.	fluid	6121
J2-1296	09/17/2020	09:31	45.926319	-129.978938	092	1519	SAMPLE: J-1296-GTB-2. Orange-White-Black GTB. Diva vent. Temp = 304°C from Jason temp probe.	gas	6132
J2-1296	09/17/2020	10:16	45.926074	-129.979866	359	1514	SAMPLE: J-1296-Major-3. White Major. Castle vent. Temp = 247°C from Jason temp probe.	fluid	6181
J2-1296	09/17/2020	10:24	45.926074	-129.979866	359	1514	SAMPLE: J-1296-GTB-4. Green GTB. Castle vent. Temp = 247°C from Jason temp probe.	gas	6187
J2-1296	09/17/2020	11:23	45.926487	-129.979661	103	1500	SAMPLE: J-1296-Major-5. Black Major. El Guapo vent. Temp = 338°C from Jason temp probe. This Major did not trigger at first - had to be fired 3 times to find the perfect angle.	fluid	6248
J2-1296	09/17/2020	11:30	45.926487	-129.979661	103	1500	SAMPLE: J-1296-Major-6. RED Major. El Guapo vent. Temp = 338°C from Jason temp probe.	fluid	6252
J2-1296	09/17/2020	11:38	45.926487	-129.979661	103	1500	SAMPLE: J-1296-GTB-7. Red-Green GTB. El Guapo vent. Temp = 338°C from Jason temp probe.	gas	6259
J2-1296	09/17/2020	11:47	45.926483	-129.979646	105	1496	SAMPLE: J-1296-Niskin-8. Front #1 Niskin. Tripped above El Guapo vent in the plume for e-DNA. (After attempted to trip hydrolic Niskin #3, which did not close properly).	bio	6267
J2-1296	09/17/2020	11:57	45.926203	-129.979712	105	1496	SAMPLE: J-1296-Niskin-9. Rear #2 Niskin. Tripped 25 m down-current from El Guapo vent. Unsure if we are in the plume.	bio	6277
J2-1297	09/18/2020	12:38	45.933234	-130.013917	128	1539	SAMPLE: J-1297-Bio-1. Suction of 10-15 brittle stars on bare rock near base of Hell vent.	bio	6893
J2-1297	09/18/2020	13:12	45.933278	-130.01393	034	1536	SAMPLE: J-1297-Major-2. Green Major. Hell vent. Temp = 310°C from Jason temp probe.	fluid	6924
J2-1297	09/18/2020	13:17	45.933278	-130.01393	034	1536	SAMPLE: J-1297-Major-3. Black Major. Hell vent. Temp = 310°C from Jason temp probe.	fluid	6930
J2-1297	09/18/2020	13:23	45.933278	-130.01393	034	1536	SAMPLE: J-1297-GTB-4. White GTB. Hell vent. Temp = 310°C from Jason temp probe. NOTE: BOTTLE APPARENTLY DID NOT TRIGGER.	gas	6935

dive	date	time	latitude	longitude	Head	depth	Comments	type	vv
J2-1297	09/18/2020	13:46	45.933567	-130.013657	201	1536	SAMPLE: J-1297-Major-5. White Major. Inferno vent. Temp = 318°C from Jason temp probe.	fluid	6952
J2-1297	09/18/2020	13:51	45.933567	-130.013657	201	1536	SAMPLE: J-1297-Major-6. Red Major. Inferno vent. Temp = 318°C from Jason temp probe.	fluid	6956
J2-1297	09/18/2020	14:00	45.933567	-130.013657	201	1536	SAMPLE: J-1297-GTB-7. Purple GTB. Inferno vent. Temp = 318°C from Jason temp probe.	gas	6962
J2-1297	09/18/2020	14:23	45.933199	-130.013716	223	1536	SAMPLE: J-1297-Niskin-8. Hydraulic Niskin #3. Directly above vent. For e-DNA.	bio	6979
J2-1297	09/18/2020	14:32	45.933012	-130.013481	129	1536	SAMPLE: J-1297-Niskin-9. Rear Niskin #2. Tripped 25 m down-current, which was SE for e-DNA.	bio	6987
J2-1297	09/18/2020	14:57	45.931936	-130.011896	133	1536	SAMPLE: J-1297-Niskin-10. Front Niskin #1. Tripped 200 m down-current from Anemone vent to the SE for e-DNA.	bio	7000



6.7 – ROV Jason Dive Logs

ROV Jason dive J2-1293 Dive Log (edited/corrected from Jason Virtual Van)

Date/Time (GMT)	Latitude	Longitude	Gyro	Altitude	Depth	J2-1293 Logger Comment
09/04/2020 02:50:49	45.750025	-130.200008	318.69	0	1.01	TXT: Webb Comp A1 instrument was deployed from the ship and is at 210m depth descending to the seafloor
09/04/2020 02:51:09	45.750025	-130.200008	318.69	0	1.01	TXT: Shield S1 was also deployed from the ship and is at 232m depth
09/04/2020 03:20:00	45.750025	-130.200008	318.93	0	1.18	TXT: Shield on bottom at 1535 m
09/04/2020 03:51:10	45.750025	-130.200008	322.67	166.92	2.98	VEHICLE: milestone Jason in water. This dive will position 3 Webb instruments on the bottom (one at a time) and will conduct fluid sampling in the ASHES vent field.
09/04/2020 04:05:18	45.750022	-130.200045	315.64	196.69	129.89	TXT: Wire beacon on and heading down
09/04/2020 05:03:53	45.947623	-130.003292	316.67	4.41	1527.87	VEHICLE: milestone On bottom
09/04/2020 05:04:58	45.947607	-130.003290	106.38	4.91	1527.42	TXT: Found Shield
09/04/2020 05:18:41	45.945909	-130.003819	210.52	1.79	1528.8	TXT: OOI cable in sight
09/04/2020 05:19:22	45.945867	-130.003858	218.22	5.78	1524.83	TXT: Comp A1 in sight
09/04/2020 05:20:30	45.945827	-130.003840	219.51	6	1525.08	TXT: Approaching float
09/04/2020 05:21:16	45.945817	-130.003801	219.97	6.28	1524.84	TXT: Jason stbd arm reaching for float
09/04/2020 05:21:46	45.945812	-130.003797	219.99	6.4	1524.7	TXT: Jason grabs cable
09/04/2020 05:22:42	45.945800	-130.003766	220.23	11.83	1519.43	TXT: Jason lifts off bottom
09/04/2020 05:23:39	45.945813	-130.003825	318.18	19.4	1511.78	TXT: Jason lifts Comp A1 package off bottom
09/04/2020 05:28:53	45.946402	-130.003663	1.73	19.88	1510.91	TXT: Transiting to location WEBB-4
09/04/2020 05:55:11	45.948699	-130.003382	11.01	6.36	1526.97	TXT: Instrument package on the sea floor
09/04/2020 05:56:07	45.948705	-130.003391	10.85	1.25	1532.1	TXT: Package is at slight angle
09/04/2020 06:01:00	45.948682	-130.003416	6.61	2.21	1531.16	TXT: Jason grabs line to reposition Comp A1 to more level ground
09/04/2020 06:01:39	45.948684	-130.003403	14.79	1.23	1532.09	NAV: nav Doppler Reset
09/04/2020 06:03:33	45.948723	-130.003521	22.36	2.03	1531.12	TXT: Rat tail swims by
09/04/2020 06:08:04	45.948674	-130.003406	112.79	1.18	1532	TXT: Jason moves package to more level position
09/04/2020 06:12:34	45.948506	-130.003414	287.09	2.66	1530.54	TXT: Comp A1 on station
09/04/2020 06:14:40	45.948341	-130.003555	180.16	3.14	1528.12	TXT: Jason in transit to the shield
09/04/2020 06:18:45	45.947816	-130.003533	146.52	2.09	1530.12	NAV: nav Doppler Reset

Date/Time (GMT)	Latitude	Longitude	Gyro	Altitude	Depth	J2-1293 Logger Comment
09/04/2020 06:23:24	45.947531	-130.003169	82.43	1.15	1531.52	TXT: Upside down shield is righted by Jason
09/04/2020 06:28:10	45.947567	-130.003057	131.59	0.74	1531.8	TXT: Jason uses knife to cut rope from weight
09/04/2020 06:31:03	45.947567	-130.003078	132.12	0.85	1531.72	TXT: Jason puts weight in port side of basket
09/04/2020 06:35:38	45.947544	-130.003278	108.23	2.53	1530.39	TXT: Jason lifts shield and returns to instrument package
09/04/2020 06:46:38	45.948530	-130.003498	14.47	3.93	1529.65	WATCH_CHANGE: new_watchstander Jeff Beeson Leland Wood
09/04/2020 06:58:22	45.948663	-130.003393	330.4	1.51	1532.17	TXT: Jason releases shield by instrument package
09/04/2020 07:04:28	45.948667	-130.003333	305.21	5.8	1527.89	TXT: Jason puts transponder beacon from shield on float.
09/04/2020 07:19:30	45.948694	-130.003298	266.01	3.23	1530.43	TXT: Float released from Comp
09/04/2020 09:37:23	45.947316	-130.004198	285.8	88.67	1448	TXT: Float recovered at service about 15 min ago. Ship now headed back to instrument location.
09/04/2020 09:38:20	45.947316	-130.004198	292.23	87.76	1448.29	TXT: We are 1800 m away. Ship had trouble maneuvering to recover float. Took about 2 hours. Captain had to go to the bridge to get it done.
09/04/2020 09:38:36	45.947316	-130.004198	3.36	87.17	1448.51	TXT: Slowly transiting back to the Webb-4 site.
09/04/2020 12:08:14	45.947866	-130.003922	56.71	3.18	1530.72	NAV: nav Doppler Reset
09/04/2020 12:08:41	45.947963	-130.003802	56.89	2.33	1531.57	TXT: Jason back on bottom after transit
09/04/2020 12:10:46	45.948395	-130.003570	55.68	2.39	1531.48	TXT: Webb instrument in sight
09/04/2020 12:11:13	45.948477	-130.003577	56.22	2.38	1531.53	TXT: Moving the ship 50 m east
09/04/2020 12:15:09	45.948834	-130.003338	157.76	2.33	1530.97	TXT: Waiting for Sparr to come to the Jason Van
09/04/2020 12:21:23	45.948704	-130.003383	159.36	0.74	1533.1	TXT: This is the first of three Webb instruments at the site we're calling Webb-4
09/04/2020 12:24:14	45.948674	-130.003387	160.54	0.74	1533.14	TXT: Webb-4 position: LAT 45.948626 LON -130.003343 DEPTH 1533.1m
09/04/2020 12:25:06	45.948671	-130.003385	160.01	0.74	1533.11	TXT: Jason is using the arm to pull the rope off of the instrument for positioning the cover
09/04/2020 12:28:18	45.948663	-130.003361	159.41	0.88	1533.09	TXT: The first blue piece of tape on the rope which is meant to help give a range for cover positioning may have fallen off.
09/04/2020 12:29:57	45.948655	-130.003340	158.9	0.74	1533.06	TXT: Jason will be aiming for just outboard of the first visible piece of tape since they are not sure if the first or second piece of tape fell off
09/04/2020 12:30:22	45.948673	-130.003338	156.56	0.84	1532.7	TXT: Moving to grab the cover
09/04/2020 12:32:33	45.948669	-130.003442	40.26	0.74	1533.3	TXT: Attempting to grab the cover
09/04/2020 12:33:02	45.948666	-130.003436	40.58	0.74	1533.3	TXT: Cover is being lifted
09/04/2020 12:33:35	45.948662	-130.003430	41.43	0.9	1533.26	TXT: Setting the cover back down
09/04/2020 12:34:17	45.948659	-130.003424	40.05	0.74	1533.19	TXT: Cover is lifted

Date/Time (GMT)	Latitude	Longitude	Gyro	Altitude	Depth	J2-1293 Logger Comment
09/04/2020 12:35:09	45.948655	-130.003417	39.72	0.74	1533.2	TXT: Trying to get a better grip on the cover
09/04/2020 12:39:19	45.948663	-130.003425	40.8	0.91	1533.22	TXT: They are trying to get it high enough that it can be placed over the instrument in one go
09/04/2020 12:40:31	45.948672	-130.003445	42.1	1	1532.83	TXT: Cover in the starboard arm. Going to approach the instrument and put the cover on
09/04/2020 12:44:49	45.948681	-130.003367	151.63	0.75	1532.92	TXT: Attempting to place the cover over the instrument
09/04/2020 12:45:27	45.948686	-130.003376	146.94	0.74	1532.82	TXT: Cover bumped the instrument
09/04/2020 12:47:35	45.948692	-130.003382	148.2	0.74	1532.86	TXT: Grabbing the cover with the left arm
09/04/2020 12:48:18	45.948693	-130.003380	149.24	0.74	1532.86	TXT: Let go with right arm
09/04/2020 12:49:49	45.948693	-130.003368	148.99	0.74	1532.92	TXT: Cover placed. Adjustments will be made
09/04/2020 12:50:19	45.948693	-130.003362	149.59	0.74	1532.91	TXT: Using the instrument's positioning rope and the center line in the window of the cover to position it
09/04/2020 12:53:31	45.948705	-130.003331	134.57	1.69	1531.72	TXT: Moving to the other side of the instrument to check the alignment
09/04/2020 12:54:46	45.948649	-130.003392	343.93	1.24	1532.25	TXT: Decided it looks good. No need to move it. Next step is to put the weights on top.
09/04/2020 12:57:08	45.948656	-130.003366	344.85	0.74	1532.98	TXT: Picking up weights and moving them over the cover
09/04/2020 12:57:51	45.948656	-130.003365	344.6	0.74	1532.94	TXT: Cover is too far from Jason to place the weight
09/04/2020 12:58:05	45.948657	-130.003364	338.88	0.74	1532.82	TXT: Moving closer to the cover
09/04/2020 12:58:55	45.948653	-130.003370	337.6	0.74	1533.04	TXT: Weight is placed on the cover
09/04/2020 12:59:27	45.948653	-130.003374	337.66	0.78	1533.06	TXT: Going to fly around the cover to get good footage before moving to Ashes
09/04/2020 13:02:15	45.948738	-130.003374	105.01	2.19	1531.28	TXT: Correction: moving to Inferno vent after fly around
09/04/2020 13:12:20	45.948617	-130.003418	153.39	2.05	1531.23	TXT: Beginning transit to Ashes Vent field. Range around 1860 m from Jason.
09/04/2020 14:56:30	45.934282	-130.013041	244.91	3.48	1537.55	TXT: Bottom in sight
09/04/2020 15:03:14	45.933899	-130.013521	233.35	2.83	1538.3	NAV: nav Doppler Reset
09/04/2020 15:03:56	45.933865	-130.013545	204.21	3.5	1538.22	TXT: Lights from the video camera that's coonnected to the OOI cable at Mushroom vent are visible.
09/04/2020 15:04:15	45.933835	-130.013578	197.13	2.44	1538.99	TXT: About 40 meters north of Inferno
09/04/2020 15:09:34	45.933609	-130.013757	181.46	3.59	1538.02	WATCH_CHANGE: new_watchstander Bill Chadwick & Kelly Chadwick
09/04/2020 15:19:23	45.933584	-130.013723	248.31	3.76	1537.4	TXT: At Inferno Chimney searching for fluid sampling location
09/04/2020 15:20:07	45.933587	-130.013712	240.94	4.46	1536.91	TXT: Temperature probe has a ground fault and is disabled (so there will be no temperatures on this dive)
09/04/2020 15:21:10	45.933586	-130.013716	242.72	4.2	1537.12	TXT: Jason is searching for a stable location for sampling
09/04/2020 15:27:25	45.933582	-130.013719	242.02	4.29	1537.19	TXT: Preparing to take Major sample
09/04/2020 15:29:52	45.933580	-130.013725	242.17	4.29	1537.14	TXT: Removing bungie by pulling loop

Date/Time (GMT)	Latitude	Longitude	Gyro	Altitude	Depth	J2-1293 Logger Comment
09/04/2020 15:32:23	45.933585	-130.013734	242.1	4.24	1537.17	TXT: Jason moving to back of crate for accessibility
09/04/2020 15:36:09	45.933588	-130.013733	242.38	4.19	1537.15	TXT: Picking up the green Major
09/04/2020 15:36:50	45.933588	-130.013731	242.44	4.19	1537.12	Sample: J-1293-Major-1. Green Major. Top of Inferno chimney. Heading = 242. Altitude = 4.2 m. No temperature.
09/04/2020 15:39:37	45.933590	-130.013723	242.25	4.21	1537.19	TXT: Putting Green Major back in basket
09/04/2020 15:42:23	45.933592	-130.013719	242.55	4.19	1537.16	Sample: J-1293-Major-2. Black Major. Top of Inferno chimney. Heading = 242. Altitude = 4.2 m. No temperature.
09/04/2020 15:45:34	45.933593	-130.013720	242.17	4.24	1537.22	TXT: Sample 1 was green Major. sample 2 was black Major
09/04/2020 15:48:31	45.933590	-130.013731	242.13	4.28	1537.18	TXT: 45.933577 -130.013745 Position of samples 1 and 2 at Inferno
09/04/2020 15:50:02	45.933586	-130.013740	241.9	4.31	1537.19	TXT: Grabbing Gastight bottle after stowing the black major. Picking up the red gastight
09/04/2020 15:52:34	45.933575	-130.013751	242.46	4.23	1537.15	Sample: J-1293-GTB-3. Red gastight bottle is in the same vent as Majors. Top of Inferno chimney. Heading = 242. Altitude = 4.2 m. No temperature.
09/04/2020 15:54:50	45.933562	-130.013748	242.45	4.26	1537.17	TXT: Stowing the red gastight back in the milk crate
09/04/2020 15:56:11	45.933553	-130.013735	242.32	4.25	1537.18	TXT: Heading to Virgin Vent. Going to approach Virgin Vent for sampling but will not enter log information while we're at the vent. Data will be entered later.
09/04/2020 16:03:19	45.933467	-130.013351	72.05	1.95	1538.05	TXT: Switching to color bars on live video feed and ASnap turned off (video & imagery embargo requested at Virgin vent so no logging was done)
09/04/2020 16:57:59	45.933610	-130.013413	204.9	1.33	1540.12	TXT: Now leaving Virgin after sampling. Heading to Anemone vent.
09/04/2020 16:58:40	45.933610	-130.013412	204.99	1.59	1540.05	TXT: At Virgin we took one Major and one Gastight. Then we deployed one HOBO probe. Details will follow
09/04/2020 16:58:47	45.933609	-130.013415	205.05	1.61	1540.15	Sample: J-1293-Major-4. White Major. Tried to use Red Major first but didn't trigger. Sampled at 16:32. No temperature. 45.933659 -130.013749. 1540m.
09/04/2020 17:06:26	45.933454	-130.013376	188.43	2.15	1539.61	NAV: nav Doppler Reset
09/04/2020 17:06:36	45.933429	-130.013380	189.79	2.06	1539.54	Sample: J-1293-GTB-5. Virgin vent in blue-orange Gastight bottle at 16:38. 45.933659 -13013217. No temp. Knocked down anhydrite chimney.
09/04/2020 17:18:10	45.933282	-130.013783	313.2	1.41	1540.44	TXT: Deployed HOBO 141 at Virgin at 16:53
09/04/2020 17:19:27	45.933286	-130.013796	313.01	1.38	1540.46	TXT: Now we're at Anemone Vent to sample tubeworms
09/04/2020 17:28:39	45.933447	-130.013634	1.56	2.55	1539.35	Sample: J-1293-Bio-6. Tube worm grab into port biobox. From tubeworm bush near Anemone vent. 45.933297 -130.013833.
09/04/2020 17:29:29	45.933474	-130.013587	1.82	3.56	1538.56	TXT: Navigation seems to be off. We are going to do a doppler reset at the OOI COVIS sonar.
09/04/2020 17:29:36	45.933472	-130.013589	2.11	3.89	1538.07	NAV: Doppler Reset
09/04/2020 17:30:03	45.933427	-130.013635	270.78	5.16	1536.52	TXT: Still looking for Anemone vent - have not seen marker 129 anywhere
09/04/2020 17:31:18	45.933388	-130.013852	209.43	2.48	1540	TXT: Hopefully the doppler reset will give us better relative navigation

Date/Time (GMT)	Latitude	Longitude	Gyro	Altitude	Depth	J2-1293 Logger Comment
09/04/2020 17:33:56	45.933341	-130.013940	150.64	1.5	1540.8	TXT: Fathead Sculpin fish near vent
09/04/2020 17:34:54	45.933326	-130.013934	149.83	1.5	1540.85	TXT: The anchor for Marker 204 - which was in the basket - was melted off and so we discarded the marker
09/04/2020 17:37:09	45.933303	-130.013921	149.08	1.5	1540.83	TXT: Marker 205 deployed near Anemone vent
09/04/2020 17:38:06	45.933297	-130.013917	149.07	1.51	1540.85	TXT: We deployed MTR 3281 at Anemone vent
09/04/2020 17:44:20	45.933282	-130.013921	186.82	0.94	1540.76	TXT: MTR 3291 deployed to the right side of vent with heading of 186
09/04/2020 17:53:28	45.933266	-130.013935	205.79	1.88	1539.37	TXT: MTR 3334 deployed on left side of vent heading 187.
09/04/2020 17:57:34	45.933255	-130.013927	203.2	1.4	1539.82	TXT: Jason is right over Anemone vent. We're going to trip the hydraulic Niskin #3. Altitude 1.4m
09/04/2020 17:57:41	45.933255	-130.013926	203.17	1.4	1539.84	Sample: J-1293-Niskin-7. Sample taken directly over Anemone Vent (Marker 205). Lat = 45.933326 Lon = -130.013773. Depth -1541m. Alt 2.8m. Taken for eDNA.
09/04/2020 18:02:15	45.933304	-130.013856	226.85	5.15	1537.58	TXT: Now going to go 25m and then 200m down-current to trip the other two Niskins
09/04/2020 18:03:21	45.933409	-130.013807	30.68	5.25	1537.59	TXT: Looks like current is going straight north.
09/04/2020 18:04:27	45.933451	-130.013775	3.91	4.93	1537.7	TXT: current direction determined by shutting thrusters off and seeing which way Jason drifted.
09/04/2020 18:27:15	45.935191	-130.013689	82	2.43	1541.68	TXT: It is now 18:26. Keyboard malfunction caused delay in recording events. Updating events now.
09/04/2020 18:27:34	45.935200	-130.013649	82.35	2.31	1541.75	Sample: J-1293-Niskin-8. Niskin #2 Aft on side of Jason. Taken at 18:10 25m down-current from Anemone Vent. Lat = 45.933475 Long = -130.013746. Depth = 1541m. Alt = 3.2m. Taken for eDNA.
09/04/2020 18:32:34	45.935346	-130.012761	81.18	15.05	1527.44	TXT: Drifted down current 200m from Anemone and attempted to take last Niskin but forward Niskin #1 on side of Jason failed to close. NO SAMPLE.
09/04/2020 18:34:02	45.935395	-130.012617	81.08	14.35	1527.05	TXT: Transitting to Webb-6 target.
09/04/2020 19:39:51	45.936189	-129.999066	78.83	14.6	1522.27	TXT: 45 m away from target
09/04/2020 19:46:08	45.936010	-129.998040	79.9	14.88	1525.55	TXT: On position. Waiting to launch instrument packages from ship at Webb-6 target
09/04/2020 20:09:16	45.935840	-129.999284	281.37	22.33	1517.77	TXT: Jason moving up to 50 m altitude
09/04/2020 20:23:11	45.935780	-129.999154	281.65	53.97	1487.26	TXT: Waiting for instruments to launch
09/04/2020 20:45:53	45.935772	-129.999113	281.58	54.17	1487.15	TXT: Estimate 30 min to deployment
09/04/2020 20:58:11	45.935760	-129.999137	281.51	54.21	1487.17	TXT: Shield going in water first. Almost ready
09/04/2020 21:02:44	45.935772	-129.999136	281.42	54.32	1487.14	TXT: Shield off deck
09/04/2020 21:04:35	45.935775	-129.999135	281.74	54.23	1487.15	TXT: Shied in the water
09/04/2020 21:04:46	45.935775	-129.999135	281.8	54.19	1487.15	TXT: Shield released
09/04/2020 21:13:52	45.935730	-129.999119	281.47	54.22	1487.04	TXT: Tracking shield - at about 40 m/min descent

Date/Time (GMT)	Latitude	Longitude	Gyro	Altitude	Depth	J2-1293 Logger Comment
09/04/2020 21:15:11	45.935729	-129.999119	281.49	54.17	1487.14	TXT: Shield at depth of 330 m
09/04/2020 21:22:11	45.935996	-129.998672	32.44	52.98	1486.83	TXT: Shield at depth of 560 m
09/04/2020 21:29:03	45.936398	-129.997912	33.34	53.36	1487.11	TXT: Shield at 795 m
09/04/2020 21:36:06	45.936418	-129.998472	296.62	53.49	1487.18	TXT: Shield at 1013 m
09/04/2020 21:36:46	45.936387	-129.998481	295.98	53.36	1487.31	TXT: Proceeding with launching instrument package Comp A2
09/04/2020 21:42:32	45.936398	-129.999006	293.78	50.57	1485.55	TXT: Shield at depth of 1214 m
09/04/2020 21:47:18	45.936481	-129.999432	296.32	48.14	1487.28	TXT: Preparing to launch instrument Comp A2
09/04/2020 21:51:46	45.936484	-129.999494	296.07	48.57	1487.04	TXT: Instrument is off deck
09/04/2020 21:52:11	45.936480	-129.999494	295.29	48.36	1487.22	TXT: Shield is on bottom
09/04/2020 21:53:03	45.936467	-129.999492	296.12	48.63	1487.02	TXT: Instrument is in the water
09/04/2020 21:53:21	45.936464	-129.999492	296.11	48.41	1487.2	TXT: Instrument is released
09/04/2020 21:53:43	45.936443	-129.999476	265.67	48.26	1487.2	TXT: Jason moving due west to avoid instrument
09/04/2020 21:59:27	45.936361	-129.999905	266.01	47.63	1486.93	TXT: Comp A2 at depth of 172 m
09/04/2020 22:12:51	45.936242	-130.000797	266.1	48.98	1486.62	TXT: Comp A2 at depth of 550 m
09/04/2020 22:21:25	45.936261	-130.000794	266.78	48.38	1487.09	TXT: Comp A2 is at depth of 800 m
09/04/2020 22:33:59	45.936249	-130.000763	266.94	48.28	1487.27	TXT: Proceeding with Sentry launch
09/04/2020 22:37:25	45.936247	-130.000767	266.39	48.67	1486.92	TXT: Comp A2 at depth of 1245 m
09/04/2020 22:43:04	45.936236	-130.000808	266.23	48.41	1486.95	TXT: Comp A2 at depth of 1414 m
09/04/2020 22:45:44	45.936221	-130.000811	266.43	48.12	1487.26	WATCH_CHANGE: new_watchstander Bill Chadwick + Kelly Chadwick
09/04/2020 22:47:51	45.936217	-130.000773	266.36	48.19	1487.21	TXT: Comp A2 on the bottom
09/04/2020 22:51:51	45.936308	-130.000503	315.82	3.65	1532.45	TXT: Bottom in sight
09/04/2020 23:05:54	45.936668	-129.997886	58.88	3.55	1536.64	TXT: Instrument in sight
09/04/2020 23:08:08	45.936726	-129.997778	60.47	1.13	1539.08	TXT: Looking for the weight that is attached to the instrument. Examining the site.
09/04/2020 23:09:41	45.936742	-129.997795	60.82	1.15	1539.1	TXT: Cutting the line to the descent anchor.
09/04/2020 23:13:15	45.936733	-129.997794	60.26	1.16	1539.08	TXT: Weight's rope is cut. Knife replaced in sheath
09/04/2020 23:14:21	45.936725	-129.997788	60.12	1.19	1539.05	TXT: Moving the instrument
09/04/2020 23:15:40	45.936692	-129.997787	63.51	1.25	1539.01	TXT: Looking for a flat area
09/04/2020 23:18:18	45.936693	-129.997825	62.52	0.74	1539.51	TXT: Attempting to place the instrument
09/04/2020 23:19:11	45.936693	-129.997826	61.48	0.74	1539.51	TXT: Examining instrument's placement to check that it's flat
09/04/2020 23:21:30	45.936707	-129.997830	70	0.74	1539.52	TXT: Deemed a good site

Date/Time (GMT)	Latitude	Longitude	Gyro	Altitude	Depth	J2-1293 Logger Comment
09/04/2020 23:23:42	45.936709	-129.997840	67.72	0.74	1539.48	TXT: Attempting to pull out the measurement rope
09/04/2020 23:24:38	45.936705	-129.997838	67.62	0.74	1539.48	TXT: Rope is pulled out
09/04/2020 23:25:17	45.936697	-129.997842	68.48	0.74	1539.56	TXT: Using the arm to straighten out the rope
09/04/2020 23:26:04	45.936688	-129.997833	68.18	0.74	1539.59	TXT: Examining leveling gears to make sure they're well engaged
09/04/2020 23:28:01	45.936596	-129.997798	332.57	0.78	1539.3	NAV: Doppler Reset
09/04/2020 23:30:06	45.936537	-129.997812	251.04	1.23	1537.42	TXT: Transiting south to the cover's location
09/04/2020 23:34:00	45.936067	-129.998331	115.57	3.04	1536.65	TXT: Cover in sight
09/04/2020 23:35:08	45.935955	-129.998129	176.11	2.5	1537.14	TXT: Cover location approximately LAT 45.935963 LONG -129.998005
09/04/2020 23:36:40	45.935957	-129.998061	127.48	1.86	1537.8	TXT: Considering how best to flip the cover
09/04/2020 23:38:15	45.935944	-129.998003	124.05	0.8	1538.89	TXT: Attempting to flip the cover
09/04/2020 23:40:03	45.935951	-129.997955	127.86	0.75	1538.91	TXT: Attempting to flip the cover again
09/04/2020 23:43:18	45.935946	-129.998010	344.82	0.74	1538.32	TXT: Decided to cut the weight off before trying to flip it again
09/04/2020 23:44:34	45.935964	-129.998008	345.69	0.74	1538.35	TXT: Pulled the pin out to disconnect the weight
09/04/2020 23:45:26	45.935943	-129.997939	263.12	1.21	1537.24	TXT: Going to use the handles to attempt to flip the cover
09/04/2020 23:47:17	45.935966	-129.997938	273.83	0.74	1538.11	TXT: Pillow lava is in the way of the handles
09/04/2020 23:49:13	45.935969	-129.997949	252.86	1.05	1538.37	TXT: Trying to reach the handles again after moving closer to the cover
09/04/2020 23:49:48	45.935968	-129.997948	247.97	0.74	1538.36	TXT: Left arm has a grip on the vertical handle
09/04/2020 23:50:50	45.935965	-129.997958	255.59	0.74	1538.34	TXT: Struggling to fully flip the cover over
09/04/2020 23:51:28	45.935960	-129.997960	251.39	0.83	1538.35	TXT: Part of the vertical handle broke off
09/04/2020 23:52:11	45.935974	-129.998048	350.49	1.88	1536.64	TXT: Cover is on its side. Jason doesn't have a hold of it anymore. Moving to the back to flip it fully over
09/04/2020 23:53:01	45.935976	-129.998049	347.91	0.74	1538.37	TXT: Attempting to push the cover over using the arm
09/04/2020 23:53:33	45.935982	-129.998056	346.8	0.74	1538.34	TXT: Cover is slowly falling
09/04/2020 23:53:52	45.935997	-129.998062	12.73	1.59	1537.31	TXT: Cover is right-side-up
09/04/2020 23:55:12	45.935994	-129.997939	193.17	1.66	1538.23	TXT: Moving to the side of the cover that has the handles
09/04/2020 23:56:57	45.935965	-129.997971	224.11	0.76	1538.41	TXT: Looking for the weight
09/04/2020 23:57:50	45.935963	-129.997984	236.9	0.74	1538.42	TXT: They are going to cut the rope attached to the weight so the weight will be easier to transport
09/04/2020 23:59:10	45.935965	-129.997985	236.75	0.74	1538.29	TXT: Used the arm to move the cover out of the way of the weight
09/05/2020 00:00:37	45.935965	-129.998006	235.42	0.74	1538.27	TXT: Grabbed the weight's rope
09/05/2020 00:01:11	45.935967	-129.998006	235.72	0.74	1538.25	TXT: Putting the weight into a basket on Jason

Date/Time (GMT)	Latitude	Longitude	Gyro	Altitude	Depth	J2-1293 Logger Comment
09/05/2020 00:01:55	45.935969	-129.998006	235.68	0.74	1538.24	TXT: Getting the knife to cut the weight's rope
09/05/2020 00:04:10	45.935974	-129.998006	235.61	0.74	1538.24	TXT: Cutting the rope
09/05/2020 00:04:33	45.935974	-129.998006	235.92	0.78	1538.22	TXT: Putting the knife back in its sheath
09/05/2020 00:05:28	45.935973	-129.998005	236.09	0.74	1538.23	TXT: Moved the cut rope away
09/05/2020 00:06:43	45.935994	-129.997974	226.87	1.24	1538.44	NAV: Doppler Reset
09/05/2020 00:07:14	45.935992	-129.997974	226.41	0.84	1538.76	TXT: The handle that was damaged is only connected to the cover by one bolt now
09/05/2020 00:07:50	45.935988	-129.997974	226.04	0.93	1538.71	TXT: Using the left arm to grip the horizontal handle to bring the cover to the instrument
09/05/2020 00:08:37	45.935983	-129.997972	225.26	0.91	1538.71	TXT: Using the right arm to grip the top of the vertical handle which is the part that is still attached to the cover
09/05/2020 00:10:13	45.935962	-129.997968	227.39	2.13	1536.68	TXT: Transiting to the instrument site with the cover
09/05/2020 00:12:11	45.935940	-129.998036	227.8	6.06	1533.4	TXT: Right arm has lost contact with the broken handle
09/05/2020 00:13:20	45.935928	-129.998054	227.51	5.96	1533.56	TXT: Right arm has a grip on the broken handle again
09/05/2020 00:23:34	45.936581	-129.997743	40.89	4.24	1533.88	TXT: Instrument in sight
09/05/2020 00:26:43	45.936608	-129.997831	46.87	0.74	1538.82	TXT: Set shield down
09/05/2020 00:28:10	45.936587	-129.997894	45.02	0.74	1538.96	TXT: Reposition arms to pick up shield again
09/05/2020 00:29:22	45.936598	-129.997888	45.61	0.75	1538.97	TXT: Set shield down again. Removing the beacon from top of the shield
09/05/2020 00:31:11	45.936662	-129.997791	45.75	0.79	1538.93	TXT: Pulling shield closer to Jason with top eyelet
09/05/2020 00:33:49	45.936749	-129.997663	45.52	160.21	1538.89	TXT: Shield is too far away to remove bungee on beacon - trying to pull closer
09/05/2020 00:33:55	45.936745	-129.997669	44.83	1.16	1538.9	TXT: Bungee is free
09/05/2020 00:34:24	45.936730	-129.997692	44.83	1.11	1538.91	TXT: Beacon is free
09/05/2020 00:36:08	45.936731	-129.997761	50.25	3.43	1536.23	TXT: Carrying beacon to float pack above Comp A2 instrument
09/05/2020 00:38:05	45.936651	-129.997771	275.54	5.43	1534.26	TXT: Right arm grabs float rail to steady it
09/05/2020 00:39:03	45.936646	-129.997792	275.59	5.48	1534.23	TXT: Beacon placed in holster on float
09/05/2020 00:40:23	45.936645	-129.997817	275.71	5.45	1534.24	TXT: Bungee placed on bolt to secure beacon
09/05/2020 00:41:44	45.936635	-129.997830	274.79	3.73	1535.97	TXT: Arm let go of beacon going down to Comp A2 instrument
09/05/2020 00:43:14	45.936714	-129.997871	62.76	0.91	1539.07	TXT: Setting down in front of Comp A2 instrument to release float
09/05/2020 00:45:44	45.936696	-129.997886	64.3	0.74	1538.91	TXT: Releasing the pin on Comp A2's float
09/05/2020 00:46:03	45.936693	-129.997885	64.92	0.74	1538.88	TXT: Float is away
09/05/2020 00:51:31	45.936395	-129.997934	188.06	3.78	1535.66	TXT: Moving up off bottom so that ship can move to retrieve the float
09/05/2020 00:55:09	45.935792	-129.998305	184.68	49.66	1488.59	TXT: Jason waiting at an altitude of 50 meters

Date/Time (GMT)	Latitude	Longitude	Gyro	Altitude	Depth	J2-1293 Logger Comment
09/05/2020 01:03:38	45.934597	-129.998896	213.4	43.11	1488.57	TXT: Float at 800 meters
09/05/2020 01:07:02	45.934203	-129.999217	213.05	42.74	1488.23	TXT: Jason waiting for float retrieval at an altitude of 42 meters
09/05/2020 01:12:30	45.933597	-129.999322	179.22	41.83	1488.61	TXT: Float is at 439 meters
09/05/2020 01:23:47	45.933593	-129.999709	1.66	42.52	1488.73	TXT: Float on surface
09/05/2020 01:40:46	45.933850	-129.997704	47.46	40.42	1488.6	TXT: Float is out of the water
09/05/2020 01:41:25	45.933851	-129.997741	48.25	40.78	1488.66	TXT: Float is on deck
09/05/2020 01:45:28	45.933651	-129.997382	340.85	41.13	1488.68	TXT: Heading back to Comp A2 instrument site
09/05/2020 02:12:33	45.935604	-129.997543	347.17	4.16	1529.97	TXT: Five meters altitude
09/05/2020 02:12:42	45.935617	-129.997557	347.28	2.18	1532.29	TXT: Sea floor in sight
09/05/2020 02:16:05	45.936184	-129.997623	352.19	6.36	1532	NAV: Doppler Reset
09/05/2020 02:16:44	45.936302	-129.997624	349.2	6.45	1532.61	TXT: Bottom no longer in sight
09/05/2020 02:17:06	45.936314	-129.997677	347.99	4.44	1534.6	TXT: Bottom in sight
09/05/2020 02:19:42	45.936489	-129.997753	0.72	3.13	1535.65	TXT: Cover in sight
09/05/2020 02:19:56	45.936516	-129.997736	357.17	3.2	1535.67	TXT: Comp A2 in sight
09/05/2020 02:21:22	45.936647	-129.997702	87.27	1.35	1537.7	TXT: Waiting for cable to catch up
09/05/2020 02:22:36	45.936644	-129.997751	68.39	0.74	1538.4	TXT: Straightening Comp A2's measuring rope
09/05/2020 02:24:55	45.936657	-129.997862	31.81	0.74	1538.15	TXT: Left arm is grabbing the horizontal handle on the cover
09/05/2020 02:25:17	45.936653	-129.997863	32.17	1.44	1538.18	TXT: Cover is being lifted
09/05/2020 02:26:55	45.936663	-129.997853	41.04	1.41	1537.39	TXT: Moving toward Comp A2 with the cover
09/05/2020 02:28:30	45.936673	-129.997815	68.62	0.74	1538.29	TXT: Cover is positioned over Comp A2
09/05/2020 02:29:36	45.936663	-129.997813	71.24	0.74	1538.23	TXT: Adjusting cover
09/05/2020 02:30:47	45.936657	-129.997815	69.92	0.91	1538.32	TXT: Poor visibility because of sediment
09/05/2020 02:31:06	45.936655	-129.997815	73.01	0.74	1538.31	TXT: Cover is placed
09/05/2020 02:32:07	45.936654	-129.997819	71.56	0.74	1538.18	TXT: Cannot see the measuring rope. Waiting for sediment to clear.
09/05/2020 02:33:33	45.936659	-129.997826	71.87	0.74	1538.24	TXT: The horizontal handle was damaged during cover placement
09/05/2020 02:33:52	45.936661	-129.997828	71.06	0.74	1538.25	TXT: Using horizontal handle to adjust the cover now that the measuring rope is visible
09/05/2020 02:34:29	45.936665	-129.997831	71.56	0.74	1538.27	TXT: Measuring rope is not visible again. Waiting for sediment to clear
09/05/2020 02:36:41	45.936693	-129.997840	73.99	0.74	1538.22	TXT: Looking at the tape on the measuring rope
09/05/2020 02:37:31	45.936705	-129.997843	74.07	0.74	1538.18	TXT: Going to pull the cover towards Jason with the left arm
09/05/2020 02:38:23	45.936717	-129.997847	73.69	0.74	1538.21	TXT: Checking the other side to see the cover's positioning

Date/Time (GMT)	Latitude	Longitude	Gyro	Altitude	Depth	J2-1293 Logger Comment
09/05/2020 02:41:11	45.936677	-129.997811	248.02	0.85	1538.03	TXT: Decided that the cover is too close to the instrument so Jason is going to push it forward towards the measuring rope side
09/05/2020 02:42:26	45.936687	-129.997817	249.79	0.74	1538.02	TXT: Getting the weight out of Jason's basket
09/05/2020 02:43:33	45.936683	-129.997815	249.57	0.74	1537.98	TXT: Weight is being placed on the cover top
09/05/2020 02:43:40	45.936682	-129.997815	249.61	0.74	1538.02	TXT: Weight is placed
09/05/2020 02:45:00	45.936663	-129.997803	251.52	1.6	1536.93	WATCH_CHANGE: new_watchstander Bill Hanshumaker
09/05/2020 02:47:51	45.936610	-129.997801	264.27	2.73	1535.99	TXT: Heading Northeast to Webb-5 target location
09/05/2020 04:51:48	45.946716	-129.983821	349.24	4.93	1516.01	NAV: Doppler Reset
09/05/2020 05:02:25	45.947120	-129.984591	264.92	3.91	1516.42	TXT: Arrived at Webb-5 target
09/05/2020 05:10:55	45.946971	-129.984863	234.6	4.9	1516.92	TXT: Instrument Comp A3 deployed from ship with float attached
09/05/2020 05:12:06	45.947068	-129.985114	265.45	3.3	1517.56	TXT: We will track the instrument package as it descends
09/05/2020 05:31:11	45.947026	-129.985539	257.56	9	1516.3	TXT: Discovered the float pack was deployed without strobe or beacon on
09/05/2020 06:04:16	45.947066	-129.985486	84.35	21.02	1499.74	TXT: Jason begins search pattern at 7 m off the bottom
09/05/2020 06:06:11	45.947030	-129.985410	125.86	9.09	1515.86	TXT: Jason is moving to the SE
09/05/2020 06:10:36	45.946708	-129.985229	182.99	7.48	1513.2	TXT: Jason is conducting a 75 m search pattern
09/05/2020 06:19:54	45.946356	-129.983840	122.08	4.88	1515.79	NAV: Doppler Reset
09/05/2020 06:20:34	45.946324	-129.983800	120.73	4.6	1513.74	TXT: Passed over benchmark AX-302
09/05/2020 06:27:41	45.946141	-129.983545	1.15	7.4	1511.87	TXT: Since previous packages landed N and S of deployment
09/05/2020 06:39:50	45.946674	-129.983561	359.14	7.14	1510.24	TXT: Search pattern will begin to the north
09/05/2020 06:48:27	45.947325	-129.983582	359.67	7.49	1510.71	WATCH_CHANGE: new_watchstander Jeff Beeson + Leland Wood
09/05/2020 06:53:57	45.947682	-129.983553	359.54	7.73	1507.97	TXT: 30 m to go at heading 000
09/05/2020 06:58:11	45.947938	-129.983502	359.54	7.44	1509.01	TXT: First move finished
09/05/2020 07:00:53	45.947972	-129.983478	89.53	7.9	1508.53	TXT: Turning to starboard 90 deg. Step forward 15 m to begin second swath
09/05/2020 07:04:03	45.947855	-129.983347	179.86	7.51	1509.39	TXT: Change heading for 180.
09/05/2020 07:20:20	45.946810	-129.983468	180.26	6.56	1509.9	TXT: Instrument in sight!
09/05/2020 07:23:34	45.946770	-129.983422	180.07	6.36	1510	TXT: Approach to Comp A3 instrument
09/05/2020 07:29:17	45.946686	-129.983453	155.97	6.3	1512.25	TXT: inspecting beacon and strobe to confirm they were not turned on
09/05/2020 07:30:51	45.946681	-129.983460	126.93	4.7	1513.42	TXT: Beacon and strobe indeed are off
09/05/2020 07:32:15	45.946666	-129.983422	151.95	1.91	1516.67	TXT: Jason getting into position to pick up instrument
09/05/2020 07:35:49	45.946673	-129.983367	185.15	1.43	1516.52	TXT: Lifting up to reposition in order to remove weight from Comp A3

Date/Time (GMT)	Latitude	Longitude	Gyro	Altitude	Depth	J2-1293 Logger Comment
09/05/2020 07:38:21	45.946647	-129.983396	268.8	2.15	1514.94	TXT: Checking bouyancy of Jason
09/05/2020 07:39:26	45.946655	-129.983386	268.39	2.31	1514.72	TXT: Bouyancy readjusted
09/05/2020 07:43:24	45.946679	-129.983385	266.24	1.13	1518	TXT: Positioning to cut weight free from Comp A3
09/05/2020 07:45:05	45.946679	-129.983377	266.17	173.82	1518	TXT: Arm moving to grab knife
09/05/2020 07:48:02	45.946681	-129.983368	266.07	175.2	1518.04	TXT: Rope cut to remove weight
09/05/2020 07:48:14	45.946681	-129.983368	266.06	169.76	1518.03	TXT: Knife returning to sheath
09/05/2020 07:49:10	45.946683	-129.983370	265.98	167.76	1518.03	TXT: Knife secure
09/05/2020 07:51:00	45.946682	-129.983381	265.54	0.74	1516.95	TXT: Jason moving up from bottom
09/05/2020 07:51:24	45.946670	-129.983398	265.91	1	1516.56	TXT: Begin flying around to scout for place to position Comp A3
09/05/2020 07:53:04	45.946700	-129.983408	322.78	2.39	1514.79	TXT: Begin heading north
09/05/2020 07:58:21	45.946990	-129.983446	321.02	2.03	1516.42	TXT: Looking for location
09/05/2020 08:02:28	45.947081	-129.983457	353.07	0.86	1517.87	TXT: Setting Jason down to measure angle of seafloor
09/05/2020 08:02:43	45.947074	-129.983453	336.25	1.61	1517.13	TXT: About 4 deg - mark location for instrument
09/05/2020 08:03:33	45.947043	-129.983372	188.65	3.75	1514.93	TXT: Returning to Comp A3
09/05/2020 08:06:42	45.946750	-129.983438	197.17	2.11	1515.25	TXT: Comp A3 in sight
09/05/2020 08:09:00	45.946682	-129.983445	247.68	0.74	1516.4	TXT: Approach Comp A3
09/05/2020 08:09:23	45.946678	-129.983433	252.03	0.74	1516.56	TXT: Inspecting blue gears on side of Comp A3 - leveling system
09/05/2020 08:12:59	45.946681	-129.983394	308.79	0.74	1518.25	TXT: Everything looks good - repositioning to grab line to lift Comp A3
09/05/2020 08:16:05	45.946675	-129.983397	300.77	0.78	1518.34	TXT: Grabing Comp A3 by shackle
09/05/2020 08:18:35	45.946702	-129.983454	322.69	1.4	1517.62	TXT: Comp A3 lifted. Moving to location
09/05/2020 08:19:59	45.946787	-129.983459	332.6	3	1515.25	TXT: Weight attached to Comp A3 was left behind
09/05/2020 08:23:44	45.947049	-129.983373	332.85	1.93	1516.92	TXT: Arrived at location where want to place Comp A3 instrument
09/05/2020 08:24:41	45.947076	-129.983422	335	0.74	1518.23	TXT: Begin setting down to place Comp A3
09/05/2020 08:27:04	45.947082	-129.983486	334.06	0.74	1518.25	TXT: Setting Comp A3 down
09/05/2020 08:29:03	45.947084	-129.983507	333.49	0.84	1518.3	TXT: Comp A3 on bottom
09/05/2020 08:29:17	45.947085	-129.983508	333.47	0.86	1518.3	TXT: Backing up to check level at position
09/05/2020 08:32:17	45.947092	-129.983478	337.22	1.11	1517.77	TXT: Roll is appears to be level
09/05/2020 08:32:26	45.947084	-129.983465	315.94	1.08	1517.77	TXT: Moving to right to check pitch
09/05/2020 08:33:53	45.947097	-129.983432	297.96	1.11	1517.72	TXT: Pitch appears to be level. Position confirmed
09/05/2020 08:34:52	45.947115	-129.983411	298.2	0.9	1517.91	TXT: Begin to start shield deployment from ship

Date/Time (GMT)	Latitude	Longitude	Gyro	Altitude	Depth	J2-1293 Logger Comment
09/05/2020 08:35:47	45.947082	-129.983374	299.25	7.18	1511.05	TXT: Backing away and Jason coming off bottom so ship can move
09/05/2020 08:37:05	45.947001	-129.983296	299.2	20.33	1497.11	TXT: Moving to 30 m altitude
09/05/2020 08:37:19	45.946998	-129.983295	298.8	23.27	1493.98	TXT: 25 m altitude
09/05/2020 08:44:28	45.947134	-129.983206	317.84	41.56	1475.48	TXT: Moving to 50 m altitude
09/05/2020 08:46:44	45.947104	-129.983261	318.36	58.65	1458.3	TXT: Jason came up too high - moving back down to 50 m
09/05/2020 08:48:57	45.947064	-129.983280	317.33	49.42	1467.85	TXT: Holding posiiion - setting up for when the shield is deployed
09/05/2020 08:55:38	45.947008	-129.983592	271.46	50.86	1467.92	TXT: Waiting for shield deployment - putting second knife on shield for Jason backup
09/05/2020 08:57:37	45.947024	-129.983654	271.48	50.98	1467.79	TXT: No longer adding knife - instead changing weight on shield to a pull pin release
09/05/2020 09:00:33	45.947023	-129.983656	271.56	50.96	1467.83	TXT: Green light for launch of shield
09/05/2020 09:08:13	45.947037	-129.983641	271.59	50.94	1467.84	TXT: Shield off deck
09/05/2020 09:10:04	45.947021	-129.983643	271.58	50.96	1467.84	TXT: Shield over side
09/05/2020 09:10:56	45.947008	-129.983647	271.58	50.97	1467.84	TXT: Shiled in water
09/05/2020 09:11:24	45.946999	-129.983651	271.65	50.94	1467.87	TXT: Shield released
09/05/2020 09:11:51	45.947000	-129.983675	271.03	50.89	1468	TXT: Shield is sinking - Jason moving to avoid shield descent
09/05/2020 09:12:43	45.947011	-129.983751	271.06	51.19	1467.72	TXT: Tracking shield
09/05/2020 09:15:04	45.947002	-129.983977	270.62	50.88	1467.75	TXT: Jason moving due west
09/05/2020 09:18:34	45.947027	-129.984296	272.58	50.48	1467.68	TXT: Shield at 200 m depth
09/05/2020 09:51:38	45.947199	-129.984783	97.91	53.64	1468.14	TXT: Shield deep enough for Jason to begin moving towards it
09/05/2020 10:09:14	45.946275	-129.982548	87.93	4.05	1515.22	TXT: Still moving to shield
09/05/2020 10:09:32	45.946317	-129.982489	82.22	4.63	1514.29	TXT: shield in sight
09/05/2020 10:11:30	45.946365	-129.982387	67.72	3.09	1514.76	NAV: Doppler Reset
09/05/2020 10:13:22	45.946366	-129.982297	256.36	4.11	1514.44	TXT: Moving to side of shield with handle for approach
09/05/2020 10:15:00	45.946437	-129.982293	204.71	0.93	1517.58	TXT: Cable vertical - paying out cable to avoid hockle
09/05/2020 10:17:51	45.946461	-129.982325	204.01	0.93	1517.58	TXT: In position. Starting the move to grab shield
09/05/2020 10:18:52	45.946460	-129.982332	203.84	0.93	1517.58	TXT: Using port arm to grab shield
09/05/2020 10:19:54	45.946455	-129.982337	203.78	0.93	1517.58	TXT: Arm on shield
09/05/2020 10:20:06	45.946455	-129.982337	203.23	0.95	1517.57	TXT: Lifing shield
09/05/2020 10:20:29	45.946453	-129.982338	201.97	0.98	1517.57	TXT: Rotating arm to turn shield right side up
09/05/2020 10:23:22	45.946440	-129.982340	200.56	0.93	1517.61	TXT: Rotating shield to grab in different position
09/05/2020 10:26:10	45.946432	-129.982344	200.5	0.95	1517.61	TXT: Using starboard arm to grab handle on shield

Date/Time (GMT)	Latitude	Longitude	Gyro	Altitude	Depth	J2-1293 Logger Comment
09/05/2020 10:28:02	45.946430	-129.982348	200.63	0.93	1517.62	TXT: Let go with port arm
09/05/2020 10:28:12	45.946430	-129.982347	200.21	0.91	1517.61	TXT: Rotating shield over
09/05/2020 10:28:36	45.946429	-129.982348	200.97	0.93	1517.62	TXT: Shield is right side up
09/05/2020 10:29:51	45.946429	-129.982349	201.05	0.94	1517.61	TXT: Using port arm to grab knife
09/05/2020 10:31:23	45.946416	-129.982375	228.18	1.06	1517.33	TXT: Moving to reposition
09/05/2020 10:32:33	45.946421	-129.982370	227.16	0.74	1517.71	TXT: Using starboard arm to grab rope to pull tight
09/05/2020 10:35:10	45.946427	-129.982360	226.5	0.74	1517.71	TXT: Rope grabbed
09/05/2020 10:36:45	45.946431	-129.982355	226.54	0.74	1517.71	TXT: Using port arm to grab knife
09/05/2020 10:38:30	45.946436	-129.982348	226.51	0.74	1517.7	TXT: Knife grabbed
09/05/2020 10:41:07	45.946442	-129.982336	226.6	0.74	1517.68	TXT: Rope is cut
09/05/2020 10:41:20	45.946443	-129.982335	226.63	0.74	1517.69	TXT: Returning knife to sheath
09/05/2020 10:49:25	45.946433	-129.982310	226.77	0.74	1517.68	WATCH_CHANGE: new_watchstander Bill Chadwick + Kelly Chadwick
09/05/2020 10:54:36	45.946460	-129.982321	141.4	0.83	1517.12	TXT: Jason is grabbing the cover using the right arm and the vertical handle
09/05/2020 10:55:24	45.946458	-129.982326	140.68	0.8	1517.13	TXT: Attempting to use the left arm to hold the horizontal handle
09/05/2020 11:00:05	45.946512	-129.982473	306.99	4.5	1514.19	TXT: Moving the cover to the instrument's site
09/05/2020 11:12:37	45.947027	-129.983338	321.23	4.66	1513.5	TXT: Instrument in sight
09/05/2020 11:14:44	45.947089	-129.983371	19.72	0.94	1517.94	TXT: Placing the cover beside the instrument
09/05/2020 11:16:07	45.947077	-129.983403	24.84	0.74	1518.21	TXT: Cover is placed on the bottom
09/05/2020 11:17:38	45.947049	-129.983424	2.18	0.74	1518.19	TXT: Attempting to remove the beacon from the cover
09/05/2020 11:18:28	45.947046	-129.983435	2.07	0.74	1518.16	TXT: Removing the bungee from the beacon
09/05/2020 11:18:55	45.947045	-129.983441	2.64	0.74	1518.17	TXT: Beacon removed
09/05/2020 11:19:15	45.947044	-129.983446	2.8	0.74	1518.25	TXT: Taking the beacon to the instrument's float
09/05/2020 11:23:05	45.947103	-129.983427	127.88	5.39	1513.53	TXT: Attempting to put the beacon in the float's holster
09/05/2020 11:24:18	45.947095	-129.983441	128.38	5.44	1513.56	TXT: Using the left arm to hold the float still while the right arm positions the beacon
09/05/2020 11:25:06	45.947091	-129.983446	128.22	5.46	1513.54	TXT: Beacon in the holster
09/05/2020 11:25:21	45.947090	-129.983448	128.25	5.43	1513.56	TXT: Using the right arm to attach the beacon's bungee
09/05/2020 11:25:42	45.947088	-129.983449	128.38	5.44	1513.55	TXT: Bungee attached
09/05/2020 11:27:45	45.947079	-129.983455	127.66	1.88	1517.06	TXT: Float is prepared for release but we have to wait until sunrise to release it so that it can be easily recovered
09/05/2020 11:30:19	45.947055	-129.983513	21.62	0.74	1518.2	TXT: Realized we left the weight at the cover's drop site

Date/Time (GMT)	Latitude	Longitude	Gyro	Altitude	Depth	J2-1293 Logger Comment
09/05/2020 11:30:52	45.947056	-129.983503	21.78	0.74	1518.21	TXT: Getting the measuring rope
09/05/2020 11:31:55	45.947062	-129.983482	21.22	0.74	1518.21	TXT: Measuring rope is placed
09/05/2020 11:34:48	45.947020	-129.983371	133.52	2.18	1516.69	TXT: Transiting back to the cover's drop site to look for the weight
09/05/2020 11:46:12	45.946421	-129.982351	67.83	2.11	1515.64	TXT: Looking for the weight
09/05/2020 11:49:12	45.946450	-129.982467	8.1	1.88	1516.1	NAV: Doppler Reset
09/05/2020 11:54:51	45.946432	-129.982253	180.95	2.03	1515.94	TXT: Found the weight
09/05/2020 11:55:50	45.946423	-129.982279	182.56	0.84	1517.1	TXT: Picking up the weight
09/05/2020 11:56:09	45.946425	-129.982281	182.31	0.85	1517.07	TXT: Weight is out of reach
09/05/2020 11:56:43	45.946411	-129.982300	224.74	1.19	1516.58	TXT: Moving so that Jason can reach the weight
09/05/2020 11:57:27	45.946397	-129.982353	301.81	1.08	1517.2	TXT: Attempting to pick up the weight
09/05/2020 11:57:36	45.946394	-129.982354	301.45	1.04	1517.24	TXT: Putting the weight in the basket
09/05/2020 11:58:35	45.946363	-129.982353	275.24	1.41	1516.38	TXT: Transiting back to the site of the instrument and the cover
09/05/2020 12:13:40	45.946516	-129.982773	239.62	1.15	1515.89	TXT: Decided to head to Trevi vent first for sampling instead of the instrument which we will return to later
09/05/2020 12:27:23	45.946363	-129.983748	256.95	3.91	1516.21	TXT: Marker in sight
09/05/2020 12:28:47	45.946314	-129.983846	192.9	3.91	1516.78	TXT: Arrived at Trevi vent
09/05/2020 12:29:44	45.946278	-129.983877	176.43	3.91	1517.43	TXT: Discussing the order of events that should happen
09/05/2020 12:30:26	45.946270	-129.983898	152.57	3.91	1517.69	TXT: Trevi doesn't have a chimney but instead the vent is in a hole now
09/05/2020 12:30:36	45.946266	-129.983900	150.65	3.91	1517.56	TXT: Checking for clams for later sampling
09/05/2020 12:30:52	45.946259	-129.983901	150.91	3.91	1517.56	TXT: Clams spotted
09/05/2020 12:32:09	45.946234	-129.983904	149.77	3.91	1517.56	TXT: Grabbing new HOBO 104 from Jason basket
09/05/2020 12:32:57	45.946227	-129.983908	149.89	3.91	1517.49	TXT: Attempting to place HOBO 104
09/05/2020 12:33:25	45.946228	-129.983913	149.82	3.91	1517.5	TXT: Repositioning HOBO 104
09/05/2020 12:33:44	45.946225	-129.983912	149.92	3.91	1517.5	TXT: Picking up the old HOBO so it's out of the way
09/05/2020 12:34:17	45.946222	-129.983912	150.05	3.91	1517.49	TXT: Repositioning HOBO 104
09/05/2020 12:34:29	45.946221	-129.983912	150.03	3.91	1517.49	TXT: Picking up the old HOBO 103
09/05/2020 12:35:03	45.946221	-129.983912	150.01	3.91	1517.49	TXT: HOBO 103 is recovered from the Trevi vent
09/05/2020 12:35:15	45.946221	-129.983912	149.89	3.91	1517.52	TXT: Putting HOBO 103 in the basket
09/05/2020 12:35:44	45.946221	-129.983911	149.67	3.91	1517.54	TXT: HOBO 103 secured to Jason
09/05/2020 12:36:23	45.946222	-129.983910	149.6	3.91	1517.52	TXT: Placing the bungee to fully secure HOBO 103

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09/05/2020 12:37:07	45.946224	-129.983908	149.74	3.91	1517.49	TXT: HOBO 103 secured
09/05/2020 12:37:50	45.946227	-129.983906	150.02	3.91	1517.47	TXT: Attempting to reposition HOBO 104 at Trevi vent
09/05/2020 12:39:04	45.946231	-129.983903	149.9	3.91	1517.41	TXT: HOBO 104 is placed (but not the final position)
09/05/2020 12:40:00	45.946235	-129.983900	149.24	3.91	1517.44	TXT: Going to release the bungee that holds the forward majors
09/05/2020 12:40:41	45.946237	-129.983899	149.42	3.91	1517.44	TXT: Trying to grab the red major that failed to trigger earlier in the dive
09/05/2020 12:41:42	45.946239	-129.983896	149.88	3.91	1517.49	TXT: The plan is to try to poke the red major's plunger with the left arm while holding the major with the right arm
09/05/2020 12:41:56	45.946237	-129.983888	152.85	3.91	1517.21	TXT: Repositioning Jason so that the basket isn't in the way
09/05/2020 12:42:45	45.946238	-129.983885	152.38	3.91	1517.51	TXT: Trying to position the red major
09/05/2020 12:44:56	45.946239	-129.983881	152.57	3.91	1517.44	TXT: Using the left arm to attempt to push the bolt on the back of the red major
09/05/2020 12:46:55	45.946239	-129.983879	152.68	3.91	1517.43	TXT: Checking the spring for movement
09/05/2020 12:47:12	45.946239	-129.983878	152.53	3.91	1517.45	TXT: Trying to move the bolt with the left arm again
09/05/2020 12:49:38	45.946239	-129.983878	152.2	3.91	1517.43	TXT: Spring is moving!
09/05/2020 12:49:47	45.946239	-129.983878	152.25	3.91	1517.43	Sample: J-1293-Major-10. Red Major at Trevi vent. No temperature. Using Major that previously did not trigger with the ram but we were able to get it to work by pushing with Jason's claw. LAT = 45.946215 LON = -129.983913. DEPTH = 1517. Heading = 152.
09/05/2020 12:55:06	45.946235	-129.983872	151.66	3.91	1517.42	TXT: CORRECTION: last sample ID is J-1293-Major-10
09/05/2020 12:57:18	45.946230	-129.983851	151.94	3.91	1516.8	TXT: Red Major stored
09/05/2020 12:57:32	45.946230	-129.983842	152.36	3.91	1516.99	TXT: Moving to attempt to collect clams
09/05/2020 13:00:21	45.946203	-129.983887	130.44	3.91	1517.31	TXT: Right biobox positioned
09/05/2020 13:01:16	45.946203	-129.983887	131.68	3.91	1517.68	TXT: Attempting to release the biobox bungee
09/05/2020 13:01:49	45.946202	-129.983886	131.43	3.91	1517.68	TXT: Bungee is released
09/05/2020 13:02:05	45.946203	-129.983885	130.51	3.91	1517.67	TXT: Attempting to grab clams with right arm
09/05/2020 13:02:41	45.946204	-129.983884	129.91	3.91	1517.68	TXT: Handful of clams being moved to biobox
09/05/2020 13:03:01	45.946204	-129.983883	130.17	3.91	1517.65	Sample: J-1293-BIO-11. Collected clams near Trevi vent using Jason claw. Put in right biobox. LAT = 45.946183 LONG = -129.983919. DEPTH = 1517.7m. For e-DNA related work.
09/05/2020 13:07:52	45.946227	-129.983862	129.58	3.91	1517.6	TXT: Going to close biobox
09/05/2020 13:08:20	45.946230	-129.983860	129.56	3.91	1517.61	TXT: Biobox closed and secured with bungee
09/05/2020 13:09:28	45.946235	-129.983851	130.42	3.91	1517.38	TXT: Biobox back in place
09/05/2020 13:11:45	45.946222	-129.983882	317.83	3.91	1517.33	TXT: Realized that HOBO 104 got moved during the Major collection
09/05/2020 13:11:55	45.946221	-129.983881	317.72	3.91	1517.23	TXT: Going to reposition HOBO 104

Date/Time (GMT)	Latitude	Longitude	Gyro	Altitude	Depth	J2-1293 Logger Comment
09/05/2020 13:13:17	45.946216	-129.983876	317.96	3.91	1517.21	TXT: HOBO 104 repositioned
09/05/2020 13:14:57	45.946192	-129.983826	252.22	3.91	1516.26	TXT: Checking that the HOBO 104 body is not being bathed with too much hot water
09/05/2020 13:15:35	45.946255	-129.983808	114.44	3.91	1516.45	TXT: Repositioning HOBO 104 again because the tip is still not in the hot water
09/05/2020 13:20:01	45.946256	-129.983850	113.42	3.91	1516.99	TXT: Moving to check HOBO 104's position from other angles
09/05/2020 13:21:05	45.946209	-129.983896	238.71	3.91	1517.14	TXT: HOBO 104 has been successfully positioned at the Trevi vent
09/05/2020 13:21:16	45.946208	-129.983898	237.53	3.91	1517.03	TXT: Transiting back to the Comp A3 instrument and cover location
09/05/2020 13:31:16	45.947060	-129.983486	334.39	3.91	1517.35	TXT: Arrived at Comp A3 instrument location
09/05/2020 13:31:26	45.947063	-129.983492	334.12	3.91	1517.33	TXT: Going to pull the pin to release the float from the instrument
09/05/2020 13:32:35	45.947079	-129.983521	332.64	3.91	1517.3	TXT: Trying to grab the rope with the left arm
09/05/2020 13:33:07	45.947077	-129.983523	325.74	3.91	1516.96	TXT: Moving Jason for easier access
09/05/2020 13:33:51	45.947076	-129.983525	330.2	3.91	1517.28	TXT: Grabbing the three white ropes connected to the instrument and holding them
09/05/2020 13:34:10	45.947072	-129.983523	329.77	3.91	1517.27	TXT: Using right arm to grab the pull pin
09/05/2020 13:34:35	45.947064	-129.983518	329.76	3.91	1517.27	TXT: Pin is pulled. Float is away
09/05/2020 13:35:12	45.947049	-129.983505	329.55	3.91	1517.25	TXT: They decided not to try to put the cover on the instrument until after the float is recovered by the ship
09/05/2020 13:49:19	45.945737	-129.984293	206.37	3.91	1519.24	TXT: Jason off bottom. Following the ship as it moves to keep up with the float
09/05/2020 14:05:11	45.943963	-129.985060	178.53	3.91	1517.65	TXT: Float at 330 meters
09/05/2020 14:10:08	45.943370	-129.985244	179.39	3.91	1518.39	TXT: Jason moving up to 50 meters
09/05/2020 14:11:26	45.943278	-129.985179	181.07	3.91	1499.71	TXT: Altimeter appears to be stuck
09/05/2020 14:13:38	45.943072	-129.985169	179.41	3.91	1469.8	TXT: Float is on the surface
09/05/2020 14:13:57	45.943036	-129.985196	174.4	3.91	1470	TXT: Ship moving to pick up the float
09/05/2020 14:44:47	45.942716	-129.979888	90.37	3.91	1457.69	TXT: Float on deck
09/05/2020 14:51:27	45.942631	-129.979065	328.86	3.91	1457.49	TXT: Transiting to instrument and cover site.
09/05/2020 15:47:32	45.947074	-129.982994	295.9	3.91	1514.09	NAV: Doppler Reset
09/05/2020 15:49:55	45.947128	-129.983383	290.5	3.91	1515.37	TXT: Comp A3 instrument located with shield right beside
09/05/2020 15:56:33	45.947041	-129.983455	9.81	3.91	1516.5	TXT: Jason lifts shield by T handle
09/05/2020 15:59:56	45.947079	-129.983461	10.49	3.91	1515.57	TXT: Jason moves shield towards Comp A3
09/05/2020 16:10:43	45.947101	-129.983530	10.57	3.91	1516.49	TXT: Shield in place over package
09/05/2020 16:14:01	45.947096	-129.983454	190.17	3.91	1516.54	TXT: Jason circles package to check for shield placement
09/05/2020 16:17:15	45.947098	-129.983474	190.4	3.91	1516.59	TXT: Jason adds weight to top of shield
09/05/2020 16:19:26	45.947132	-129.983555	268.9	3.91	1498.81	TXT: Jason is off the bottom. End of dive.

Date/Time (GMT)	Latitude	Longitude	Gyro	Altitude	Depth	J2-1293 Logger Comment
09/05/2020 16:26:19	45.947147	-129.983547	268.99	3.91	1296.53	TXT: Jason is on its way to the surface
09/05/2020 17:12:38	45.947147	-129.983547	267.07	3.91	138.23	TXT: Jason recovery begins
09/05/2020 17:19:01	45.947147	-129.983547	273.63	3.91	20.26	TXT: Jason on deck
09/04/2020 02:50:49	45.750025	-130.200008	318.69	0	1.01	TXT: Webb Comp A1 instrument was deployed from the ship and is at 210m depth descending to the seafloor
09/04/2020 02:51:09	45.750025	-130.200008	318.69	0	1.01	TXT: Shield S1 was also deployed from the ship and is at 232m depth
09/04/2020 03:20:00	45.750025	-130.200008	318.93	0	1.18	TXT: Shield on bottom at 1535 m
09/04/2020 03:51:10	45.750025	-130.200008	322.67	166.92	2.98	VEHICLE: milestone Jason in water. This dive will position 3 Webb instruments on the bottom (one at a time) and will conduct fluid sampling in the ASHES vent field.
09/04/2020 04:05:18	45.750022	-130.200045	315.64	196.69	129.89	TXT: Wire beacon on and heading down
09/04/2020 05:03:53	45.947623	-130.003292	316.67	4.41	1527.87	VEHICLE: milestone On bottom
09/04/2020 05:04:58	45.947607	-130.003290	106.38	4.91	1527.42	TXT: Found Shield
09/04/2020 05:18:41	45.945909	-130.003819	210.52	1.79	1528.8	TXT: OOI cable in sight
09/04/2020 05:19:22	45.945867	-130.003858	218.22	5.78	1524.83	TXT: Comp A1 in sight
09/04/2020 05:20:30	45.945827	-130.003840	219.51	6	1525.08	TXT: Approaching float
09/04/2020 05:21:16	45.945817	-130.003801	219.97	6.28	1524.84	TXT: Jason stbd arm reaching for float
09/04/2020 05:21:46	45.945812	-130.003797	219.99	6.4	1524.7	TXT: Jason grabs cable
09/04/2020 05:22:42	45.945800	-130.003766	220.23	11.83	1519.43	TXT: Jason lifts off bottom
09/04/2020 05:23:39	45.945813	-130.003825	318.18	19.4	1511.78	TXT: Jason lifts Comp A1 package off bottom
09/04/2020 05:28:53	45.946402	-130.003663	1.73	19.88	1510.91	TXT: Transiting to location WEBB-4
09/04/2020 05:55:11	45.948699	-130.003382	11.01	6.36	1526.97	TXT: Instrument package on the sea floor
09/04/2020 05:56:07	45.948705	-130.003391	10.85	1.25	1532.1	TXT: Package is at slight angle
09/04/2020 06:01:00	45.948682	-130.003416	6.61	2.21	1531.16	TXT: Jason grabs line to reposition Comp A1 to more level ground
09/04/2020 06:01:39	45.948684	-130.003403	14.79	1.23	1532.09	NAV: nav Doppler Reset
09/04/2020 06:03:33	45.948723	-130.003521	22.36	2.03	1531.12	TXT: Rat tail swims by
09/04/2020 06:08:04	45.948674	-130.003406	112.79	1.18	1532	TXT: Jason moves package to more level position
09/04/2020 06:12:34	45.948506	-130.003414	287.09	2.66	1530.54	TXT: Comp A1 on station
09/04/2020 06:14:40	45.948341	-130.003555	180.16	3.14	1528.12	TXT: Jason in transit to the shield
09/04/2020 06:18:45	45.947816	-130.003533	146.52	2.09	1530.12	NAV: nav Doppler Reset
09/04/2020 06:23:24	45.947531	-130.003169	82.43	1.15	1531.52	TXT: Upside down shield is righted by Jason
09/04/2020 06:28:10	45.947567	-130.003057	131.59	0.74	1531.8	TXT: Jason uses knife to cut rope from weight

Date/Time (GMT)	Latitude	Longitude	Gyro	Altitude	Depth	J2-1293 Logger Comment
09/04/2020 06:31:03	45.947567	-130.003078	132.12	0.85	1531.72	TXT: Jason puts weight in port side of basket
09/04/2020 06:35:38	45.947544	-130.003278	108.23	2.53	1530.39	TXT: Jason lifts shield and returns to instrument package
09/04/2020 06:46:38	45.948530	-130.003498	14.47	3.93	1529.65	WATCH_CHANGE: new_watchstander Jeff Beeson Leland Wood
09/04/2020 06:58:22	45.948663	-130.003393	330.4	1.51	1532.17	TXT: Jason releases shield by instrument package
09/04/2020 07:04:28	45.948667	-130.003333	305.21	5.8	1527.89	TXT: Jason puts transponder beacon from shield on float.
09/04/2020 07:19:30	45.948694	-130.003298	266.01	3.23	1530.43	TXT: Float released from Comp
09/04/2020 09:37:23	45.947316	-130.004198	285.8	88.67	1448	TXT: Float recovered at service about 15 min ago. Ship now headed back to instrument location.
09/04/2020 09:38:20	45.947316	-130.004198	292.23	87.76	1448.29	TXT: We are 1800 m away. Ship had trouble manuevering to recover float. Took about 2 hours. Captain had to go to the bridge to get it done.
09/04/2020 09:38:36	45.947316	-130.004198	3.36	87.17	1448.51	TXT: Slowly transiting back to the Webb-4 site.
09/04/2020 12:08:14	45.947866	-130.003922	56.71	3.18	1530.72	NAV: nav Doppler Reset
09/04/2020 12:08:41	45.947963	-130.003802	56.89	2.33	1531.57	TXT: Jason back on bottom after transit
09/04/2020 12:10:46	45.948395	-130.003570	55.68	2.39	1531.48	TXT: Webb instrument in sight
09/04/2020 12:11:13	45.948477	-130.003577	56.22	2.38	1531.53	TXT: Moving the ship 50 m east
09/04/2020 12:15:09	45.948834	-130.003338	157.76	2.33	1530.97	TXT: Waiting for Sparr to come to the Jason Van
09/04/2020 12:21:23	45.948704	-130.003383	159.36	0.74	1533.1	TXT: This is the first of three Webb instruments at the site we're calling Webb-4
09/04/2020 12:24:14	45.948674	-130.003387	160.54	0.74	1533.14	TXT: Webb-4 position: LAT 45.948626 LON -130.003343 DEPTH 1533.1m
09/04/2020 12:25:06	45.948671	-130.003385	160.01	0.74	1533.11	TXT: Jason is using the arm to pull the rope off of the instrument for positioning the cover
09/04/2020 12:28:18	45.948663	-130.003361	159.41	0.88	1533.09	TXT: The first blue piece of tape on the rope which is meant to help give a range for cover positioning may have fallen off.
09/04/2020 12:29:57	45.948655	-130.003340	158.9	0.74	1533.06	TXT: Jason will be aiming for just outboard of the first visible piece of tape since they are not sure if the first or second piece of tape fell off
09/04/2020 12:30:22	45.948673	-130.003338	156.56	0.84	1532.7	TXT: Moving to grab the cover
09/04/2020 12:32:33	45.948669	-130.003442	40.26	0.74	1533.3	TXT: Attempting to grab the cover
09/04/2020 12:33:02	45.948666	-130.003436	40.58	0.74	1533.3	TXT: Cover is being lifted
09/04/2020 12:33:35	45.948662	-130.003430	41.43	0.9	1533.26	TXT: Setting the cover back down
09/04/2020 12:34:17	45.948659	-130.003424	40.05	0.74	1533.19	TXT: Cover is lifted
09/04/2020 12:35:09	45.948655	-130.003417	39.72	0.74	1533.2	TXT: Trying to get a better grip on the cover
09/04/2020 12:39:19	45.948663	-130.003425	40.8	0.91	1533.22	TXT: They are trying to get it high enough that it can be placed over the instrument in one go

Date/Time (GMT)	Latitude	Longitude	Gyro	Altitude	Depth	J2-1293 Logger Comment
09/04/2020 12:40:31	45.948672	-130.003445	42.1	1	1532.83	TXT: Cover in the starboard arm. Going to approach the instrument and put the cover on
09/04/2020 12:44:49	45.948681	-130.003367	151.63	0.75	1532.92	TXT: Attempting to place the cover over the instrument
09/04/2020 12:45:27	45.948686	-130.003376	146.94	0.74	1532.82	TXT: Cover bumped the instrument
09/04/2020 12:47:35	45.948692	-130.003382	148.2	0.74	1532.86	TXT: Grabbing the cover with the left arm
09/04/2020 12:48:18	45.948693	-130.003380	149.24	0.74	1532.86	TXT: Let go with right arm
09/04/2020 12:49:49	45.948693	-130.003368	148.99	0.74	1532.92	TXT: Cover placed. Adjustments will be made
09/04/2020 12:50:19	45.948693	-130.003362	149.59	0.74	1532.91	TXT: Using the instrument's positioning rope and the center line in the window of the cover to position it
09/04/2020 12:53:31	45.948705	-130.003331	134.57	1.69	1531.72	TXT: Moving to the other side of the instrument to check the alignment
09/04/2020 12:54:46	45.948649	-130.003392	343.93	1.24	1532.25	TXT: Decided it looks good. No need to move it. Next step is to put the weights on top.
09/04/2020 12:57:08	45.948656	-130.003366	344.85	0.74	1532.98	TXT: Picking up weights and moving them over the cover
09/04/2020 12:57:51	45.948656	-130.003365	344.6	0.74	1532.94	TXT: Cover is too far from Jason to place the weight
09/04/2020 12:58:05	45.948657	-130.003364	338.88	0.74	1532.82	TXT: Moving closer to the cover
09/04/2020 12:58:55	45.948653	-130.003370	337.6	0.74	1533.04	TXT: Weight is placed on the cover
09/04/2020 12:59:27	45.948653	-130.003374	337.66	0.78	1533.06	TXT: Going to fly around the cover to get good footage before moving to Ashes
09/04/2020 13:02:15	45.948738	-130.003374	105.01	2.19	1531.28	TXT: Correction: moving to Inferno vent after fly around
09/04/2020 13:12:20	45.948617	-130.003418	153.39	2.05	1531.23	TXT: Beginning transit to Ashes Vent field. Range around 1860 m from Jason.
09/04/2020 14:56:30	45.934282	-130.013041	244.91	3.48	1537.55	TXT: Bottom in sight
09/04/2020 15:03:14	45.933899	-130.013521	233.35	2.83	1538.3	NAV: nav Doppler Reset
09/04/2020 15:03:56	45.933865	-130.013545	204.21	3.5	1538.22	TXT: Lights from the video camera that's coconnected to the OOI cable at Mushroom vent are visible.
09/04/2020 15:04:15	45.933835	-130.013578	197.13	2.44	1538.99	TXT: About 40 meters north of Inferno
09/04/2020 15:09:34	45.933609	-130.013757	181.46	3.59	1538.02	WATCH_CHANGE: new_watchstander Bill Chadwick & Kelly Chadwick
09/04/2020 15:19:23	45.933584	-130.013723	248.31	3.76	1537.4	TXT: At Inferno Chimney searching for fluid sampling location
09/04/2020 15:20:07	45.933587	-130.013712	240.94	4.46	1536.91	TXT: Temperature probe has a ground fault and is disabled (so there will be no temperatures on this dive)
09/04/2020 15:21:10	45.933586	-130.013716	242.72	4.2	1537.12	TXT: Jason is searching for a stable location for sampling
09/04/2020 15:27:25	45.933582	-130.013719	242.02	4.29	1537.19	TXT: Preparing to take Major sample
09/04/2020 15:29:52	45.933580	-130.013725	242.17	4.29	1537.14	TXT: Removing bungie by pulling loop
09/04/2020 15:32:23	45.933585	-130.013734	242.1	4.24	1537.17	TXT: Jason moving to back of crate for accessibility
09/04/2020 15:36:09	45.933588	-130.013733	242.38	4.19	1537.15	TXT: Picking up the green Major

Date/Time (GMT)	Latitude	Longitude	Gyro	Altitude	Depth	J2-1293 Logger Comment
09/04/2020 15:36:50	45.933588	-130.013731	242.44	4.19	1537.12	Sample: J-1293-Major-1. Green Major. Top of Inferno chimney. Heading = 242. Altitude = 4.2 m. No temperature.
09/04/2020 15:39:37	45.933590	-130.013723	242.25	4.21	1537.19	TXT: Putting Green Major back in basket
09/04/2020 15:42:23	45.933592	-130.013719	242.55	4.19	1537.16	Sample: J-1293-Major-2. Black Major. Top of Inferno chimney. Heading = 242. Altitude = 4.2 m. No temperature.
09/04/2020 15:45:34	45.933593	-130.013720	242.17	4.24	1537.22	TXT: Sample 1 was green Major. sample 2 was black Major
09/04/2020 15:48:31	45.933590	-130.013731	242.13	4.28	1537.18	TXT: 45.933577 -130.013745 Position of samples 1 and 2 at Inferno
09/04/2020 15:50:02	45.933586	-130.013740	241.9	4.31	1537.19	TXT: Grabbing Gastight bottle after stowing the black major. Picking up the red gastight
09/04/2020 15:52:34	45.933575	-130.013751	242.46	4.23	1537.15	Sample: J-1293-GTB-3. Red gastight bottle is in the same vent as Majors. Top of Inferno chimney. Heading = 242. Altitude = 4.2 m. No temperature.
09/04/2020 15:54:50	45.933562	-130.013748	242.45	4.26	1537.17	TXT: Stowing the red gastight back in the milk crate
09/04/2020 15:56:11	45.933553	-130.013735	242.32	4.25	1537.18	TXT: Heading to Virgin Vent. Going to approach Virgin Vent for sampling but will not enter log information while we're at the vent. Data will be entered later.
09/04/2020 16:03:19	45.933467	-130.013351	72.05	1.95	1538.05	TXT: Switching to color bars on live video feed and ASnap turned off (video & imagery embargo requested at Virgin vent so no logging was done)
09/04/2020 16:57:59	45.933610	-130.013413	204.9	1.33	1540.12	TXT: Now leaving Virgin after sampling. Heading to Anemone vent.
09/04/2020 16:58:40	45.933610	-130.013412	204.99	1.59	1540.05	TXT: At Virgin we took one Major and one Gastight. Then we deployed one HOBO probe. Details will follow
09/04/2020 16:58:47	45.933609	-130.013415	205.05	1.61	1540.15	Sample: J-1293-Major-4. White Major. Tried to use Red Major first but didn't trigger. Sampled at 16:32. No temperature. 45.933659 -130.013749. 1540m.
09/04/2020 17:06:26	45.933454	-130.013376	188.43	2.15	1539.61	NAV: nav Doppler Reset
09/04/2020 17:06:36	45.933429	-130.013380	189.79	2.06	1539.54	Sample: J-1293-GTB-5. Virgin vent in blue-orange Gastight bottle at 16:38. 45.933659 - 13013217. No temp. Knocked down anhydrite chimney.
09/04/2020 17:18:10	45.933282	-130.013783	313.2	1.41	1540.44	TXT: Deployed HOBO 141 at Virgin at 16:53
09/04/2020 17:19:27	45.933286	-130.013796	313.01	1.38	1540.46	TXT: Now we're at Anemone Vent to sample tubeworms
09/04/2020 17:28:39	45.933447	-130.013634	1.56	2.55	1539.35	Sample: J-1293-Bio-6. Tube worm grab into port biobox. From tubeworm bush near Anemone vent. 45.933297 -130.013833.
09/04/2020 17:29:29	45.933474	-130.013587	1.82	3.56	1538.56	TXT: Navigation seems to be off. We are going to do a doppler reset at the OOI COVIS sonar.
09/04/2020 17:29:36	45.933472	-130.013589	2.11	3.89	1538.07	NAV: Doppler Reset
09/04/2020 17:30:03	45.933427	-130.013635	270.78	5.16	1536.52	TXT: Still looking for Anemone vent - have not seen marker 129 anywhere
09/04/2020 17:31:18	45.933388	-130.013852	209.43	2.48	1540	TXT: Hopefully the doppler reset will give us better relative navigation
09/04/2020 17:33:56	45.933341	-130.013940	150.64	1.5	1540.8	TXT: Fathead Sculpin fish near vent

Date/Time (GMT)	Latitude	Longitude	Gyro	Altitude	Depth	J2-1293 Logger Comment
09/04/2020 17:34:54	45.933326	-130.013934	149.83	1.5	1540.85	TXT: The anchor for Marker 204 - which was in the basket - was melted off and so we discarded the marker
09/04/2020 17:37:09	45.933303	-130.013921	149.08	1.5	1540.83	TXT: Marker 205 deployed near Anemone vent
09/04/2020 17:38:06	45.933297	-130.013917	149.07	1.51	1540.85	TXT: We deployed MTR 3281 at Anemone vent
09/04/2020 17:44:20	45.933282	-130.013921	186.82	0.94	1540.76	TXT: MTR 3291 deployed to the right side of vent with heading of 186
09/04/2020 17:53:28	45.933266	-130.013935	205.79	1.88	1539.37	TXT: MTR 3334 deployed on left side of vent heading 187.
09/04/2020 17:57:34	45.933255	-130.013927	203.2	1.4	1539.82	TXT: Jason is right over Anemone vent. We're going to trip the hydraulic Niskin #3. Altitude 1.4m
09/04/2020 17:57:41	45.933255	-130.013926	203.17	1.4	1539.84	Sample: J-1293-Niskin-7. Sample taken directly over Anemone Vent (Marker 205). Lat = 45.933326 Lon = -130.013773. Depth -1541m. Alt 2.8m. Taken for eDNA.
09/04/2020 18:02:15	45.933304	-130.013856	226.85	5.15	1537.58	TXT: Now going to go 25m and then 200m down-current to trip the other two Niskins
09/04/2020 18:03:21	45.933409	-130.013807	30.68	5.25	1537.59	TXT: Looks like current is going straight north.
09/04/2020 18:04:27	45.933451	-130.013775	3.91	4.93	1537.7	TXT: current direction determined by shutting thrusters off and seeing which way Jason drifted.
09/04/2020 18:27:15	45.935191	-130.013689	82	2.43	1541.68	TXT: It is now 18:26. Keyboard malfunction caused delay in recording events. Updating events now.
09/04/2020 18:27:34	45.935200	-130.013649	82.35	2.31	1541.75	Sample: J-1293-Niskin-8. Niskin #2 Aft on side of Jason. Taken at 18:10 25m down-current from Anemone Vent. Lat = 45.933475 Long = -130.013746. Depth = 1541m. Alt = 3.2m. Taken for eDNA.
09/04/2020 18:32:34	45.935346	-130.012761	81.18	15.05	1527.44	TXT: Drifted down current 200m from Anemone and attempted to take last Niskin but forward Niskin #1 on side of Jason failed to close. NO SAMPLE.
09/04/2020 18:34:02	45.935395	-130.012617	81.08	14.35	1527.05	TXT: Transitting to Webb-6 target.
09/04/2020 19:39:51	45.936189	-129.999066	78.83	14.6	1522.27	TXT: 45 m away from target
09/04/2020 19:46:08	45.936010	-129.998040	79.9	14.88	1525.55	TXT: On position. Waiting to launch instrument packages from ship at Webb-6 target
09/04/2020 20:09:16	45.935840	-129.999284	281.37	22.33	1517.77	TXT: Jason moving up to 50 m altitude
09/04/2020 20:23:11	45.935780	-129.999154	281.65	53.97	1487.26	TXT: Waiting for instruments to launch
09/04/2020 20:45:53	45.935772	-129.999113	281.58	54.17	1487.15	TXT: Estimate 30 min to deployment
09/04/2020 20:58:11	45.935760	-129.999137	281.51	54.21	1487.17	TXT: Shield going in water first. Almost ready
09/04/2020 21:02:44	45.935772	-129.999136	281.42	54.32	1487.14	TXT: Shield off deck
09/04/2020 21:04:35	45.935775	-129.999135	281.74	54.23	1487.15	TXT: Shield in the water
09/04/2020 21:04:46	45.935775	-129.999135	281.8	54.19	1487.15	TXT: Shield released
09/04/2020 21:13:52	45.935730	-129.999119	281.47	54.22	1487.04	TXT: Tracking shield - at about 40 m/min descent
09/04/2020 21:15:11	45.935729	-129.999119	281.49	54.17	1487.14	TXT: Shield at depth of 330 m

Date/Time (GMT)	Latitude	Longitude	Gyro	Altitude	Depth	J2-1293 Logger Comment
09/04/2020 21:22:11	45.935996	-129.998672	32.44	52.98	1486.83	TXT: Shield at depth of 560 m
09/04/2020 21:29:03	45.936398	-129.997912	33.34	53.36	1487.11	TXT: Shield at 795 m
09/04/2020 21:36:06	45.936418	-129.998472	296.62	53.49	1487.18	TXT: Shield at 1013 m
09/04/2020 21:36:46	45.936387	-129.998481	295.98	53.36	1487.31	TXT: Proceeding with launching instrument package Comp A2
09/04/2020 21:42:32	45.936398	-129.999006	293.78	50.57	1485.55	TXT: Shield at depth of 1214 m
09/04/2020 21:47:18	45.936481	-129.999432	296.32	48.14	1487.28	TXT: Preparing to launch instrument Comp A2
09/04/2020 21:51:46	45.936484	-129.999494	296.07	48.57	1487.04	TXT: Instrument is off deck
09/04/2020 21:52:11	45.936480	-129.999494	295.29	48.36	1487.22	TXT: Shield is on bottom
09/04/2020 21:53:03	45.936467	-129.999492	296.12	48.63	1487.02	TXT: Instrument is in the water
09/04/2020 21:53:21	45.936464	-129.999492	296.11	48.41	1487.2	TXT: Instrument is released
09/04/2020 21:53:43	45.936443	-129.999476	265.67	48.26	1487.2	TXT: Jason moving due west to avoid instrument
09/04/2020 21:59:27	45.936361	-129.999905	266.01	47.63	1486.93	TXT: Comp A2 at depth of 172 m
09/04/2020 22:12:51	45.936242	-130.000797	266.1	48.98	1486.62	TXT: Comp A2 at depth of 550 m
09/04/2020 22:21:25	45.936261	-130.000794	266.78	48.38	1487.09	TXT: Comp A2 is at depth of 800 m
09/04/2020 22:33:59	45.936249	-130.000763	266.94	48.28	1487.27	TXT: Proceeding with Sentry launch
09/04/2020 22:37:25	45.936247	-130.000767	266.39	48.67	1486.92	TXT: Comp A2 at depth of 1245 m
09/04/2020 22:43:04	45.936236	-130.000808	266.23	48.41	1486.95	TXT: Comp A2 at depth of 1414 m
09/04/2020 22:45:44	45.936221	-130.000811	266.43	48.12	1487.26	WATCH_CHANGE: new_watchstander Bill Chadwick + Kelly Chadwick
09/04/2020 22:47:51	45.936217	-130.000773	266.36	48.19	1487.21	TXT: Comp A2 on the bottom
09/04/2020 22:51:51	45.936308	-130.000503	315.82	3.65	1532.45	TXT: Bottom in sight
09/04/2020 23:05:54	45.936668	-129.997886	58.88	3.55	1536.64	TXT: Instrument in sight
09/04/2020 23:08:08	45.936726	-129.997778	60.47	1.13	1539.08	TXT: Looking for the weight that is attached to the instrument. Examining the site.
09/04/2020 23:09:41	45.936742	-129.997795	60.82	1.15	1539.1	TXT: Cutting the line to the descent anchor.
09/04/2020 23:13:15	45.936733	-129.997794	60.26	1.16	1539.08	TXT: Weight's rope is cut. Knife replaced in sheath
09/04/2020 23:14:21	45.936725	-129.997788	60.12	1.19	1539.05	TXT: Moving the instrument
09/04/2020 23:15:40	45.936692	-129.997787	63.51	1.25	1539.01	TXT: Looking for a flat area
09/04/2020 23:18:18	45.936693	-129.997825	62.52	0.74	1539.51	TXT: Attempting to place the instrument
09/04/2020 23:19:11	45.936693	-129.997826	61.48	0.74	1539.51	TXT: Examining instrument's placement to check that it's flat
09/04/2020 23:21:30	45.936707	-129.997830	70	0.74	1539.52	TXT: Deemed a good site
09/04/2020 23:23:42	45.936709	-129.997840	67.72	0.74	1539.48	TXT: Attempting to pull out the measurement rope
09/04/2020 23:24:38	45.936705	-129.997838	67.62	0.74	1539.48	TXT: Rope is pulled out

Date/Time (GMT)	Latitude	Longitude	Gyro	Altitude	Depth	J2-1293 Logger Comment
09/04/2020 23:25:17	45.936697	-129.997842	68.48	0.74	1539.56	TXT: Using the arm to straighten out the rope
09/04/2020 23:26:04	45.936688	-129.997833	68.18	0.74	1539.59	TXT: Examining leveling gears to make sure they're well engaged
09/04/2020 23:28:01	45.936596	-129.997798	332.57	0.78	1539.3	NAV: Doppler Reset
09/04/2020 23:30:06	45.936537	-129.997812	251.04	1.23	1537.42	TXT: Transiting south to the cover's location
09/04/2020 23:34:00	45.936067	-129.998331	115.57	3.04	1536.65	TXT: Cover in sight
09/04/2020 23:35:08	45.935955	-129.998129	176.11	2.5	1537.14	TXT: Cover location approximately LAT 45.935963 LONG -129.998005
09/04/2020 23:36:40	45.935957	-129.998061	127.48	1.86	1537.8	TXT: Considering how best to flip the cover
09/04/2020 23:38:15	45.935944	-129.998003	124.05	0.8	1538.89	TXT: Attempting to flip the cover
09/04/2020 23:40:03	45.935951	-129.997955	127.86	0.75	1538.91	TXT: Attempting to flip the cover again
09/04/2020 23:43:18	45.935946	-129.998010	344.82	0.74	1538.32	TXT: Decided to cut the weight off before trying to flip it again
09/04/2020 23:44:34	45.935964	-129.998008	345.69	0.74	1538.35	TXT: Pulled the pin out to disconnect the weight
09/04/2020 23:45:26	45.935943	-129.997939	263.12	1.21	1537.24	TXT: Going to use the handles to attempt to flip the cover
09/04/2020 23:47:17	45.935966	-129.997938	273.83	0.74	1538.11	TXT: Pillow lava is in the way of the handles
09/04/2020 23:49:13	45.935969	-129.997949	252.86	1.05	1538.37	TXT: Trying to reach the handles again after moving closer to the cover
09/04/2020 23:49:48	45.935968	-129.997948	247.97	0.74	1538.36	TXT: Left arm has a grip on the vertical handle
09/04/2020 23:50:50	45.935965	-129.997958	255.59	0.74	1538.34	TXT: Struggling to fully flip the cover over
09/04/2020 23:51:28	45.935960	-129.997960	251.39	0.83	1538.35	TXT: Part of the vertical handle broke off
09/04/2020 23:52:11	45.935974	-129.998048	350.49	1.88	1536.64	TXT: Cover is on its side. Jason doesn't have a hold of it anymore. Moving to the back to flip it fully over
09/04/2020 23:53:01	45.935976	-129.998049	347.91	0.74	1538.37	TXT: Attempting to push the cover over using the arm
09/04/2020 23:53:33	45.935982	-129.998056	346.8	0.74	1538.34	TXT: Cover is slowly falling
09/04/2020 23:53:52	45.935997	-129.998062	12.73	1.59	1537.31	TXT: Cover is right-side-up
09/04/2020 23:55:12	45.935994	-129.997939	193.17	1.66	1538.23	TXT: Moving to the side of the cover that has the handles
09/04/2020 23:56:57	45.935965	-129.997971	224.11	0.76	1538.41	TXT: Looking for the weight
09/04/2020 23:57:50	45.935963	-129.997984	236.9	0.74	1538.42	TXT: They are going to cut the rope attached to the weight so the weight will be easier to transport
09/04/2020 23:59:10	45.935965	-129.997985	236.75	0.74	1538.29	TXT: Used the arm to move the cover out of the way of the weight
09/05/2020 00:00:37	45.935965	-129.998006	235.42	0.74	1538.27	TXT: Grabbed the weight's rope
09/05/2020 00:01:11	45.935967	-129.998006	235.72	0.74	1538.25	TXT: Putting the weight into a basket on Jason
09/05/2020 00:01:55	45.935969	-129.998006	235.68	0.74	1538.24	TXT: Getting the knife to cut the weight's rope
09/05/2020 00:04:10	45.935974	-129.998006	235.61	0.74	1538.24	TXT: Cutting the rope
09/05/2020 00:04:33	45.935974	-129.998006	235.92	0.78	1538.22	TXT: Putting the knife back in its sheath

Date/Time (GMT)	Latitude	Longitude	Gyro	Altitude	Depth	J2-1293 Logger Comment
09/05/2020 00:05:28	45.935973	-129.998005	236.09	0.74	1538.23	TXT: Moved the cut rope away
09/05/2020 00:06:43	45.935994	-129.997974	226.87	1.24	1538.44	NAV: Doppler Reset
09/05/2020 00:07:14	45.935992	-129.997974	226.41	0.84	1538.76	TXT: The handle that was damaged is only connected to the cover by one bolt now
09/05/2020 00:07:50	45.935988	-129.997974	226.04	0.93	1538.71	TXT: Using the left arm to grip the horizontal handle to bring the cover to the instrument
09/05/2020 00:08:37	45.935983	-129.997972	225.26	0.91	1538.71	TXT: Using the right arm to grip the top of the vertical handle which is the part that is still attached to the cover
09/05/2020 00:10:13	45.935962	-129.997968	227.39	2.13	1536.68	TXT: Transiting to the instrument site with the cover
09/05/2020 00:12:11	45.935940	-129.998036	227.8	6.06	1533.4	TXT: Right arm has lost contact with the broken handle
09/05/2020 00:13:20	45.935928	-129.998054	227.51	5.96	1533.56	TXT: Right arm has a grip on the broken handle again
09/05/2020 00:23:34	45.936581	-129.997743	40.89	4.24	1533.88	TXT: Instrument in sight
09/05/2020 00:26:43	45.936608	-129.997831	46.87	0.74	1538.82	TXT: Set shield down
09/05/2020 00:28:10	45.936587	-129.997894	45.02	0.74	1538.96	TXT: Reposition arms to pick up shield again
09/05/2020 00:29:22	45.936598	-129.997888	45.61	0.75	1538.97	TXT: Set shield down again. Removing the beacon from top of the shield
09/05/2020 00:31:11	45.936662	-129.997791	45.75	0.79	1538.93	TXT: Pulling shield closer to Jason with top eyelet
09/05/2020 00:33:49	45.936749	-129.997663	45.52	160.21	1538.89	TXT: Shield is too far away to remove bungee on beacon - trying to pull closer
09/05/2020 00:33:55	45.936745	-129.997669	44.83	1.16	1538.9	TXT: Bungee is free
09/05/2020 00:34:24	45.936730	-129.997692	44.83	1.11	1538.91	TXT: Beacon is free
09/05/2020 00:36:08	45.936731	-129.997761	50.25	3.43	1536.23	TXT: Carrying beacon to float pack above Comp A2 instrument
09/05/2020 00:38:05	45.936651	-129.997771	275.54	5.43	1534.26	TXT: Right arm grabs float rail to steady it
09/05/2020 00:39:03	45.936646	-129.997792	275.59	5.48	1534.23	TXT: Beacon placed in holster on float
09/05/2020 00:40:23	45.936645	-129.997817	275.71	5.45	1534.24	TXT: Bungee placed on bolt to secure beacon
09/05/2020 00:41:44	45.936635	-129.997830	274.79	3.73	1535.97	TXT: Arm let go of beacon going down to Comp A2 instrument
09/05/2020 00:43:14	45.936714	-129.997871	62.76	0.91	1539.07	TXT: Setting down in front of Comp A2 instrument to release float
09/05/2020 00:45:44	45.936696	-129.997886	64.3	0.74	1538.91	TXT: Releasing the pin on Comp A2's float
09/05/2020 00:46:03	45.936693	-129.997885	64.92	0.74	1538.88	TXT: Float is away
09/05/2020 00:51:31	45.936395	-129.997934	188.06	3.78	1535.66	TXT: Moving up off bottom so that ship can move to retrieve the float
09/05/2020 00:55:09	45.935792	-129.998305	184.68	49.66	1488.59	TXT: Jason waiting at an altitude of 50 meters
09/05/2020 01:03:38	45.934597	-129.998896	213.4	43.11	1488.57	TXT: Float at 800 meters
09/05/2020 01:07:02	45.934203	-129.999217	213.05	42.74	1488.23	TXT: Jason waiting for float retrieval at an altitude of 42 meters
09/05/2020 01:12:30	45.933597	-129.999322	179.22	41.83	1488.61	TXT: Float is at 439 meters
09/05/2020 01:23:47	45.933593	-129.999709	1.66	42.52	1488.73	TXT: Float on surface

Date/Time (GMT)	Latitude	Longitude	Gyro	Altitude	Depth	J2-1293 Logger Comment
09/05/2020 01:40:46	45.933850	-129.997704	47.46	40.42	1488.6	TXT: Float is out of the water
09/05/2020 01:41:25	45.933851	-129.997741	48.25	40.78	1488.66	TXT: Float is on deck
09/05/2020 01:45:28	45.933651	-129.997382	340.85	41.13	1488.68	TXT: Heading back to Comp A2 instrument site
09/05/2020 02:12:33	45.935604	-129.997543	347.17	4.16	1529.97	TXT: Five meters altitude
09/05/2020 02:12:42	45.935617	-129.997557	347.28	2.18	1532.29	TXT: Sea floor in sight
09/05/2020 02:16:05	45.936184	-129.997623	352.19	6.36	1532	NAV: Doppler Reset
09/05/2020 02:16:44	45.936302	-129.997624	349.2	6.45	1532.61	TXT: Bottom no longer in sight
09/05/2020 02:17:06	45.936314	-129.997677	347.99	4.44	1534.6	TXT: Bottom in sight
09/05/2020 02:19:42	45.936489	-129.997753	0.72	3.13	1535.65	TXT: Cover in sight
09/05/2020 02:19:56	45.936516	-129.997736	357.17	3.2	1535.67	TXT: Comp A2 in sight
09/05/2020 02:21:22	45.936647	-129.997702	87.27	1.35	1537.7	TXT: Waiting for cable to catch up
09/05/2020 02:22:36	45.936644	-129.997751	68.39	0.74	1538.4	TXT: Straightening Comp A2's measuring rope
09/05/2020 02:24:55	45.936657	-129.997862	31.81	0.74	1538.15	TXT: Left arm is grabbing the horizontal handle on the cover
09/05/2020 02:25:17	45.936653	-129.997863	32.17	1.44	1538.18	TXT: Cover is being lifted
09/05/2020 02:26:55	45.936663	-129.997853	41.04	1.41	1537.39	TXT: Moving toward Comp A2 with the cover
09/05/2020 02:28:30	45.936673	-129.997815	68.62	0.74	1538.29	TXT: Cover is positioned over Comp A2
09/05/2020 02:29:36	45.936663	-129.997813	71.24	0.74	1538.23	TXT: Adjusting cover
09/05/2020 02:30:47	45.936657	-129.997815	69.92	0.91	1538.32	TXT: Poor visibility because of sediment
09/05/2020 02:31:06	45.936655	-129.997815	73.01	0.74	1538.31	TXT: Cover is placed
09/05/2020 02:32:07	45.936654	-129.997819	71.56	0.74	1538.18	TXT: Cannot see the measuring rope. Waiting for sediment to clear.
09/05/2020 02:33:33	45.936659	-129.997826	71.87	0.74	1538.24	TXT: The horizontal handle was damaged during cover placement
09/05/2020 02:33:52	45.936661	-129.997828	71.06	0.74	1538.25	TXT: Using horizontal handle to adjust the cover now that the measuring rope is visible
09/05/2020 02:34:29	45.936665	-129.997831	71.56	0.74	1538.27	TXT: Measuring rope is not visible again. Waiting for sediment to clear
09/05/2020 02:36:41	45.936693	-129.997840	73.99	0.74	1538.22	TXT: Looking at the tape on the measuring rope
09/05/2020 02:37:31	45.936705	-129.997843	74.07	0.74	1538.18	TXT: Going to pull the cover towards Jason with the left arm
09/05/2020 02:38:23	45.936717	-129.997847	73.69	0.74	1538.21	TXT: Checking the other side to see the cover's positioning
09/05/2020 02:41:11	45.936677	-129.997811	248.02	0.85	1538.03	TXT: Decided that the cover is too close to the instrument so Jason is going to push it forward towards the measuring rope side
09/05/2020 02:42:26	45.936687	-129.997817	249.79	0.74	1538.02	TXT: Getting the weight out of Jason's basket
09/05/2020 02:43:33	45.936683	-129.997815	249.57	0.74	1537.98	TXT: Weight is being placed on the cover top
09/05/2020 02:43:40	45.936682	-129.997815	249.61	0.74	1538.02	TXT: Weight is placed

Date/Time (GMT)	Latitude	Longitude	Gyro	Altitude	Depth	J2-1293 Logger Comment
09/05/2020 02:45:00	45.936663	-129.997803	251.52	1.6	1536.93	WATCH_CHANGE: new_watchstander Bill Hanshumaker
09/05/2020 02:47:51	45.936610	-129.997801	264.27	2.73	1535.99	TXT: Heading Northeast to Webb-5 target location
09/05/2020 04:51:48	45.946716	-129.983821	349.24	4.93	1516.01	NAV: Doppler Reset
09/05/2020 05:02:25	45.947120	-129.984591	264.92	3.91	1516.42	TXT: Arrived at Webb-5 target
09/05/2020 05:10:55	45.946971	-129.984863	234.6	4.9	1516.92	TXT: Instrument Comp A3 deployed from ship with float attached
09/05/2020 05:12:06	45.947068	-129.985114	265.45	3.3	1517.56	TXT: We will track the instrument package as it descends
09/05/2020 05:31:11	45.947026	-129.985539	257.56	9	1516.3	TXT: Discovered the float pack was deployed without strobe or beacon on
09/05/2020 06:04:16	45.947066	-129.985486	84.35	21.02	1499.74	TXT: Jason begins search pattern at 7 m off the bottom
09/05/2020 06:06:11	45.947030	-129.985410	125.86	9.09	1515.86	TXT: Jason is moving to the SE
09/05/2020 06:10:36	45.946708	-129.985229	182.99	7.48	1513.2	TXT: Jason is conducting a 75 m search pattern
09/05/2020 06:19:54	45.946356	-129.983840	122.08	4.88	1515.79	NAV: Doppler Reset
09/05/2020 06:20:34	45.946324	-129.983800	120.73	4.6	1513.74	TXT: Passed over benchmark AX-302
09/05/2020 06:27:41	45.946141	-129.983545	1.15	7.4	1511.87	TXT: Since previous packages landed N and S of deployment
09/05/2020 06:39:50	45.946674	-129.983561	359.14	7.14	1510.24	TXT: Search pattern will begin to the north
09/05/2020 06:48:27	45.947325	-129.983582	359.67	7.49	1510.71	WATCH_CHANGE: new_watchstander Jeff Beeson + Leland Wood
09/05/2020 06:53:57	45.947682	-129.983553	359.54	7.73	1507.97	TXT: 30 m to go at heading 000
09/05/2020 06:58:11	45.947938	-129.983502	359.54	7.44	1509.01	TXT: First move finished
09/05/2020 07:00:53	45.947972	-129.983478	89.53	7.9	1508.53	TXT: Turning to starboard 90 deg. Step forward 15 m to begin second swath
09/05/2020 07:04:03	45.947855	-129.983347	179.86	7.51	1509.39	TXT: Change heading for 180.
09/05/2020 07:20:20	45.946810	-129.983468	180.26	6.56	1509.9	TXT: Instrument in sight!
09/05/2020 07:23:34	45.946770	-129.983422	180.07	6.36	1510	TXT: Approach to Comp A3 instrument
09/05/2020 07:29:17	45.946686	-129.983453	155.97	6.3	1512.25	TXT: inspecting beacon and strobe to confirm they were not turned on
09/05/2020 07:30:51	45.946681	-129.983460	126.93	4.7	1513.42	TXT: Beacon and strobe indeed are off
09/05/2020 07:32:15	45.946666	-129.983422	151.95	1.91	1516.67	TXT: Jason getting into position to pick up instrument
09/05/2020 07:35:49	45.946673	-129.983367	185.15	1.43	1516.52	TXT: Lifting up to reposition in order to remove weight from Comp A3
09/05/2020 07:38:21	45.946647	-129.983396	268.8	2.15	1514.94	TXT: Checking bouyancy of Jason

Date/Time (GMT)	Latitude	Longitude	Gyro	Altitude	Depth	J2-1293 Logger Comment
09/05/2020 07:39:26	45.946655	-129.983386	268.39	2.31	1514.72	TXT: Bouyancy readjusted
09/05/2020 07:43:24	45.946679	-129.983385	266.24	1.13	1518	TXT: Positioning to cut weight free from Comp A3
09/05/2020 07:45:05	45.946679	-129.983377	266.17	173.82	1518	TXT: Arm moving to grab knife
09/05/2020 07:48:02	45.946681	-129.983368	266.07	175.2	1518.04	TXT: Rope cut to remove weight
09/05/2020 07:48:14	45.946681	-129.983368	266.06	169.76	1518.03	TXT: Knife returning to sheath
09/05/2020 07:49:10	45.946683	-129.983370	265.98	167.76	1518.03	TXT: Knife secure
09/05/2020 07:51:00	45.946682	-129.983381	265.54	0.74	1516.95	TXT: Jason moving up from bottom
09/05/2020 07:51:24	45.946670	-129.983398	265.91	1	1516.56	TXT: Begin flying around to scout for place to position Comp A3
09/05/2020 07:53:04	45.946700	-129.983408	322.78	2.39	1514.79	TXT: Begin heading north
09/05/2020 07:58:21	45.946990	-129.983446	321.02	2.03	1516.42	TXT: Looking for location
09/05/2020 08:02:28	45.947081	-129.983457	353.07	0.86	1517.87	TXT: Setting Jason down to measure angle of seafloor
09/05/2020 08:02:43	45.947074	-129.983453	336.25	1.61	1517.13	TXT: About 4 deg - mark location for instrument
09/05/2020 08:03:33	45.947043	-129.983372	188.65	3.75	1514.93	TXT: Returning to Comp A3
09/05/2020 08:06:42	45.946750	-129.983438	197.17	2.11	1515.25	TXT: Comp A3 in sight
09/05/2020 08:09:00	45.946682	-129.983445	247.68	0.74	1516.4	TXT: Approach Comp A3
09/05/2020 08:09:23	45.946678	-129.983433	252.03	0.74	1516.56	TXT: Inspecting blue gears on side of Comp A3 - leveling system
09/05/2020 08:12:59	45.946681	-129.983394	308.79	0.74	1518.25	TXT: Everything looks good - repositioning to grab line to lift Comp A3
09/05/2020 08:16:05	45.946675	-129.983397	300.77	0.78	1518.34	TXT: Grabing Comp A3 by shackle
09/05/2020 08:18:35	45.946702	-129.983454	322.69	1.4	1517.62	TXT: Comp A3 lifted. Moving to location
09/05/2020 08:19:59	45.946787	-129.983459	332.6	3	1515.25	TXT: Weight attached to Comp A3 was left behind
09/05/2020 08:23:44	45.947049	-129.983373	332.85	1.93	1516.92	TXT: Arrived at location where want to place Comp A3 instrument
09/05/2020 08:24:41	45.947076	-129.983422	335	0.74	1518.23	TXT: Begin setting down to place Comp A3
09/05/2020 08:27:04	45.947082	-129.983486	334.06	0.74	1518.25	TXT: Setting Comp A3 down
09/05/2020 08:29:03	45.947084	-129.983507	333.49	0.84	1518.3	TXT: Comp A3 on bottom
09/05/2020 08:29:17	45.947085	-129.983508	333.47	0.86	1518.3	TXT: Backing up to check level at position
09/05/2020 08:32:17	45.947092	-129.983478	337.22	1.11	1517.77	TXT: Roll is appears to be level

Date/Time (GMT)	Latitude	Longitude	Gyro	Altitude	Depth	J2-1293 Logger Comment
09/05/2020 08:32:26	45.947084	-129.983465	315.94	1.08	1517.77	TXT: Moving to right to check pitch
09/05/2020 08:33:53	45.947097	-129.983432	297.96	1.11	1517.72	TXT: Pitch appears to be level. Position confirmed
09/05/2020 08:34:52	45.947115	-129.983411	298.2	0.9	1517.91	TXT: Begin to start shield deployment from ship
09/05/2020 08:35:47	45.947082	-129.983374	299.25	7.18	1511.05	TXT: Backing away and Jason coming off bottom so ship can move
09/05/2020 08:37:05	45.947001	-129.983296	299.2	20.33	1497.11	TXT: Moving to 30 m altitude
09/05/2020 08:37:19	45.946998	-129.983295	298.8	23.27	1493.98	TXT: 25 m altitude
09/05/2020 08:44:28	45.947134	-129.983206	317.84	41.56	1475.48	TXT: Moving to 50 m altitude
09/05/2020 08:46:44	45.947104	-129.983261	318.36	58.65	1458.3	TXT: Jason came up too high - moving back down to 50 m
09/05/2020 08:48:57	45.947064	-129.983280	317.33	49.42	1467.85	TXT: Holding position - setting up for when the shield is deployed
09/05/2020 08:55:38	45.947008	-129.983592	271.46	50.86	1467.92	TXT: Waiting for shield deployment - putting second knife on shield for Jason backup
09/05/2020 08:57:37	45.947024	-129.983654	271.48	50.98	1467.79	TXT: No longer adding knife - instead changing weight on shield to a pull pin release
09/05/2020 09:00:33	45.947023	-129.983656	271.56	50.96	1467.83	TXT: Green light for launch of shield
09/05/2020 09:08:13	45.947037	-129.983641	271.59	50.94	1467.84	TXT: Shield off deck
09/05/2020 09:10:04	45.947021	-129.983643	271.58	50.96	1467.84	TXT: Shield over side
09/05/2020 09:10:56	45.947008	-129.983647	271.58	50.97	1467.84	TXT: Shielded in water
09/05/2020 09:11:24	45.946999	-129.983651	271.65	50.94	1467.87	TXT: Shield released
09/05/2020 09:11:51	45.947000	-129.983675	271.03	50.89	1468	TXT: Shield is sinking - Jason moving to avoid shield descent
09/05/2020 09:12:43	45.947011	-129.983751	271.06	51.19	1467.72	TXT: Tracking shield
09/05/2020 09:15:04	45.947002	-129.983977	270.62	50.88	1467.75	TXT: Jason moving due west
09/05/2020 09:18:34	45.947027	-129.984296	272.58	50.48	1467.68	TXT: Shield at 200 m depth
09/05/2020 09:51:38	45.947199	-129.984783	97.91	53.64	1468.14	TXT: Shield deep enough for Jason to begin moving towards it
09/05/2020 10:09:14	45.946275	-129.982548	87.93	4.05	1515.22	TXT: Still moving to shield
09/05/2020 10:09:32	45.946317	-129.982489	82.22	4.63	1514.29	TXT: shield in sight
09/05/2020 10:11:30	45.946365	-129.982387	67.72	3.09	1514.76	NAV: Doppler Reset
09/05/2020 10:13:22	45.946366	-129.982297	256.36	4.11	1514.44	TXT: Moving to side of shield with handle for approach
09/05/2020 10:15:00	45.946437	-129.982293	204.71	0.93	1517.58	TXT: Cable vertical - paying out cable to avoid hockle

Date/Time (GMT)	Latitude	Longitude	Gyro	Altitude	Depth	J2-1293 Logger Comment
09/05/2020 10:17:51	45.946461	-129.982325	204.01	0.93	1517.58	TXT: In position. Starting the move to grab shield
09/05/2020 10:18:52	45.946460	-129.982332	203.84	0.93	1517.58	TXT: Using port arm to grab shield
09/05/2020 10:19:54	45.946455	-129.982337	203.78	0.93	1517.58	TXT: Arm on shield
09/05/2020 10:20:06	45.946455	-129.982337	203.23	0.95	1517.57	TXT: Lifting shield
09/05/2020 10:20:29	45.946453	-129.982338	201.97	0.98	1517.57	TXT: Rotating arm to turn shield right side up
09/05/2020 10:23:22	45.946440	-129.982340	200.56	0.93	1517.61	TXT: Rotating shield to grab in different position
09/05/2020 10:26:10	45.946432	-129.982344	200.5	0.95	1517.61	TXT: Using starboard arm to grab handle on shield
09/05/2020 10:28:02	45.946430	-129.982348	200.63	0.93	1517.62	TXT: Let go with port arm
09/05/2020 10:28:12	45.946430	-129.982347	200.21	0.91	1517.61	TXT: Rotating shield over
09/05/2020 10:28:36	45.946429	-129.982348	200.97	0.93	1517.62	TXT: Shield is right side up
09/05/2020 10:29:51	45.946429	-129.982349	201.05	0.94	1517.61	TXT: Using port arm to grab knife
09/05/2020 10:31:23	45.946416	-129.982375	228.18	1.06	1517.33	TXT: Moving to reposition
09/05/2020 10:32:33	45.946421	-129.982370	227.16	0.74	1517.71	TXT: Using starboard arm to grab rope to pull tight
09/05/2020 10:35:10	45.946427	-129.982360	226.5	0.74	1517.71	TXT: Rope grabbed
09/05/2020 10:36:45	45.946431	-129.982355	226.54	0.74	1517.71	TXT: Using port arm to grab knife
09/05/2020 10:38:30	45.946436	-129.982348	226.51	0.74	1517.7	TXT: Knife grabbed
09/05/2020 10:41:07	45.946442	-129.982336	226.6	0.74	1517.68	TXT: Rope is cut
09/05/2020 10:41:20	45.946443	-129.982335	226.63	0.74	1517.69	TXT: Returning knife to sheath
09/05/2020 10:49:25	45.946433	-129.982310	226.77	0.74	1517.68	WATCH_CHANGE: new_watchstander Bill Chadwick + Kelly Chadwick
09/05/2020 10:54:36	45.946460	-129.982321	141.4	0.83	1517.12	TXT: Jason is grabbing the cover using the right arm and the vertical handle
09/05/2020 10:55:24	45.946458	-129.982326	140.68	0.8	1517.13	TXT: Attempting to use the left arm to hold the horizontal handle
09/05/2020 11:00:05	45.946512	-129.982473	306.99	4.5	1514.19	TXT: Moving the cover to the instrument's site
09/05/2020 11:12:37	45.947027	-129.983338	321.23	4.66	1513.5	TXT: Instrument in sight
09/05/2020 11:14:44	45.947089	-129.983371	19.72	0.94	1517.94	TXT: Placing the cover beside the instrument
09/05/2020 11:16:07	45.947077	-129.983403	24.84	0.74	1518.21	TXT: Cover is placed on the bottom
09/05/2020 11:17:38	45.947049	-129.983424	2.18	0.74	1518.19	TXT: Attempting to remove the beacon from the cover

Date/Time (GMT)	Latitude	Longitude	Gyro	Altitude	Depth	J2-1293 Logger Comment
09/05/2020 11:18:28	45.947046	-129.983435	2.07	0.74	1518.16	TXT: Removing the bungee from the beacon
09/05/2020 11:18:55	45.947045	-129.983441	2.64	0.74	1518.17	TXT: Beacon removed
09/05/2020 11:19:15	45.947044	-129.983446	2.8	0.74	1518.25	TXT: Taking the beacon to the instrument's float
09/05/2020 11:23:05	45.947103	-129.983427	127.88	5.39	1513.53	TXT: Attempting to put the beacon in the float's holster
09/05/2020 11:24:18	45.947095	-129.983441	128.38	5.44	1513.56	TXT: Using the left arm to hold the float still while the right arm positions the beacon
09/05/2020 11:25:06	45.947091	-129.983446	128.22	5.46	1513.54	TXT: Beacon in the holster
09/05/2020 11:25:21	45.947090	-129.983448	128.25	5.43	1513.56	TXT: Using the right arm to attach the beacon's bungee
09/05/2020 11:25:42	45.947088	-129.983449	128.38	5.44	1513.55	TXT: Bungee attached
09/05/2020 11:27:45	45.947079	-129.983455	127.66	1.88	1517.06	TXT: Float is prepared for release but we have to wait until sunrise to release it so that it can be easily recovered
09/05/2020 11:30:19	45.947055	-129.983513	21.62	0.74	1518.2	TXT: Realized we left the weight at the cover's drop site
09/05/2020 11:30:52	45.947056	-129.983503	21.78	0.74	1518.21	TXT: Getting the measuring rope
09/05/2020 11:31:55	45.947062	-129.983482	21.22	0.74	1518.21	TXT: Measuring rope is placed
09/05/2020 11:34:48	45.947020	-129.983371	133.52	2.18	1516.69	TXT: Transiting back to the cover's drop site to look for the weight
09/05/2020 11:46:12	45.946421	-129.982351	67.83	2.11	1515.64	TXT: Looking for the weight
09/05/2020 11:49:12	45.946450	-129.982467	8.1	1.88	1516.1	NAV: Doppler Reset
09/05/2020 11:54:51	45.946432	-129.982253	180.95	2.03	1515.94	TXT: Found the weight
09/05/2020 11:55:50	45.946423	-129.982279	182.56	0.84	1517.1	TXT: Picking up the weight
09/05/2020 11:56:09	45.946425	-129.982281	182.31	0.85	1517.07	TXT: Weight is out of reach
09/05/2020 11:56:43	45.946411	-129.982300	224.74	1.19	1516.58	TXT: Moving so that Jason can reach the weight
09/05/2020 11:57:27	45.946397	-129.982353	301.81	1.08	1517.2	TXT: Attempting to pick up the weight
09/05/2020 11:57:36	45.946394	-129.982354	301.45	1.04	1517.24	TXT: Putting the weight in the basket
09/05/2020 11:58:35	45.946363	-129.982353	275.24	1.41	1516.38	TXT: Transiting back to the site of the instrument and the cover
09/05/2020 12:13:40	45.946516	-129.982773	239.62	1.15	1515.89	TXT: Decided to head to Trevi vent first for sampling instead of the instrument which we will return to later
09/05/2020 12:27:23	45.946363	-129.983748	256.95	3.91	1516.21	TXT: Marker in sight
09/05/2020 12:28:47	45.946314	-129.983846	192.9	3.91	1516.78	TXT: Arrived at Trevi vent

Date/Time (GMT)	Latitude	Longitude	Gyro	Altitude	Depth	J2-1293 Logger Comment
09/05/2020 12:29:44	45.946278	-129.983877	176.43	3.91	1517.43	TXT: Discussing the order of events that should happen
09/05/2020 12:30:26	45.946270	-129.983898	152.57	3.91	1517.69	TXT: Trevi doesn't have a chimney but instead the vent is in a hole now
09/05/2020 12:30:36	45.946266	-129.983900	150.65	3.91	1517.56	TXT: Checking for clams for later sampling
09/05/2020 12:30:52	45.946259	-129.983901	150.91	3.91	1517.56	TXT: Clams spotted
09/05/2020 12:32:09	45.946234	-129.983904	149.77	3.91	1517.56	TXT: Grabbing new HOBO 104 from Jason basket
09/05/2020 12:32:57	45.946227	-129.983908	149.89	3.91	1517.49	TXT: Attempting to place HOBO 104
09/05/2020 12:33:25	45.946228	-129.983913	149.82	3.91	1517.5	TXT: Repositioning HOBO 104
09/05/2020 12:33:44	45.946225	-129.983912	149.92	3.91	1517.5	TXT: Picking up the old HOBO so it's out of the way
09/05/2020 12:34:17	45.946222	-129.983912	150.05	3.91	1517.49	TXT: Repositioning HOBO 104
09/05/2020 12:34:29	45.946221	-129.983912	150.03	3.91	1517.49	TXT: Picking up the old HOBO 103
09/05/2020 12:35:03	45.946221	-129.983912	150.01	3.91	1517.49	TXT: HOBO 103 is recovered from the Trevi vent
09/05/2020 12:35:15	45.946221	-129.983912	149.89	3.91	1517.52	TXT: Putting HOBO 103 in the basket
09/05/2020 12:35:44	45.946221	-129.983911	149.67	3.91	1517.54	TXT: HOBO 103 secured to Jason
09/05/2020 12:36:23	45.946222	-129.983910	149.6	3.91	1517.52	TXT: Placing the bungee to fully secure HOBO 103
09/05/2020 12:37:07	45.946224	-129.983908	149.74	3.91	1517.49	TXT: HOBO 103 secured
09/05/2020 12:37:50	45.946227	-129.983906	150.02	3.91	1517.47	TXT: Attempting to reposition HOBO 104 at Trevi vent
09/05/2020 12:39:04	45.946231	-129.983903	149.9	3.91	1517.41	TXT: HOBO 104 is placed (but not the final position)
09/05/2020 12:40:00	45.946235	-129.983900	149.24	3.91	1517.44	TXT: Going to release the bungee that holds the forward majors
09/05/2020 12:40:41	45.946237	-129.983899	149.42	3.91	1517.44	TXT: Trying to grab the red major that failed to trigger earlier in the dive
09/05/2020 12:41:42	45.946239	-129.983896	149.88	3.91	1517.49	TXT: The plan is to try to poke the red major's plunger with the left arm while holding the major with the right arm
09/05/2020 12:41:56	45.946237	-129.983888	152.85	3.91	1517.21	TXT: Repositioning Jason so that the basket isn't in the way
09/05/2020 12:42:45	45.946238	-129.983885	152.38	3.91	1517.51	TXT: Trying to position the red major
09/05/2020 12:44:56	45.946239	-129.983881	152.57	3.91	1517.44	TXT: Using the left arm to attempt to push the bolt on the back of the red major
09/05/2020 12:46:55	45.946239	-129.983879	152.68	3.91	1517.43	TXT: Checking the spring for movement
09/05/2020 12:47:12	45.946239	-129.983878	152.53	3.91	1517.45	TXT: Trying to move the bolt with the left arm again

Date/Time (GMT)	Latitude	Longitude	Gyro	Altitude	Depth	J2-1293 Logger Comment
09/05/2020 12:49:38	45.946239	-129.983878	152.2	3.91	1517.43	TXT: Spring is moving!
09/05/2020 12:49:47	45.946239	-129.983878	152.25	3.91	1517.43	Sample: J-1293-Major-10. Red Major at Trevi vent. No temperature. Using Major that previously did not trigger with the ram but we were able to get it to work by pushing with Jason's claw. LAT = 45.946215 LON = -129.983913. DEPTH = 1517. Heading = 152.
09/05/2020 12:55:06	45.946235	-129.983872	151.66	3.91	1517.42	TXT: CORRECTION: last sample ID is J-1293-Major-10
09/05/2020 12:57:18	45.946230	-129.983851	151.94	3.91	1516.8	TXT: Red Major stored
09/05/2020 12:57:32	45.946230	-129.983842	152.36	3.91	1516.99	TXT: Moving to attempt to collect clams
09/05/2020 13:00:21	45.946203	-129.983887	130.44	3.91	1517.31	TXT: Right biobox positioned
09/05/2020 13:01:16	45.946203	-129.983887	131.68	3.91	1517.68	TXT: Attempting to release the biobox bungee
09/05/2020 13:01:49	45.946202	-129.983886	131.43	3.91	1517.68	TXT: Bungee is released
09/05/2020 13:02:05	45.946203	-129.983885	130.51	3.91	1517.67	TXT: Attempting to grab clams with right arm
09/05/2020 13:02:41	45.946204	-129.983884	129.91	3.91	1517.68	TXT: Handful of clams being moved to biobox
09/05/2020 13:03:01	45.946204	-129.983883	130.17	3.91	1517.65	Sample: J-1293-BIO-11. Collected clams near Trevi vent using Jason claw. Put in right biobox. LAT = 45.946183 LONG = -129.983919. DEPTH = 1517.7m. For e-DNA related work.
09/05/2020 13:07:52	45.946227	-129.983862	129.58	3.91	1517.6	TXT: Going to close biobox
09/05/2020 13:08:20	45.946230	-129.983860	129.56	3.91	1517.61	TXT: Biobox closed and secured with bungee
09/05/2020 13:09:28	45.946235	-129.983851	130.42	3.91	1517.38	TXT: Biobox back in place
09/05/2020 13:11:45	45.946222	-129.983882	317.83	3.91	1517.33	TXT: Realized that HOBO 104 got moved during the Major collection
09/05/2020 13:11:55	45.946221	-129.983881	317.72	3.91	1517.23	TXT: Going to reposition HOBO 104
09/05/2020 13:13:17	45.946216	-129.983876	317.96	3.91	1517.21	TXT: HOBO 104 repositioned
09/05/2020 13:14:57	45.946192	-129.983826	252.22	3.91	1516.26	TXT: Checking that the HOBO 104 body is not being bathed with too much hot water
09/05/2020 13:15:35	45.946255	-129.983808	114.44	3.91	1516.45	TXT: Repositioning HOBO 104 again because the tip is still not in the hot water
09/05/2020 13:20:01	45.946256	-129.983850	113.42	3.91	1516.99	TXT: Moving to check HOBO 104's position from other angles
09/05/2020 13:21:05	45.946209	-129.983896	238.71	3.91	1517.14	TXT: HOBO 104 has been successfully positioned at the Trevi vent
09/05/2020 13:21:16	45.946208	-129.983898	237.53	3.91	1517.03	TXT: Transiting back to the Comp A3 instrument and cover location
09/05/2020 13:31:16	45.947060	-129.983486	334.39	3.91	1517.35	TXT: Arrived at Comp A3 instrument location
09/05/2020 13:31:26	45.947063	-129.983492	334.12	3.91	1517.33	TXT: Going to pull the pin to release the float from the instrument

Date/Time (GMT)	Latitude	Longitude	Gyro	Altitude	Depth	J2-1293 Logger Comment
09/05/2020 13:32:35	45.947079	-129.983521	332.64	3.91	1517.3	TXT: Trying to grab the rope with the left arm
09/05/2020 13:33:07	45.947077	-129.983523	325.74	3.91	1516.96	TXT: Moving Jason for easier access
09/05/2020 13:33:51	45.947076	-129.983525	330.2	3.91	1517.28	TXT: Grabbing the three white ropes connected to the instrument and holding them
09/05/2020 13:34:10	45.947072	-129.983523	329.77	3.91	1517.27	TXT: Using right arm to grab the pull pin
09/05/2020 13:34:35	45.947064	-129.983518	329.76	3.91	1517.27	TXT: Pin is pulled. Float is away
09/05/2020 13:35:12	45.947049	-129.983505	329.55	3.91	1517.25	TXT: They decided not to try to put the cover on the instrument until after the float is recovered by the ship
09/05/2020 13:49:19	45.945737	-129.984293	206.37	3.91	1519.24	TXT: Jason off bottom. Following the ship as it moves to keep up with the float
09/05/2020 14:05:11	45.943963	-129.985060	178.53	3.91	1517.65	TXT: Float at 330 meters
09/05/2020 14:10:08	45.943370	-129.985244	179.39	3.91	1518.39	TXT: Jason moving up to 50 meters
09/05/2020 14:11:26	45.943278	-129.985179	181.07	3.91	1499.71	TXT: Altimeter appears to be stuck
09/05/2020 14:13:38	45.943072	-129.985169	179.41	3.91	1469.8	TXT: Float is on the surface
09/05/2020 14:13:57	45.943036	-129.985196	174.4	3.91	1470	TXT: Ship moving to pick up the float
09/05/2020 14:44:47	45.942716	-129.979888	90.37	3.91	1457.69	TXT: Float on deck
09/05/2020 14:51:27	45.942631	-129.979065	328.86	3.91	1457.49	TXT: Transiting to instrument and cover site.
09/05/2020 15:47:32	45.947074	-129.982994	295.9	3.91	1514.09	NAV: Doppler Reset
09/05/2020 15:49:55	45.947128	-129.983383	290.5	3.91	1515.37	TXT: Comp A3 instrument located with shield right beside
09/05/2020 15:56:33	45.947041	-129.983455	9.81	3.91	1516.5	TXT: Jason lifts shield by T handle
09/05/2020 15:59:56	45.947079	-129.983461	10.49	3.91	1515.57	TXT: Jason moves shield towards Comp A3
09/05/2020 16:10:43	45.947101	-129.983530	10.57	3.91	1516.49	TXT: Shield in place over package
09/05/2020 16:14:01	45.947096	-129.983454	190.17	3.91	1516.54	TXT: Jason circles package to check for shield placement
09/05/2020 16:17:15	45.947098	-129.983474	190.4	3.91	1516.59	TXT: Jason adds weight to top of shield
09/05/2020 16:19:26	45.947132	-129.983555	268.9	3.91	1498.81	TXT: Jason is off the bottom. End of dive.
09/05/2020 16:26:19	45.947147	-129.983547	268.99	3.91	1296.53	TXT: Jason is on its way to the surface
09/05/2020 17:12:38	45.947147	-129.983547	267.07	3.91	138.23	TXT: Jason recovery begins
09/05/2020 17:19:01	45.947147	-129.983547	273.63	3.91	20.26	TXT: Jason on deck

ROV Jason dive J2-1294 Dive Log (edited/corrected from Jason Virtual Van)

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1294 Logger Comment
09/06/2020 03:11:54	45.750005	-130.199974	153.2	1.11	VEHICLE: milestone Jason off deck
09/06/2020 03:13:26	45.750005	-130.199974	239.65	1.16	VEHICLE: milestone Jason in water. This dive will explore the mini-smoker area on the 2015 lava flow on Axial's north rift zone.
09/06/2020 03:30:16	45.750007	-130.200019	274.28	188.98	TXT: Mkr-264 is 1764m
09/06/2020 04:20:21	45.750007	-130.200019	213.3	1598.56	TXT: Temperature probe failed and will not be available during this dive
09/06/2020 04:28:07	46.120002	-129.970233	243.83	1736.21	NAV: Doppler Reset
09/06/2020 04:32:19	46.120178	-129.970391	11.21	1766.9	VEHICLE: milestone On bottom
09/06/2020 04:35:52	46.120413	-129.970336	359.62	1763.33	TXT: On our way to Prosecco
09/06/2020 04:44:37	46.120664	-129.969822	94.42	1761.85	TXT: Looking for Marker-264
09/06/2020 04:46:18	46.120623	-129.969762	266.78	1762.45	TXT: Sighted Marker
09/06/2020 04:49:44	46.120625	-129.969873	328.44	1764.83	TXT: Looking for shimmering water but don't see any
09/06/2020 04:51:16	46.120621	-129.969858	283.3	1765.08	TXT: Pillow basalt is orange and yellow with some white
09/06/2020 04:52:43	46.120653	-129.969854	205.43	1764.17	TXT: Spinning Jason to look around in all directions
09/06/2020 04:53:49	46.120605	-129.969915	15.34	1764.56	TXT: Examining the white coating some of the rock
09/06/2020 04:56:53	46.120540	-129.969986	235.22	1765.45	TXT: Quite colorful mixture of staining of rock within 4m of former venting area. Otherwise rock is quite dark
09/06/2020 04:57:24	46.120478	-129.970040	231.33	1765.67	TXT: No active venting observed at Prosecco (marker 264). On our way to Kalua vent (marker 241).
09/06/2020 04:59:27	46.120348	-129.970372	253.46	1766.34	TXT: Looking for Marker-241
09/06/2020 05:00:30	46.120275	-129.970521	258.88	1765.32	TXT: Rock is mostly dark - lava from 2015 eruptive event
09/06/2020 05:01:22	46.120256	-129.970657	250.12	1763.53	TXT: Jason is on heading 252
09/06/2020 05:03:05	46.120251	-129.970702	201.56	1764.45	TXT: Jason located Marker 241 but vent is inactive with no apparent warm water
09/06/2020 05:04:14	46.120247	-129.970689	202.04	1764.02	TXT: Same colorful rock near the former vent location
09/06/2020 05:07:20	46.120260	-129.970802	35.75	1762.94	TXT: Jason is spinning to look for any additional venting
09/06/2020 05:12:25	46.120032	-129.970602	242.24	1766.31	TXT: Jason is moving in 230 heading
09/06/2020 05:15:59	46.120031	-129.970634	261.28	1767.32	TXT: See some staining and small chimneys but no currently obvious venting
09/06/2020 05:16:32	46.120032	-129.970661	261.66	1766.08	TXT: Heading towards Sambuca vent target
09/06/2020 05:17:11	46.120006	-129.970731	260.6	1764.72	TXT: Sambuca has no marker
09/06/2020 05:18:55	46.119995	-129.970797	267.79	1765.13	TXT: Small chimney about .5 meter high but no obvious venting observed
09/06/2020 05:19:35	46.119996	-129.970798	267.86	1765.13	TXT: Lots of iron staining with no venting

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1294 Logger Comment
09/06/2020 05:24:47	46.119963	-129.970909	287.93	1764.53	TXT: Seeing lots of small chimneys and staining but no venting
09/06/2020 05:26:44	46.119945	-129.970915	151.14	1763.31	TXT: Jason heading 288. Zigzaging south looking for active venting.
09/06/2020 05:31:41	46.119563	-129.970389	96.19	1770.04	TXT: Jason is exploring the high area at the top of the pillow mound that is surrounded by deeper rock
09/06/2020 05:33:00	46.119478	-129.970221	158.45	1765.68	TXT: Center of mound is surrounded by area of slightly deeper seafloor. Jason is driving around that island of shallower seafloor.
09/06/2020 05:34:25	46.119332	-129.970285	207.5	1763.6	TXT: The vertical side of the rock ridge is stained inside of the cracks
09/06/2020 05:35:44	46.119199	-129.970340	264.72	1763.23	TXT: Jason is moving north through dark rock. We are exploring the top of the mound for any continued venting.
09/06/2020 05:48:28	46.119072	-129.971118	345.13	1764.8	TXT: We examined small chimney with staining with no venting
09/06/2020 05:49:04	46.119213	-129.971110	357.81	1765	TXT: Jason continues rapid survey without seeing any active venting
09/06/2020 05:50:27	46.119323	-129.971154	220.75	1764.9	TXT: Lots of evidence of former venting
09/06/2020 05:53:26	46.118795	-129.971291	232.61	1765.29	TXT: There may be cloudy water but unsure (probably not)
09/06/2020 05:59:54	46.118754	-129.971496	236.12	1765.87	TXT: Still no evidence of venting
09/06/2020 06:01:30	46.119008	-129.971682	348.62	1763.93	TXT: Heading north to continue zigzag search pattern
09/06/2020 06:03:34	46.119081	-129.971721	175.2	1764.47	TXT: Broken black basalt interrupted by the occasional smooth dome structures
09/06/2020 06:09:28	46.119074	-129.972006	339.74	1764.07	TXT: Jason is passing over old vent sites with colorful rock
09/06/2020 06:13:40	46.119395	-129.971403	128.59	1762.87	TXT: Jason is passing over a collapsed dome-like structure
09/06/2020 06:16:42	46.119484	-129.971338	243.57	1764.01	TXT: Vertical surface of cracks are stained from the warm vent water previously passing through
09/06/2020 06:21:09	46.119595	-129.971837	54.59	1764.27	TXT: Lobate sheet flow alternates with fractured sheet flow
09/06/2020 06:50:17	46.120423	-129.971468	65.01	1764.09	WATCH_CHANGE: new_watchstander Jeff Beeson + Leland Wood
09/06/2020 06:54:14	46.120580	-129.970877	87.06	1764.98	TXT: Yellow staining especially in between cracks of lava
09/06/2020 06:58:52	46.120681	-129.971702	16.46	1764.31	TXT: Inactive chimney
09/06/2020 07:02:04	46.120859	-129.970977	94.98	1766.28	TXT: Area with really smooth bottom
09/06/2020 07:02:37	46.120851	-129.970831	92.95	1765.98	TXT: Small chimney with yellow orange staining
09/06/2020 07:02:56	46.120847	-129.970754	77.35	1765.46	TXT: Small chimneys
09/06/2020 07:04:24	46.120999	-129.970862	268.33	1765.78	TXT: Flat sheet flow - flat bottom
09/06/2020 07:04:57	46.120989	-129.971048	268.65	1767.7	TXT: Diffuse staining in cracks
09/06/2020 07:06:38	46.121006	-129.971600	304.93	1767.04	TXT: Large patch of staining
09/06/2020 07:09:06	46.121248	-129.971111	94.66	1767.3	TXT: Large patch of orange staining
09/06/2020 07:10:43	46.121283	-129.970669	55.33	1764.51	TXT: Staining in cracks of rock

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1294 Logger Comment
09/06/2020 07:11:08	46.121365	-129.970671	323.1	1764.14	TXT: White patch of staining
09/06/2020 07:11:59	46.121433	-129.970893	281.79	1764.39	TXT: Bright yellow staining in cracks of rock
09/06/2020 07:12:42	46.121429	-129.971116	269.67	1765.99	TXT: Small white patch in larger yellow staining
09/06/2020 07:13:04	46.121424	-129.971200	270.16	1764.39	TXT: Lots of staining in cracks and in between pillows
09/06/2020 07:13:13	46.121427	-129.971238	275.14	1763.41	TXT: Largely altered area
09/06/2020 07:14:49	46.121418	-129.971646	294.68	1766.56	TXT: Light staining
09/06/2020 07:15:25	46.121554	-129.971680	18.25	1765.1	TXT: Staining in cracks of rock
09/06/2020 07:17:26	46.121694	-129.971105	79.09	1766.24	TXT: Large pillow sticking up above
09/06/2020 07:18:39	46.121722	-129.970778	71.83	1764.98	TXT: Light staining in cracks
09/06/2020 07:19:14	46.121825	-129.970756	322.9	1764.16	TXT: Staining in collapsed rock
09/06/2020 07:20:46	46.121800	-129.971182	255.28	1766.22	TXT: Begin moving west - counterclockwise around top of pillow mound
09/06/2020 07:22:52	46.121707	-129.971654	258.16	1764.74	TXT: White patch of staining
09/06/2020 07:25:22	46.121553	-129.971940	191.82	1765.22	TXT: Area of light staining
09/06/2020 07:25:38	46.121499	-129.971948	191.84	1764.47	TXT: Two small patches of heavy staining
09/06/2020 07:27:24	46.121153	-129.972006	191.31	1762.91	TXT: Small patch of heavy stain
09/06/2020 07:28:47	46.121097	-129.972234	306.76	1762.59	TXT: Large patch of staining in collapsed area
09/06/2020 07:29:49	46.121340	-129.972359	337.67	1766.11	TXT: Light staining in cracks
09/06/2020 07:30:24	46.121487	-129.972413	336.17	1765.39	TXT: Large cracks with staining in between
09/06/2020 07:31:28	46.121742	-129.972375	359.23	1765.09	TXT: Light white staining in cracks
09/06/2020 07:32:35	46.121779	-129.972498	232.64	1764.99	TXT: Large stain on side of displaced rock
09/06/2020 07:34:40	46.121394	-129.972607	173.23	1764.52	TXT: Large flat area broken up into large slabs
09/06/2020 07:35:27	46.121236	-129.972532	200.13	1765.78	TXT: Light staining area and in cracks
09/06/2020 07:35:53	46.121194	-129.972643	278.13	1765.88	TXT: White stain area
09/06/2020 07:39:51	46.121504	-129.973130	190.3	1763.95	TXT: Staining in cracks of large breakup
09/06/2020 07:42:07	46.121119	-129.972964	141.05	1765.7	TXT: Staining in cracks of rock
09/06/2020 07:43:18	46.120948	-129.972648	137.13	1763.33	TXT: Broad orange stained area
09/06/2020 07:44:00	46.120912	-129.972439	120.86	1765.54	TXT: Broad lightly stained area
09/06/2020 07:44:56	46.120757	-129.972232	185.93	1765.43	TXT: Lightly stained area
09/06/2020 07:45:23	46.120682	-129.972335	230.89	1765.9	TXT: White spots
09/06/2020 07:45:50	46.120694	-129.972504	264.74	1765.52	TXT: Broad stained area
09/06/2020 07:46:01	46.120697	-129.972571	266.61	1764.86	TXT: Heavy stained area

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1294 Logger Comment
09/06/2020 07:47:50	46.120698	-129.973106	164.75	1763.63	TXT: Stained mound area - orange
09/06/2020 07:48:44	46.120565	-129.972925	130.56	1764.27	TXT: Small chimney
09/06/2020 07:48:50	46.120554	-129.972911	131.05	1764.01	TXT: Not active
09/06/2020 07:49:09	46.120522	-129.972814	114.42	1763.45	TXT: Heavy staining in collapse
09/06/2020 07:51:39	46.120356	-129.972250	223.6	1767.49	TXT: Staining in cracks of rock
09/06/2020 07:51:48	46.120343	-129.972303	239.73	1766.98	TXT: Large patch of staining
09/06/2020 07:53:31	46.120278	-129.972840	257.47	1764.46	TXT: Broad staining
09/06/2020 07:54:13	46.120292	-129.973050	259.57	1765.05	TXT: White spotting
09/06/2020 07:54:26	46.120304	-129.973107	259.51	1764.61	TXT: Very large stained area
09/06/2020 07:56:23	46.120190	-129.972827	107.37	1765.29	TXT: White staining with yellow stains
09/06/2020 07:57:03	46.120172	-129.972584	103.58	1765.06	TXT: Large stained mound
09/06/2020 07:57:45	46.120085	-129.972399	190.29	1764.44	TXT: Very large stained area
09/06/2020 07:59:10	46.119960	-129.972687	270.02	1763.68	TXT: Staining in large cracks
09/06/2020 08:00:55	46.120014	-129.973203	265.93	1765.1	TXT: Large white stain in soft yellow stain
09/06/2020 08:03:00	46.119807	-129.973369	185.29	1763.18	TXT: Large mound of staining in sight
09/06/2020 08:04:41	46.119764	-129.973404	185.86	1763.58	TXT: Just heavily stoned area - no vents
09/06/2020 08:05:19	46.119779	-129.973207	93.64	1765.7	TXT: Pretty flat bottom with some light staining
09/06/2020 08:06:33	46.119809	-129.972676	106.38	1764.28	TXT: Staining in large cracks
09/06/2020 08:07:16	46.119655	-129.972580	215.91	1765.49	TXT: Large staining area
09/06/2020 08:08:40	46.119586	-129.973101	258.98	1767.81	TXT: Staining in large area
09/06/2020 08:10:06	46.119535	-129.973019	82.32	1769.18	TXT: Large staining area
09/06/2020 08:10:28	46.119534	-129.972909	83.74	1769.19	TXT: Heavy staining in cracks
09/06/2020 08:11:50	46.119568	-129.972444	82.64	1764.66	TXT: Heavy staining in cracks
09/06/2020 08:11:58	46.119564	-129.972398	88.49	1764.63	TXT: Large white patch of staining
09/06/2020 08:13:17	46.119527	-129.972294	212.67	1764.66	TXT: Sporadic heavy staining area
09/06/2020 08:13:53	46.119419	-129.972427	210.48	1763.94	TXT: Large crack with staining
09/06/2020 08:15:40	46.119375	-129.973015	256.06	1770.09	TXT: White spotting
09/06/2020 08:16:18	46.119348	-129.973209	265.71	1769.36	TXT: Large patch of flat bottom with heavy staining
09/06/2020 08:19:32	46.119355	-129.973780	344.05	1766.07	TXT: White and yellow staining in cracks of pillows
09/06/2020 08:19:55	46.119389	-129.973751	321.73	1765.43	TXT: White and yellow staining in cracks of broken pillows
09/06/2020 08:20:08	46.119403	-129.973732	312.38	1765.16	TXT: Heavy yellow staining in spots

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1294 Logger Comment
09/06/2020 08:20:24	46.119461	-129.973720	19.95	1765.33	TXT: More heavy yellow staining
09/06/2020 08:21:45	46.119712	-129.973609	350.25	1765.12	TXT: White staining
09/06/2020 08:22:11	46.119808	-129.973604	354.05	1764.39	TXT: Large area of staining
09/06/2020 08:23:18	46.119992	-129.973738	274.95	1765.5	TXT: Staining in between pillows
09/06/2020 08:23:51	46.120012	-129.973885	257.67	1765.07	TXT: Octopus!
09/06/2020 08:25:39	46.119971	-129.973959	161.8	1764.17	TXT: Thin cracks with white staining
09/06/2020 08:26:05	46.119884	-129.973917	173.55	1763.96	TXT: White staining patch
09/06/2020 08:29:50	46.119201	-129.974231	310.05	1764.38	TXT: Large staining patch
09/06/2020 08:30:11	46.119230	-129.974234	313.66	1764.61	TXT: Heavy yellow staining
09/06/2020 08:31:30	46.119420	-129.974221	53.46	1763.51	TXT: Depression with staining
09/06/2020 08:36:43	46.119639	-129.974343	189.05	1763.57	TXT: Large broad staining with white patch
09/06/2020 08:40:46	46.119353	-129.974644	358.76	1764.2	TXT: Broad staining area
09/06/2020 08:41:14	46.119450	-129.974589	7.14	1763.85	TXT: Very broad flat area with staining
09/06/2020 08:41:36	46.119444	-129.974592	6.53	1763.82	TXT: Cluster of small inactive vents
09/06/2020 08:45:35	46.120200	-129.974350	71.02	1763.02	TXT: Smooth and rippled lava morphology
09/06/2020 08:49:55	46.120467	-129.973791	257.72	1763.2	TXT: More staining in cracks
09/06/2020 08:52:01	46.120326	-129.974355	253.06	1763.12	TXT: Cool cracks with staining in slope
09/06/2020 08:52:21	46.120342	-129.974379	216.54	1763.02	TXT: Moving to get better look of collapsed wall area
09/06/2020 08:59:52	46.120795	-129.973497	77.78	1764.41	TXT: Lots of cracks with orange staining
09/06/2020 09:00:40	46.120924	-129.973417	289.41	1764.72	TXT: Large fractures with staining
09/06/2020 09:01:27	46.120943	-129.973527	216.15	1763.93	TXT: Large cracked mound
09/06/2020 09:02:01	46.120930	-129.973489	238.22	1763.57	TXT: Looks like one giant bubble of lava
09/06/2020 09:03:04	46.120905	-129.973495	245.68	1763.37	TXT: Nickname: the egg
09/06/2020 09:03:41	46.120907	-129.973499	245.38	1763.27	TXT: Smaller ball within fracture down middle
09/06/2020 09:04:13	46.120952	-129.973552	211.78	1763.42	TXT: Estimated size of two or three Jasons across
09/06/2020 09:12:07	46.120515	-129.974480	180.52	1763.68	TXT: Returning back to the large fissure area
09/06/2020 09:13:41	46.120536	-129.974529	219.82	1763.22	TXT: Two swirls in lava
09/06/2020 09:16:30	46.120458	-129.974715	246.68	1763.14	TXT: Large fracture with heavy staining - large semicircle
09/06/2020 09:19:02	46.120400	-129.974657	185.67	1762.93	TXT: More large fractures
09/06/2020 09:27:40	46.119929	-129.974612	193.53	1762.98	TXT: Waiting for ship move before continuing
09/06/2020 09:33:42	46.119652	-129.974793	107.67	1763.58	TXT: Some light staining in cracks

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1294 Logger Comment
09/06/2020 09:37:24	46.119506	-129.974668	196.71	1763.58	TXT: Light staining
09/06/2020 09:37:30	46.119493	-129.974668	186.79	1763.64	TXT: White patch of staining
09/06/2020 09:40:20	46.119509	-129.974983	267.42	1763.86	TXT: Large flat flow area
09/06/2020 09:41:04	46.119482	-129.975208	231.3	1763.89	TXT: Another zone of large fractures
09/06/2020 09:41:36	46.119423	-129.975222	207.52	1763.84	TXT: Skate!
09/06/2020 09:42:39	46.119398	-129.975337	270.49	1763.71	TXT: Following along with skate
09/06/2020 09:45:31	46.119233	-129.975059	130.94	1763.65	TXT: Light staining in fractures
09/06/2020 09:46:02	46.119206	-129.974940	134.08	1763.57	TXT: Large patch of stained area
09/06/2020 09:47:47	46.119001	-129.974581	143.28	1764.92	TXT: White spotting
09/06/2020 09:49:11	46.118979	-129.974910	276.1	1765.21	TXT: Stained area
09/06/2020 09:50:19	46.119074	-129.975322	269.06	1765.28	TXT: Staining deep in cracks
09/06/2020 09:51:22	46.118946	-129.975441	166.75	1765.32	TXT: White stain patch
09/06/2020 09:52:16	46.118831	-129.975200	125.56	1765.27	TXT: Large stained patch
09/06/2020 09:52:51	46.118806	-129.975210	138.97	1765.43	TXT: Couple small chimneys
09/06/2020 09:54:46	46.118565	-129.974722	137.08	1765.39	TXT: White spotting
09/06/2020 09:56:57	46.118357	-129.974651	228.26	1765.45	TXT: White stain patch
09/06/2020 09:58:30	46.118413	-129.975116	287.34	1765.39	TXT: Staining patch
09/06/2020 09:58:37	46.118426	-129.975139	289.06	1765.25	TXT: Some bright yellow patches
09/06/2020 09:59:42	46.118550	-129.975471	288.11	1765.43	TXT: Staining in cracks of pillows
09/06/2020 10:01:28	46.118542	-129.975686	170.75	1764.17	TXT: Another egg type feature
09/06/2020 10:02:09	46.118533	-129.975689	166.79	1763.94	TXT: Looking at possible star? Could just be a different rock
09/06/2020 10:03:37	46.118511	-129.975625	178.53	1763.78	TXT: Looking at layers of staining in the cracks of feature
09/06/2020 10:05:33	46.118256	-129.975289	121.63	1763.78	TXT: Collapsed feature
09/06/2020 10:06:46	46.118158	-129.974766	101.24	1764.17	TXT: Large patch of staining
09/06/2020 10:08:21	46.117993	-129.974523	260.88	1764.84	TXT: Large staining in cracks
09/06/2020 10:11:13	46.117836	-129.974484	91.77	1764.89	TXT: Small patch of staining
09/06/2020 10:11:52	46.117891	-129.974213	85.07	1764.79	TXT: Large patch of staining
09/06/2020 10:12:01	46.117905	-129.974151	88.01	1764.36	TXT: White spots of staining
09/06/2020 10:12:59	46.117775	-129.974045	198.25	1764.06	TXT: Large staining over pillows
09/06/2020 10:14:10	46.117623	-129.974144	199.37	1764.69	TXT: Large staining patch - pretty
09/06/2020 10:14:37	46.117577	-129.974200	199.36	1764.7	TXT: Really flat area

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1294 Logger Comment
09/06/2020 10:15:49	46.117489	-129.974137	126.56	1764.93	TXT: Some very large structure in view
09/06/2020 10:16:30	46.117494	-129.974121	124.18	1763.67	TXT: Some light staining on side of feature
09/06/2020 10:17:35	46.117460	-129.974116	148.26	1763.97	TXT: Really interesting morphology
09/06/2020 10:24:30	46.117479	-129.973623	100.94	1764.89	TXT: Skate in view
09/06/2020 10:30:58	46.117389	-129.973634	170.32	1763.69	TXT: Close up of skate
09/06/2020 10:43:33	46.117314	-129.974161	35.88	1766.15	WATCH_CHANGE: new_watchstander Bill Chadwick + Kelly Chadwick
09/06/2020 10:59:17	46.117695	-129.972088	86.27	1764.34	TXT: End of venting search. We're going to begin using the new Jason multibeam sonar. Starting with a patch test of Kongberg EM2040 sonar.
09/06/2020 10:59:45	46.117694	-129.972087	86.55	1764.36	TXT: We're on the southern rim of the 2015 lava flow (top of pillow mound)
09/06/2020 11:02:30	46.117692	-129.972088	86.59	1764.35	TXT: The ship and the ROV are stopped and we're setting up the multibeam for the survey. Stefano and Scotty are in the van
09/06/2020 11:03:41	46.117692	-129.972082	86.91	1764.28	TXT: We believe we can see the multibeam's activity on the BlueView sonar
09/06/2020 11:13:35	46.117693	-129.972057	86.76	1761.47	TXT: Jason is going up to 60m altitude
09/06/2020 11:13:59	46.117692	-129.972020	86.5	1752.66	TXT: We are going to be looking for interference with other sonars on the vehicle
09/06/2020 11:16:33	46.117696	-129.972000	84.74	1702.37	TXT: Using the DVL to determine altitude because the altimeter is not working. We are at 66 meters
09/06/2020 11:17:13	46.117694	-129.971996	86.52	1703.92	TXT: We're dropping our altitude by 10 meters
09/06/2020 11:39:42	46.117665	-129.972022	306.76	1714.41	TXT: Going west
09/06/2020 11:40:25	46.117703	-129.972015	266.18	1714.23	TXT: Going west 100 or so meters then turning around and going east about the same amount
09/06/2020 11:42:13	46.117751	-129.971884	269.49	1714.22	NAV: Doppler Reset
09/06/2020 11:44:52	46.117751	-129.971884	269.48	1714.39	TXT: Going west 75 meters
09/06/2020 11:45:50	46.117754	-129.972000	269.38	1711.99	TXT: Patch test line heading 270 distance 75 meters
09/06/2020 11:50:31	46.117774	-129.972830	270.05	1695.26	TXT: There's an issue with the auto altitude. It's not maintaining the altitude as we move
09/06/2020 11:51:42	46.117773	-129.972830	268.39	1704.48	TXT: It was doing auto depth instead of auto altitude
09/06/2020 11:54:10	46.117777	-129.973146	271.24	1713.91	NAV: Doppler Reset
09/06/2020 11:54:40	46.117805	-129.973098	88.87	1714.51	TXT: Turning around. Heading East
09/06/2020 11:55:51	46.117793	-129.973022	89.45	1713.44	TXT: Patch test heading 090 distance 75 meters
09/06/2020 11:59:17	46.117777	-129.972380	90.77	1715.38	TXT: Altitude of 55 meters we're seeing 200 meter wide swath
09/06/2020 11:59:36	46.117775	-129.972326	87.96	1713.8	TXT: 41 meters to go
09/06/2020 12:00:33	46.117766	-129.972144	90.56	1713.17	TXT: 27 meters to go
09/06/2020 12:01:59	46.117761	-129.971877	88.52	1715.01	TXT: 5 meters to go

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1294 Logger Comment
09/06/2020 12:02:14	46.117759	-129.971828	86.54	1714.98	TXT: End of line
09/06/2020 12:02:25	46.117760	-129.971841	89.3	1712.66	TXT: Turning 180 and heading back west
09/06/2020 12:05:34	46.117761	-129.971932	270.91	1714.13	TXT: Patch test due west heading 270 distance 100 meters. Start of line
09/06/2020 12:10:46	46.117790	-129.972912	271.83	1715.53	TXT: 18 meters to go
09/06/2020 12:11:17	46.117791	-129.973008	270.65	1714.95	TXT: 12 meters to go
09/06/2020 12:11:55	46.117794	-129.973124	268.93	1714.38	TXT: End of line
09/06/2020 12:13:13	46.117772	-129.972952	178.56	1713.98	TXT: Moving the ship
09/06/2020 12:15:45	46.117395	-129.973012	177.15	1714.11	TXT: Heading due south heading 180. This line will be up and down the south slope of the pillow mound
09/06/2020 12:19:55	46.117242	-129.972985	178.95	1715.78	TXT: Switching to auto depth
09/06/2020 12:26:37	46.117154	-129.972952	175.25	1709.24	TXT: Going to 40 meter altitude
09/06/2020 12:29:30	46.117189	-129.973022	179.7	1728.71	TXT: Start of line patch test due south heading 180 altitude 40 meters distance 100 meters
09/06/2020 12:35:47	46.116343	-129.973060	180.6	1728.55	TXT: End of line
09/06/2020 12:36:15	46.116313	-129.973061	176.59	1728.25	TXT: Auto depth was more stable than auto altitude
09/06/2020 12:37:16	46.116311	-129.973090	1.11	1728.38	TXT: Turning 180 degrees to head back up the line north (upslope)
09/06/2020 12:39:03	46.116358	-129.973134	358.76	1728.65	TXT: Start of line patch test due north heading 360 distance 100 meters
09/06/2020 12:39:12	46.116374	-129.973136	358.33	1728.34	TXT: Altitude around 60 meters
09/06/2020 12:45:32	46.117211	-129.973083	358.61	1728.42	TXT: End of line
09/06/2020 12:58:51	46.117205	-129.973084	0.14	1728.47	TXT: Finished patch test. Planning to start a small survey to compare to AUV data
09/06/2020 13:04:28	46.117202	-129.973041	58.1	1728.69	TXT: Moving the ship east a little
09/06/2020 13:07:07	46.117337	-129.972697	59.36	1728.49	TXT: Switching back to auto altitude
09/06/2020 13:09:18	46.117356	-129.972706	178.95	1728.43	TXT: Planning to do runs north to south
09/06/2020 13:11:13	46.117356	-129.972705	178.64	1728.42	TXT: Auto depth at 40 meters
09/06/2020 13:11:41	46.117314	-129.972706	180.69	1728.59	TXT: Start of line heading 180 distance 100 meters survey
09/06/2020 13:11:59	46.117278	-129.972711	181	1728.67	TXT: Due south
09/06/2020 13:18:16	46.116455	-129.972893	176.36	1728.3	TXT: End of line
09/06/2020 13:19:30	46.116409	-129.972821	138.04	1729.13	TXT: Driving east
09/06/2020 13:20:00	46.116329	-129.972595	114.81	1728.95	TXT: Switching to auto altitude
09/06/2020 13:23:26	46.116231	-129.971813	2.41	1728.01	TXT: Survey start of line due south heading 0 degrees distance 100 meters altitude around 50 meters using auto altitude
09/06/2020 13:29:56	46.117110	-129.971783	0.49	1720.98	TXT: Going to trip all three Niskins just to see if they work and seal properly. These are NOT samples.

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1294 Logger Comment
09/06/2020 13:30:15	46.117136	-129.971784	2.11	1721	TXT: The Niskins did not seal well on the last dive
09/06/2020 13:30:23	46.117129	-129.971784	1.55	1720.92	TXT: End of line
09/06/2020 13:33:08	46.117131	-129.971786	1.52	1720.92	TXT: Forward Niskan (number 1) tripped
09/06/2020 13:33:23	46.117131	-129.971786	1.38	1720.88	TXT: Back Niskan tripped
09/06/2020 13:34:08	46.117131	-129.971786	1.55	1720.88	TXT: Hydraulic Niskan tripped
09/06/2020 13:34:32	46.117131	-129.971786	1.62	1720.89	TXT: Altitude is 50 meters above bottom. Over the southern part of the pillow mound
09/06/2020 13:36:06	46.117154	-129.971948	288.86	1721.54	TXT: Moving into position to go up
09/06/2020 13:41:16	46.116787	-129.972775	270.53	1668.81	VEHICLE: milestone Off bottom
09/06/2020 13:41:34	46.116787	-129.972775	270.66	1659.82	TXT: On the way up
09/06/2020 13:42:58	46.116787	-129.972775	270.55	1618.55	TXT: Adjusting winch speed
09/06/2020 13:45:53	46.116787	-129.972775	271.16	1545.25	TXT: Depth 1545
09/06/2020 13:48:35	46.116787	-129.972775	271.08	1490.19	TXT: 1490 depth
09/06/2020 13:49:16	46.116787	-129.972775	128.2	1478.23	TXT: Doing two turns
09/06/2020 13:49:27	46.116787	-129.972775	10.17	1475.09	TXT: Depth 1475
09/06/2020 13:50:57	46.116787	-129.972775	268.82	1450.57	TXT: Depth 1450
09/06/2020 13:53:25	46.116787	-129.972775	268.88	1399.97	TXT: Depth 1400
09/06/2020 13:58:16	46.116787	-129.972775	267.8	1300.9	TXT: Depth 1300
09/06/2020 14:03:09	46.116787	-129.972775	267.61	1200.62	TXT: Depth 1200
09/06/2020 14:08:03	46.116787	-129.972775	267.51	1099.56	TXT: Depth 1100
09/06/2020 14:14:24	46.116787	-129.972775	266.78	1000.47	TXT: Depth 1000
09/06/2020 14:19:11	46.116787	-129.972775	269.06	900.85	TXT: Depth 900
09/06/2020 14:24:07	46.116787	-129.972775	268.99	800.64	TXT: Depth 800
09/06/2020 14:26:40	46.116787	-129.972775	152.55	746.12	TXT: Turning Jason
09/06/2020 14:29:56	46.116787	-129.972775	270.13	680.87	TXT: Depth 680
09/06/2020 14:33:58	46.116787	-129.972775	269.73	613.69	WATCH_CHANGE: new_watchstander Bill Hanshumaker
09/06/2020 14:34:51	46.116787	-129.972775	270.28	599.32	TXT: Depth 600m
09/06/2020 14:40:11	46.116787	-129.972775	271.78	496.12	TXT: Depth 500m
09/06/2020 14:53:53	46.116787	-129.972775	259.02	237.76	TXT: Depth 250m
09/06/2020 14:56:52	46.116787	-129.972775	264.22	183.73	TXT: Jason ascent rate is approx. 20m/sec
09/06/2020 15:01:04	46.116787	-129.972775	269.73	142.75	TXT: All stop at 142m
09/06/2020 15:02:17	46.116787	-129.972775	274.12	139.42	TXT: Jason ascent continues

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1294 Logger Comment
09/06/2020 15:05:21	46.116787	-129.972775	272.13	96.9	TXT: Depth 100m
09/06/2020 15:08:40	46.116787	-129.972775	270.49	34.4	TXT: Cable floats visible
09/06/2020 15:11:51	46.116787	-129.972775	270.87	10.08	TXT: Depth 10m
09/06/2020 15:12:27	46.116787	-129.972775	266.35	2.3	TXT: Last football floated up
09/06/2020 15:16:01	46.116787	-129.972775	88.67	0.9	VEHICLE: milestone Jason on deck

ROV Jason dive J2-1295 Dive Log (edited/corrected from Jason Virtual Van)

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1295 Logger Comment
09/10/2020 01:31:07	45.750026	-130.200002	121.81	0.9	TXT: Float pack deployed off stbd aft ~ten minutes ago. Sinking at about 48 meters/min
09/10/2020 01:37:22	45.750026	-130.200002	222.87	1.15	VEHICLE: milestone Jason off deck
09/10/2020 01:38:38	45.750026	-130.200002	306.03	2.76	VEHICLE: milestone Jason in water. This dive will recover 3 Webb instruments then will conduct pressure measurements at seafloor benchmarks and finally will sample fluids at Vixen and Casper vents.
09/10/2020 01:55:51	45.750026	-130.200002	304.56	175.24	TXT: Float pack on the bottom 1511 m - for recovery of Webb instrument at Webb-5 site (near Trevi)
09/10/2020 02:13:56	45.749977	-130.199993	178.22	707.95	TXT: Cable biasing turn (one) at 700m.
09/10/2020 02:33:56	45.749970	-130.199973	246.17	1291.3	TXT: 1290 depth
09/10/2020 02:45:34	45.947451	-129.983577	84.02	1513.11	VEHICLE: milestone On bottom
09/10/2020 02:47:58	45.947452	-129.983538	82.41	1513.71	WATCH_CHANGE: new_watchstander Bill Hanshumaker
09/10/2020 02:50:59	45.947331	-129.983484	167.38	1514.18	TXT: Float spotted
09/10/2020 02:52:09	45.947226	-129.983497	156.38	1516.3	TXT: Webb instrument Comp 3A sighted close by
09/10/2020 02:55:19	45.947194	-129.983483	188.7	1516.97	TXT: Jason removes weight off of top of shield on instrument
09/10/2020 02:57:26	45.947195	-129.983479	187.65	1516.85	TXT: Dive weight in basket
09/10/2020 03:02:44	45.947173	-129.983475	7.13	1516.17	TXT: Jason removes shield
09/10/2020 03:08:39	45.947191	-129.983510	132.74	1516.33	TXT: Shield set to the side of the instrument package
09/10/2020 03:11:18	45.947163	-129.983528	105.36	1517.5	TXT: Jason spins the shield to align red hook
09/10/2020 03:15:39	45.947154	-129.983490	347.72	1517.06	TXT: Shield placed back on ground

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1295 Logger Comment
09/10/2020 03:17:21	45.947153	-129.983514	39.18	1517.76	TXT: Jason grabs pull pin
09/10/2020 03:17:50	45.947146	-129.983517	39.33	1517.75	TXT: Recovery line is removed
09/10/2020 03:18:52	45.947150	-129.983525	85.58	1516.73	TXT: Jason surveys shield position for confirmation
09/10/2020 03:21:12	45.947164	-129.983505	103.87	1517.69	TXT: Line is lifted over the top of the instrument package
09/10/2020 03:25:48	45.947167	-129.983496	93.59	1517.71	TXT: Jason pulls blue pull pin to the right and puts it in the basket
09/10/2020 03:27:50	45.947175	-129.983510	91.14	1517.68	TXT: Second blue pull pin is removed and stowed in basket
09/10/2020 03:31:40	45.947170	-129.983493	90.84	1517.65	TXT: Red thimble is grabbed and moved off platform
09/10/2020 03:33:17	45.947181	-129.983478	90.91	1517.66	TXT: Jason grabs T handle and is stowed in basket
09/10/2020 03:37:16	45.947173	-129.983503	90.77	1517.61	TXT: Third blue pull pin is removed and stowed in basket
09/10/2020 03:41:40	45.947153	-129.983511	127.93	1517.52	TXT: Jason grabs floating white line
09/10/2020 03:59:45	45.947144	-129.983513	103.93	1517.45	TXT: After several unsuccessful attempts to put the hook with the floating line through the shield's eye bolt Jason realigns the shield
09/10/2020 04:04:07	45.947135	-129.983557	116.84	1517.31	TXT: Jason lifts the shield off the bottom to get a better angle for the hook
09/10/2020 04:14:09	45.947141	-129.983527	117.13	1517.36	TXT: Hook is attached to the shield's eyebolt
09/10/2020 04:15:56	45.947206	-129.983457	104.33	1514.04	TXT: Jason moves the float
09/10/2020 04:18:53	45.947230	-129.983325	352.07	1515.08	TXT: Jason grabs the blue float line and rotates the float clockwise
09/10/2020 04:22:59	45.947213	-129.983316	351.93	1515.06	TXT: Removes pin and stows it in the basket
09/10/2020 04:26:26	45.947125	-129.983482	294.2	1517.41	TXT: Shackle is removed from the float and installed on the shield's eyebolt
09/10/2020 04:29:42	45.947242	-129.983351	177.45	1514.32	TXT: Jason returns to the float and grabs the top bale
09/10/2020 04:31:43	45.947178	-129.983488	152.45	1514.79	TXT: Float is moved to the instrument package
09/10/2020 04:31:57	45.947174	-129.983490	149.3	1514.89	NAV: Doppler Reset
09/10/2020 04:36:32	45.947187	-129.983498	151.42	1514.83	TXT: Jason grabs the top to remove the shackle on the float
09/10/2020 04:37:52	45.947197	-129.983491	149.92	1517.22	TXT: Blue rope is unbundled and shackled is taken to the instrument package
09/10/2020 04:40:54	45.947198	-129.983529	150.3	1517.18	TXT: Jason grabs the bridle and connects the hook on the blue rope
09/10/2020 04:46:27	45.947216	-129.983517	150.57	1517.17	TXT: Latch is not closing completely
09/10/2020 04:46:46	45.947219	-129.983526	150.57	1517.17	TXT: Latch is closed
09/10/2020 04:50:46	45.947209	-129.983451	274.83	1516.95	TXT: Float is connected to Webb instrument Comp A3
09/10/2020 04:53:28	45.947217	-129.983457	280.86	1517.12	TXT: Jason removes pull pin from weights
09/10/2020 04:56:30	45.947239	-129.983389	278.53	1516.61	TXT: Package is released (float pack + instrument + shield). Will be recovered by ship.
09/10/2020 04:57:02	45.947198	-129.983358	302.33	1512.62	TXT: Shield is off the bottom
09/10/2020 05:00:30	45.946792	-129.983830	225.13	1514.89	TXT: Approximately 70 minutes to surface

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1295 Logger Comment
09/10/2020 05:02:32	45.946314	-129.984102	200	1507.74	TXT: Jason's heading 195 and rises 50 meters of the sea floor
09/10/2020 05:07:16	45.946002	-129.984543	259.92	1469.58	TXT: Jason heading 258
09/10/2020 05:11:33	45.945724	-129.985022	269.23	1469.68	TXT: Estimated time for float surfacing is 60 minutes
09/10/2020 05:41:35	45.944951	-129.987097	253.74	1469.13	TXT: Package should surface in 35 minutes
09/10/2020 06:15:04	45.943352	-129.987344	308.83	1469.28	TXT: Seven minutes to surface
09/10/2020 06:24:07	45.943279	-129.987770	29.88	1469.56	TXT: Bridge has visual on float
09/10/2020 06:54:43	45.944826	-129.984236	38.69	1465.97	WATCH_CHANGE: new_watchstander Jeff Beeson + Leland Wood
09/10/2020 07:03:41	45.946231	-129.982236	37.27	1467.55	TXT: Ship moving alongside float
09/10/2020 07:07:02	45.946640	-129.981625	38.88	1468.07	TXT: Float being recovered by ship
09/10/2020 07:17:18	45.946097	-129.981927	249.76	1467.63	TXT: instrument on deck
09/10/2020 07:27:14	45.946005	-129.981154	250.08	1467.83	TXT: Shield on deck
09/10/2020 07:33:32	45.945978	-129.981157	250.51	1467.99	TXT: Begin transit to Webb-4 instrument site
09/10/2020 07:38:50	45.945959	-129.981112	249.83	1510.9	TXT: Moving down to bottom for transit - bottom in sight
09/10/2020 07:39:30	45.945974	-129.981158	277.67	1509.08	NAV: Doppler Reset
09/10/2020 07:50:38	45.945925	-129.982149	287.85	1514.09	TXT: image
09/10/2020 09:20:03	45.947542	-129.992940	291.57	1519.86	NAV: Doppler Reset
09/10/2020 10:46:57	45.948569	-130.003375	295.03	1524.01	TXT: Cover in sight
09/10/2020 10:47:09	45.948579	-130.003360	295.31	1523.79	WATCH_CHANGE: new_watchstander Bill Chadwick + Kelly Chadwick
09/10/2020 10:52:37	45.948649	-130.003369	293.33	1525.06	TXT: Waiting for floatation pack to be deployed by ship at this location (Webb-4)
09/10/2020 11:11:10	45.948672	-130.003401	293.31	1520.72	TXT: Float in the water
09/10/2020 11:11:17	45.948672	-130.003401	293.08	1520.66	TXT: Moving the ship
09/10/2020 11:14:29	45.948679	-130.003386	293.06	1520.67	TXT: Waiting for float to descend to bottom
09/10/2020 11:38:42	45.949288	-130.003846	135.56	1511.88	TXT: Float on bottom (1513 depth)
09/10/2020 11:40:19	45.949263	-130.003830	135.02	1527.34	TXT: Bottom in sight
09/10/2020 11:42:25	45.949022	-130.003633	159.29	1528.36	NAV: Doppler Reset
09/10/2020 11:43:50	45.948782	-130.003622	170.79	1529.18	TXT: Flying by the instrument Comp A1
09/10/2020 11:44:05	45.948747	-130.003626	169.77	1529.18	TXT: Float seems to have gone down pretty straight
09/10/2020 11:45:24	45.948586	-130.003616	169.21	1529.14	TXT: Float pack in sight
09/10/2020 11:46:48	45.948516	-130.003568	169.65	1529.1	TXT: image of float pack
09/10/2020 11:47:13	45.948493	-130.003558	167.13	1529.09	TXT: Image of float pack
09/10/2020 11:48:25	45.948421	-130.003534	53.64	1528.73	TXT: image of float pack

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1295 Logger Comment
09/10/2020 11:49:36	45.948424	-130.003541	0.45	1528.6	TXT: The rope on float is fouled a little
09/10/2020 11:50:15	45.948437	-130.003522	2.35	1530.58	TXT: The rope is wrapped around the anchor
09/10/2020 11:50:32	45.948439	-130.003515	2.18	1530.56	TXT: Image of fouled rope
09/10/2020 11:52:11	45.948440	-130.003512	3.09	1527.67	TXT: Right arm grabbing football float
09/10/2020 11:53:09	45.948428	-130.003509	3.16	1529.06	TXT: Going to attempt to untangle the rope
09/10/2020 11:55:33	45.948470	-130.003503	285.8	1530.77	TXT: image
09/10/2020 11:56:58	45.948456	-130.003457	285.01	1530.48	TXT: image
09/10/2020 11:57:08	45.948458	-130.003454	285.41	1530.57	TXT: image
09/10/2020 11:59:34	45.948435	-130.003474	275.19	1530.56	TXT: Released the football float line but it's still wrapped around the hook
09/10/2020 12:00:35	45.948434	-130.003502	275.55	1530.47	TXT: Going to attempt to unwrap line from the hook
09/10/2020 12:00:58	45.948433	-130.003505	275.28	1530.44	TXT: Pulling football float line down a little to unwrap it
09/10/2020 12:01:16	45.948433	-130.003504	275.46	1530.45	TXT: Rope unwrapped!
09/10/2020 12:01:50	45.948435	-130.003504	275.28	1530.46	TXT: Planning how to move the float pack
09/10/2020 12:02:57	45.948453	-130.003498	275.42	1530.19	TXT: Grabbing the float
09/10/2020 12:04:03	45.948440	-130.003486	248.8	1525.73	TXT: Lifting float pack
09/10/2020 12:04:18	45.948436	-130.003474	151.28	1526.89	TXT: Doing some turns
09/10/2020 12:06:41	45.948577	-130.003442	18.7	1526.8	TXT: The instrument and cover are visible in the pilot cam on the bottom
09/10/2020 12:07:40	45.948638	-130.003436	12.94	1526.57	TXT: Planning how to attach the float pack
09/10/2020 12:08:31	45.948664	-130.003426	16.2	1526.76	TXT: Moving into position
09/10/2020 12:10:36	45.948683	-130.003427	12.19	1530.46	TXT: Float pack placed beside cover and instrument
09/10/2020 12:11:58	45.948686	-130.003431	12.5	1530.79	TXT: Grabbing one of the attachment ropes
09/10/2020 12:12:15	45.948687	-130.003432	12.81	1530.74	TXT: Using both arms
09/10/2020 12:12:46	45.948688	-130.003432	12.54	1530.73	TXT: Figuring how to undo the bungee
09/10/2020 12:13:07	45.948686	-130.003429	12.45	1530.73	TXT: Bungee away.
09/10/2020 12:13:51	45.948687	-130.003421	12.51	1530.66	TXT: Placing bungee in crate
09/10/2020 12:14:22	45.948690	-130.003413	12.18	1530.79	TXT: Bungee is stuck on Jason's claw
09/10/2020 12:16:00	45.948699	-130.003447	338.19	1532.38	TXT: Going to attempt to attach the released rope with the hook to the cover
09/10/2020 12:16:27	45.948703	-130.003450	340.52	1532.29	TXT: image
09/10/2020 12:17:00	45.948705	-130.003447	340.85	1532.26	TXT: Doing a re grab
09/10/2020 12:17:24	45.948704	-130.003443	340.92	1532.3	TXT: Bungee knocked off Jason's claw
09/10/2020 12:17:40	45.948703	-130.003443	340.99	1532.28	TXT: Holding released rope with both arms

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1295 Logger Comment
09/10/2020 12:18:36	45.948697	-130.003450	340.57	1532.28	TXT: Right arm holding rope and left arm picking up bungee and putting it away
09/10/2020 12:19:40	45.948692	-130.003447	340.61	1532.22	TXT: Attaching rope hook thing
09/10/2020 12:20:46	45.948690	-130.003446	340.02	1532.24	TXT: Attached
09/10/2020 12:21:00	45.948690	-130.003446	340.08	1532.26	TXT: Removing the cover's weight
09/10/2020 12:21:18	45.948689	-130.003446	340.02	1532.29	TXT: Putting the weight on the ground
09/10/2020 12:22:26	45.948685	-130.003472	16.4	1531.58	TXT: Planning to remove cover and then attach instrument to the cover
09/10/2020 12:24:26	45.948716	-130.003497	160.67	1532.28	TXT: Grabbing the cover
09/10/2020 12:25:02	45.948715	-130.003491	160.71	1532.23	TXT: Grabbed cover with both arms
09/10/2020 12:25:37	45.948706	-130.003496	160.78	1532.19	TXT: Going to fly the cover off
09/10/2020 12:25:54	45.948700	-130.003507	161.21	1530.77	TXT: Flying the cover up and away from instrument
09/10/2020 12:27:04	45.948686	-130.003537	7.36	1530.19	TXT: Placing the cover beside the instrument
09/10/2020 12:28:41	45.948683	-130.003503	333.09	1532.37	TXT: Cover placed
09/10/2020 12:29:24	45.948690	-130.003507	328.4	1532.39	TXT: Jason no longer holding the cover
09/10/2020 12:30:18	45.948694	-130.003511	332.58	1530.2	TXT: Going to hook the instrument to the cover first then to the float
09/10/2020 12:30:37	45.948698	-130.003513	139.28	1530.06	TXT: Jason moving into position to attach the cover to the instrument
09/10/2020 12:31:37	45.948710	-130.003506	168.39	1532.34	TXT: Jason sitting on bottom
09/10/2020 12:31:47	45.948711	-130.003505	169.26	1532.32	TXT: Quick break
09/10/2020 12:35:46	45.948702	-130.003482	169.59	1532.33	TXT: Jason at the instrument
09/10/2020 12:37:32	45.948699	-130.003471	172.24	1532.32	TXT: Going to pull the pull-pin to release the lines that will attach the instrument to the float
09/10/2020 12:39:37	45.948707	-130.003477	174.26	1532.31	TXT: Pulling the pull pin that attaches the instrument to the cover
09/10/2020 12:40:06	45.948706	-130.003478	172.64	1532.34	TXT: Put the pull pin in the box
09/10/2020 12:41:52	45.948709	-130.003480	172.92	1532.32	TXT: Removing pull pin from other hook
09/10/2020 12:42:48	45.948713	-130.003481	172.75	1532.35	TXT: Pulling third pull pin
09/10/2020 12:43:48	45.948718	-130.003488	173.7	1532.34	TXT: image
09/10/2020 12:44:17	45.948718	-130.003505	168.9	1532.2	TXT: Rope is all up in Jason's face
09/10/2020 12:44:34	45.948716	-130.003517	160.09	1531.8	TXT: Jason is moving back to get away from the rope
09/10/2020 12:45:10	45.948709	-130.003533	162.38	1532.43	TXT: Moving into position to connect the instrument's rope and hook to the cover
09/10/2020 12:46:21	45.948707	-130.003519	162.4	1532.41	TXT: Cover is just out of reach of the hook
09/10/2020 12:46:42	45.948707	-130.003517	162.54	1532.36	TXT: Jason is going to move the cover with its left arm
09/10/2020 12:47:54	45.948699	-130.003517	165	1532.4	TXT: Attempting to attach the hook again
09/10/2020 12:48:11	45.948698	-130.003519	165.1	1532.41	TXT: Hook is attached!

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1295 Logger Comment
09/10/2020 12:51:51	45.948704	-130.003548	161.2	1532.43	TXT: Grabbing the loop to move the cover but the loop came off
09/10/2020 12:52:34	45.948704	-130.003548	161.09	1532.42	TXT: Regrabbing the loop to reattach it to the cover
09/10/2020 12:53:09	45.948699	-130.003541	156.67	1532.23	TXT: Moving closer because Jason was too far away
09/10/2020 12:53:57	45.948698	-130.003542	150.91	1532.35	TXT: Dropped the loop
09/10/2020 12:54:43	45.948699	-130.003546	150.95	1532.4	TXT: Trying again to attach the loop to the cover
09/10/2020 12:55:16	45.948697	-130.003547	151.34	1532.38	TXT: Loop reattached to the cover
09/10/2020 12:55:44	45.948697	-130.003554	148.75	1532.42	TXT: Pulling cover away from instrument to stretch out the line of rope connecting them together
09/10/2020 12:56:54	45.948716	-130.003526	187.47	1530.88	TXT: Moving to connect the instrument to the float
09/10/2020 13:01:13	45.948698	-130.003445	137.87	1530.31	TXT: Grabbing the hook of the float pack's rope so it can be connected to the instrument
09/10/2020 13:01:46	45.948700	-130.003444	137.43	1530.44	TXT: Float pack is spinning so the rope is moving away
09/10/2020 13:02:09	45.948704	-130.003448	138.08	1530.43	TXT: Jason spun the float pack but it went too far the other way
09/10/2020 13:02:49	45.948707	-130.003465	138.01	1530.39	TXT: Holding float pack with left arm while right arm gets the hook
09/10/2020 13:03:07	45.948705	-130.003466	137.82	1530.39	TXT: Right arm has the hook
09/10/2020 13:03:48	45.948696	-130.003452	137.98	1530.4	TXT: Using the left arm to pull the pull pin
09/10/2020 13:04:07	45.948693	-130.003447	137.77	1530.4	TXT: Pull pin deposited in jason box
09/10/2020 13:04:57	45.948693	-130.003461	137.81	1530.4	TXT: Going to attach the float pack's rope and hook to the instrument
09/10/2020 13:06:04	45.948701	-130.003488	160.9	1532.27	TXT: In position to attach the hook to the instrument
09/10/2020 13:07:06	45.948699	-130.003485	166.75	1532.4	TXT: Trying to use the left arm to hold the loop that the hook will attach to
09/10/2020 13:07:50	45.948703	-130.003503	168	1532.38	TXT: Attempting to attach the hook
09/10/2020 13:08:51	45.948707	-130.003516	167.55	1532.4	TXT: Trying to find a good angle to attach the hook
09/10/2020 13:09:16	45.948709	-130.003519	167.69	1532.41	TXT: Hook attached!
09/10/2020 13:09:39	45.948711	-130.003521	168.56	1532.41	TXT: Now the instrument is attached to the float pack and the cover
09/10/2020 13:11:24	45.948713	-130.003513	167.8	1532.28	TXT: Letting the bridge know that the float is ready to go
09/10/2020 13:11:41	45.948714	-130.003507	169.95	1531.95	TXT: Moving toward the float
09/10/2020 13:14:09	45.948717	-130.003468	166.18	1532.52	TXT: Discussing ship position
09/10/2020 13:15:14	45.948718	-130.003480	171.34	1532.41	TXT: Discussing how the float will move when the anchors are released
09/10/2020 13:16:40	45.948719	-130.003464	226.42	1532.47	TXT: Jason moved so that the science cam can see the instrument when the anchor is released
09/10/2020 13:17:43	45.948719	-130.003455	226.37	1532.48	TXT: Trying to position the weights so Jason can reach the pull pin easily
09/10/2020 13:18:10	45.948719	-130.003447	226.15	1532.46	TXT: Trying to grab the pull pin

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1295 Logger Comment
09/10/2020 13:19:02	45.948718	-130.003446	225.97	1532.46	TXT: Pull pin is a little stuck
09/10/2020 13:19:22	45.948717	-130.003453	226.01	1532.44	TXT: Going to hold the weights down with the left arm
09/10/2020 13:20:57	45.948715	-130.003473	226.11	1532.43	TXT: Still struggling to keep the weights still enough to remove the pull pin
09/10/2020 13:24:05	45.948720	-130.003453	226.15	1532.42	TXT: Pull spin is still stuck a bit
09/10/2020 13:24:09	45.948721	-130.003451	226.15	1532.38	TXT: Pull pin removed
09/10/2020 13:24:25	45.948724	-130.003446	226.94	1532.33	TXT: Float and instrument and cover are away. Will be recovered by ship.
09/10/2020 13:26:23	45.948760	-130.003434	355	1528.84	TXT: Waiting for the float to reach the surface. Going up 20 meters
09/10/2020 13:40:14	45.948564	-130.005812	227.36	1506.39	TXT: Instrument at 918 depth
09/10/2020 14:06:57	45.947995	-130.007179	49.5	1506.01	TXT: Float is on surface. Moving ship to be along side
09/10/2020 14:10:05	45.947905	-130.006469	91.83	1506.09	TXT: Float will be recovered on deck
09/10/2020 14:16:30	45.948036	-130.005626	32.74	1505.94	TXT: Float visible off the side of the ship
09/10/2020 14:20:49	45.947955	-130.005177	36.46	1505.99	TXT: Got a hook on the float. Starting the process of bringing it on board
09/10/2020 14:27:30	45.947911	-130.005267	36.43	1506.03	TXT: Instrument on deck
09/10/2020 14:28:38	45.947920	-130.005274	36.56	1506.01	TXT: Float on deck (for real this time)
09/10/2020 14:38:19	45.947917	-130.005278	36.92	1506.14	TXT: Cover on deck
09/10/2020 14:41:53	45.947915	-130.005279	36.45	1505.71	TXT: Starting to prepare for transit to Webb-6 instrument location
09/10/2020 14:43:58	45.947867	-130.005310	121.95	1506.14	WATCH_CHANGE: new_watchstander Bill Hanshumaker
09/10/2020 16:25:58	45.936356	-129.998835	303.19	1505.89	TXT: Float prepared to deploy from ship
09/10/2020 16:37:05	45.936557	-129.999253	303.81	1505.93	TXT: Float is in the water
09/10/2020 16:40:42	45.936738	-129.999181	37.22	1506.42	TXT: Jason in proximity of Webb-6 and waiting for float to descend
09/10/2020 16:43:23	45.936806	-129.998964	351.53	1505.81	TXT: Estimated time for float to reach bottom is 24 minutes
09/10/2020 17:04:52	45.936587	-129.998599	143.9	1506.22	TXT: Float is on the bottom
09/10/2020 17:05:56	45.936477	-129.998381	145.18	1506.15	TXT: Jason is heading 144 towards the float
09/10/2020 17:10:29	45.936228	-129.998063	139.95	1538.63	TXT: Jason across bottom at 1538m
09/10/2020 17:11:28	45.936160	-129.997930	136.63	1538.42	TXT: Float sighted
09/10/2020 17:14:23	45.936084	-129.997810	136.9	1530.9	TXT: Jason grabs line below football float
09/10/2020 17:18:17	45.936458	-129.998084	353.99	1525.05	TXT: Jason is moving float to instrument package
09/10/2020 17:21:17	45.936640	-129.997923	40.06	1532.19	TXT: Shield is in sight
09/10/2020 17:26:21	45.936728	-129.997769	315.99	1539.58	NAV: Doppler Reset
09/10/2020 17:28:27	45.936742	-129.997834	72.28	1539.62	TXT: Jason removes weight from shield
09/10/2020 17:33:35	45.936723	-129.997847	142.39	1540.53	TXT: Jason removes shield from instrument package

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1295 Logger Comment
09/10/2020 17:39:20	45.936727	-129.997903	160.24	1539.16	TXT: Wood handle on sheild broke
09/10/2020 17:42:00	45.936720	-129.997820	117.35	1540.45	TXT: Jason moves to instrument package Comp A2
09/10/2020 17:43:23	45.936744	-129.997815	163.09	1540.36	TXT: Jason removes and stows pin releasing rope bridle
09/10/2020 17:49:21	45.936737	-129.997791	162.16	1540.24	TXT: Jason repositions bridle for easier access
09/10/2020 17:49:44	45.936737	-129.997785	161.59	1540.24	TXT: Jason pulls and stows second pin
09/10/2020 17:51:48	45.936749	-129.997804	161.82	1540.22	TXT: Jason removes and stows third pin
09/10/2020 17:54:35	45.936717	-129.997868	153.3	1540.3	TXT: Jason grabs hook extends rope
09/10/2020 18:00:04	45.936736	-129.997888	166.46	1540.42	TXT: Jason adjusted shield for easier hook attachment angle
09/10/2020 18:00:41	45.936741	-129.997926	163.01	1538.88	TXT: Hook is attached to shield
09/10/2020 18:04:25	45.936631	-129.997925	87.18	1537.26	TXT: Jason moves to float and grabs it by the top handle
09/10/2020 18:06:49	45.936766	-129.997795	160.98	1536.97	TXT: Float is moved to the bridle side of the instrument package
09/10/2020 18:14:46	45.936726	-129.997905	58.01	1538.82	TXT: Jason moves to the float and releases the shackle by pulling its pin
09/10/2020 18:18:05	45.936731	-129.997881	147.27	1540.42	TXT: Shackle attached to top of shield
09/10/2020 18:24:51	45.936762	-129.997816	115.1	1539.93	TXT: Jason moves to the float and pulls and stows the pin holding the hook
09/10/2020 18:30:12	45.936747	-129.997804	112.47	1540.33	TXT: Hook is attached to instrument package bridle
09/10/2020 18:37:04	45.936724	-129.997998	214.33	1535.88	TXT: Pulled pin on weights and package away at 40 meters per minute ascent time
09/10/2020 18:48:28	45.935704	-130.000286	245.78	1513.96	WATCH_CHANGE: new_watchstander Jeff Beeson + Leland Wood
09/10/2020 18:48:54	45.935666	-130.000369	245.83	1513.72	TXT: ETA 20 min until float at surface
09/10/2020 19:08:38	45.935111	-130.001638	251.67	1480.21	TXT: Jason rising higher for Sentry launch
09/10/2020 19:13:41	45.935059	-130.001742	250.65	1367.44	TXT: Float at surface - start of Sentry launch
09/10/2020 19:15:24	45.935158	-130.001540	249.96	1356.42	TXT: Still doing pre check for sentry - and recovering float before the launch
09/10/2020 19:34:43	45.937285	-129.999456	330.61	1327.44	TXT: Float at starboard side - almost ready for recovery
09/10/2020 19:38:17	45.937911	-129.999568	7.76	1308.76	TXT: Float hooked with tag lines
09/10/2020 19:45:00	45.938896	-129.998570	315.18	1313.5	TXT: Instrument on deck
09/10/2020 19:45:04	45.938889	-129.998561	315.02	1313.41	TXT: Float on deck
09/10/2020 19:55:03	45.938999	-129.997872	314.41	1313.64	TXT: Shield on deck
09/10/2020 20:02:38	45.939005	-129.997819	234.6	1312.62	TXT: Move about 200 m SW for better location for Sentry launch
09/10/2020 20:20:46	45.937507	-129.998924	291.27	1311.4	TXT: Still waiting for Sentry launch
09/10/2020 20:44:09	45.937327	-129.999712	302.4	1311.24	TXT: Sentry off deck
09/10/2020 20:45:46	45.937424	-129.999697	302.4	1311.22	TXT: Sentry in water
09/10/2020 20:45:49	45.937426	-129.999697	302.3	1311.15	TXT: Sentry released

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1295 Logger Comment
09/10/2020 20:46:35	45.937452	-129.999700	302.49	1311.32	TXT: Moving to port for Sentry to descend
09/10/2020 21:17:46	45.938122	-130.001929	302.02	1311.13	TXT: Still waiting for green light from Sentry that we are good to begin transit
09/10/2020 21:44:36	45.938042	-130.001693	217.11	1313.25	TXT: Begin transit to AX-308
09/10/2020 21:52:31	45.937567	-130.001649	181.28	1532.26	TXT: Jason back on bottom
09/10/2020 21:52:52	45.937499	-130.001632	169.25	1532.48	NAV: Doppler Reset
09/10/2020 22:16:26	45.934838	-130.000202	180.34	1537.85	TXT: Interesting pillow field
09/10/2020 22:23:03	45.934131	-129.999948	180.06	1531.83	TXT: Found weight plate?
09/10/2020 22:24:01	45.934074	-129.999893	176.38	1531.87	TXT: Second
09/10/2020 22:27:28	45.933662	-129.999742	179.24	1532.4	TXT: OOI cable in sight
09/10/2020 22:30:26	45.933392	-129.999657	179.18	1531.61	TXT: So many brittle stars in this area!
09/10/2020 22:47:12	45.931735	-129.998868	164.13	1529.83	WATCH_CHANGE: new_watchstander Bill Chadwick and Kelly Chadwick
09/10/2020 22:47:29	45.931700	-129.998857	165	1529.83	TXT: Benchmark AX-308 in sight
09/10/2020 22:48:35	45.931631	-129.998851	232.21	1530.63	TXT: image
09/10/2020 22:50:34	45.931600	-129.998841	270.73	1531.3	TXT: Brittle stars!
09/10/2020 22:51:21	45.931606	-129.998850	270.12	1531.31	TXT: Grabbing the MPR with right arm
09/10/2020 22:53:15	45.931602	-129.998855	270.45	1531.32	TXT: MPR is released from the bungees. Right arm is grabbing old Mini-BPR off benchmark
09/10/2020 22:53:34	45.931601	-129.998855	270.8	1531.31	TXT: Old Mini-BPR 2014-08 is being placed on the ocean floor
09/10/2020 22:54:37	45.931610	-129.998851	270.38	1531.34	TXT: Grabbing the MPR with the right arm
09/10/2020 22:55:03	45.931617	-129.998846	270.72	1531.34	TXT: MPR is being moved to AX-308 platform
09/10/2020 22:55:31	45.931621	-129.998846	270.84	1531.35	TXT: Realized MPR is still connected by one bungee at the front
09/10/2020 22:56:37	45.931626	-129.998849	270.87	1531.35	TXT: Waiting for the brittle star to move
09/10/2020 22:56:58	45.931630	-129.998840	270.85	1531.35	TXT: MPR is placed on benchmark
09/10/2020 22:58:00	45.931628	-129.998829	270.86	1531.32	TXT: Adjusting position of MPR
09/10/2020 22:59:27	45.931616	-129.998840	270.84	1531.34	TXT: Starting the pressure measurement at AX-308
09/10/2020 23:03:05	45.931600	-129.998841	270.82	1531.37	TXT: Starfish!
09/10/2020 23:03:36	45.931608	-129.998841	270.83	1531.36	TXT: image
09/10/2020 23:03:54	45.931613	-129.998838	270.86	1531.37	TXT: Mystery organisms
09/10/2020 23:04:42	45.931625	-129.998836	270.85	1531.36	TXT: image
09/10/2020 23:04:51	45.931626	-129.998838	270.84	1531.36	TXT: image
09/10/2020 23:09:07	45.931623	-129.998853	270.87	1531.39	TXT: Shrimp!!
09/10/2020 23:11:59	45.931600	-129.998826	270.87	1531.35	TXT: Fish!

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1295 Logger Comment
09/10/2020 23:19:23	45.931607	-129.998844	270.94	1531.33	TXT: Pressure measurement at AX-308 is done
09/10/2020 23:19:45	45.931607	-129.998844	270.65	1531.37	TXT: Jason is moving the MPR back into the basket
09/10/2020 23:20:33	45.931605	-129.998844	270.49	1531.38	TXT: Jason is doing cable management
09/10/2020 23:20:58	45.931606	-129.998847	270.66	1531.43	TXT: Grabbing new Mini-BPR 2020-01 out of the basket
09/10/2020 23:21:30	45.931611	-129.998853	270.63	1531.41	TXT: Jason removed the pull pin
09/10/2020 23:21:42	45.931612	-129.998855	270.64	1531.42	TXT: Mini-BPR 2020-01 moved a little bit
09/10/2020 23:22:21	45.931614	-129.998857	270.64	1531.41	TXT: The right arm is lifting Mini-BPR 2020-01
09/10/2020 23:22:45	45.931615	-129.998855	270.71	1531.31	TXT: Mini-BPR 2020-01 is being positioned on the benchmark
09/10/2020 23:23:24	45.931613	-129.998831	270.83	1531.36	TXT: Mini-BPR 2020-01 fell into the platform hole a little
09/10/2020 23:23:43	45.931613	-129.998818	270.92	1531.36	TXT: Mini-BPR 2020-01 placed at AX-308
09/10/2020 23:24:12	45.931615	-129.998811	270.86	1531.37	TXT: Leaving the old Mini-BPR (2014-08) on the sea floor for now. Will be picking it up later
09/10/2020 23:24:23	45.931616	-129.998808	271.1	1531.4	TXT: Beginning transit to AX-106
09/10/2020 23:46:11	45.932261	-130.000987	288.52	1532	TXT: Pillow lava
09/11/2020 00:08:35	45.933374	-130.005223	288.01	1533.6	TXT: Fish!
09/11/2020 00:14:23	45.933700	-130.006466	290.75	1533.46	TXT: Crossing some OOI cables that go to Ashes
09/11/2020 00:15:00	45.933733	-130.006593	288.49	1533.29	TXT: image
09/11/2020 00:27:06	45.934218	-130.009204	289.59	1533.74	TXT: Conducting video quality test - pausing sci cam and downloading images before resuming
09/11/2020 00:33:46	45.934376	-130.010866	278.25	1537.79	TXT: Sci cam resume recording
09/11/2020 00:34:45	45.934394	-130.010971	278.71	1537.84	TXT: image
09/11/2020 00:38:01	45.934463	-130.011659	321.21	1540	TXT: AX-106 in sight
09/11/2020 00:38:44	45.934448	-130.011682	77.57	1540.54	TXT: Moving to correct side of benchmark
09/11/2020 00:39:31	45.934450	-130.011680	72.49	1542.08	TXT: Jason set down in front of AX-106
09/11/2020 00:41:18	45.934426	-130.011685	73.82	1542.13	TXT: Jason is moving the MPR into position
09/11/2020 00:41:33	45.934431	-130.011686	73.75	1542.13	TXT: The cable on the pressure measure is caught on the crate
09/11/2020 00:42:00	45.934441	-130.011690	73.75	1542.11	TXT: Waiting for the brittle stars to move
09/11/2020 00:43:42	45.934444	-130.011739	73.94	1542.08	TXT: Adjusting position of the MPR
09/11/2020 00:44:19	45.934456	-130.011722	73.65	1542.1	TXT: Checking position
09/11/2020 00:44:51	45.934465	-130.011707	73.77	1542.08	TXT: MPR placed
09/11/2020 00:45:11	45.934468	-130.011701	73.57	1542.05	TXT: Beginning pressure measure at AX-106
09/11/2020 00:51:08	45.934459	-130.011713	73.76	1542	TXT: Looking at animals on the flag attached to the benchmark

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1295 Logger Comment
09/11/2020 00:55:01	45.934475	-130.011736	73.62	1541.99	TXT: Pressure measurement at AX-106 complete
09/11/2020 00:56:10	45.934463	-130.011713	73.65	1542	TXT: MPR replaced in its holster
09/11/2020 00:58:05	45.934535	-130.011709	6.13	1540.24	TXT: Transiting
09/11/2020 01:09:25	45.935228	-130.011524	12.53	1539.11	TXT: image
09/11/2020 02:16:14	45.945200	-130.009123	0.18	1539.05	TXT: AX-307 in sight
09/11/2020 02:17:45	45.945363	-130.009272	87.31	1541.62	TXT: Moving to the right position
09/11/2020 02:20:18	45.945381	-130.009250	172.42	1543.28	TXT: Moving to remove the old Mini-BPR that is on the benchmark
09/11/2020 02:21:50	45.945377	-130.009236	172.28	1543.32	TXT: Mini-BPR 2014-09 has been placed on the sea floor
09/11/2020 02:22:02	45.945377	-130.009238	172.28	1543.28	TXT: MPR being moved to position
09/11/2020 02:24:59	45.945373	-130.009251	172.55	1543.21	TXT: Positioning MPR so that it's stable
09/11/2020 02:26:37	45.945352	-130.009259	172.41	1543.27	TXT: Beginning pressure measurement at AX-307
09/11/2020 02:37:06	45.945376	-130.009266	172.5	1543.17	TXT: image
09/11/2020 02:47:20	45.945377	-130.009254	172.48	1543.21	TXT: Pressure measurement is ended at AX-307
09/11/2020 02:47:49	45.945376	-130.009257	172.4	1543.21	TXT: Replacing the MPR on Jason
09/11/2020 02:49:23	45.945360	-130.009262	173.62	1542.43	TXT: Securing the MPR
09/11/2020 02:50:39	45.945440	-130.009171	19.41	1539.87	TXT: Beginning transit to AX-101
09/11/2020 02:50:46	45.945453	-130.009167	7.33	1539.93	WATCH_CHANGE: new_watchstander Bill Hanshumaker
09/11/2020 02:56:54	45.945813	-130.009343	1.86	1538.42	TXT: ETA to AX-101 is 70 minutes
09/11/2020 03:22:12	45.948370	-130.009284	1.48	1536.51	TXT: ETA 44 minutes
09/11/2020 03:54:13	45.952858	-130.008861	36.31	1529.7	TXT: Decided to head to OOI SCTAA301 tiltmeter before going to AX-101 benchmark
09/11/2020 04:11:31	45.954913	-130.008802	355.43	1523.98	NAV: Doppler Reset
09/11/2020 04:12:12	45.954906	-130.008812	355.25	1523.98	TXT: Arrived at the tiltmeter SCTAA301
09/11/2020 04:14:26	45.955020	-130.008781	247.88	1523.92	TXT: Surveying to determine where to move the device
09/11/2020 04:18:57	45.954987	-130.008870	180.86	1527.38	TXT: Bill is communicating with researchers on shore via Zoom to determine how to realign device
09/11/2020 04:20:35	45.954993	-130.008853	180.52	1527.35	TXT: Jason will lift leg 2 of the tiltmeter very slightly
09/11/2020 04:25:53	45.954995	-130.008873	220.66	1527.45	TXT: Next leg 1 of the tiltmeter was lifted about a centimeter and then put back down
09/11/2020 04:27:00	45.955002	-130.008880	220.74	1527.44	TXT: Repositioning Jason to pick up the tiltmeter and move it about a meter
09/11/2020 04:33:31	45.954974	-130.008875	175.1	1527.36	TXT: Jason lifts tiltmeter by its bridle
09/11/2020 04:33:45	45.954972	-130.008879	175.15	1527.35	TXT: Jason moves device about 1 meter to right
09/11/2020 04:43:32	45.955025	-130.008866	174.36	1527.31	TXT: Jason releases bridle and begins adjusting the three legs to relevel the instrument

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1295 Logger Comment
09/11/2020 04:55:01	45.954969	-130.008861	175.72	1527.23	TXT: Leveling of Tiltmeter is within one degree
09/11/2020 04:56:28	45.954985	-130.008840	175.74	1527.22	TXT: Jason will push down on each corner to confirm firm contact with seafloor
09/11/2020 05:02:12	45.954986	-130.008868	175.09	1527.35	TXT: Fine adjusting legs to gain half degree to perfectly level
09/11/2020 05:07:18	45.954995	-130.008888	160.59	1527.26	TXT: Video is recording verification for each leg
09/11/2020 05:20:42	45.955012	-130.008724	320.04	1450.76	TXT: Jason records a fly around upon departure
09/11/2020 05:23:42	45.955063	-130.008812	321.11	1394.64	TXT: Jason is coming up 200m off bottom to avoid Sentry
09/11/2020 05:28:16	45.955037	-130.008758	304.38	1311.48	TXT: Transiting to AX-101 at 200m
09/11/2020 05:51:23	45.955102	-130.009848	298.45	1525.92	TXT: Jason is descending to 1525m
09/11/2020 05:52:00	45.955173	-130.009975	301.59	1527.25	TXT: Marker is sighted
09/11/2020 05:52:23	45.955223	-130.010017	292.04	1527.22	NAV: Doppler Reset
09/11/2020 05:52:57	45.955261	-130.010044	242.69	1527.95	TXT: Arrived at AX-101
09/11/2020 06:02:58	45.955216	-130.010075	239.65	1529.87	TXT: Removed MPR from front basket and situated on benchmark
09/11/2020 06:03:19	45.955215	-130.010077	239.67	1529.85	TXT: Begining pressure measurement
09/11/2020 06:03:35	45.955215	-130.010080	239.69	1529.84	TXT: Record for 20 minutes
09/11/2020 06:22:59	45.955259	-130.010080	239.8	1529.71	TXT: End of pressure measurement
09/11/2020 06:23:44	45.955256	-130.010081	239.77	1529.75	TXT: MPR restowed on basket
09/11/2020 06:27:24	45.955239	-130.010072	240.15	1528.4	TXT: Mini-BPR 2020-02 deployed on Benchmark AX-101
09/11/2020 06:29:06	45.955241	-130.010084	240.17	1528.63	TXT: Begin transit to AX-302
09/11/2020 06:31:09	45.955010	-130.009952	176.79	1523.09	WATCH_CHANGE: new_watchstander Jeff Beeson + Leland Wood
09/11/2020 06:46:43	45.953944	-130.007627	119.79	1525.64	TXT: Estimated 3 hour transit to AX-302
09/11/2020 06:47:07	45.953953	-130.007585	118.86	1524.5	TXT: image
09/11/2020 07:05:29	45.953050	-130.005424	120.44	1523.72	TXT: Some cool morphology
09/11/2020 08:38:54	45.946686	-129.988044	114.28	1518.33	TXT: image
09/11/2020 08:39:05	45.946678	-129.988015	114.41	1518.14	TXT: Large collapses
09/11/2020 08:54:14	45.946085	-129.985140	89.67	1516.88	TXT: image
09/11/2020 08:54:26	45.946087	-129.985099	89.32	1516.81	TXT: Large dropout - super cool collapse
09/11/2020 09:04:32	45.946145	-129.983933	42.18	1513.9	TXT: Approaching vent field - seeing lots of worms
09/11/2020 09:05:26	45.946204	-129.983872	42.19	1515.73	TXT: image
09/11/2020 09:05:46	45.946241	-129.983848	41.47	1515.19	TXT: Old hobo temp probe in vent
09/11/2020 09:09:19	45.946442	-129.983754	268.25	1513.07	TXT: AX-302 in sight
09/11/2020 09:10:37	45.946409	-129.983873	255.86	1514.9	TXT: Approaching AX-302

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1295 Logger Comment
09/11/2020 09:10:49	45.946412	-129.983895	252.55	1515.86	TXT: image
09/11/2020 09:11:13	45.946419	-129.983924	236.85	1516.18	NAV: Doppler Reset
09/11/2020 09:13:37	45.946425	-129.983882	235.84	1514.27	TXT: Waiting for ship direction change
09/11/2020 09:19:30	45.946369	-129.983942	234.21	1517.18	TXT: Jason set down in front of AX-302
09/11/2020 09:21:25	45.946394	-129.983966	238.39	1517.62	TXT: Removing previous Mini-BPR from benchmark
09/11/2020 09:21:59	45.946392	-129.983940	238.28	1517.64	TXT: Set previous Mini-BPR to right side of AX-302
09/11/2020 09:22:44	45.946386	-129.983904	238.52	1517.66	TXT: Previous Mini-BPR is number 2014-12
09/11/2020 09:23:33	45.946376	-129.983927	238.29	1517.65	TXT: Removing bungee from MPR
09/11/2020 09:23:54	45.946377	-129.983946	238.01	1517.65	TXT: Lifting MPR from basket
09/11/2020 09:25:08	45.946333	-129.983874	238.16	1517.62	TXT: MPR set in recess on AX-302
09/11/2020 09:25:30	45.946324	-129.983883	238.17	1517.62	TXT: Readjusting MPR
09/11/2020 09:27:49	45.946325	-129.983915	238.19	1517.65	TXT: Looking at placement with camera on arm to ensure precision of placement
09/11/2020 09:32:33	45.946333	-129.983903	238.28	1517.64	TXT: Tilt and pitch are about 0.2-0.3 off from previous years
09/11/2020 09:33:13	45.946340	-129.983907	238.13	1517.63	TXT: Trying to get better view of position
09/11/2020 09:36:20	45.946362	-129.983924	237.93	1517.62	TXT: Another nudge to move MPR to the right and hopefully be in the correct position
09/11/2020 09:36:33	45.946364	-129.983924	237.69	1517.63	TXT: image
09/11/2020 09:36:37	45.946366	-129.983925	237.62	1517.64	TXT: image
09/11/2020 09:37:38	45.946361	-129.983941	237.66	1517.65	TXT: Begin pressure measurement for AX-302
09/11/2020 09:49:34	45.946351	-129.983914	237.72	1517.68	TXT: Shimmer in water - vent fluid?
09/11/2020 09:49:43	45.946354	-129.983912	237.61	1517.69	TXT: Nothing marked coming from direction of current
09/11/2020 09:52:23	45.946352	-129.983926	237.6	1517.66	TXT: image
09/11/2020 09:59:19	45.946344	-129.983934	237.48	1517.69	TXT: End of pressure measurement at AX-302
09/11/2020 10:00:20	45.946337	-129.983931	237.19	1517.68	TXT: Returning MPR to basket
09/11/2020 10:01:32	45.946348	-129.983911	237.23	1517.65	TXT: Right swing-arm out to grab new Mini-BPR
09/11/2020 10:03:52	45.946360	-129.983890	237.04	1517.65	TXT: Placing Mini-BPR 2020-04 at AX-302
09/11/2020 10:03:55	45.946360	-129.983891	237.04	1517.67	TXT: image
09/11/2020 10:05:21	45.946337	-129.983882	236.05	1515.75	TXT: Backing away from AX-302 benchmark before securing the MPR and basket as to not bump the benchmark
09/11/2020 10:07:09	45.946358	-129.983871	235.76	1515.67	TXT: Everything is secured
09/11/2020 10:07:31	45.946358	-129.983877	235.7	1515.69	TXT: Going to look in the close vicinity for the source of the shimmering water - possible vent?

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1295 Logger Comment
09/11/2020 10:08:40	45.946275	-129.983827	165.58	1513.8	TXT: Nothing to see
09/11/2020 10:09:00	45.946234	-129.983780	174.16	1514.11	TXT: Beginning transit to AX-309
09/11/2020 10:09:12	45.946224	-129.983763	168.9	1514.56	TXT: Passing Trevi vent
09/11/2020 10:10:57	45.946001	-129.983607	139.28	1513.96	TXT: In transit to AX-309
09/11/2020 10:51:46	45.942318	-129.978452	137.48	1509.88	WATCH_CHANGE: new_watchstander Kelly Chadwick + Bill Chadwick
09/11/2020 10:52:31	45.942311	-129.978310	135.93	1509.78	TXT: Discussing position relative to Sentry
09/11/2020 10:55:23	45.942112	-129.977707	135.76	1509.95	TXT: image
09/11/2020 10:57:11	45.941854	-129.977341	134.87	1509.38	TXT: image
09/11/2020 10:58:10	45.941728	-129.977183	135.2	1509.53	TXT: image
09/11/2020 10:59:25	45.941621	-129.977025	135.3	1509.6	TXT: image
09/11/2020 11:00:15	45.941525	-129.976900	138.42	1509.71	TXT: image
09/11/2020 11:05:56	45.941136	-129.976335	135.77	1509.74	TXT: image
09/11/2020 11:10:37	45.940795	-129.975835	135.7	1507.42	TXT: Going to 1300 depth to wait for Sentry to pass by
09/11/2020 11:39:41	45.938302	-129.972254	87.04	1302.41	TXT: Sentry is passed. Returning to bottom.
09/11/2020 11:50:38	45.938268	-129.972204	88.28	1516.42	TXT: Bottom in sight
09/11/2020 11:50:54	45.938282	-129.972180	56.47	1518.77	TXT: image
09/11/2020 11:54:02	45.938388	-129.972064	287.56	1517.96	TXT: AX-309 in sight
09/11/2020 11:55:18	45.938439	-129.972142	245.83	1524.24	TXT: Setting down at AX-309
09/11/2020 11:57:57	45.938439	-129.972158	245.37	1525.39	TXT: Releasing the MPR
09/11/2020 11:59:37	45.938435	-129.972201	245.42	1525.39	TXT: Placing the MPR on benchmark
09/11/2020 12:05:15	45.938406	-129.972174	246.28	1525.43	TXT: Beginning pressure measurement at AX-309
09/11/2020 12:26:02	45.938404	-129.972178	246.92	1525.5	TXT: Pressure measurement finished at AX-309
09/11/2020 12:27:09	45.938403	-129.972132	244.88	1523.65	TXT: Stowing MPR
09/11/2020 12:28:37	45.938433	-129.972065	245.82	1523.6	NAV: Doppler Reset
09/11/2020 12:28:48	45.938437	-129.972056	245.79	1523.6	TXT: Beginning transit to AX-303
09/11/2020 13:31:13	45.933489	-129.982153	230.58	1513.53	TXT: AX-303 in sight
09/11/2020 13:32:17	45.933404	-129.982328	211.46	1513.46	TXT: image
09/11/2020 13:36:01	45.933391	-129.982331	185.31	1514.22	TXT: Checking the old Mini-BPR's feet for rust
09/11/2020 13:38:58	45.933388	-129.982312	185.35	1514.23	TXT: Moving the old Mini-BPR to the sea floor
09/11/2020 13:40:02	45.933395	-129.982312	185.33	1514.25	TXT: Looking at the Mini-BPR feet that came off on benchmark
09/11/2020 13:42:01	45.933404	-129.982323	185.31	1514.25	TXT: Retrieving the MPR

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1295 Logger Comment
09/11/2020 13:43:02	45.933406	-129.982304	185.28	1514.27	TXT: Placing the MPR on benchmark
09/11/2020 13:44:31	45.933382	-129.982310	185.27	1514.26	TXT: Adjusting MPR
09/11/2020 13:48:40	45.933378	-129.982344	185.24	1514.26	TXT: MPR placed
09/11/2020 13:49:05	45.933374	-129.982342	185.24	1514.25	TXT: Beginning pressure measurement at AX-303 now
09/11/2020 14:09:37	45.933378	-129.982295	185.14	1514.31	TXT: End of pressure measurement at AX-303
09/11/2020 14:09:45	45.933378	-129.982293	185.13	1514.31	TXT: Retrieving the MPR
09/11/2020 14:12:06	45.933415	-129.982300	185.04	1514.31	TXT: The MPR is back in its holster
09/11/2020 14:12:46	45.933411	-129.982303	185.04	1514.31	TXT: Going off the bottom so the ship can retrieve Sentry
09/11/2020 14:42:55	45.933149	-129.982276	292.65	1462.76	WATCH_CHANGE: new_watchstander Bill Hanshumaker
09/11/2020 15:17:59	45.935177	-129.980781	3.19	1462.75	TXT: Sentry at surface
09/11/2020 15:25:02	45.935202	-129.981102	254.18	1462.73	TXT: Sentry on board
09/11/2020 15:45:41	45.935408	-129.978720	173.07	1462.79	TXT: Beginning transit to AX-310
09/11/2020 17:07:04	45.925839	-129.977782	205.26	1525.01	TXT: Arrived at AX-310
09/11/2020 17:11:52	45.925851	-129.977738	283.09	1527.16	TXT: MPR removed from Jason's basket and situated on benchmark
09/11/2020 17:15:46	45.925834	-129.977756	283.23	1527.16	TXT: Started recording
09/11/2020 17:35:34	45.925838	-129.977767	283.19	1527.16	TXT: Stop recording
09/11/2020 17:36:10	45.925834	-129.977735	283.62	1527.16	TXT: Jason removes and stows MPR
09/11/2020 17:37:40	45.925775	-129.977748	217.6	1524.09	TXT: Begin transit to AX-104
09/11/2020 18:48:59	45.918765	-129.986419	222.08	1525.29	WATCH_CHANGE: new_watchstander Jeff Beeson + Leland Wood
09/11/2020 19:02:33	45.917431	-129.988205	221.46	1524.62	TXT: About 200 m from AX-104
09/11/2020 19:16:07	45.916192	-129.989404	101.95	1526.69	TXT: AX-104 in sight
09/11/2020 19:17:27	45.916166	-129.989343	97.54	1527.06	TXT: image
09/11/2020 19:17:44	45.916160	-129.989315	69.19	1527.8	TXT: image
09/11/2020 19:18:47	45.916173	-129.989265	344.8	1528.82	TXT: image
09/11/2020 19:19:39	45.916164	-129.989269	348.47	1529.26	TXT: Jason set down in front of AX-104
09/11/2020 19:20:52	45.916164	-129.989266	348.34	1529.2	TXT: Lifting MPR out of basket
09/11/2020 19:21:08	45.916169	-129.989267	348.41	1529.16	TXT: Begin placing MPR on AX-104
09/11/2020 19:22:32	45.916153	-129.989286	348.61	1529.16	TXT: Checking tilt of MPR
09/11/2020 19:23:22	45.916145	-129.989305	348.24	1529.18	TXT: Brow cam image
09/11/2020 19:24:34	45.916163	-129.989266	348.53	1529.16	TXT: Tilt is good - setting up for pressure measurement
09/11/2020 19:25:04	45.916162	-129.989265	348.38	1529.18	TXT: Begin pressure measurement of AX-104

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1295 Logger Comment
09/11/2020 19:46:42	45.916154	-129.989258	348.35	1529.15	TXT: End of pressure measurement for AX-104
09/11/2020 19:47:07	45.916154	-129.989266	348.57	1529.17	TXT: Replacing MPR back in basket
09/11/2020 19:48:20	45.916162	-129.989264	348.28	1529.13	TXT: Removed pull pin from Mini-BPR 2020-05
09/11/2020 19:48:56	45.916161	-129.989255	348.63	1529.17	TXT: Lifting 2020-05 out of basket
09/11/2020 19:49:29	45.916159	-129.989246	348.12	1529.13	TXT: image
09/11/2020 19:49:43	45.916158	-129.989242	349.1	1529.12	TXT: Placing Mini-BPR 2020-05 onto AX-104
09/11/2020 19:50:43	45.916153	-129.989257	348.44	1529.2	TXT: image
09/11/2020 19:51:10	45.916145	-129.989279	345.13	1528.01	TXT: Lifting off from AX-104
09/11/2020 19:51:27	45.916121	-129.989292	254.86	1524.58	TXT: Begin transit to AX-105
09/11/2020 19:54:42	45.915644	-129.989815	190.5	1522.82	TXT: Powering up Jason multibeam for testing during transit
09/11/2020 19:58:45	45.915137	-129.989987	188.88	1521.39	TXT: Powering up system on laptop for multibeam in control van
09/11/2020 20:00:49	45.914868	-129.990006	189	1522.1	TXT: Being testing with multibeam
09/12/2020 02:18:32	45.863343	-130.003834	162.28	1714.95	TXT: Bottom in sight
09/12/2020 02:18:56	45.863301	-130.003799	160.13	1714.63	TXT: AX-105 in sight
09/12/2020 02:21:52	45.863216	-130.003630	357.82	1715.59	TXT: Dealing with the cable
09/12/2020 02:25:27	45.863198	-130.003631	356.01	1715.49	TXT: Having issues with the engineer computer
09/12/2020 02:25:31	45.863199	-130.003631	357.93	1715.55	TXT: Bringing out the swing arms to see which crate is empty
09/12/2020 02:26:22	45.863222	-130.003625	359.63	1715.89	TXT: Moving into place in front of the benchmark
09/12/2020 02:26:55	45.863238	-130.003613	1.63	1716.75	TXT: Engineer computer is being restarted
09/12/2020 02:28:13	45.863225	-130.003626	1.67	1717.55	TXT: Going to remove the new Mini-BPR from the right swing-arc milk crate first
09/12/2020 02:30:08	45.863221	-130.003631	1.88	1717.5	TXT: Placing the new Mini-BPR on the sea floor for a moment so the old Mini-BPR 2014-13 can be placed in the empty right crate
09/12/2020 02:31:14	45.863226	-130.003626	1.67	1717.52	TXT: Mini-BPR 2014-13 is placed in the right crate
09/12/2020 02:32:31	45.863239	-130.003627	2.17	1717.48	TXT: Getting the second new Mini-BPR from the left crate
09/12/2020 02:33:04	45.863239	-130.003627	2.01	1717.49	TXT: Mini-BPR 2020-08 is placed on the seafloor for the moment
09/12/2020 02:33:56	45.863236	-130.003633	1.99	1717.52	TXT: The MPR is being placed on the benchmark
09/12/2020 02:34:51	45.863238	-130.003617	1.53	1717.53	TXT: Science cam is not working
09/12/2020 02:34:57	45.863238	-130.003615	1.51	1717.53	TXT: Science cam is working again
09/12/2020 02:36:05	45.863235	-130.003630	1.69	1717.52	TXT: MPR is placed. Checking for positioning
09/12/2020 02:37:02	45.863222	-130.003637	1.56	1717.51	TXT: Beginning pressure measurement for AX-105
09/12/2020 02:47:55	45.863226	-130.003661	1.71	1717.52	WATCH_CHANGE: new_watchstander Bill Hanshumaker

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1295 Logger Comment
09/12/2020 02:58:25	45.863222	-130.003650	2.52	1717.54	TXT: MPR removed and replaced in the basket
09/12/2020 03:01:36	45.863235	-130.003628	2.46	1717.52	TXT: Mini-BPR 2020-08 and 2020-03 placed on Benchmark AX-105
09/12/2020 03:04:37	45.863205	-130.003572	7.29	1713.19	TXT: Jason begins north transit
09/12/2020 03:41:47	45.866900	-130.004465	4.64	1709.24	TXT: Jason rises to 1515m in anticipation of Sentry launch
09/12/2020 04:20:58	45.869090	-130.003120	39.91	1507.52	TXT: Sentry is deployed
09/12/2020 05:04:21	45.869696	-130.001848	40	1317.04	TXT: Jason heading north to AX-104.
09/12/2020 06:41:37	45.877693	-129.999295	14.39	1311.92	TXT: 272 minutes to AX-104
09/12/2020 06:46:24	45.878236	-129.999143	14.82	1311.85	WATCH_CHANGE: new_watchstander Jeff Beeson + Leland Wood
09/12/2020 10:46:31	45.910975	-129.990325	12.68	1311.9	WATCH_CHANGE: new_watchstander Bill Chadwick + Kelly Chadwick
09/12/2020 10:46:37	45.910995	-129.990319	12.23	1311.93	TXT: Still transiting
09/12/2020 11:25:29	45.916083	-129.989459	348.05	1526.37	TXT: Bottom in sight
09/12/2020 11:27:15	45.916147	-129.989193	28.33	1526.15	NAV: Doppler Reset
09/12/2020 11:32:32	45.916248	-129.989370	352.38	1523.73	TXT: AX-104 in sight
09/12/2020 11:33:51	45.916293	-129.989379	333.74	1527.33	TXT: Setting down in front of the benchmark
09/12/2020 11:37:10	45.916281	-129.989390	340.29	1528.36	TXT: Grabbing the MPR
09/12/2020 11:37:29	45.916279	-129.989388	340.44	1528.35	TXT: Placing the MPR on the benchmark
09/12/2020 11:39:03	45.916271	-129.989388	340.25	1528.34	TXT: Checking MPR's positiong
09/12/2020 11:41:48	45.916270	-129.989386	340.03	1528.36	TXT: Beginning pressure measurement at AX-104
09/12/2020 12:02:09	45.916264	-129.989374	339.73	1528.44	TXT: End of pressure measurement at AX-104
09/12/2020 12:02:24	45.916267	-129.989377	339.85	1528.43	TXT: Retrieving MPR
09/12/2020 12:04:17	45.916240	-129.989344	339.16	1527.05	TXT: Discussing where to put out a marker
09/12/2020 12:07:36	45.916203	-129.989372	338.25	1528.65	TXT: Placing the marker about ten meters south of the AX-104 benchmark
09/12/2020 12:08:48	45.916209	-129.989374	339.29	1528.69	TXT: The new marker at AX-104 is Marker 213
09/12/2020 12:09:46	45.916204	-129.989327	44.67	1527.04	TXT: Beginning transit to AX-310
09/12/2020 12:12:51	45.916499	-129.988804	40.38	1525.18	TXT: 87 minutes to go
09/12/2020 13:00:43	45.920282	-129.983646	41.12	1519.88	TXT: Passing over 2nd alien base. Saw 2 UFOs enter ... 1 exit. Aliens appear green. Sadly
09/12/2020 13:02:07	45.920412	-129.983435	40.28	1519.91	this is not part of funded research ... moving along. No time for pictures :-{
09/12/2020 13:51:02	45.925845	-129.977866	9.13	1522.69	TXT: AX-310 in sight
09/12/2020 13:52:12	45.925888	-129.977798	277.4	1522.56	TXT: Setting down in front of the benchmark
09/12/2020 13:59:50	45.925910	-129.977821	277.23	1526.94	TXT: Moving the MPR to the benchmark
09/12/2020 14:04:41	45.925916	-129.977834	276.4	1526.91	TXT: Beginning pressure measurement at AX-310

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1295 Logger Comment
09/12/2020 14:24:19	45.925908	-129.977838	277.15	1527.01	TXT: Finished pressure measurement at AX-310
09/12/2020 14:25:04	45.925904	-129.977838	277.01	1527.02	TXT: Moving the MPR back to its holster
09/12/2020 14:29:04	45.925873	-129.977893	300.92	1521.99	NAV: Doppler Reset
09/12/2020 14:29:41	45.925934	-129.977946	336.54	1522.11	TXT: Beginning transit to AX-303
09/12/2020 14:38:46	45.926479	-129.978717	356.82	1481.64	WATCH_CHANGE: new_watchstander Bill Hanshumaker
09/12/2020 15:41:38	45.933528	-129.982178	53.95	1510.94	TXT: Arrived at AX-303
09/12/2020 15:44:53	45.933534	-129.982186	171.19	1514.06	TXT: Mini-BPR 2016-10 recovered and put in starboard basket
09/12/2020 15:47:39	45.933533	-129.982192	170.81	1512.92	TXT: Mini-BPR 2020-07 placed on Benchmark AX-303
09/12/2020 15:51:16	45.933538	-129.982174	176.13	1514.16	TXT: MPR situated on AX-303
09/12/2020 15:52:43	45.933549	-129.982165	176.14	1514.16	TXT: Measurement begins
09/12/2020 16:13:52	45.933539	-129.982177	176.01	1514.2	TXT: Measurement completed and MPR returned to front of basket
09/12/2020 16:15:11	45.933567	-129.982058	41.7	1512.7	TXT: Jason is proceeding to AX-309
09/12/2020 16:18:45	45.933690	-129.981815	47.85	1514.23	TXT: Tubeworms in the adjacent region
09/12/2020 17:25:33	45.938348	-129.972117	56.65	1519.66	NAV: Doppler Reset
09/12/2020 17:27:49	45.938544	-129.972094	66.99	1520.52	TXT: AX-309 in sight
09/12/2020 17:36:55	45.938578	-129.972048	228.11	1525.8	TXT: Arrived at AX-309
09/12/2020 17:37:56	45.938584	-129.972049	228.14	1525.8	TXT: Removed MPR and situated on benchmark
09/12/2020 17:43:28	45.938586	-129.972045	228.26	1525.8	TXT: Measurement begins
09/12/2020 18:02:29	45.938585	-129.972044	228.73	1525.78	TXT: Measurement ceased
09/12/2020 18:03:13	45.938581	-129.972042	228.74	1525.78	TXT: MPR removed and restowed
09/12/2020 18:04:38	45.938582	-129.972101	273.98	1520.62	TXT: Depart AX-309 heading for AX-302
09/12/2020 18:27:17	45.940062	-129.975209	316.85	1514.35	TXT: H264 recorder number 3 was down for the last hour. Restarting now
09/12/2020 18:48:06	45.942040	-129.977754	318.08	1509.01	WATCH_CHANGE: new_watchstander Jeff Beeson - Leland Wood
09/12/2020 18:59:42	45.943204	-129.979246	319.67	1499.69	TXT: rising off bottom - to depth of 1340 - to give room for Sentry to pass
09/12/2020 19:36:08	45.946721	-129.983529	49.09	1346.95	TXT: At location - ship will have heading change and Sentry will pass - while still in mid water column
09/12/2020 19:52:57	45.946776	-129.983357	96.91	1383.6	TXT: Heading back down to seafloor to benchmark
09/12/2020 19:59:11	45.946604	-129.983650	174.56	1512.51	TXT: Bottom in sight
09/12/2020 20:00:01	45.946501	-129.983823	189.45	1515.16	TXT: Vent field in sight
09/12/2020 20:01:18	45.946415	-129.983713	126.88	1516.05	TXT: AX-302 in sight
09/12/2020 20:03:13	45.946440	-129.983654	230.38	1517.89	NAV: Doppler Reset

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1295 Logger Comment
09/12/2020 20:03:17	45.946439	-129.983654	222.5	1518.01	TXT: Setting down in front of AX-302
09/12/2020 20:04:05	45.946434	-129.983653	219.68	1518.33	TXT: Stbd arm moving to grab MPR
09/12/2020 20:04:37	45.946429	-129.983655	219.65	1518.29	TXT: MPR moved to benchmark
09/12/2020 20:05:05	45.946429	-129.983660	219.76	1518.28	TXT: MPR set down on AX-302
09/12/2020 20:06:09	45.946454	-129.983674	219.28	1518.32	TXT: Checking placement
09/12/2020 20:07:45	45.946433	-129.983642	219.19	1518.3	TXT: Begin pressure measurement for AX-302
09/12/2020 20:29:02	45.946440	-129.983626	219.54	1518.3	TXT: end of pressure measurement at AX-302
09/12/2020 20:29:25	45.946434	-129.983633	219.58	1518.3	TXT: begin recovering MPR
09/12/2020 20:29:39	45.946430	-129.983638	219.5	1518.29	TXT: Lifting MPR off benchmark
09/12/2020 20:30:01	45.946428	-129.983643	219.64	1518.32	TXT: Replacing MPR back in basket
09/12/2020 20:30:26	45.946431	-129.983653	219.65	1518.33	TXT: MPR secured
09/12/2020 20:31:24	45.946435	-129.983667	222.86	1515.61	TXT: Lifting off from AX-302
09/12/2020 20:32:14	45.946440	-129.983631	77.48	1505.49	TXT: Rising 100 m off bottom - preparing for Sentry recovery
09/12/2020 20:43:33	45.946361	-129.983607	76.91	1431	TXT: image
09/12/2020 20:45:11	45.946393	-129.983523	77.22	1429.8	TXT: Rising additional 60 m - to 1370 m depth
09/12/2020 21:33:29	45.946103	-129.983540	179.77	1349.39	TXT: Ship has taken control for the Sentry recovery
09/12/2020 21:47:27	45.943682	-129.983950	169.95	1347.86	TXT: Ship driving to catch Sentry
09/12/2020 21:48:24	45.943532	-129.983916	174.29	1348.33	TXT: Tag lines attached
09/12/2020 21:48:57	45.943480	-129.983911	180.81	1348.62	TXT: Sentry out of water
09/12/2020 21:52:01	45.943942	-129.983968	359.96	1357.24	TXT: Sentry on deck
09/12/2020 21:54:17	45.944330	-129.984074	359.31	1357.26	TXT: Sentry is secured on deck
09/12/2020 21:56:10	45.944422	-129.984168	359.94	1357.01	TXT: Jason takes control
09/12/2020 21:56:28	45.944440	-129.984189	0.25	1357.36	TXT: Begin transit to AX-101
09/12/2020 22:13:04	45.945343	-129.986915	303.82	1355.57	TXT: Jelly covered pilot cam
09/12/2020 22:13:22	45.945358	-129.986952	304.3	1356.2	TXT: Broke free - into the props...
09/12/2020 22:46:21	45.947365	-129.991961	304.44	1354.39	TXT: image
09/12/2020 22:49:02	45.947540	-129.992339	304.87	1353.07	WATCH_CHANGE: new_watchstander Bill Chadwick + Kelly Chadwick
09/12/2020 23:33:02	45.950756	-130.000274	305.27	1343.97	NAV: Doppler Reset
09/12/2020 23:33:36	45.950816	-130.000337	304.84	1343.95	TXT: Realized we're not in doppler range
09/13/2020 00:34:44	45.954597	-130.008900	304.61	1522.24	TXT: AX-101 in sight
09/13/2020 00:36:05	45.954899	-130.009450	307.08	1522.45	TXT: AX-101 in sight. See a marker.

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1295 Logger Comment
09/13/2020 00:38:22	45.955203	-130.009788	238.23	1524.18	TXT: AX-101 in sight now
09/13/2020 00:39:07	45.955165	-130.009796	236.56	1528.87	TXT: Setting down in front of the benchmark
09/13/2020 00:40:32	45.955146	-130.009875	238.53	1529.93	TXT: Moving to place the pressure sensor on the benchmark
09/13/2020 00:42:03	45.955160	-130.009864	238.56	1529.91	TXT: Checking pressure placement
09/13/2020 00:43:50	45.955137	-130.009842	238.42	1529.92	TXT: Beginning pressure measurement at AX-101
09/13/2020 01:05:56	45.955111	-130.009795	176.24	1528.82	TXT: Pressure measurement is finished
09/13/2020 01:06:16	45.955108	-130.009778	176.29	1528.81	TXT: Beginning transit to AX-307
09/13/2020 01:07:54	45.955068	-130.009565	178.06	1528.22	NAV: Doppler Reset
09/13/2020 02:04:57	45.947497	-130.009267	180.8	1538.99	TXT: Bottom in sight
09/13/2020 02:16:52	45.945332	-130.008988	155.68	1540.71	TXT: AX-307 in sight
09/13/2020 02:19:19	45.945316	-130.008974	170.63	1542.61	TXT: Putting the pressure sensor on the benchmark
09/13/2020 02:22:00	45.945307	-130.008972	170.2	1542.57	TXT: Beginning pressure measurement at AX-307
09/13/2020 02:42:01	45.945316	-130.008985	169.58	1542.62	TXT: End of pressure measurement at AX-307
09/13/2020 02:47:15	45.945318	-130.008952	168.79	1542.61	TXT: Put Mini-BPR 2020-06 from left swing-arm milk crate on AX-307
09/13/2020 02:48:40	45.945322	-130.009012	189.09	1539.74	TXT: Mini-BPR 2014-09 stowed in left swing-arm milk crate of Jason
09/13/2020 02:50:36	45.945128	-130.009199	189.6	1540.97	TXT: In route to AX-106
09/13/2020 02:51:07	45.945077	-130.009261	189.6	1540.8	NAV: Doppler Reset
09/13/2020 02:54:14	45.944776	-130.009356	197.42	1539.04	WATCH_CHANGE: new_watchstander Bill Hanshumaker
09/13/2020 04:21:38	45.934383	-130.011437	70.1	1540.74	TXT: Arrive at AX-106
09/13/2020 04:25:00	45.934371	-130.011465	78.64	1540.94	TXT: Removed and positioned MPR on AX-106 benchmark
09/13/2020 04:27:27	45.934379	-130.011455	77.15	1540.96	TXT: Starting pressure measurement
09/13/2020 04:47:05	45.934368	-130.011443	76.89	1540.92	TXT: Measurement completed and MPR returned to basket
09/13/2020 04:48:17	45.934413	-130.011426	113.13	1539.44	TXT: No old Mini-BPR here
09/13/2020 04:50:11	45.934293	-130.011211	122.04	1538.16	TXT: Transit AX-106 to AX-308
09/13/2020 06:04:42	45.931551	-129.998619	160.71	1526.88	TXT: Arrived at AX-308
09/13/2020 06:09:40	45.931528	-129.998592	269.25	1529.88	TXT: MPR removed and situated on benchmark
09/13/2020 06:10:20	45.931527	-129.998594	269.28	1529.87	TXT: Pressure measurement started
09/13/2020 06:30:38	45.931531	-129.998572	269.47	1529.77	TXT: Measurement completed
09/13/2020 06:31:07	45.931535	-129.998576	269.39	1529.76	TXT: MPR returned to basket
09/13/2020 06:34:16	45.931529	-129.998567	272.1	1528.54	TXT: Mini-BPR 2014-08 recovered from seafloor
09/13/2020 06:37:00	45.931333	-129.998645	183.12	1526.84	TXT: Transit AX-308 to AX-105 begins

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1295 Logger Comment
09/13/2020 06:37:15	45.931326	-129.998681	185.23	1527.66	NAV: Doppler Reset
09/13/2020 06:45:03	45.930359	-129.998805	182.59	1527.48	WATCH_CHANGE: new_watchstander Jeff Beeson + Leland Wood
09/13/2020 08:23:37	45.917749	-129.999899	180.26	1528.08	TXT: Ship GPS is noisy - holding position until fixed
09/13/2020 08:23:54	45.917756	-129.999896	180.21	1527.96	TXT: Ship taking control for moment
09/13/2020 08:30:50	45.916793	-129.999932	180.9	1527.93	TXT: Continuing transit
09/13/2020 10:45:07	45.899654	-130.000574	180.16	1528.1	WATCH_CHANGE: new_watchstander Bill Chadwick + Kelly Chadwick
09/13/2020 11:06:40	45.898981	-130.000558	179.62	1520.27	TXT: We paused the ship to wait for Sentry deployment
09/13/2020 11:08:07	45.898808	-130.000523	179.55	1520.3	but the launch was aborted due to issues with the multibeam
09/13/2020 11:10:07	45.898600	-130.000517	179.51	1520.26	so we resumed the transit down to AX-105
09/13/2020 14:55:56	45.871823	-130.002123	183.54	1399.47	WATCH_CHANGE: new_watchstander Bill Hanshumaker
09/13/2020 16:04:49	45.863071	-130.003630	222.85	1714.13	TXT: AX-105 in sight
09/13/2020 16:08:51	45.863048	-130.003615	354.32	1716.93	TXT: MPR removed and situated on AX-105
09/13/2020 16:09:47	45.863048	-130.003620	354.16	1716.92	TXT: Pressure recording begins
09/13/2020 16:29:34	45.863072	-130.003639	354.18	1716.99	TXT: Pressure recording completed
09/13/2020 16:30:19	45.863077	-130.003630	354.08	1717.04	TXT: MPR returned to Jason
09/13/2020 16:31:55	45.863088	-130.003524	30.15	1714.19	TXT: Transit AX-105 to AX-104 (Bag City)
09/13/2020 16:41:19	45.864396	-130.003609	10.74	1716.38	NAV: Doppler Reset
09/13/2020 18:48:30	45.880496	-130.000276	12.41	1507.45	WATCH_CHANGE: new_watchstander Jeff Beeson + Leland Wood
09/13/2020 22:44:09	45.913082	-129.991180	12.31	1505.75	WATCH_CHANGE: new_watchstander Bill Chadwick + Kelly Chadwick
09/13/2020 23:08:56	45.916164	-129.990174	80.3	1525.65	TXT: Bottom in sight
09/13/2020 23:11:47	45.916166	-129.989497	114.25	1528.23	TXT: AX-104 in sight
09/13/2020 23:12:30	45.916133	-129.989432	99.46	1527.98	TXT: Going to put down another marker to make AX-104 easier to find
09/13/2020 23:14:05	45.916176	-129.989386	96.88	1527.29	TXT: The dynamic donut was getting into a bad position so we had to move
09/13/2020 23:15:23	45.916148	-129.989333	97.37	1528.14	TXT: Placing marker 286 near AX-104
09/13/2020 23:16:38	45.916167	-129.989257	97.27	1528.59	TXT: Marker 286 is placed
09/13/2020 23:17:20	45.916131	-129.989279	97.4	1528.6	TXT: The marker was caught on Jason's arm and got moved during placement. Getting replaced in original place
09/13/2020 23:17:40	45.916105	-129.989287	97.44	1528.6	TXT: Heading to the benchmark
09/13/2020 23:18:52	45.916142	-129.989217	101.64	1527.67	TXT: Managing the donut
09/13/2020 23:19:22	45.916166	-129.989151	103.36	1527.46	NAV: Doppler Reset
09/13/2020 23:22:08	45.916104	-129.989279	332.94	1528.37	TXT: Setting down in front of the benchmark

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1295 Logger Comment
09/13/2020 23:24:21	45.916097	-129.989269	331.83	1528.88	TXT: MPR is being placed
09/13/2020 23:25:53	45.916152	-129.989305	332.13	1528.89	TXT: Beginning pressure measurement at AX-104
09/13/2020 23:46:21	45.916109	-129.989331	331.75	1528.93	TXT: Pressure measurement at AX-104 is finished
09/13/2020 23:49:05	45.916143	-129.989343	332.97	1528.37	TXT: MPR secured
09/13/2020 23:49:37	45.916126	-129.989315	332.92	1528.32	TXT: Beginning transit to Vixen vent
09/14/2020 00:19:10	45.917272	-129.992946	275.25	1529.23	HIGHLIGHTS: Vixen highlights 4K highlights start
09/14/2020 00:21:04	45.917270	-129.992960	275.05	1529.68	TXT: Looking for missing HOBO (from previous years). Didn't find.
09/14/2020 00:23:32	45.917254	-129.992957	0.71	1531.08	TXT: Approaching the vent to collect current HOBO
09/14/2020 00:24:51	45.917255	-129.992980	356.83	1531.23	TXT: Taking out the new HOBO-103 and putting it on the ground
09/14/2020 00:26:19	45.917251	-129.992989	357.07	1531.19	HIGHLIGHTS: highlights 4K highlights stop
09/14/2020 00:26:43	45.917240	-129.992984	357.66	1531.18	TXT: Pulling HOBO-101 out of Vixen vent
09/14/2020 00:27:57	45.917243	-129.992975	356.83	1531.22	TXT: HOBO-101 secured on Jason
09/14/2020 00:29:16	45.917250	-129.992951	356.4	1531.22	HIGHLIGHTS: highlights 4K highlights start
09/14/2020 00:29:28	45.917249	-129.992952	356.54	1531.24	TXT: Going to take a temperature measurement at Vixen
09/14/2020 00:29:46	45.917249	-129.992956	356.68	1531.23	TXT: Temperature probe in Vixen
09/14/2020 00:31:19	45.917260	-129.992955	356.45	1531.23	TXT: Jason temp probe measures 323 Degrees C at Vixen
09/14/2020 00:31:35	45.917256	-129.992956	356.65	1531.25	HIGHLIGHTS: highlights 4K highlights stop
09/14/2020 00:32:09	45.917237	-129.992973	356.67	1531.25	TXT: Going to do a Major sampler next
09/14/2020 00:33:05	45.917250	-129.993008	356.28	1531.23	TXT: Taking out the White Major
09/14/2020 00:34:05	45.917262	-129.992987	356.18	1531.25	Sample:
09/14/2020 00:37:40	45.917225	-129.992997	356.39	1531.25	TXT: SAMPLE: Major at Vixen Vent. White Major. LAT: 45.917237 LONG: -129.992955 Depth: 1531.2 m
09/14/2020 00:39:43	45.917250	-129.992997	356.95	1531.26	TXT: SAMPLE: J2-1295-Major-1 at Vixen Vent. White Major. LAT: 45.917237 LONG: -129.992955 Depth: 1531.2 m
09/14/2020 00:42:06	45.917252	-129.992970	356.88	1531.25	TXT: SAMPLE: J2-1295-Major-2 at Vixen Vent. Black Major. LAT: 45.917237 LONG: -129.992955 Depth: 1531.3 m
09/14/2020 00:44:13	45.917235	-129.992975	356.79	1531.27	Sample:
09/14/2020 00:46:17	45.917239	-129.992957	356.64	1531.3	TXT: Securing the Majors
09/14/2020 00:48:18	45.917251	-129.992977	356.87	1531.24	TXT: Releasing the bungees on the black gastight
09/14/2020 00:49:17	45.917258	-129.993010	356.58	1531.28	TXT: Moving black gastight into position
09/14/2020 00:49:49	45.917258	-129.993017	356.86	1531.27	TXT: SAMPLE: J2-1295-Gastight-3 at Vixen Vent. Black Gastight. LAT: 45.917237 LONG: -129.992955 Depth: 1531.3 m

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1295 Logger Comment
09/14/2020 00:51:23	45.917251	-129.993017	356.87	1531.25	TXT: Gastight is secured
09/14/2020 00:52:06	45.917244	-129.993001	356.8	1531.25	TXT: HOBO-103 being placed at Vixen
09/14/2020 00:52:51	45.917241	-129.992979	356.63	1531.26	TXT: HOBO-103 is placed at Vixen
09/14/2020 00:53:48	45.917241	-129.992993	356.67	1531.31	Sample:
09/14/2020 00:55:39	45.917255	-129.992943	358.64	1530.5	TXT: Moving to do Niskins
09/14/2020 01:00:16	45.917287	-129.993001	359.5	1529.73	TXT: Trying to get over the vent for the first Niskin
09/14/2020 01:03:09	45.917278	-129.992998	358.86	1529.88	TXT: Hydraulic Niskan didn't fire. The back didn't close
09/14/2020 01:04:41	45.917278	-129.992976	358.45	1529.77	TXT: SAMPLE: J2-1295-Niskin-4 above and downcurrent from Vixen Vent. Manual Niskin in front marked with #1. LAT: 45.917272 LONG: -129.993030 Depth: 1529.9m ALT: 3.3m. For eDNA.
09/14/2020 01:04:55	45.917281	-129.992974	358.53	1529.79	TXT: Floating 25 meters downcurrent for next niskin
09/14/2020 01:09:39	45.917360	-129.992985	358.53	1526.17	TXT: Waiting for ship to move north so we can continue downcurrent
09/14/2020 01:13:42	45.917479	-129.992985	358.62	1525.81	TXT: SAMPLE: J2-1295-Niskin-5 above and 25m downcurrent (north) from Vixen Vent. Aft Niskin triggered. LAT: 45.917485 LONG: -129.992955 Depth: 1525.9m ALT: 7m. For e-DNA.
09/14/2020 01:18:31	45.917285	-129.993035	22.84	1531.39	TXT: Going to Casper vent since we have some extra time before Jason needs to be off the bottom
09/14/2020 01:19:26	45.917331	-129.993016	23.61	1531.79	TXT: Going to take the temperature at Casper
09/14/2020 01:24:38	45.917308	-129.993019	23.07	1531.79	TXT: Temp Probe at Casper Vent 295 degrees C
09/14/2020 01:29:22	45.917284	-129.992995	23.29	1531.84	TXT: Jason's thumb came off the ram while trying to fire Red Major at Casper
09/14/2020 01:30:37	45.917280	-129.993020	23.23	1531.86	TXT: Not seeing evidence of flow out the port on the Red Major yet. Repositioned.
09/14/2020 01:32:02	45.917280	-129.993037	23.3	1531.86	TXT: SAMPLE: J2-1295-Major-6 at Casper Vent. Red Major. LAT: 45.917271 LONG: -129.993074 Depth: 1531.8m ALT: 1.2m Initial issue where Jason's thumb came off the ram while trying to fire it. Attempted again and spring triggered
09/14/2020 01:34:35	45.917292	-129.993068	23.06	1531.89	TXT: Red Major replaced in the basket
09/14/2020 01:35:39	45.917305	-129.993077	23.02	1531.89	TXT: Extracting the Green Major
09/14/2020 01:37:38	45.917317	-129.993075	22.91	1531.87	TXT: SAMPLE: J2-1295-Major-7 at Casper Vent. Green Major. LAT: 45.917271 LONG: -129.993074 Depth: 1531.9m ALT: 1.2m
09/14/2020 01:40:07	45.917359	-129.993064	22.83	1531.92	TXT: Securing the Green and Red Majors
09/14/2020 01:41:42	45.917342	-129.992988	22.48	1531.9	TXT: Going to secure the Mini-BPRs in the swing arms
09/14/2020 01:43:59	45.917321	-129.993017	24.66	1530.4	TXT: Left swing arm's milk crate secured with a bungee
09/14/2020 01:46:17	45.917326	-129.992962	24.12	1530.38	TXT: Right swing arm's milk crate secured with a bungee
09/14/2020 01:51:36	45.917187	-129.992315	144.72	1529.52	TXT: Waiting for ship to change heading
09/14/2020 01:53:17	45.917260	-129.992171	145.59	1526.55	TXT: Leaving bottom. End of dive.

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1295 Logger Comment
09/14/2020 02:16:54	45.917213	-129.992051	146.43	850.17	TXT: 850 depth
09/14/2020 02:28:44	45.917213	-129.992051	151.26	499.59	TXT: 500 depth
09/14/2020 02:39:32	45.917213	-129.992051	152.1	193.92	TXT: 200 m depth
09/14/2020 02:41:25	45.917213	-129.992051	148	146.7	TXT: All stop at 160
09/14/2020 02:42:10	45.917213	-129.992051	149.9	140.14	TXT: Beginning recovery of Jason
09/14/2020 02:44:25	45.917213	-129.992051	151.97	124.65	WATCH_CHANGE: new_watchstander Bill Hanshumaker
09/14/2020 02:53:33	45.917213	-129.992051	157.68	1.83	TXT: Jason at surface
09/14/2020 02:57:18	45.917213	-129.992051	329.66	0.63	VEHICLE: milestone Jason on deck

ROV Jason dive J2-1296 Dive Log (edited/corrected from Jason Virtual Van)

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1296 Logger Comment
09/16/2020 17:17:28	45.750020	-130.199984	43.94	0.77	Before Jason dive Webb instrument was deployed by ship at Webb-2 target site. Jason will be diving on instrument to reposition on bottom.
09/16/2020 19:25:53	45.750023	-130.199997	351.28	28.36	VEHICLE: Last float on cable milestone
09/16/2020 19:31:48	45.750023	-130.199997	352.31	146.11	TXT: Jason descending to depth. This dive will position two Webb instruments for their second deployment then will do fluid sampling at International District
09/16/2020 20:26:20	45.923613	-129.984226	50.01	1514.62	TXT: Transiting to instrument package at Webb-2 site
09/16/2020 20:36:34	45.924378	-129.982876	50.46	1514.6	NAV: Doppler Reset
09/16/2020 20:41:44	45.924919	-129.982509	2.77	1519.1	TXT: Instrument package in sight
09/16/2020 20:42:18	45.924963	-129.982508	4.25	1522.04	TXT: Jason approaching instrument
09/16/2020 20:44:49	45.924956	-129.982497	4.21	1522.42	TXT: Pulling weight out from underneath instrument
09/16/2020 20:45:28	45.924952	-129.982494	4.02	1522.42	TXT: Pull pin released from weight
09/16/2020 20:46:25	45.924963	-129.982514	4.62	1522.41	TXT: Jason lifting instrument off bottom
09/16/2020 20:46:42	45.924965	-129.982526	6.39	1521.49	TXT: Jason rising - transiting to Webb-2 target site
09/16/2020 20:52:59	45.924079	-129.982434	163.25	1522.93	TXT: Jason dropping to seafloor - setting instrument down
09/16/2020 20:54:49	45.924074	-129.982447	164.36	1524.39	TXT: Webb instrument placed. This will be the first to two instruments deployed at the same site (Webb-2).

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1296 Logger Comment
09/16/2020 20:56:04	45.924069	-129.982448	177.58	1523.67	TXT: Lifting to fly around and look at surrounding area
09/16/2020 20:58:32	45.924086	-129.982406	175.86	1523.24	TXT: Happy with placement
09/16/2020 20:59:21	45.924143	-129.982452	305.17	1521.82	TXT: Transiting to retrieve shield which was also deployed from the ship
09/16/2020 20:59:24	45.924149	-129.982456	302.09	1521.43	TXT: image
09/16/2020 20:59:33	45.924169	-129.982465	302.57	1520.58	TXT: image
09/16/2020 21:03:35	45.924889	-129.981691	52.68	1516.87	TXT: Shield in sight
09/16/2020 21:04:27	45.924990	-129.981644	96.2	1518.84	TXT: Setting down in front of shield
09/16/2020 21:05:09	45.924966	-129.981631	93.27	1519.55	TXT: Grabbing shield to turn it over
09/16/2020 21:05:48	45.924954	-129.981630	94.61	1519.46	TXT: Righting shield
09/16/2020 21:08:37	45.924998	-129.981630	144.05	1519.5	TXT: Pushing shield over
09/16/2020 21:09:09	45.924997	-129.981631	144.49	1519.46	TXT: Shield upright
09/16/2020 21:10:51	45.924988	-129.981620	145.68	1519.55	TXT: Pull pin released to detach weight from shield
09/16/2020 21:11:57	45.924984	-129.981601	146.32	1519.55	TXT: Stowing weight in basket
09/16/2020 21:12:40	45.924986	-129.981602	146.41	1519.54	TXT: First cutting excess length of rope off
09/16/2020 21:13:14	45.924987	-129.981606	146.36	1519.54	TXT: Weight cut
09/16/2020 21:14:54	45.924986	-129.981599	145.33	1519.53	TXT: Weight secured
09/16/2020 21:17:21	45.924954	-129.981575	49.86	1519.53	TXT: Shield lifted with both arms
09/16/2020 21:18:29	45.924964	-129.981566	48.22	1518.89	TXT: Transiting back to instrument
09/16/2020 21:27:04	45.924112	-129.982317	258.34	1522.46	TXT: Instrument in sight
09/16/2020 21:27:32	45.924121	-129.982304	264.07	1524.18	TXT: Shield set on bottom
09/16/2020 21:31:48	45.924125	-129.982327	182.12	1523.34	TXT: Beacon removed from shield
09/16/2020 21:34:36	45.924088	-129.982356	223.12	1519.52	TXT: Placing beacon on floatpack - begin moving ship for recovery
09/16/2020 21:35:06	45.924087	-129.982361	223.28	1519.5	TXT: Port arm grabs float pack to stabilize
09/16/2020 21:35:38	45.924089	-129.982370	223.12	1519.53	TXT: Beacon placed on float pack
09/16/2020 21:36:33	45.924078	-129.982351	223.33	1519.54	TXT: Beacon secured
09/16/2020 21:38:57	45.924048	-129.982314	53.58	1521.44	TXT: Going down to float pack to remove pin on anchor line
09/16/2020 21:42:51	45.924046	-129.982322	36.3	1524.25	TXT: Starting ship movement
09/16/2020 21:48:22	45.923932	-129.982038	127.25	1518.5	TXT: image
09/16/2020 21:48:24	45.923929	-129.982032	126.8	1518.38	TXT: image
09/16/2020 21:48:34	45.923911	-129.982002	127.65	1517.61	TXT: image
09/16/2020 21:48:37	45.923907	-129.981993	128.65	1517.36	TXT: image

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1296 Logger Comment
09/16/2020 21:48:53	45.923890	-129.981961	134.22	1516.93	TXT: image
09/16/2020 21:48:56	45.923888	-129.981957	131.6	1517.01	TXT: image
09/16/2020 21:50:08	45.923872	-129.981965	110.43	1518.53	TXT: image
09/16/2020 21:50:45	45.923860	-129.981942	110.68	1518.49	TXT: Waiting for ship movement to complete
09/16/2020 21:56:10	45.924048	-129.982312	20.96	1524.18	TXT: Waiting for ship to complete before releasing float pack
09/16/2020 21:57:41	45.924038	-129.982300	22.72	1524.19	TXT: Removed pin from float pack
09/16/2020 21:59:05	45.924027	-129.982388	288.39	1521.98	TXT: Shackle let go on opposite side - will correct when shield is placed
09/16/2020 21:59:14	45.924015	-129.982450	228.93	1520.88	TXT: Moving up in water column after float release
09/16/2020 21:59:30	45.924000	-129.982522	245.33	1518.98	TXT: Moving with ship for recovery of float pack
09/16/2020 22:35:12	45.925564	-129.983692	118.96	1465.52	TXT: Float 100 m from surface
09/16/2020 22:37:12	45.925421	-129.983494	119.45	1465.58	TXT: Float at surface
09/16/2020 23:03:06	45.924643	-129.987036	88.48	1461.01	WATCH_CHANGE: new_watchstander Bill Chadwick + Kelly Chadwick
09/16/2020 23:03:47	45.924639	-129.987243	87.47	1461.06	TXT: Float recovered by ship. Waiting for Sentry's launch
09/16/2020 23:47:25	45.925488	-129.988127	89.38	1472.81	TXT: Sentry was launched 20 minutes ago and the ship is moving back east toward the WEBB-2 instrument deployment site
09/17/2020 00:15:49	45.925414	-129.984095	88.81	1472.36	TXT: Jason moving up to 1390 depth to make sure to avoid Sentry
09/17/2020 00:44:56	45.924905	-129.982907	104.71	1501.89	TXT: The ship is in position to deploy the second Webb instrument and cover (one at a time)
09/17/2020 00:45:45	45.924819	-129.982955	108.8	1513.96	TXT: Jason back on bottom
09/17/2020 00:45:59	45.924806	-129.982966	157.16	1513.67	TXT: The cover's going in soon
09/17/2020 00:57:54	45.924677	-129.982928	117.71	1514.31	TXT: Cover in the water and descending to the bottom
09/17/2020 01:01:03	45.925093	-129.981863	3.94	1513.7	TXT: Going towards cover's position
09/17/2020 01:11:31	45.924442	-129.981823	179.43	1513.77	TXT: Have to wait for the cover to get to 1000 meters before putting the instrument in the water
09/17/2020 01:19:57	45.924054	-129.982311	161.69	1518.95	TXT: Jason is at the first instrument and cover at the Webb-2 site
09/17/2020 01:21:20	45.924027	-129.982320	149.92	1522.98	TXT: Moving the previous instrument's string while we're here waiting for the 2nd cover to get to 1000 meters
09/17/2020 01:33:35	45.924020	-129.981952	88.58	1517.67	TXT: image
09/17/2020 01:34:05	45.924017	-129.981947	82.72	1517.35	TXT: image
09/17/2020 01:34:24	45.924015	-129.981948	88.61	1517.32	TXT: image
09/17/2020 01:34:49	45.924013	-129.981949	88.55	1517.35	TXT: image
09/17/2020 01:35:56	45.924014	-129.981954	88.32	1517.31	TXT: image
09/17/2020 01:36:57	45.924014	-129.981943	88.43	1517.3	TXT: image

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1296 Logger Comment
09/17/2020 01:37:06	45.924014	-129.981944	88.68	1517.35	TXT: Looking at some tubeworms
09/17/2020 01:42:44	45.924095	-129.981340	42.43	1516.38	TXT: Getting ready to deploy the 2nd Webb instrument on deck now
09/17/2020 01:44:35	45.924496	-129.980923	18.91	1513.91	TXT: Instrument in water
09/17/2020 02:05:18	45.924029	-129.982336	66.17	1519.33	TXT: fish
09/17/2020 02:11:52	45.924383	-129.982902	308.18	1515.54	TXT: Second cover in sight on the seafloor
09/17/2020 02:14:31	45.924450	-129.982985	312.66	1517.76	TXT: Going to try to turn the cover over
09/17/2020 02:14:59	45.924453	-129.982987	312.07	1517.73	TXT: Moving the cover using the right arm and the metal loop
09/17/2020 02:16:04	45.924427	-129.983031	301.51	1516.92	TXT: The cover is set right side up
09/17/2020 02:18:32	45.924474	-129.983014	283.65	1517.79	TXT: Going to detach the weight
09/17/2020 02:19:45	45.924463	-129.983052	282.54	1517.78	TXT: Left arm trying to grab the weight's rope
09/17/2020 02:21:27	45.924450	-129.982995	282.75	1517.79	TXT: Weight is caught under the cover
09/17/2020 02:22:13	45.924432	-129.983000	282.75	1517.78	TXT: Got the weight
09/17/2020 02:23:30	45.924452	-129.983011	282.64	1517.79	TXT: Cutting the rope off the weight
09/17/2020 02:26:06	45.924435	-129.983023	282.47	1517.82	TXT: Putting weight in the basket
09/17/2020 02:28:25	45.924448	-129.983051	164.49	1517.67	TXT: Picking up the cover
09/17/2020 02:29:35	45.924440	-129.983050	162.73	1517.67	TXT: Moving the cover to the Webb-2 target while we wait for the 2nd instrument to get to the bottom
09/17/2020 02:44:52	45.924107	-129.982524	146.1	1517.91	WATCH_CHANGE: new_watchstander Bill Hanshumaker
09/17/2020 02:48:54	45.923937	-129.982389	147.3	1518.44	TXT: Moving
09/17/2020 02:49:40	45.923871	-129.982296	149.11	1519.22	TXT: Moving the cover to Webb-2 location
09/17/2020 02:51:11	45.923845	-129.982293	144.23	1523.18	TXT: Put shield cover on bottom
09/17/2020 02:55:52	45.923805	-129.982315	108.11	1522.21	TXT: Heading to 2nd Webb instrument package that was deployed by the ship
09/17/2020 03:02:19	45.923956	-129.981491	42.66	1512.31	TXT: Approaching 2nd instrument package
09/17/2020 03:10:31	45.924026	-129.981503	137.32	1513.65	TXT: Put beacon from shield in float and secured
09/17/2020 03:16:51	45.923964	-129.981705	271.69	1500.86	TXT: Jason takes instrument package and float back to Webb-2 site
09/17/2020 03:27:43	45.923920	-129.982124	204.4	1523.31	TXT: Jason uses knife to cut line to weight attached to shield
09/17/2020 03:29:22	45.923919	-129.982132	204.57	1523.34	TXT: Jason puts weight into its basket
09/17/2020 03:32:09	45.923904	-129.982175	129.56	1523.28	TXT: Jason circles package looking for final deployment location
09/17/2020 03:36:11	45.923975	-129.982223	270.1	1521.34	NAV: Doppler Reset
09/17/2020 03:43:45	45.923895	-129.982229	185.5	1522.63	TXT: Moving 2nd Webb instrument package south a bit
09/17/2020 03:49:04	45.923894	-129.982247	186.91	1523.48	TXT: Jason removes small cable and shackle held by rubberbands

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1296 Logger Comment
09/17/2020 03:56:35	45.923871	-129.982265	145.5	1522.93	TXT: Jason pulls pin releasing float pack while holding harness shackle
09/17/2020 03:56:51	45.923874	-129.982268	159.43	1523.13	TXT: Float is ascending
09/17/2020 03:58:34	45.924023	-129.982299	348.95	1518.43	TXT: Jason moves away towards shield
09/17/2020 04:02:49	45.924913	-129.982087	78.11	1488.19	TXT: Float is 30 minutes from surface
09/17/2020 04:13:33	45.926376	-129.981417	20.72	1488.17	TXT: Jason still heading north
09/17/2020 04:34:01	45.927448	-129.980341	112.64	1488.22	TXT: Thompson has visual on float
09/17/2020 05:10:10	45.933003	-129.973047	52.54	1370.24	TXT: Float is on deck
09/17/2020 05:11:29	45.933216	-129.972655	51.1	1366.41	TXT: Thompson is over Jason's cable
09/17/2020 05:23:54	45.935389	-129.970083	47.87	1468.15	TXT: Ship Is moving back towards Jason
09/17/2020 05:41:23	45.934443	-129.971829	212.71	1474.27	TXT: Jason is returning to Webb-2 site
09/17/2020 06:09:56	45.932024	-129.974833	212.14	1474.17	TXT: 70 minutes ETA
09/17/2020 06:56:34	45.927180	-129.979963	207.39	1474.23	WATCH_CHANGE: new_watchstander Jeff Beeson + Leland Wood
09/17/2020 07:19:12	45.924176	-129.982249	181.42	1518.79	TXT: Bottom back in sight
09/17/2020 07:19:30	45.924109	-129.982269	182.6	1520.95	TXT: Shield in sight
09/17/2020 07:21:52	45.923825	-129.982300	183.85	1520.52	TXT: Going to southern shield first
09/17/2020 07:23:56	45.923762	-129.982283	146.2	1524.91	TXT: Set down in front of shield
09/17/2020 07:25:41	45.923764	-129.982269	149.43	1524.91	TXT: Lifting shield with stbd arm
09/17/2020 07:25:56	45.923763	-129.982267	149.54	1524.87	TXT: Stabilizing with port arm
09/17/2020 07:26:35	45.923788	-129.982278	150.21	1524	TXT: Flying up over to instrument
09/17/2020 07:28:21	45.923843	-129.982254	183.37	1522.49	TXT: Positioning shield over instrument
09/17/2020 07:29:01	45.923828	-129.982215	190.01	1523.71	TXT: Setting down on seafloor
09/17/2020 07:30:08	45.923831	-129.982210	186.54	1524.84	TXT: Fish on inside of shield
09/17/2020 07:31:13	45.923810	-129.982234	186.59	1524.96	TXT: Shield placed
09/17/2020 07:32:29	45.923863	-129.982224	186.32	1525.07	TXT: Placement is good - adding weights to top of shield
09/17/2020 07:33:20	45.923853	-129.982227	186.39	1525.07	TXT: Weight placed on top
09/17/2020 07:34:19	45.923857	-129.982230	186.43	1523.2	TXT: Looking at opposite side of shield to confirm everything is good
09/17/2020 07:35:15	45.923832	-129.982250	119.78	1522.7	TXT: image
09/17/2020 07:36:24	45.923821	-129.982218	18.71	1522.85	TXT: Everything is good - moving on to second instrument and shield
09/17/2020 07:37:02	45.923893	-129.982271	31.8	1522.75	TXT: image
09/17/2020 07:38:32	45.924016	-129.982246	258.9	1523.81	TXT: Setting down in front of shield
09/17/2020 07:39:14	45.923993	-129.982217	264.86	1525.14	NAV: Doppler Reset

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1296 Logger Comment
09/17/2020 07:39:26	45.923991	-129.982217	264.51	1525.13	TXT: Placing weight in basket
09/17/2020 07:41:01	45.923999	-129.982221	263.37	1525.06	TXT: Lifting shield with arms
09/17/2020 07:43:05	45.923994	-129.982247	131.86	1522.56	TXT: Moving to instrument
09/17/2020 07:45:44	45.924029	-129.982225	112.09	1522.45	TXT: Looking for instrument
09/17/2020 07:47:45	45.923967	-129.982264	152.65	1522.38	TXT: Found instrument - moving to position shield
09/17/2020 07:48:47	45.923927	-129.982295	127.34	1523.19	TXT: Positioned over shield - setting down
09/17/2020 07:49:16	45.923934	-129.982301	121.61	1524.83	TXT: Set on bottom
09/17/2020 07:50:03	45.923949	-129.982312	131.56	1524.99	TXT: Arms released grip from shield
09/17/2020 07:50:33	45.923946	-129.982321	132.18	1525.03	TXT: Shield placed
09/17/2020 07:50:50	45.923941	-129.982316	132.16	1525.05	TXT: Letting dust settle to check placement
09/17/2020 07:52:02	45.923926	-129.982303	132.16	1525	TXT: Putting weight on top of shield
09/17/2020 07:52:23	45.923919	-129.982312	132.18	1524.95	TXT: Weight placed on top
09/17/2020 07:54:40	45.923957	-129.982243	339.24	1523.96	TXT: Moving to check placement on opposite side to confirm
09/17/2020 07:55:05	45.923977	-129.982224	309.75	1524.18	TXT: Placement is good. Done with Webb instrument deployments.
09/17/2020 07:56:16	45.924013	-129.982220	56.2	1519.79	TXT: Begin transit to Diva vent at International District vent field
09/17/2020 07:58:45	45.924158	-129.981826	52.24	1517.9	TXT: image
09/17/2020 08:09:24	45.925148	-129.980806	56.73	1517.03	TXT: image
09/17/2020 08:20:08	45.926049	-129.979919	16.58	1515.46	TXT: Castle vent in sight
09/17/2020 08:20:13	45.926060	-129.979919	17.52	1515.44	TXT: Marker 278
09/17/2020 08:20:17	45.926068	-129.979921	17.67	1514.92	TXT: image
09/17/2020 08:20:32	45.926088	-129.979930	30.53	1513.24	TXT: image
09/17/2020 08:21:03	45.926119	-129.979972	36.54	1507.99	TXT: image
09/17/2020 08:24:05	45.926349	-129.979424	64.91	1515.34	TXT: image
09/17/2020 08:27:41	45.926350	-129.978976	106.97	1516.28	TXT: image
09/17/2020 08:28:15	45.926335	-129.978972	115.17	1516.23	TXT: image
09/17/2020 08:31:01	45.926321	-129.978928	65.03	1518.14	TXT: Trying to see if this is indeed Diva vent
09/17/2020 08:32:12	45.926315	-129.978911	343.54	1518.8	TXT: image
09/17/2020 08:35:07	45.926318	-129.978938	343.47	1517.03	TXT: Looking at other vent to see what marker number it is
09/17/2020 08:35:13	45.926323	-129.978945	343.09	1516.57	NAV: Doppler Reset
09/17/2020 08:36:54	45.926492	-129.979146	294.54	1514.59	TXT: Found marker 153
09/17/2020 08:37:07	45.926496	-129.979149	293.97	1514.52	TXT: image

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1296 Logger Comment
09/17/2020 08:38:25	45.926449	-129.979056	157.06	1514.45	TXT: Going back to that vent - think it is Diva but the marker is gone
09/17/2020 08:39:28	45.926339	-129.978972	134.27	1518.18	TXT: Looking for the HOB0 at this vent
09/17/2020 08:41:04	45.926328	-129.978950	134.67	1519.31	TXT: Do not see HOB0
09/17/2020 08:42:05	45.926306	-129.978959	134.65	1519.3	TXT: Standing by for confirmation on if this is really Diva vent (waking up Bill)
09/17/2020 08:42:49	45.926297	-129.978963	134.61	1519.29	TXT: image
09/17/2020 08:46:04	45.926308	-129.978942	134.31	1519.3	TXT: image
09/17/2020 08:52:40	45.926327	-129.978966	303.48	1515.97	TXT: There is about 12 m offset from the nav underlay map and previous targets
09/17/2020 08:52:54	45.926329	-129.978993	310.84	1514.35	TXT: Looking at neighboring chimney to verify - should be Escargot
09/17/2020 08:53:12	45.926331	-129.979019	310.13	1513.97	TXT: image
09/17/2020 08:53:36	45.926332	-129.979034	310.3	1513.96	TXT: image
09/17/2020 08:54:51	45.926321	-129.978955	34.13	1514.66	TXT: It is Escargot vent - meaning we were at Diva
09/17/2020 08:56:29	45.926304	-129.978926	43.26	1518.77	TXT: There is an OOI cabled Seifried sensor at Diva vent, but it is not directly in the fluid flow
09/17/2020 08:56:51	45.926311	-129.978922	43.26	1518.77	TXT: Looking again for hobo that should be here at Diva
09/17/2020 09:01:54	45.926292	-129.978938	34.25	1518.15	TXT: Looking downslope for hobo - possibly it fell?
09/17/2020 09:03:39	45.926309	-129.979002	58.61	1517.08	TXT: No hobo found - positioning to take samples at Diva and place new hobo
09/17/2020 09:04:45	45.926317	-129.978957	86.74	1518.34	TXT: Set down for sampling
09/17/2020 09:06:17	45.926296	-129.978963	92.64	1519.03	TXT: Starting with temp from Jason probe
09/17/2020 09:10:21	45.926305	-129.978947	92.21	1518.99	TXT: image
09/17/2020 09:12:42	45.926312	-129.978948	92.21	1518.97	TXT: Temp of Diva Vent: 304 C
09/17/2020 09:14:41	45.926293	-129.978960	92.12	1518.97	TXT: SAMPLE: J-1296-Major-1. Green Major. LAT: 45.926319 LONG: -129.978938 Depth: 1519.0 Vent: Diva Temp: 304 C
09/17/2020 09:17:14	45.926317	-129.978945	92.16	1518.94	TXT: image
09/17/2020 09:20:01	45.926310	-129.978973	92.1	1518.92	TXT: hard to see vent port for flow
09/17/2020 09:22:04	45.926337	-129.978962	92.06	1518.9	TXT: readjusting position of snorkel
09/17/2020 09:23:40	45.926336	-129.978952	91.76	1518.89	TXT: in better position
09/17/2020 09:23:44	45.926336	-129.978952	91.75	1518.89	TXT: sample taken
09/17/2020 09:28:22	45.926306	-129.978954	91.6	1518.85	TXT: SAMPLE: Sample Name: J-1296-GTB-2. Orange white black GTB. LAT: 45.926319 LONG: -129.978938 Depth: 1519.0 Vent: Diva Temp: 304 C
09/17/2020 09:29:03	45.926305	-129.978950	91.7	1518.84	TXT: image
09/17/2020 09:33:05	45.926303	-129.978951	91.86	1518.84	TXT: image
09/17/2020 09:33:12	45.926302	-129.978951	92.05	1518.86	TXT: Large fish

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1296 Logger Comment
09/17/2020 09:33:13	45.926302	-129.978951	92.03	1518.85	TXT: image
09/17/2020 09:33:47	45.926301	-129.978951	92.12	1518.86	TXT: image
09/17/2020 09:33:55	45.926301	-129.978950	92.37	1518.85	TXT: Major and GTB secured
09/17/2020 09:34:04	45.926301	-129.978949	92.12	1518.86	TXT: Placing new HOBO
09/17/2020 09:40:02	45.926306	-129.978954	92.2	1518.81	TXT: Using temp probe to break down vent chimney to place hobo
09/17/2020 09:42:03	45.926289	-129.978936	92.45	1518.8	TXT: Placing HOBO-153 at Diva Vent Lat: 45.926319 Long: -129.978938 Depth: 1518.8
09/17/2020 09:42:18	45.926292	-129.978938	92.48	1518.8	TXT: image
09/17/2020 09:45:18	45.926295	-129.978955	92.26	1518.8	TXT: Placing Marker-232 at Diva Vent Lat: 45.926319 Long: -129.978938 Depth: 1518.8
09/17/2020 09:45:21	45.926297	-129.978955	92.26	1518.8	TXT: image
09/17/2020 09:45:47	45.926329	-129.978967	89.62	1518	TXT: Transiting to Castle vent
09/17/2020 09:52:24	45.926158	-129.979860	281.51	1512.39	TXT: See Marker 278 - correct location
09/17/2020 09:53:56	45.926102	-129.979885	354.68	1509.35	TXT: Sampling at small anhydrite chimney at base of Castle as top of sulfide chimney is no longer active (looks like parts have fallen down?)
09/17/2020 09:54:52	45.926121	-129.979899	336.84	1513.57	TXT: image
09/17/2020 09:56:14	45.926115	-129.979912	359.17	1514.84	TXT: Set down in front of Castle vent anhydrite chimney
09/17/2020 09:57:37	45.926118	-129.979923	359.27	1514.83	TXT: Recovering old HOBO 129
09/17/2020 09:59:39	45.926095	-129.979948	359.33	1514.8	TXT: Placing old HOBO in basket
09/17/2020 10:00:33	45.926089	-129.979956	359.46	1514.79	TXT: Hobo secured
09/17/2020 10:02:25	45.926101	-129.979966	359.74	1514.77	TXT: Taking temp of vent
09/17/2020 10:07:14	45.926085	-129.979999	359.45	1514.72	TXT: Jason temp probe 2 grounded - using temp probe 1
09/17/2020 10:11:58	45.926091	-129.980010	359.33	1514.68	TXT: Temp of Castle Vent: 247.4 C
09/17/2020 10:13:18	45.926068	-129.979994	359.22	1514.67	TXT: Begin Major sampling
09/17/2020 10:16:07	45.926103	-129.980069	359.19	1514.62	TXT: SAMPLE: Sample Name: J-1296-Major-3. White Major. LAT:45.926074 LONG:-129.979892 Depth:1514.6 Vent: Castle Temp: 247.4
09/17/2020 10:18:51	45.926082	-129.980102	359.14	1514.62	TXT: Securing Major - starting GTB sample
09/17/2020 10:24:15	45.926111	-129.980095	359.11	1514.5	TXT: SAMPLE: Sample Name: J-1296-GTB-4. Green GTB. LAT: 45.926074 LONG: -129.979892 Depth: 1514.5 Vent: Castle Temp: 247.4 C
09/17/2020 10:30:10	45.926116	-129.980132	358.94	1514.45	TXT: Placing HOBO-101 at Castle Vent - Lat: 45.926074 Long: -129979892 Depth:1514.5
09/17/2020 10:31:17	45.926114	-129.980132	358.92	1514.46	TXT: Happy with placement - securing Major GTB and old HOBO
09/17/2020 10:33:19	45.926124	-129.980135	358.13	1514.52	HIGHLIGHTS: Fly over of Castle Vent from bottom to top highlights 4K highlights start
09/17/2020 10:34:29	45.926121	-129.980140	0.8	1514.61	NAV: Doppler Reset
09/17/2020 10:38:10	45.926175	-129.980122	268.23	1507.7	HIGHLIGHTS: highlights 4K highlights stop

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1296 Logger Comment
09/17/2020 10:41:02	45.926116	-129.980092	359.9	1507.63	TXT: Begin transit to El Guapo vent
09/17/2020 10:47:39	45.926700	-129.979502	246.09	1509.8	WATCH_CHANGE: new_watchstander Bill Chadwick + Kelly Chadwick
09/17/2020 10:49:39	45.926514	-129.979730	132.49	1507.78	TXT: image
09/17/2020 10:49:55	45.926526	-129.979733	133.2	1501.87	TXT: image
09/17/2020 10:50:16	45.926563	-129.979768	122.64	1499.75	TXT: Trying to identify which chimney this is
09/17/2020 10:51:05	45.926600	-129.979874	170.02	1508.94	TXT: The dynamic donut forced us to move away from the chimney and where El Guapo is
09/17/2020 10:55:53	45.926393	-129.979715	126.15	1510.33	TXT: Saw the recovered HOB0 probe was bent (the one in the Jason basket)
09/17/2020 10:57:20	45.926385	-129.979701	126.02	1510.5	TXT: Waiting for the ship/cable/donut to move so we can approach El Guapo
09/17/2020 10:59:37	45.926465	-129.979649	5.71	1502.01	TXT: Is this El Guapo chimney?
09/17/2020 11:00:09	45.926437	-129.979665	7.85	1498.37	TXT: Not sure
09/17/2020 11:03:10	45.926478	-129.979649	6.83	1509.36	TXT: We think this is El Guapo now
09/17/2020 11:04:02	45.926520	-129.979643	4.54	1505.02	TXT: image
09/17/2020 11:04:42	45.926503	-129.979643	14.1	1503.11	TXT: There's a navigation offset relative to the map that changes depending on the ship's heading which makes it hard to tell where we are and which chimney we are seeing
09/17/2020 11:04:53	45.926499	-129.979646	14.27	1502.57	TXT: The donut is still keeping us from approaching El Guapo
09/17/2020 11:06:24	45.926552	-129.979653	19.37	1500.73	TXT: image
09/17/2020 11:09:21	45.926547	-129.979654	39.96	1500.8	TXT: image
09/17/2020 11:10:06	45.926547	-129.979667	79.91	1500.79	TXT: At the top of El Guapo. Moving to the other side to avoid smoke in the brow cam
09/17/2020 11:12:28	45.926556	-129.979666	102.75	1500.49	TXT: Getting the temperature probe
09/17/2020 11:13:43	45.926549	-129.979675	103.04	1500.48	TXT: Temp probe in
09/17/2020 11:16:36	45.926557	-129.979668	103.12	1500.45	TXT: Temperature at El Guapo is 338 degrees C
09/17/2020 11:16:53	45.926554	-129.979665	103.05	1500.42	TXT: Putting back temp probe
09/17/2020 11:18:16	45.926553	-129.979664	102.82	1500.44	TXT: Grabbing Red Major
09/17/2020 11:19:18	45.926538	-129.979664	102.76	1500.43	TXT: Switched to the Black Major
09/17/2020 11:21:42	45.926532	-129.979673	102.8	1500.38	TXT: Black Major is not firing
09/17/2020 11:22:18	45.926539	-129.979664	102.71	1500.37	TXT: Trying to readjust the Black Major for a better angle
09/17/2020 11:23:43	45.926546	-129.979663	102.76	1500.35	TXT: SAMPLE: Sample Name: J2-1296-Major-5 LAT:45.926487 LONG:-129.979661 Depth:1500.4 Major color:black Vent:El Guapo Temp:338 C Extra: didn't originally fire after trigger was used multiple times. Had to get the perfect angle
09/17/2020 11:29:54	45.926534	-129.979658	102.74	1500.3	TXT: SAMPLE: Sample Name: J2-1296-Major-6 LAT:45.926487 LONG:-129.979661 Depth:1500.4 Major color:red Vent:El Guapo Temp:338 C
09/17/2020 11:32:45	45.926556	-129.979675	102.31	1500.3	TXT: Securing the majors

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1296 Logger Comment
09/17/2020 11:35:07	45.926553	-129.979700	102.42	1500.25	TXT: Getting Gastight
09/17/2020 11:39:04	45.926544	-129.979677	102.86	1500.22	TXT: SAMPLE: Sample Name: J2-1296-GTB-7 LAT:45.926487 -129.979661 Depth:1500.4 GBT color:red/green Vent:El Guapo Temp:338 C
09/17/2020 11:40:08	45.926539	-129.979670	102.66	1500.21	TXT: Securing gastight
09/17/2020 11:40:43	45.926534	-129.979657	102.73	1500.2	TXT: Niskins next
09/17/2020 11:42:02	45.926539	-129.979682	105.14	1499.97	TXT: Moving into position for first Niskin
09/17/2020 11:47:19	45.926548	-129.979656	104.96	1496.5	TXT: SAMPLE: Sample Name: J2-1296-Niskin-8 LAT:45.926483 LONG:-129.979646 Depth:1496.5 Niskin:front (#1) Vent: El Guapo Description: hydraulic Niskin did not fire so triggered a manual Niskin instead
09/17/2020 11:47:33	45.926547	-129.979656	104.96	1496.55	TXT: Moving 25m downcurrent
09/17/2020 11:48:16	45.926543	-129.979646	105.02	1496.53	TXT: Need to move the ship
09/17/2020 11:51:55	45.926521	-129.979625	105.06	1496.52	TXT: Trying to determine which way the current is going
09/17/2020 11:55:15	45.926290	-129.979621	104.94	1496.29	TXT: We've come 25 meters south and we think we're in the plume but it's hard to tell
09/17/2020 11:56:49	45.926294	-129.979577	104.74	1496.45	TXT: SAMPLE: Sample Name: J2-1296-Niskin-9 LAT:45.926203 LONG:-129.979712 Depth:1496.4 Vent: El Guapo (25m downcurrent) Description: the second manual niskin. For e-DNA.
09/17/2020 11:57:11	45.926315	-129.979601	45.53	1496.39	TXT: image
09/17/2020 11:59:02	45.926454	-129.979776	317.93	1496.4	TXT: Realized the temp probe has been damaged
09/17/2020 11:59:06	45.926457	-129.979776	318.24	1496.54	TXT: Turning the temp probe off
09/17/2020 12:00:06	45.926604	-129.979834	315.92	1496.59	TXT: Beginning transit to M33 (1.5 hrs)
09/17/2020 13:06:16	45.925008	-129.975947	156.3	1325.33	TXT: Change of plans: because we are ahead of schedule and we need to stay in the same area for Sentry's recovery we are going an old dead transponder to cut its cord and release it
09/17/2020 13:06:28	45.925038	-129.975970	155.75	1327.02	TXT: Transiting to XP 8.5 (old dead transponder)
09/17/2020 13:07:01	45.925065	-129.975996	156.02	1329.42	TXT: We're looking for it with the Blueview sonar
09/17/2020 13:15:19	45.924713	-129.975717	137.19	1322.76	TXT: Wire in sight
09/17/2020 13:19:02	45.924668	-129.975641	143.21	1360.28	TXT: Going to the top of the line to cut it there so the glass ball won't a long line attached to it
09/17/2020 13:21:24	45.924683	-129.975650	138.45	1314.51	TXT: image
09/17/2020 13:21:34	45.924685	-129.975654	138	1317.8	TXT: Going to 1330 m to cut the line
09/17/2020 13:24:27	45.924634	-129.975622	133.86	1330.28	TXT: Trying to get a grip on the line
09/17/2020 13:25:14	45.924659	-129.975661	136.95	1330.28	TXT: Holding the line with the left arm
09/17/2020 13:26:02	45.924743	-129.975740	137.24	1330.32	TXT: One of the knives is missing
09/17/2020 13:26:44	45.924828	-129.975806	137.32	1330.36	TXT: Going to have to hold the line with the right arm and get the backup knife with the left

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1296 Logger Comment
09/17/2020 13:28:49	45.924930	-129.975990	137.09	1330.37	TXT: Cutting the cord on the transponder. Released.
09/17/2020 13:29:12	45.924951	-129.976022	137.08	1330.33	TXT: Replacing knife
09/17/2020 13:35:18	45.925009	-129.976134	32.67	1330.1	TXT: Going to the bottom
09/17/2020 13:42:19	45.925131	-129.976744	274.62	1350.57	TXT: Going back to International District to wait for a couple hours while Sentry does a test and gets recovered
09/17/2020 14:51:57	45.926522	-129.977788	57.34	1339.98	WATCH_CHANGE: new_watchstander Mr. Bill - Oh No
09/17/2020 15:02:59	45.926634	-129.977902	57.55	1339.98	TXT: Sentry is ascending
09/17/2020 15:33:11	45.925345	-129.979428	279.18	1340.19	TXT: Sentry on surface
09/17/2020 15:42:02	45.926241	-129.981896	299.29	1339.36	TXT: Sentry on deck
09/17/2020 15:48:02	45.926999	-129.981455	349.68	1340.14	TXT: Jason begins transit towards Marker33 vent
09/17/2020 16:45:43	45.933231	-129.982154	6.31	1512.03	TXT: Arrived at Marker33
09/17/2020 16:47:54	45.933269	-129.982185	254.33	1513.39	TXT: Recovering old MTR-3028 now
09/17/2020 16:50:50	45.933271	-129.982177	252.77	1513.38	TXT: MTR-3028 minature temperature recorder is recovered by Jason
09/17/2020 16:53:53	45.933263	-129.982123	253.31	1513.43	TXT: Jason uses temperature probe. T-Probe measured 31C
09/17/2020 16:56:10	45.933264	-129.982192	252.02	1513.41	TXT: Deploying new MTR-3317 in same location at Marker 33 vent
09/17/2020 16:59:30	45.933502	-129.982280	356.07	1509.93	TXT: Transit to MarkerN3 vent
09/17/2020 17:01:41	45.933533	-129.982268	355.44	1509.93	TXT: MTR 3028 stowed in port biobox from M33
09/17/2020 17:02:58	45.933712	-129.982257	356.17	1509.98	TXT: 90 minute transit to MarkerN3 to recover and deploy one MTR
09/17/2020 17:13:10	45.934613	-129.983001	346.27	1509.41	NAV: Doppler Reset
09/17/2020 18:24:00	45.943685	-129.985052	14.45	1518.49	TXT: MkrN3 Vent/Mkr135 sighted (marker 135 is covered with blue mat!)
09/17/2020 18:26:08	45.943735	-129.985065	2.69	1519.23	HIGHLIGHTS: highlights 4K highlights start
09/17/2020 18:28:04	45.943745	-129.985054	2.72	1519.56	HIGHLIGHTS: highlights 4K highlights stop
09/17/2020 18:44:31	45.943761	-129.985054	16.85	1520.17	NAV: Doppler Reset
09/17/2020 18:44:54	45.943760	-129.985053	16.74	1520.18	TXT: Recovered MTR-3201 and put port biobox
09/17/2020 18:48:20	45.943768	-129.985067	16	1520.21	TXT: Jason deploys temperature probe in MTR site at Marker N3 vent
09/17/2020 18:50:14	45.943763	-129.985055	16.04	1520.24	TXT: Recorded 25C temperature
09/17/2020 18:52:35	45.943769	-129.985074	17.13	1520.27	TXT: Deploy MTR-3321 at same site at Marker N3 vent
09/17/2020 18:59:17	45.943888	-129.985034	310.96	1520	HIGHLIGHTS: Marker N3 vent fly over - blue mat forest highlights 4K highlights start
09/17/2020 19:06:41	45.944347	-129.985009	18.9	1519.99	TXT: Begin transit to AX-302 at Trevi vent to pick up Mini-BPR that we did not recover of dive J2-1295
09/17/2020 19:09:24	45.944586	-129.984880	18.63	1519.18	TXT: image

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1296 Logger Comment
09/17/2020 19:09:48	45.944594	-129.984883	16.21	1518.95	TXT: image - fish!
09/17/2020 19:09:56	45.944594	-129.984886	17.24	1518.82	TXT: image
09/17/2020 19:28:22	45.946378	-129.983832	48.42	1518.19	TXT: image
09/17/2020 19:29:14	45.946429	-129.983739	81.06	1516.99	TXT: Marker in sight at AX-302 benchmark near Trevi vent
09/17/2020 19:30:15	45.946477	-129.983712	182.12	1517.82	TXT: Setting down in front of benchmark to retrieve Mini-BPR
09/17/2020 19:31:24	45.946473	-129.983696	191.56	1518.97	TXT: Opening stbd biobox to place Mini-BPR in
09/17/2020 19:31:40	45.946471	-129.983697	191.01	1518.97	TXT: Lifting Mini-BPR
09/17/2020 19:32:14	45.946469	-129.983695	191.43	1518.99	TXT: Placing Mini-BPR 2014-12 in stbd biobox
09/17/2020 19:32:49	45.946474	-129.983693	191.26	1519.03	TXT: Mini-BPR is too tall for the biobox - finding new place
09/17/2020 19:34:41	45.946474	-129.983705	193.99	1517.58	TXT: Mini-BPR stowed in GT crate in basket
09/17/2020 19:35:11	45.946466	-129.983742	190.03	1515.58	TXT: Flying down to Trevi vent
09/17/2020 19:39:28	45.946302	-129.983693	80.72	1516.78	TXT: Vent in sight
09/17/2020 19:40:34	45.946343	-129.983592	79.58	1516.34	TXT: Hovering over Trevi - going to try and fire Niskin as a test (not a sample)
09/17/2020 19:45:24	45.946350	-129.983582	79.14	1517.18	TXT: Firing hydraulic Niskin - extending ram - trigger failed
09/17/2020 19:46:52	45.946345	-129.983582	79.19	1517.17	TXT: Standby while starting multibeam software to test system some more
09/17/2020 19:55:13	45.946548	-129.983731	249.7	1515.73	TXT: Rising to altitude of 20 m
09/17/2020 19:56:16	45.946517	-129.983763	189.66	1515.49	NAV: Doppler Reset
09/17/2020 19:57:12	45.946529	-129.983715	180.64	1514.8	TXT: Starting up multibeam software
09/17/2020 20:28:16	45.946500	-129.983675	180.21	1501.72	TXT: Having trouble with data transmission with multibeam and Jason - trying to fix
09/17/2020 20:55:45	45.946473	-129.983679	180.25	1501.77	TXT: Still troubleshooting issues with multibeam software
09/17/2020 21:24:53	45.946473	-129.983667	180.08	1501.74	TXT: Still not working - phoning a friend for assistance
09/17/2020 22:00:09	45.946529	-129.983740	180.78	1501.5	VEHICLE: milestone Off bottom
09/17/2020 22:00:22	45.946481	-129.983741	154.61	1501.7	TXT: Begin ascent to recovery
09/17/2020 22:49:33	45.945752	-129.983539	124.45	121.96	TXT: Beacon is off cable
09/17/2020 22:54:40	45.945752	-129.983539	126.13	20.18	TXT: First float removed
09/17/2020 22:59:08	45.945752	-129.983539	121.31	4.75	TXT: Last float off
09/17/2020 23:02:57	45.945752	-129.983539	298.57	0.57	VEHICLE: milestone Jason on deck
09/17/2020 23:27:08	45.946206	-129.983617	60.55	0.65	TXT: J2-1296 post-dive check

ROV Jason dive J2-1297 Dive Log (edited/corrected from Jason Virtual Van)

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1297 Logger Comment
09/18/2020 07:00:41	45.749977	-130.200012	4.95	1.1	VEHICLE: milestone Jason in water. Diving at ASHES vent to collect multibeam water-column data then fluid sampling then recovering Webb instruments
09/18/2020 07:02:55	45.750023	-130.199991	4.72	4.71	TXT: First float on
09/18/2020 07:08:44	45.750021	-130.199983	4.19	41.77	TXT: Last float on
09/18/2020 07:11:38	45.750021	-130.199983	10.2	117.56	TXT: Beacon on
09/18/2020 07:53:34	45.750021	-130.199983	115.94	1284.19	TXT: Turning on Jason Kongsberg EM2040 multibeam sonar. Water-column sonar data will be collected to evaluate if it can give useful data about hydrothermal venting.
09/18/2020 08:05:02	45.749951	-130.199899	136.01	1529.03	TXT: Glass ball in front of us
09/18/2020 08:06:03	45.749973	-130.199927	157.35	1528.46	TXT: Stopping descent - avoiding cable and glass ball
09/18/2020 08:07:32	45.933577	-130.013603	189.37	1537.83	VEHICLE: milestone On bottom
09/18/2020 08:08:30	45.933588	-130.013641	357.81	1537.03	TXT: Vent in sight
09/18/2020 08:09:50	45.933604	-130.013642	358.74	1537.81	NAV: Doppler Reset
09/18/2020 08:21:41	45.933378	-130.013370	0.38	1524.05	TXT: Multibeam Survey 1 : Inferno vent - Altitude 20 m - driving lines in a 50 m box around vent - first survey will make 2 m interval of movement
09/18/2020 08:22:11	45.933389	-130.013370	0.75	1524.25	TXT: Imbes line 0001
09/18/2020 08:27:43	45.933511	-130.013360	357.9	1524.11	TXT: Imbes line 0003
09/18/2020 08:38:34	45.933716	-130.013347	1.58	1524.38	TXT: Potential heading error with Jason going due north
09/18/2020 08:42:21	45.933773	-130.013343	358.68	1523.81	TXT: Heading error fixed
09/18/2020 08:46:51	45.933809	-130.013328	269.8	1523.65	TXT: Turning to east - line northeast to northwest - Imbes line 0005
09/18/2020 08:47:11	45.933809	-130.013352	270.96	1523.98	TXT: Decreased speed to 0.1 m/s
09/18/2020 09:12:07	45.933845	-130.013933	180.66	1524.46	TXT: Turning south - line northwest corner to southwest corner of box - Imbes line 0007
09/18/2020 09:42:30	45.933414	-130.013973	90.7	1523.71	TXT: Turning East - line southwest corner to southeast corner of box - Imbes line 0009
09/18/2020 10:14:10	45.933392	-130.013343	74.94	1523.62	TXT: End of Survey 1
09/18/2020 10:17:31	45.933365	-130.013363	271.1	1523.54	TXT: Begin multibeam Survey 2 : altitude 20 m speed 0.1 m/s Imbes line 0011 - southeast corner to southwest corner of box
09/18/2020 10:27:29	45.933397	-130.013998	0.88	1523.54	TXT: Turning north - line southwest to northwest - Imbes line 0012
09/18/2020 10:36:23	45.933855	-130.013943	90.79	1523.05	TXT: Turning East - line northwest to northeast - Imbes line 0013
09/18/2020 10:45:50	45.933820	-130.013303	182.44	1523.1	TXT: Turning south - line northeast to southeast - Imbes line 0014
09/18/2020 10:53:11	45.933820	-130.013307	180.65	1523.15	TXT: Waiting for the dynamic donut
09/18/2020 10:59:37	45.933806	-130.013308	179.89	1523.64	TXT: Starting line 0014

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1297 Logger Comment
09/18/2020 11:08:17	45.933375	-130.013340	181.35	1522.86	TXT: End of Survey 2 at .1 m/s Alt: 20 m (moving continuously instead of stop and go that we did in Survey 1)
09/18/2020 11:11:08	45.933363	-130.013370	270.93	1522.83	TXT: Beginning Survey 3 at 0.05 meters per second ALT: 20 meters - line southeast to southwest
09/18/2020 11:11:10	45.933363	-130.013372	270.73	1522.82	TXT: start of line
09/18/2020 11:11:27	45.933363	-130.013383	270.72	1522.78	TXT: Line 0015
09/18/2020 11:27:48	45.933386	-130.014006	270.56	1522.91	TXT: End of line 0015
09/18/2020 11:28:07	45.933393	-130.014007	0.95	1521.94	TXT: Turning north - next line southwest to northwest
09/18/2020 11:28:16	45.933396	-130.014006	1.16	1522.34	TXT: Start line 0016
09/18/2020 11:44:55	45.933841	-130.013972	0.73	1522.31	TXT: End of line 0016
09/18/2020 11:45:03	45.933848	-130.013963	39.33	1522.49	TXT: Turning East
09/18/2020 11:45:23	45.933854	-130.013951	90.81	1522.01	TXT: Start of line 0017 - northwest to northeast - 0.05 m/second
09/18/2020 12:02:21	45.933828	-130.013319	90.67	1522.58	TXT: End of line 0017
09/18/2020 12:02:40	45.933823	-130.013311	181.05	1522.1	TXT: Turning south
09/18/2020 12:02:50	45.933816	-130.013315	181.78	1523.22	TXT: Start of line 0019 - northeast to southeast
09/18/2020 12:19:29	45.933372	-130.013348	180.57	1522.42	TXT: End of line 0019
09/18/2020 12:19:48	45.933376	-130.013348	180.81	1522.03	TXT: End of Survey 3 - 0.05 meters per second ALT:20 m
09/18/2020 12:20:18	45.933375	-130.013348	180.73	1522.36	TXT: End of multibeam surveys
09/18/2020 12:20:22	45.933374	-130.013348	180.79	1522.35	TXT: Jason returning to bottom
09/18/2020 12:26:29	45.933319	-130.013354	180.23	1522	TXT: Beginning transit to Hell vent
09/18/2020 12:28:10	45.933193	-130.013703	272.84	1521.9	TXT: Coming down to the bottom now
09/18/2020 12:29:28	45.933272	-130.013813	271.85	1535.86	TXT: Jason on bottom
09/18/2020 12:29:34	45.933276	-130.013834	272.52	1536.06	TXT: Looking for Hell Vent
09/18/2020 12:32:14	45.933252	-130.013986	192.98	1537.62	TXT: Hell Vent in sight in the back cam
09/18/2020 12:32:29	45.933270	-130.013996	65.7	1537.2	TXT: At Hell Vent
09/18/2020 12:33:06	45.933291	-130.013955	50.82	1538.95	TXT: Going to sample brittle stars first with suction sampler. Looking for bare rock near Hell vent.
09/18/2020 12:33:50	45.933263	-130.013928	130.21	1538.2	TXT: Looking for brittle stars
09/18/2020 12:34:37	45.933252	-130.013921	126.31	1539.27	TXT: Going to suction some 10-15 brittle stars
09/18/2020 12:37:26	45.933237	-130.013918	128.41	1539.21	TXT: Suction tube is ready
09/18/2020 12:38:26	45.933234	-130.013917	128.31	1539.21	TXT: SAMPLE: J-1297-Bio-1. Suction of 10-15 brittle stars on bare rock near base of Hell vent.
09/18/2020 12:40:10	45.933199	-130.013913	125.28	1539.26	TXT: Starting suction again

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1297 Logger Comment
09/18/2020 12:42:22	45.933200	-130.013910	125.23	1539.24	TXT: Suction tube may be clogged
09/18/2020 12:44:48	45.933202	-130.013908	124.47	1539.22	TXT: Brittle stars hold on to the rock and are hard to suck up with the tube. Some are damaged
09/18/2020 12:50:30	45.933197	-130.013906	123.86	1539.08	TXT: End of brittle star collection
09/18/2020 12:52:25	45.933196	-130.013899	123.7	1539.11	TXT: Suction tube is secured
09/18/2020 12:52:48	45.933196	-130.013897	123.23	1539.13	TXT: Returning to Hell Vent for fluid sampling
09/18/2020 12:58:03	45.933278	-130.013905	33.16	1536.32	TXT: Waiting for ship movement
09/18/2020 12:59:07	45.933276	-130.013900	33.15	1536.32	TXT: image
09/18/2020 13:03:16	45.933291	-130.013869	35.52	1535.96	TXT: Landed at top of Hell Vent for fluid sampling
09/18/2020 13:05:15	45.933290	-130.013879	33.46	1535.82	TXT: Positioning Jason temp probe
09/18/2020 13:06:58	45.933291	-130.013888	33.33	1535.8	TXT: Hell Vent temperature: 310 degrees C
09/18/2020 13:09:18	45.933291	-130.013893	33.53	1535.83	TXT: Picking up the Green Major
09/18/2020 13:12:17	45.933294	-130.013888	34.06	1535.78	TXT: SAMPLE - Sample Type: MAJOR Sample ID: J-1297-Major-2 LAT:45.933278 LONG:-130.013930 ALT:4.8m Depth:1535.8 Location:Hell Vent Description:Green Major at Hell Vent Temp = 310C
09/18/2020 13:13:01	45.933295	-130.013885	33.89	1535.77	TXT: image
09/18/2020 13:13:23	45.933295	-130.013884	33.75	1535.76	TXT: image
09/18/2020 13:17:43	45.933297	-130.013868	33.98	1535.71	TXT: SAMPLE - Sample Type: MAJOR Sample ID: J-1297-Major-3 Location:Hell Vent LAT:45.933278 LONG:-130.013930 DEPTH:1535.8m Description: Black Major Temp = 310C
09/18/2020 13:20:01	45.933298	-130.013866	33.58	1535.75	TXT: Majors secured
09/18/2020 13:23:37	45.933305	-130.013869	34.58	1535.67	TXT: SAMPLE - Sample Type: GASTIGHT Sample ID: J-1297-GTB-4 Location:Hell Vent LAT:45.933278 LONG:-130.013930 DEPTH:1535.8m Description: White Gastight Temp = 310C
09/18/2020 13:30:45	45.933309	-130.013871	35.04	1535.3	TXT: Beginning transit to Inferno vent
09/18/2020 13:33:02	45.933484	-130.013698	44.33	1535.35	TXT: Inferno vent in sight
09/18/2020 13:33:46	45.933533	-130.013654	45.44	1535.37	TXT: Finding a good spot to land Jason (same location as sampled during dive J2-1293)
09/18/2020 13:39:15	45.933581	-130.013596	201.72	1535.98	TXT: Getting the Jason temp probe
09/18/2020 13:42:28	45.933576	-130.013606	201.21	1535.95	TXT: Temperature at Inferno Vent: 318 degrees C
09/18/2020 13:46:24	45.933574	-130.013607	201.24	1535.94	TXT: SAMPLE - Sample Type: MAJOR Sample ID: J-1297-Major-5 Location:Inferno Vent LAT:45.933567 LONG:-130.013652 DEPTH:1535.9m Description: White Major Temp = 318C
09/18/2020 13:51:48	45.933575	-130.013604	201.59	1535.93	TXT: SAMPLE - Sample Type: MAJOR Sample ID: J-1297-Major-6 Location:Inferno Vent LAT:45.933567 LONG:-130.013652 DEPTH:1535.9m Description: Red Major Temp = 318C
09/18/2020 13:54:55	45.933576	-130.013604	201.53	1535.92	TXT: Majors secured
09/18/2020 14:00:22	45.933574	-130.013604	201.42	1535.89	TXT: SAMPLE - Sample Type: GASTIGHT Sample ID: J-1297-GTB-7 Location: Inferno Vent LAT:45.933567 LONG:-130.013652 DEPTH:1535.9m Description: Purple Gastight Temp = 318C

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1297 Logger Comment
09/18/2020 14:03:14	45.933574	-130.013605	201.33	1535.9	TXT: Gastight secured
09/18/2020 14:14:12	45.933578	-130.013608	201.07	1535.89	TXT: Beginning transit to Anemone Vent
09/18/2020 14:19:19	45.933246	-130.013663	223.35	1534.89	TXT: At Anemone vent and Marker 205
09/18/2020 14:19:38	45.933245	-130.013662	223.32	1534.86	TXT: Preparing to trip Niskins
09/18/2020 14:23:41	45.933188	-130.013688	223.23	1536.28	TXT: SAMPLE - Sample Type: NISKIN Sample ID: J-1297-Niskin-8 Location: Anemone Vent LAT:45.933199 LONG:-130.013716 DEPTH:1536.3m Description: Hydraulic Niskin (#3) tripped right above vent. For e-DNA.
09/18/2020 14:25:09	45.933180	-130.013684	223.35	1536.3	TXT: Our current nav position is 10 meters southeast of the Anemone target location
09/18/2020 14:25:27	45.933184	-130.013667	197.36	1536.26	TXT: We are going to move 25 meters to the southeast which is the down-current direction
09/18/2020 14:32:35	45.932979	-130.013424	129.08	1536.28	TXT: SAMPLE - Sample Type: NISKIN Sample ID: J-1297-Niskin-9 Location: Anemone Vent LAT:45.933012 LONG:-130.013481 DEPTH:1536.3m Description: 25m down-current (SE) of Anemone vent. Aft niskin (#2)
09/18/2020 14:47:25	45.932082	-130.012170	133.37	1536.28	NAV: Doppler Reset
09/18/2020 14:48:08	45.932083	-130.012129	132.65	1536.22	NAV: Doppler Reset
09/18/2020 14:48:21	45.932058	-130.012082	131.59	1536.32	NAV: Doppler Reset event_comment First time reset to the cursor location by mistake
09/18/2020 14:51:49	45.931912	-130.011870	133.21	1536.09	TXT: SAMPLE - Sample Type: NISKIN Sample ID: J-1297-Niskin-10 Location: 200m down-current from Anemone Vent LAT:45.931936 LONG:-130.011896 DEPTH:1536.1m Description: 200m down-current. Front Niskin (#1)
09/18/2020 15:00:28	45.932975	-130.012408	318.87	1537.34	WATCH_CHANGE: new_watchstander Bill Hanshumaker
09/18/2020 15:00:48	45.932988	-130.012435	319.01	1536.89	TXT: image
09/18/2020 15:14:20	45.933545	-130.013137	285.26	1538.78	TXT: Bugs Bunny Memorial marker for former Thompson Chief Engineer Jim Swanton (a big Looney Tunes fan) placed on seafloor near Gollum-Marker 64
09/18/2020 15:22:38	45.932760	-130.013217	128.64	1536.65	TXT: Transit from Ashes to Webb-2 instrument location is about 2.6 km
09/18/2020 15:25:17	45.932411	-130.012558	121.17	1536.85	TXT: Leaving Ashes on our way to Webb-2
09/18/2020 18:19:15	45.923999	-129.982372	190.14	1521.32	TXT: Spotted one of the Webb instrument shields
09/18/2020 18:32:11	45.923393	-129.983806	223.55	1471.1	TXT: Recovery float is on deck and ready to deploy
09/18/2020 18:34:28	45.923441	-129.983925	223.83	1438.8	TXT: Float deployed from ship and descending to the seafloor
09/18/2020 18:55:00	45.923472	-129.983907	233.75	1440.47	WATCH_CHANGE: new_watchstander Jeff Beeson + Leland Wood
09/18/2020 19:01:40	45.923483	-129.983901	28.44	1454.47	TXT: Float on bottom - begin transit to float
09/18/2020 19:05:09	45.923895	-129.983836	40.34	1517.31	TXT: Bottom back in sight
09/18/2020 19:09:32	45.924345	-129.983162	44.75	1517.12	TXT: image
09/18/2020 19:10:38	45.924433	-129.982994	43.9	1517.02	TXT: Float in sight
09/18/2020 19:11:58	45.924475	-129.982847	318.31	1520.05	TXT: image

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1297 Logger Comment
09/18/2020 19:19:41	45.924212	-129.982728	146.86	1503.39	TXT: Float pack being moved to Webb instrument package
09/18/2020 19:32:47	45.924055	-129.982405	5.28	1521.78	TXT: Instrument in sight (note there are two Webb instruments here within a few 10s of meters of each other)
09/18/2020 19:35:58	45.923997	-129.982361	182.08	1522.02	TXT: Positioning near first Webb instrument
09/18/2020 19:38:24	45.923949	-129.982520	262.35	1522.45	TXT: Setting float pack down
09/18/2020 19:40:32	45.923930	-129.982481	216.66	1523.75	NAV: Doppler Reset
09/18/2020 19:42:00	45.923837	-129.982471	189.44	1524.55	TXT: Moving to other Webb instrument AX3 - removing shield
09/18/2020 19:42:24	45.923835	-129.982472	187.52	1524.63	TXT: Removing shield to test for noise - leaving uncovered while first instrument is recovered
09/18/2020 19:43:18	45.923834	-129.982473	190.11	1524.78	TXT: Weight removed from top of shield
09/18/2020 19:44:52	45.923838	-129.982463	195.49	1522.68	TXT: Lifting shield off
09/18/2020 19:46:41	45.923833	-129.982438	200.47	1524.87	TXT: Set shield down to left of instrument
09/18/2020 19:47:05	45.923844	-129.982450	189.32	1524.25	TXT: image
09/18/2020 19:48:02	45.923834	-129.982434	197.02	1524.84	TXT: Moving shield further from instrument
09/18/2020 19:51:11	45.923862	-129.982443	308.23	1524.44	TXT: Returning to first instrument - begin attaching recovery float
09/18/2020 19:55:47	45.923928	-129.982529	105.89	1522.9	TXT: Lifting shield off instrument
09/18/2020 19:57:02	45.923936	-129.982541	100.49	1524.7	TXT: Setting shield down
09/18/2020 20:01:18	45.923914	-129.982523	53.25	1524.89	TXT: Moving to release pull pin from instrument
09/18/2020 20:01:23	45.923915	-129.982523	53.24	1524.88	TXT: Pull pin released
09/18/2020 20:02:30	45.923916	-129.982524	53.42	1524.92	TXT: Removing second pull pin from rope
09/18/2020 20:03:24	45.923917	-129.982526	53.65	1524.96	TXT: Third pull pin released from attachment rope
09/18/2020 20:04:14	45.923917	-129.982529	53.67	1524.96	TXT: Moving hook to attach line from instrument to shield
09/18/2020 20:04:28	45.923917	-129.982530	53.59	1524.95	TXT: Attached
09/18/2020 20:06:32	45.923911	-129.982545	45.05	1524.28	TXT: Flying up to float pack for attachment
09/18/2020 20:10:08	45.923953	-129.982523	135.38	1522.98	TXT: Grabbing float pack for stabilization
09/18/2020 20:13:55	45.923950	-129.982532	139.41	1522.6	TXT: Moving float pack closer to instrument
09/18/2020 20:18:14	45.923924	-129.982516	303.28	1525.01	TXT: Hooking paralink from float pack to instrument
09/18/2020 20:18:46	45.923926	-129.982515	302.94	1525	TXT: Holding shackle for stability
09/18/2020 20:22:38	45.923925	-129.982514	302.34	1525.05	TXT: Shackle in place and everything looks good
09/18/2020 20:24:08	45.923927	-129.982505	294.04	1524.48	TXT: Ship movement started south
09/18/2020 20:25:57	45.923939	-129.982496	275.57	1525.13	TXT: Removing pin from weights to release float and instrument and shield for recovery at surface by ship

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1297 Logger Comment
09/18/2020 20:26:29	45.923941	-129.982473	274.21	1525.1	TXT: Working to release pull pin
09/18/2020 20:26:31	45.923941	-129.982472	274.18	1525.11	TXT: Trying again
09/18/2020 20:27:35	45.923947	-129.982462	273.08	1525.07	TXT: Float released
09/18/2020 20:28:00	45.923959	-129.982439	274.93	1523.22	TXT: Float instrument and shield on the way to the surface
09/18/2020 20:36:56	45.923470	-129.982567	219.79	1350.73	TXT: Jason flying off bottom for recovery of instrument package by ship
09/18/2020 21:03:38	45.923475	-129.982567	308	1297.32	TXT: Float on surface
09/18/2020 21:10:19	45.923476	-129.982567	38.31	1297.66	TXT: Float on surface - moving to recover
09/18/2020 21:43:44	45.923482	-129.982567	201.78	1282.1	TXT: Float hooked
09/18/2020 21:46:12	45.923483	-129.982567	202	1287.58	TXT: Instrument on deck
09/18/2020 21:46:50	45.923483	-129.982567	200.84	1289.91	TXT: Float on deck
09/18/2020 21:54:29	45.923484	-129.982567	326.29	1295.52	TXT: Shield on deck
09/18/2020 22:10:02	45.923487	-129.982567	325.28	1295.12	TXT: Everything secured - begin to transit for Sentry recovery
09/19/2020 00:45:17	45.923516	-129.982567	343.37	1300.65	WATCH_CHANGE: new_watchstander Bill Chadwick + Kelly Chadwick
09/19/2020 00:45:23	45.923516	-129.982567	341.96	1300.55	TXT: Float is in the water deployed from ship for 2nd Webb instrument recovery
09/19/2020 00:51:27	45.923517	-129.982567	87.15	1301.44	TXT: Jason going down to 20 meters above bottom
09/19/2020 00:53:49	45.923518	-129.982567	85.32	1349.17	TXT: Jason going down to the bottom
09/19/2020 01:01:43	45.923696	-129.982533	4.85	1509.38	NAV: Doppler Reset
09/19/2020 01:02:10	45.923759	-129.982495	9.96	1519.45	TXT: Bottom in sight
09/19/2020 01:02:21	45.923797	-129.982472	7.66	1520.13	TXT: Second Webb instrument and cover in sight
09/19/2020 01:03:28	45.923852	-129.982417	9.27	1522.36	TXT: Checking the instrument and cover positioning
09/19/2020 01:04:14	45.923881	-129.982429	78.36	1522.4	TXT: Going to pick up the float which is south of us
09/19/2020 01:17:17	45.922262	-129.982668	195.3	1516.18	TXT: Float in sight
09/19/2020 01:20:09	45.922181	-129.982746	78.59	1517.37	TXT: Grabbed float
09/19/2020 01:22:30	45.922219	-129.982508	87.71	1513.01	TXT: Bringing the float back to the instrument and cover
09/19/2020 01:46:22	45.923898	-129.982462	9.36	1519.53	TXT: Arrived at instrument site
09/19/2020 01:48:01	45.923904	-129.982467	10.21	1520.72	TXT: Float is set down by the instrument
09/19/2020 01:52:29	45.923928	-129.982433	187.9	1522.82	TXT: Grabbing the rope from the instrument
09/19/2020 01:52:50	45.923927	-129.982434	188.62	1522.78	TXT: Pulling the pull pin on the rope
09/19/2020 01:54:27	45.923926	-129.982436	188.66	1522.8	TXT: Instrument's rope is free
09/19/2020 01:57:06	45.923924	-129.982406	167.25	1522.76	TXT: Going to connect the instrument to the cover
09/19/2020 01:57:50	45.923923	-129.982400	167.11	1522.75	TXT: Cover and instrument are connected

Date/Time (GMT)	Latitude	Longitude	Gyro	Depth	J2-1297 Logger Comment
09/19/2020 02:00:09	45.923911	-129.982486	78.59	1520.56	TXT: Going get the rope from the float
09/19/2020 02:03:50	45.923895	-129.982465	52.87	1520.95	TXT: Trying to grab the rope's hook
09/19/2020 02:05:42	45.923892	-129.982466	52.79	1521.04	TXT: Going to remove the pull pin with the right arm while holding the hook with the left
09/19/2020 02:06:58	45.923881	-129.982474	52.21	1520.97	TXT: Hook is free
09/19/2020 02:07:47	45.923871	-129.982483	52.63	1520.99	TXT: Float's rope is free
09/19/2020 02:08:42	45.923903	-129.982497	97.45	1520.76	TXT: Going to connect the float to the instrument with the blue rope
09/19/2020 02:11:15	45.923917	-129.982413	169.3	1522.75	TXT: Float and instrument are connected
09/19/2020 02:11:49	45.923917	-129.982412	168.08	1522.77	TXT: Moving the hook attached to the instrument to the right side of the instrument (nearer the float)
09/19/2020 02:13:02	45.923915	-129.982441	161.99	1522.15	TXT: Moving Jason so that Jason's cable is not in the way when the float and instrument and cover go up
09/19/2020 02:16:03	45.923888	-129.982461	22.05	1522.75	TXT: Holding the weight pack down with the left arm while removing the T handle with the right arm
09/19/2020 02:16:28	45.923889	-129.982459	22.21	1522.71	TXT: Float is away
09/19/2020 02:16:35	45.923889	-129.982459	22.52	1522.72	TXT: Instrument is away
09/19/2020 02:16:48	45.923880	-129.982462	22.04	1522.18	TXT: Cover is away
09/19/2020 02:19:21	45.923877	-129.982451	18.54	1522.65	TXT: Picking up a pull pin from bottom
09/19/2020 02:20:52	45.923920	-129.982499	12.05	1521.8	TXT: End of the dive. Jason can come up whenever the float instrument and cover are recovered. Jason is getting in position for recovery now
09/19/2020 02:27:43	45.923433	-129.983858	264.63	1518.6	TXT: Hauling in cable at 30m/minute
09/19/2020 02:39:01	45.923256	-129.984054	245.74	1175.03	TXT: Slowing the winch
09/19/2020 02:42:42	45.923256	-129.984054	266.36	1110.72	TXT: Stopping the winch
09/19/2020 02:44:16	45.923256	-129.984054	265.56	1104.8	WATCH_CHANGE: new_watchstander Bill Hanshumaker
09/19/2020 03:24:23	45.923256	-129.984054	280.84	1086.86	TXT: Jason is ascending
09/19/2020 03:27:35	45.923256	-129.984054	280.19	985.73	TXT: Jason is at 1000m and ascending steadily
09/19/2020 03:58:03	45.923256	-129.984054	318.89	141.81	TXT: Stopped at 160m to remove beacon
09/19/2020 03:59:41	45.923256	-129.984054	230.27	138.77	TXT: Ascending
09/19/2020 04:02:28	45.923256	-129.984054	231.32	145.49	TXT: Jason ascent is on hold
09/19/2020 04:09:04	45.923256	-129.984054	236.59	236.79	TXT: Jason begins ascent again from 240m
09/19/2020 04:20:03	45.923256	-129.984054	222.15	50.64	TXT: Jason at 50m
09/19/2020 04:26:07	45.923256	-129.984054	237.45	2.34	TXT: Jason is at the surface
09/19/2020 04:30:01	45.923263	-129.984088	50.72	0.77	VEHICLE: milestone Jason on deck

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