

# **Axial 2018 Cruise Report**

**Axial Seamount, Juan de Fuca Ridge**

**KM-18-13**

**R/V Kilo Moana**

**August 18 – 27, 2018**

**Jason Dives J2-1104 & J2-1105**

**Chief Scientists: Bill Chadwick/Scott Nooner**

**R/V Kilo Moana Captain: Charles Martin**

**JASON Expedition Leader: Tito Collasius**

**MBARI AUV Expedition Leader: Hans Thomas**

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# 1 - Axial 2018 Cruise Summary

Bill Chadwick, Chief Scientist

Our research expedition to Axial Seamount in August 2018 was another success, thanks to the efforts of everyone on board, including the captain and crew of the *R/V Kilo Moana*, the *Jason* ROV team, the MBARI Mapping AUV team, and the rest of the science party. After three days of marginal weather, during which we could not dive, we complete two long (~ 50 hr) *Jason* ROV dives, and two long (~22 hr) MBARI Mapping AUV dives. In addition, we recovered, turned-around and re-deployed five instrumental moorings (4 BPRs and 1 OBH) that had been out collecting data since last year. We also conducted seven CTD casts, and collected EM122 multibeam sonar data. In short, we accomplished all our highest priority work, despite the challenging weather.

The two *Jason* ROV dives (J2-1104 & J2-1105) were mainly devoted to making pressure measurements at an array of seafloor benchmarks to measure how much the volcano had re-inflated since our last survey last year. We found the center of the caldera has risen 40 cm in the last two years, and 1.61 m since the end of the 2015 eruption. That means the volcano has recovered nearly 2/3 of the deflation that occurred during the last eruption in the last 3 ¼ years. That means the next eruption is still probably not due before 2020 or 2021, depending on how the inflation rate varies between now and then. We'll be keeping an eye on it through the real-time data from the OOI Cabled Observatory, and will be attempting to forecast the next eruption as it gets closer.

During the *Jason* ROV dives we also opportunistically sampled hydrothermal vent fluids for chemical analysis, and turned around long-term temperature recorders at selected vent sites. At the beginning of Jason dive J2-1105, we also visited a group of 5 sulfide chimneys about 1 km SE of the International District Vent Field, that were discovered in last year's Sentry AUV high-resolution bathymetry. We discovered that they were all extinct, with no evidence of any active venting, and it was an unusual sight to see them completely covered by non-vent filter feeding fauna. We called this area Redwood Grove since the chimneys reminded us of big majestic trees, and the chimneys were close enough to each other that you could barely see the others from each one in the dark gloom.

The two MBARI Mapping AUV dives were made to resurvey previously run multibeam sonar lines to document volcanic ground deformation as depth changes between this year's survey and ones in previous years. This is done to complement the pressure measurements that we make on the seafloor. The AUV resurveys have lower resolution for detected depth change, but we can make them quickly over a much larger area than is practical to cover with the pressure measurements. This year's AUV surveys included the crisscrossing lines inside the caldera, radial lines extending outside the caldera like an asterisk, and two sets of circumferential ovals at different distances outside the caldera. This data on the surface displacements at Axial Seamount will help us model the subsurface magma storage and supply system.

As always, we are grateful to the National Science Foundation and NOAA for supporting this research, and we appreciate the support from the University of Hawaii, the captain and crew of *R/V Kilo Moana*, the Woods Hole Oceanographic Institution, the National Deep Submergence Facility, and the *Jason* ROV and MBARI Mapping AUV teams.

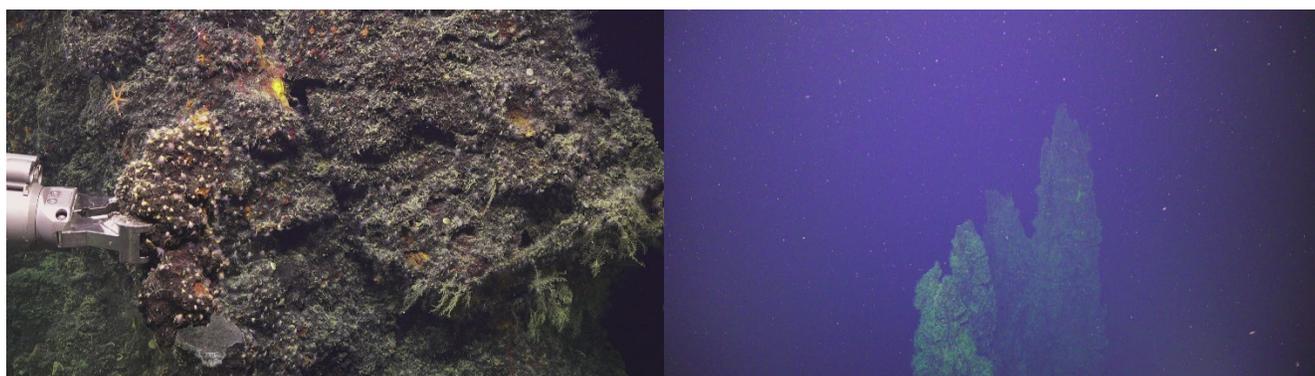
## 2 – Science Participants

<b>Name</b>	<b>Affiliation</b>	<b>Expertise</b>
Bill Chadwick	Oregon State U.	Geology
Scott Nooner	U. N. Carolina, Wilmington	Geology
Will Hefner	U. N. Carolina, Wilmington	Geology
Audra Sawyer	U. N. Carolina, Wilmington	Geology
Andra Bobbitt	Oregon State U.	Data management
Teresa Atwill	Newport High School	Teacher at sea
Chris Holm	Oregon State U.	Mooring tech.
Morgan Haldeman	Oregon State U.	Geology
Matt Cook	Scripps	Geophysics
Haley Cabaniss	Univ. of Illinois	Geophysics
Kevin Roe	U. Washington	Fluid chemistry
Hans Thomas	MBARI AUV group	MBARI Expedition Leader
Dave Caress	MBARI AUV group	AUV
Erik Trauschke	MBARI AUV group	AUV
Emery Nolasco	MBARI AUV group	AUV
Jenny Paduan	MBARI AUV group	AUV
Tito Collasius	ROV Jason group	Jason Expedition Leader
Chris Lathan	ROV Jason group	ROV
Jim Varnum	ROV Jason group	ROV
Christina Haskens	ROV Jason group	ROV
Jim Convery	ROV Jason group	ROV
Korey Verhein	ROV Jason group	ROV
Jim Pelowski	ROV Jason group	ROV
Andrew Billings	ROV Jason group	ROV
Victor Nakicki	ROV Jason group	ROV
Molly Curran	ROV Jason group	ROV

### 3 – Operations Log

Pacific Time (-7 GMT)	Date/Time GMT	Event
18-Aug 0800	18-Aug 1500	Departed Astoria, OR
0957	1657	Started logging multibeam and WCD data.
1144	2211	Stopped WCD data logging; EM122 multibeam continued.
19-Aug 0740	19-Aug 1440	Stopped EM122 logging. On station at Axial Seamount.
0854	1554	BPR-North mooring released from seafloor.
0916	1615	Mooring on surface.
1008	1708	<b>BPR-North recovered.</b> Mooring on deck.
1048	1748	BPR-Center mooring released from seafloor.
1300	2000	<b>BPR-Center recovered.</b> Mooring on deck.
1323	2023	OBH-Center mooring released from seafloor.
1350	2050	Mooring on surface.
1424	2124	<b>OBH-Center recovered.</b> OBH on deck.
1451	2151	BPR-West mooring released from seafloor.
1508	2208	Mooring on surface.
1534	2234	<b>BPR-West recovered.</b> Mooring on deck.
1611	2311	BPR-South 2 mooring released from seafloor.
1623	2328	Mooring on surface.
1653	2353	<b>BPR-South 2 recovered.</b> Mooring on deck.
2029	20-Aug 0329	<b>V18A-01 CTD</b> cast in water at International District.
2211	0511	CTD on deck.
2246	0546	<b>V18A-02 CTD</b> cast in water at Vixen Vent.
20-Aug 0019	0719	CTD on deck.
0112	0812	<b>V18A-03 CTD</b> cast in water at ASHES/Inferno Vent.
0322	1022	CTD on deck.
0408	1108	<b>V18A-04 CTD</b> cast in water at CASM Vent field
0542	1242	CTD on deck.
0645	1345	<b>V18A-05 CTD</b> cast in water at "New Chimney" site (failed to log data)
0813	1513	CTD on deck.
0932	1632	<b>V18A-06 CTD</b> in water at second "New Chimney" site
1056	1756	CTD on deck.
1154	1854	<b>V18A-07 CTD</b> in water for background cast.
1345	2045	CTD on deck.
1545	2245	<b>OBH mooring deployed</b> 45 57.4963'N 130 0.2509'W
1811	21-Aug 0111	<b>BPR South mooring deployed</b> 45 54.9348'N 129 59.6164'W
1826	0126	Begin EM122 Multibeam survey
21-Aug 0552	1252	End EM122 Multibeam survey-continuing to log/ping en route to Dive site
0600	1300	Stopped EM122 logging. On station at Axial Seamount. Weather not good.
0912	1612	<b>BPR North mooring deployed</b> 45 58.4203'N 130 1.1737'W
1012	1712	<b>BPR Center mooring deployed</b> 45 57.5116'N 130 0.6747'W
1237	1937	<b>J2-1104 Dive</b> begins at Axial Seamount
1622	22-Aug 2322	J2-1104 Jason off bottom 200m to prepare for AUV launch
1705	23-Aug 0005	<b>MBARI AUV Dive 20180822m1</b> launched
1933	0233	AUV Dive problems: brought to surface, INS reset, sent down again <b>Dive 20180822m2</b>
2000	0300	J2-1104 resumes
22-Aug 1605	2305	J2-1104 aborted to recover MBARI AUV
1656	2356	Jason out of water

Pacific Time (-7 GMT)	Date/Time GMT	Event
1921	24-Aug 0221	MBARI AUV recovered on deck
23-Aug 2040	0340	<b>J2-1105 Dive</b> begins
24-Aug 1327	2027	<b>MBARI AUV 20180824m2</b> begins
25-Aug 0925	25-Aug 1625	J2-1105 Last pressure measurement completed @AX-307 for this expedition
1040	1740	Jason on deck
1252	1952	MBARI AUV on deck
1447	2147	<b>BPR West mooring deployed</b>
26-Aug 0240	26-Aug 0940	Begin EM122 Multibeam survey
0601	1301	Ship headed for Astoria while continuing EM122 logging.
1945	27-Aug 0245	Began WCD survey with EM122
0310	1010	End EM122 and WCD survey
27-Aug 0930	1630	Arrived in Astoria



Views of Redwood Grove chimneys east of Axial's caldera.

## 4 – Discipline Summaries

### 4.1 Geology/Geophysics

#### 4.1.1 Pressure Measurements to Monitor Volcanic Deformation at Axial Seamount

Bill Chadwick, Scott Nooner, and Matt Cook

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. In addition, we have deployed various kinds of continuously-recording bottom pressure recorders (BPRs) throughout the caldera. There are 3 kinds of BPRs: (1) Some BPRs are autonomous moorings that record for 1-3 years at a time (4 of these were turned around in 2018). (2) Four others are BPR/Tilt instruments that are connected to the OOI Cabled Array. (3) In addition, we use “mini-BPRs” that are deployed and recovered by ROV on some of the MPR benchmarks (we recovered 4 of these and deployed 5 in 2018). 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 determine the instrumental drift of the BPR, so the BPR data can be corrected. The 2017-2018 time interval was the first time we have been able to constrain the drift rates of the BPRs at all of the seafloor benchmarks, except one, AX-308, which did not have a nearby BPR. 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 (South Pillow Mound), 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 this year at the center of the caldera, and once its operation is shown to be reliable, this could be used as a reference in future years. This year, MPR pressure measurements were made at the benchmarks during *Jason* dives J2-1104 and J2-1105. We had intended to conduct the measurements during a single dive, but dive J2-1104 had to be ended early in order to recover the MBARI AUV after its first dive.

This year ROV *Jason* was operating in two-body mode (with *Medea*) on *R/V Kilo Moana*. This meant that *Jason* could transit between sites at a speed of up to 1 knot, instead of being limited to 0.5 knots, as it did when in single-body mode last year. This made the pressure dives a bit more time-efficient. On dive J2-1104, we made two full transects of all the benchmarks, starting at AX-308, going to AX-105, and ending after fluid sampling at ASHES and the 3<sup>rd</sup> repeat measurement at AX-106 (all others had two, and AX-105 had one). On dive J2-1105, we started at the newly discovered chimneys ~1 km SE of International District, then proceeded to AX-310, northward to AX-303, AX-309, and AX-302, then back southward visiting all the east-side benchmarks to AX-105, and the back northward again to AX-104, AX-308, AX-106, and finally AX-307 where the dive ended. Between the 2 dives, benchmarks AX-106, AX-309, AX-303, AX-310, and AX-104 got 4 repeats, AX-308, AX-307, and AX-302 got 3 repeats, and AX-101 and AX-105 got only 2.

At the first benchmark (AX-308), we attempted to sweep off the upper surface of the benchmark with a brush, so that ash from a future eruption could be identified and sampled unambiguously, but we quickly realized this was a bad idea, because the manipulator arm would move the benchmarks if we weren’t careful. Also, the bottom currents since the 2015 eruption have now effectively removed any 2015 ash that was deposited, making cleaning them unnecessary. Therefore, we did not attempt any additional brushing on other benchmarks. 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 used in the MPR again this year. We conducted some fluid sampling during both pressure dives (using Major and Gastight sampling bottles this year instead of The Beast). The MPR pressure data were converted to depth then corrected for ocean tides using data collected by the Mini-BPR #04, which was recovered at AX-105 on the 2<sup>nd</sup> pressure dive, and predicted tides after that. 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  $\pm 1.3$  cm this year. The 2017-2018 MPR results show uplift (inflation) at all stations relative to AX-105.

#### 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

Depth changes from July 2017 to August 2018 at MPR benchmarks. Uncertainty is  $\pm 1.3$  cm.

BENCHMARK NAME	Depth change (cm)
AX-101 Caldera Center	34.3
AX-104 Bag City	13.4
AX-105 Pillow Mound	0.0
AX-106 Ashes	20.0
AX-302 Trevi	17.2
AX-303 Marker 33 site	17.5
AX-307 Magnesia West	30.7
AX-308 South1	21.8
AX-309 RSN-PN	11.4
AX-310 Intern. District	17.7

#### OOI Cabled Array BPR drift

The results from the MPR survey allow us to constrain the drift rate of the OOI Cabled Array bottom pressure/tilt instruments (BOTPTs). This is the second time we have been able to do this since the original three BOTPT instruments were powered up in September 2014 (although only for the first time for the fourth

BOTPT instrument that was deployed at ASHES in August 2017). Last year, the 2015-2017 MPR data showed that the drift at all of the OOI-BPRs was less than 1 cm/yr, which we considered “essentially zero”, considering the errors. This year, comparison with the 2017-2018 MPR results suggests small positive drift rates between 3-7 cm/yr (see table below). However, these calculations have their own uncertainty, because they require picking start and end depths from the BPR time-series, which is overprinted with tidal residuals and oceanographic effects. The fact that the calculated drift for all 4 OOI BPRs has moved in the same direction since last year, suggests that the apparent drift may be largely due to the non-geophysical signal in the BPR data. This source of error has more influence on these calculations because of the shorter time period between MPR surveys this year (2017-2018). Presumably, the longer time period of the previous MPR survey (2015-2017), should provide a more accurate determination of the OOI-BPR drift, just because the oceanographic effects will have less influence. Thus, for now, we still conclude (as we did last year) that no drift corrections should be made to the OOI NANO-BPR data from the BOTPT instruments on the cabled observatory inside the summit caldera. Our next MPR survey in 2020 will provide another 2-year survey interval with which to calculate the drift rates on the OOI-BPRs. Another, even better test of drift will be to compare the OOI-BPR data over the next year or two with the new self-calibrating pressure recorded (SCPR) that is now on the Cabled Array at the caldera center.

OOI cabled BPR Drift Rates Determined by Comparing with MPR Surveys

Name	Location	Nearest MPR benchmark	Drift rate 2017-2018 (cm/yr)	Drift rate 2015-2017 (cm/yr)
BOTPT-A301-MJ03F	Central Caldera	AX-101	+3.376	-0.682
BOTPT-A302-MJ03E	Eastern Caldera	AX-309	+6.935	-0.839
BOTPT-A303-MJ03D	Intern. District	AX-310	+3.011	-0.892
BOTPT-A304-MJ03B	ASHES	AX-106	+2.099	N/A

### Autonomous BPR moorings

We recovered the four autonomous BPR moorings in August 2018 (West, North, Center, and South2) that were deployed in July 2017 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.

Data from BPR-Center looks "normal" for the first half of the record (showing ~7 cm of inflation, before drift correction), but then there is an abrupt ~10 cm offset downward in the middle of the record, which must be due instrument instability (since the nearby OOI-BPR does not show this). Also, the record after this offset is relatively flat and does not show continued inflation like the OOI-BPR does, so the instrument apparently remained unstable for the rest of the deployment. So, this record is a bit of a bust (at least the 2nd half of it), but it's really just a back-up for the OOI-BPR at the caldera center (or they are back-ups for each other), so this is no major loss. This is the first time we've seen moored BPR instability like this, but obviously there is some luck involved when free-falling instruments from the surface. The drift rate in the table below is calculated from the first half of the record only.

Data from BPR-North looks good throughout, although it had a bit of a long equilibration. The overall record shows inflation of ~30 cm (not drift-corrected), mostly before June 2018, when inflation slowed for a month or two, which we saw in the OOI instruments. This is a good record, but we don't know the drift. Data from BPR-South2 is also a good record, and has a similar trend with time compared with BPR-North and OOI-MJ03F. It shows ~12 cm of uplift (before drift correction). Data from BPR-West is unusual because it shows steady

apparent deflation the whole year, amounting to ~40 cm! This is the first record from up on the western rim of the caldera, which probably has heavy sediment. The apparent deflation could be due to site instability - perhaps the instrument was slowly settling into the sediment all year? Or else the drift rate could be relatively high and positive, but unfortunately we have no way to constrain it. The main purpose of the BPR-North and BPR-West instruments is to have two additional continuously recording measurement sites in useful locations to catch the next eruption, so even if this record is ambiguous over the 2017-2018 time period, it may still be useful to have this instrument out there during the next eruption, because the eruption will occur over a short time-interval, so we can ignore drift.

By comparing the BPR-Center and BPR-South2 data with the 2017-2018 MPR survey at benchmarks AX-101 (Center) and AX-104 (South-2), we can determine the drift rate of these two BPRs. How those rates compare with previous years' data is shown in the following table.

**Autonomous Moored BPR Drift Rates Determined by Comparing with MPR Surveys**

Name	S/N	Dynamic range (psi)	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	103402	10,000	-18.060	-15.365	-20.101	-8.576
BPR-South2	125320	3,000	-1.278	-3.514	-5.048	n/a

This shows that (1) the same BPR deployed in the same location has a 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 in close to the same locations.

**BPR Mooring Deployment Locations in 2018 (all acoustically surveyed)**

Name	Lat Deg	Lat Min	Lon Deg	Lon Min	Lat	Lon	Depth
BPR-Center	45	57.460	-130	00.679	45.95766	-130.01131	1532
BPR-South2	45	54.910	-129	59.600	45.91516	-129.99333	1537
BPR-West	45	57.016	-130	02.174	45.95027	-130.03623	1448
BPR-North	45	58.388	-130	01.177	45.97313	-130.01962	1581

**Mini-BPRs (TG11s)**

During *Jason* dives J2-1104 and J2-1105 this year, we recovered 4 mini-BPRs that were deployed on MPR benchmarks in 2017 (see table below). These 4 mini-BPRs were built at Scripps and are owned by Glenn Sasagawa and Scott Nooner. They were deployed with small tripods on their undersides to make them stable and ~5 pounds heavy in water. All recorded for the entire period.

**MINI-BPRs RECOVERED in 2018**

BENCHMARK NAME	Mini-BPR	Paros S/N	Paros model	Range (psi)	Drift rate (cm/yr)
AX-303 Marker 33 site	#02	137987	43K	3000	+52.469
AX-105 Pillow Mound	#04	137988	43K	3000	+22.813

AX-302 Trevi	#05	137989	43K	3000	+10.768
AX-307 Magnesia West	#10	137990	43K	3000	+47.724

Just like last year, the drift rates of the mini-BPRs are high and variable. However, the drift rates I calculated for the mini-BPRs above are LINEAR. That is, I just eyeballed the starting depth and ending depth and compared it to the depth change determined by the MPR survey. However, it is pretty clear that the drift experienced by the mini-BPRs is exponential at the beginning and then (probably) linear after some time period. So the linear drift correction I have calculated is probably not the best approximation of the drift behavior. Mini-BPR #05 had one bad-data record in the raw data at 07/21/2018 05:33:20 (which was replaced by the mean of the preceding and following records). There is also an offset of about 45 cm (up) mid-way in the record for MiniBPR #04 from about 11/25/2017 to 12/11/2017. It is not just one single offset, but a series of offsets and time periods with unrealistically high changes. It is not clear what the source of these offsets was. For now, we have removed the 45 cm offset from the later 2/3 of the record (by eye), and calculated a drift rate from the artificially offset time-series, but it should be considered just a best guess.

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, which provides better predicted-tides than the generic tide-prediction program SPOTL, which we used for this purpose before 2017.

In order to have 5 Mini-BPRs to deploy in 2018, we turned around one of the units that were recovered (Mini-BPR #10), and deployed it on the second pressure dive (we only came out with 4 units instead of 5). Mini-BPR units 08, 09, 12, 10, and 13 were deployed in 2018 at the benchmarks listed in the following table:

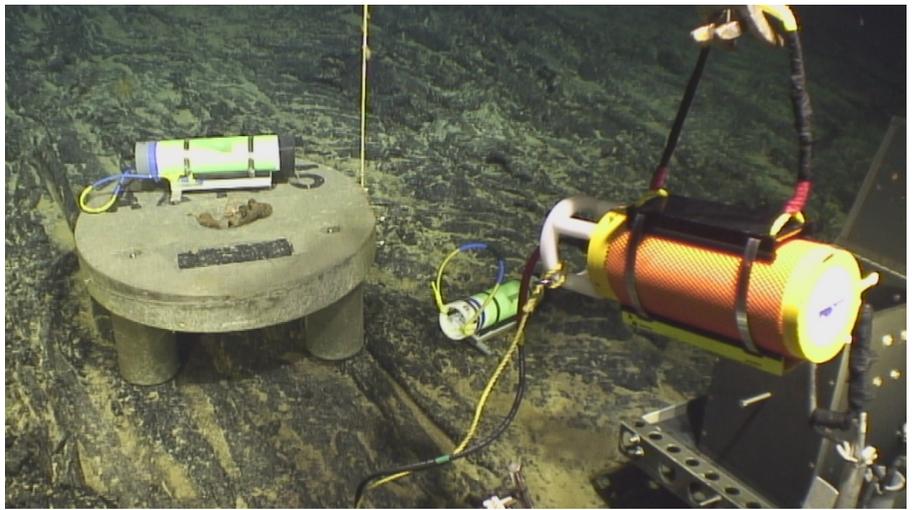
**MINI-BPRs DEPLOYED in 2018**

BENCHMARK NAME	Mini-BPR	Paros S/N	Paros model	Range (psi)
AX-308	#08	127329	43K	3000
AX-307 Magnesia West	#09	127331	43K	3000
AX-302 Trevi	#12	132673	46K	6000
AX-303 Marker 33 site	#10	137990	43K	3000
AX-105 Pillow Mound	#13	132674	46K	6000

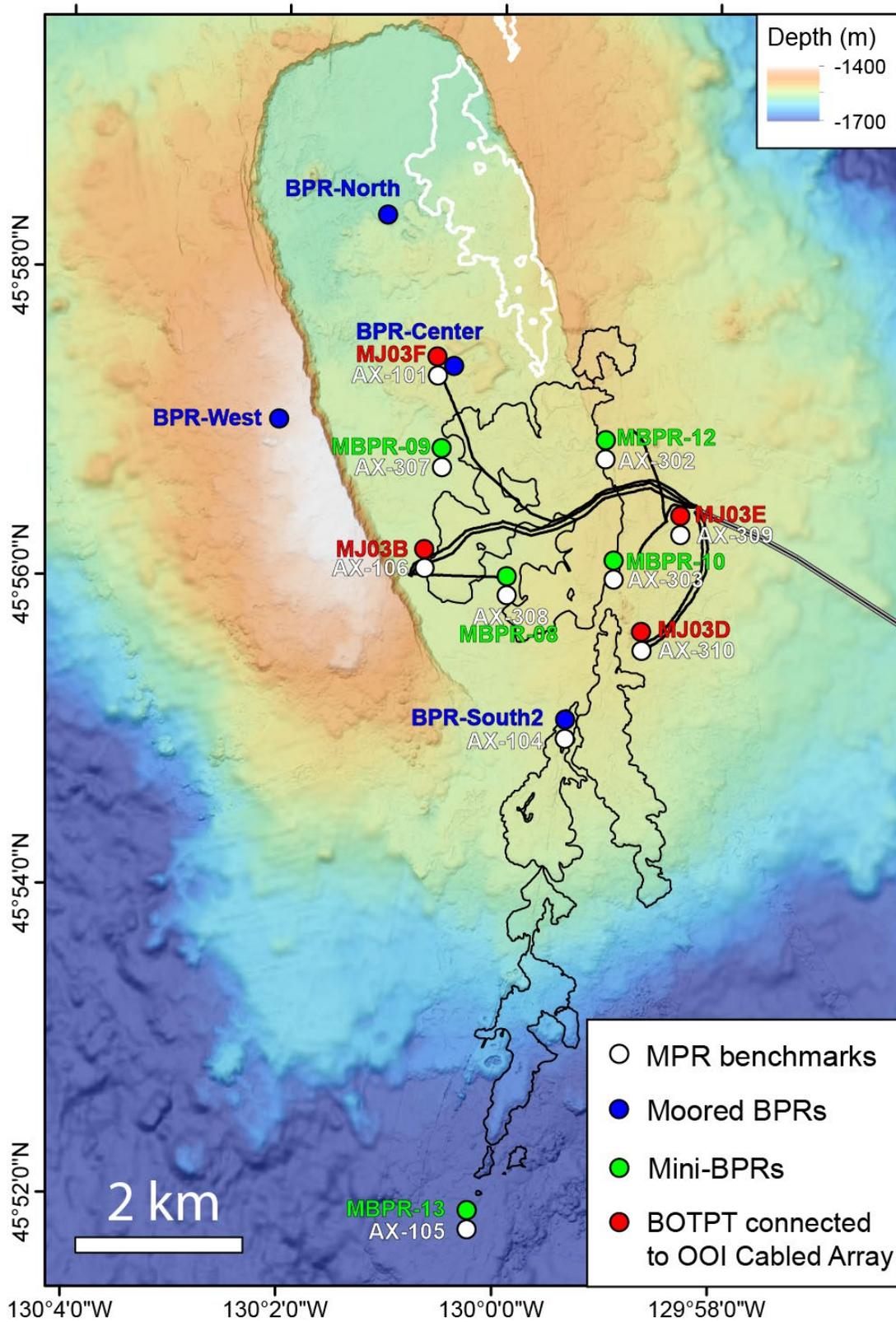
We plan to recover these in summer of 2020 and replace them with the other 5 Mini-BPRs. The 5 Mini-BPRs that are NOT currently deployed are the following units: 02, 04, 05, 06, 07. This is the first time ALL the MPR benchmarks have a BPR either on the benchmark or nearby (either a mini-BPR, and OOI-BPR, or an autonomous BPR mooring). See figure below.

**Overall Results of the Pressure Measurements**

The data from the 2018 MPR survey and the BPRs that were recovered show that by mid-August 2018 Axial Seamount had re-inflated about 63% of the total amount of deflation that occurred during the 2015 eruption (1.61 m of post-eruption re-inflation compared to 2.54 m of co-eruption deflation). The rate of re-inflation since the 2015 eruption has been variable, with periods of more rapid inflation separated by periods of slower inflation, or even short-lived deflation (such as from mid-June to early July 2018). Extrapolating the



average long-term rate of inflation (40-50 cm/yr), it appears Axial will not be ready to erupt again until mid-2020 to mid-2021. We will attempt to make a more specific forecast of the timing of the next eruption as the time nears, using the real-time BPR data from the OOI Cabled Array (<https://www.pmel.noaa.gov/eoi/rsn/>). The spatial distribution of re-inflation is consistent with the source geometry derived from modeling of our previous MPR surveys – that is, a prolate spheroid (cigar-or-football shape) that is located at a depth of about 3.8 km beneath the eastern wall of the caldera near AX-302 (Trevi) and oriented with the long-axis nearly vertical but steeply dipping to the WNW. Complementary bathymetric re-surveys with the MBARI Mapping AUV for measuring volcanic deformation over a larger area are described in the next section.



Map showing MPR benchmarks and co-located BPRs (after the 2018 cruise).

## 4.1.2 - Rock Collections

Morgan Haldeman and Jenny Paduan

### J-1105-GEO-01

- Massive polymetallic sulfide from “Redwood Grove” chimney field
- Sample was from the new chimney field that was discovered in AUV *Sentry* bathymetry data from 2017. All chimneys observed were inactive. They were uniformly wide for nearly their entire heights, which inspired the name “Redwood Grove”. They had been built directly on a lightly sedimented, hackly lava flow beyond which were pillow lavas.
- Sample was of an old orifice protruding from ~6 m up from the base of the southern-most chimney, which was 22 m high according to the ROV’s altimeter. It was broken from the chimney, and remained intact until contact with the ROV porch.
- Collected at 1553 m depth
  - 45° 55.207502 N, -129° 57.795632 (W)
  - 05:21:53 on 2018/08/24
  - Placed on porch between boxes of fluid samplers
- Broke into two large pieces 18x18x15 cm and 19x19x9 cm plus a few smaller pieces
- The interior is uniformly gray crystalline polymetallic sulfide. The lower piece retains the hollow pipe of the orifice, which is clogged by the top. No chalcopyrite or sparkly crystals are apparent. The exterior has some brown alteration.
- The exterior was populated with small pink anemones, which have been removed.
- The sample will be chemically analyzed by ActLabs and a piece sent to John Jamieson for age dating.



### J-1105-GEO-09

- Small pillow bud from 2011 Bag City lava flow
- Collected at ~1531 m, approx. 4m NW of AX104 benchmark
  - 45.91619 N, -129.989535 W
  - Collected around 23:14:22 UTC, 2018/08/24
  - Placed in port bio box
- 7 x 4 x 3.25 inches (LxWxH)



- Radial swelling from interior
- Glass rim 0.4 cm thick, very vitreous, oily rainbow sheen
- Raised, lobate glass texture
- Newly exposed surface displays outwardly radiating vesicles
  - Vesicle chains ~0.5 cm long
  - Vesicles generally  $\leq 1$  mm in diameter
  - Vesicle chains may connect to create larger voids
  - Aphanitic lithics
- Minor oxidation (orange) around the outer edges of the exposed surface
  - Deepest section ~2 cm depth
  - Appears to be mostly surficial and confined to exposed surfaces
  - Minor oxidation also present in chipped glass
- Plagioclase crystal present in exposed surface and in glass, < 0.5% of mass
  - Glass – up to 0.6 cm length, single prism
  - Lithic – up to 0.4 cm diameter, radiating lathes
- Glass chipping off very easily in shards and chips
  - Translucent pieces displaying typical brown glass coloration expected of basalt



## J-1105-GEO-12

- Collected from surface sheet flow adjacent to AX105 benchmark
- Collected at ~1715m depth
  - 45.863154 N, -130.003826 W
  - Collected around 05:11:23 UTC, 2018/08/25
  - Placed in gastight box on port side of basket
- 10.9 x 9.9 x 4.9 cm (LxWxH)

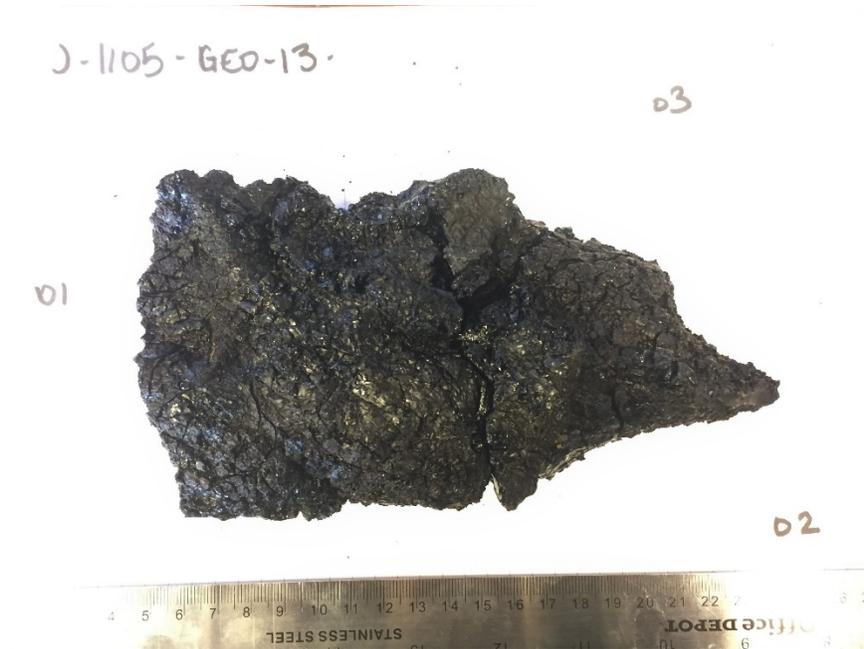
J-1105-GEO-12



- Picked up from a surface sheet flow. Pahoehoe rope structures visible, but more angular than ropy
  - Aphanitic lithics
- Matte quench rind overlaying glass beneath
- Cooling rings visible in small corner of sample
- One plagioclase crystal visible, ~0.3 cm long lathe
- No evident vesicles, but two larger voids (1 cm x 1 cm and 1.3 cm x 1 cm) may have formed from volatile exsolution
  - Evenly smoothed
  - Ovoid to spherical
- Glass rim depth / thickness difficult to determine in hand sample, but estimated at ~ 0.3 cm thick

## J-1105-GEO-13

- Collected from surface sheet flow adjacent to AX105 benchmark
- Collected at ~1715m depth
  - 45.863154 N, -130.003826 W
  - Collected around 05:14:23 UTC, 2018/08/25
  - Placed in gastight box on port side of basket
- 18.2 x 10 x 4.3 cm (LxWxH)



Note: Sample broke into 3 pieces when dropped into basket: GEO-13-01, GEO-13-02, GEO-13-03

### GEO-13-01:

- LxWxH – 8.9 x 10 x 4.3 cm
- Has elongated, ovoid void in the center with a length diameter of 1.2 cm and a width diameter of 0.4 cm
- Multiple plagioclase crystals, < 1% of mass
  - Largest is prism, 0.55 x 0.35 cm
- Cooling rings in glass
- Visible transition between glass and more lithic materials, ~ 0.6 cm from rim
  - Lithic is aphanitic
- Few vesicles visible on either glassy or exposed surfaces
  - Largest is 1 mm in diameter
- Surface (glassy rind) is cracked and split in quench / cooling textures

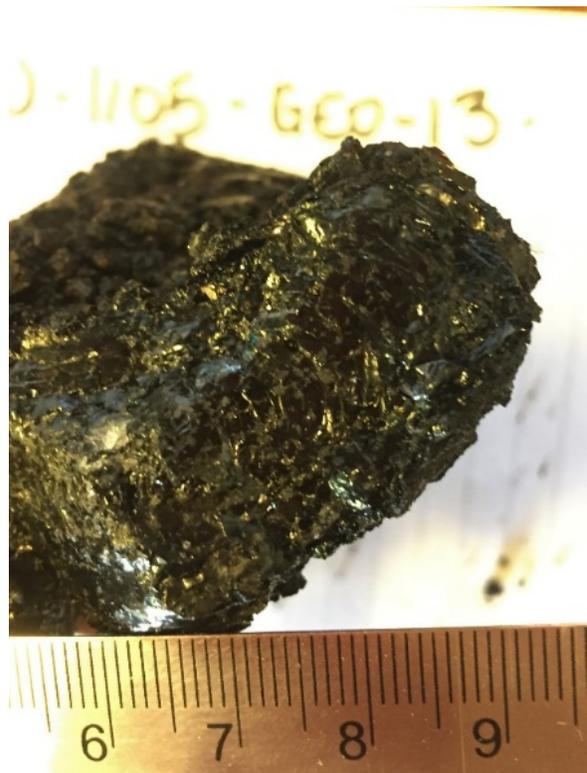


**GEO-13-02:**

- LxWxH – 7.7 x 6.8 x 5 cm
- Similar to 13-01 in textures, still contains cooling rings in glass
- Transition between glass and lithics occurs ~ 0.6 cm from rim
  - Lithic material aphanitic, black
- No visible vesicles
- Cracked / split rind displaying quench / cooling textures
- 2 prominently visible plagioclase crystals on exposed break surface
  - Both ~ 0.4 cm long and ~ 0.35 cm wide

**GEO-13-03:**

- LxWxH – 4.9 x 3.6 x 3 cm
- Similar to previous two samples
  - Cooling ring still prominent
  - Glass rind ~ 0.6 cm thick from rim to transition
  - No visible vesicles
- Only one visible plagioclase crystal, spherical, ~ in diameter
- More prominently lithic due to increased surface exposure, possibly due to the breaking during collection
- Lithic is aphanitic



1 mm

## J-1105-GEO-14

- Collected from surface pahoehoe / pillow lava flow from 2011 Bag City
  - Approx. 5 m from benchmark AX104
- Collected at ~1530m depth
  - 45° 54.96582 N, -129° 59.36880 W
  - Collected around 09:58:38 UTC, 2018/08/25
  - Placed in Majors box on starboard side of basket
- 17.7 x 11.4 x 8.9 cm (LxWxH)

Note: Sample broke into two pieces when dropped into the box: GEO-14-01, GEO-14-02



#### GEO-14-01:

- LxWxH – 12.6 x 6.4 x 8.3 cm
- Thick glass rind ~ 0.5 cm thick
  - Black, glossy, vitreous, easily breakable
- Lithic/glass transition easily distinguished in some places, less so in others
- Appears that the break point between sibling samples may have started as a pre-existing crack, as an oxidation outline is present
- Vesicle chains present, up to 0.6 cm in length
  - Individual vesicles  $\leq 1.5$  mm, most less than 0.5 mm
  - Larger ovoid / spherical void also present, ~ 0.6 cm in diameter, with a smaller companion ~ 0.25 cm in diameter
- Exposed surface of lithic retains oily sheen
  - Aphanitic, black
- One distinguishable plagioclase crystal present, ~ 1.5 mm in diameter
- Vesicle barrier present ~ 1.2 cm from rim/edge
  - 0.9 cm thick at its thickest point
  - Barrier extends along circumference of sample
  - Secondary barrier also present in center of sample
    - 1.6 cm of lithic material separates the two vesicle barriers



#### GEO-14-02:

- LxWxH – 10.2 x 10.8 x 8.9 cm
- Very thick glass rind, up to 1.4 cm thick
  - Black, glassy, vitreous
  - Matte quench coloration partially obscures glossy areas of rind
- Thick, sheened lithic and interior exposed surface
  - Aphanitic
- Minor vesicle chains present, < 0.4 cm in length
  - Largest visible vesicle is ~ 2 mm in diameter
  - Combined vesicles may create a void ~ 3 mm in diameter
- Small ring of surface oxidation on exposed surface, possible indication of an exposed crack / weakness between 14-01 and 14-02 prior to collection
- No visible plagioclase crystals

## J-1105-GEO-15

- Collected from surface pahoehoe / pillow lava flow from 2011 Bag City
  - Approx. 5 m from benchmark AX104
- Collected at ~1529m depth
  - 45° 54.96750 N, -129° 59.36874 W
  - Collected around 10:12:38 UTC, 2018/08/25
  - Placed in Majors box on starboard side of basket
- 11.4 x 7.3 x 6.6 cm (LxWxH)



- Glass rind ~ 1.3 cm thick at thickest point
  - Matte glass, quenched, makes up ~80 % of rind
  - 20% of rind is glassy, black, vitreous, somewhat laminated
- Lithic exposed surface
  - Aphanitic, oily
- Minor vesicle groups forming near-bubble chains up to 0.5 cm long
- Largest vesicles ~ 2 mm in diameter
  - Small layer of horizontal vesicles ~ 0.8 cm below the glass/lithic transition
  - ≤ 0.4 cm wide
- Three stacked, horizontal voids
  - First – 0.5 cm wide, 0.2 cm high
  - Second – 1.9 cm wide, 0.7 cm high
  - Third – 5.2 cm wide, 0.9 cm high
- Minor surface oxidation
- One plagioclase crystal ~ 0.35 cm in diameter



## 4.2 Fluid Sampling

Kevin Roe

Fluid samples were obtained from select high-temperature vents using bottles and not the PMEL EOI HFS sampler this year. The first sample attempted was using the Red major bottle #22 at Virgin Vent but the ram on the bottle was too long to be triggered by Jason's starboard arm. The sample was completed using another major (white).

dive	date	time	latitude	longitude	heading	altitude	depth	Comments	Virtual Van #
J2-1104	2018/08/23	20:24:32	45.93366	-130.01324	149	0.79	1540.7	SAMPLE: J1104-Major-01 at <b>Virgin Vent</b> . Tmax=245.5degC. White Major bottle 6C. Tail had good flow.	4948
J2-1104	2018/08/23	21:42:10	45.93357	-130.01373	255	4.04	1537.8	SAMPLE: J1104-Major-03 at <b>Inferno Vent</b> . Taken from top of chimney at large black smoker excavated for good flow. Tmax=302degC. Yellow bottle 20.	5181
J2-1105	2018/08/24	08:24:36	45.92654	-129.97953	239	15.04	1502.6	SAMPLE: J1105-Major-03 at <b>El Guapo</b> . At upper part of the vent where active pieces were exploding off. Major bottle #2. Tmax=330degC.	6168
J2-1105	2018/08/24	08:30:38	45.92654	-129.97953	240	15.04	1502.6	SAMPLE: J1105-Major-04 at <b>El Guapo</b> . Major bottle #1. Good flow deflection and sample. Same location at El Guapo. Tmax=330degC.	6187
J2-1105	2018/08/24	09:19:44	45.92638	-129.97904	215	1.76	1519.0	SAMPLE: J1105-Major-07 at <b>Diva Vent</b> . Anhydrite chimney knocked over prior to sampling for better flow. Red major bottle. Tmax=301degC.	6329
J2-1105	2018/08/24	23:50:45	45.91736	-129.99299	226	1.3	1531.1	SAMPLE: J1105-Major-10 at <b>Vixen</b> . Green bottle at Vixen with Tmax 321degC. Excavated venting orifice to get better flow.	8365

### 4.3 Gas Sampling

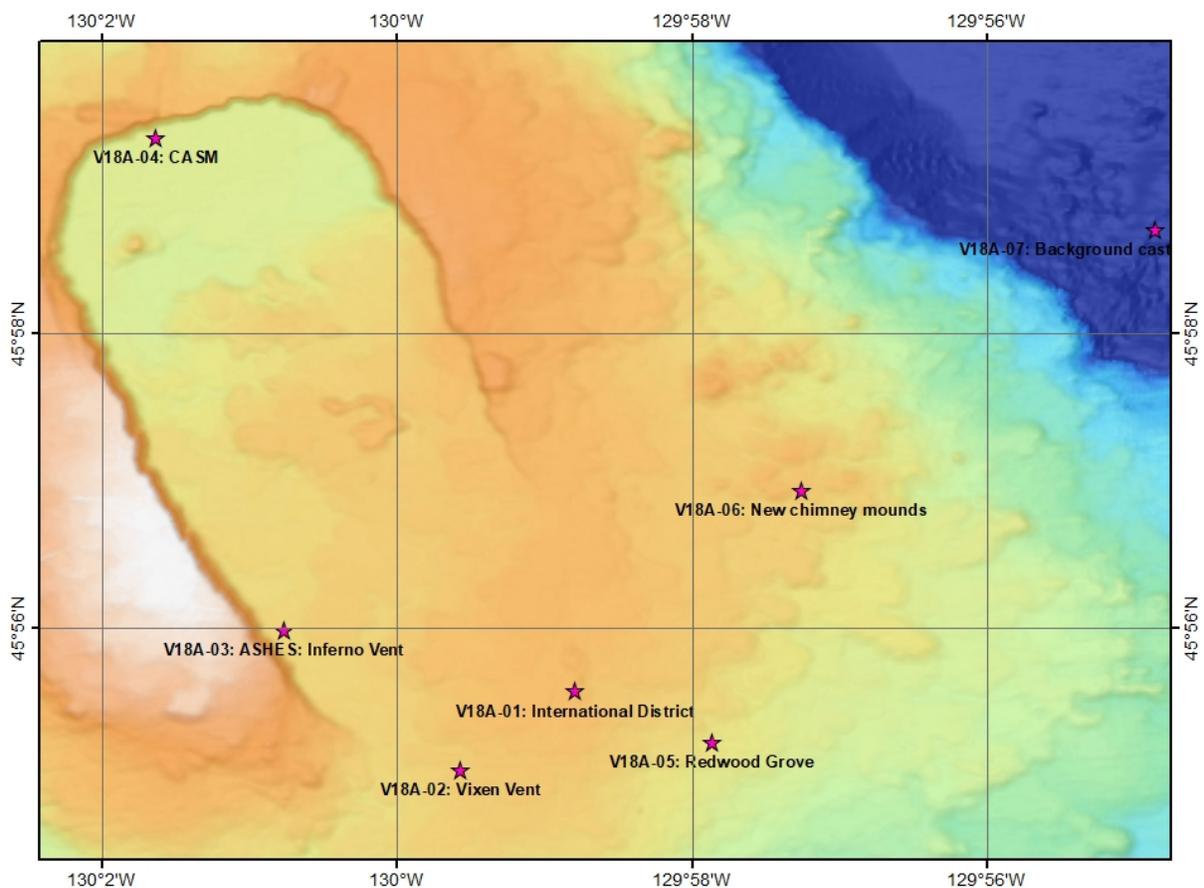
Gas samples were collected with titanium gas-tight bottles at select, high-temperature vents. Several of the gas samples failed to trigger (were empty when brought to the lab) and speculation is that bottles were not tight in the grip. The tape had been removed during pre-dive checks as it was too thick. During sampling it appeared the bottles had been triggered however movement of the o-ring movement did not occur.

dive	date	time	latitude	longitude	heading	altitude	depth	Comments	vv
J2-1104	2018/08/23	20:31:21	45.93366	-130.01324	149	0.8	1540.6	SAMPLE: J1104-GTB-02 at Virgin Vent. Tmax=245.5degC. Green bottle 2. GTB shifted forward slightly when triggered. Same place as J1104-Major-01.	4968
J2-1104	2018/08/23	21:50:12	45.93357	-130.01373	254	4.1	1537.8	SAMPLE: J1104-GTB-04 at Inferno Vent. Same location as J1104-Major-03. Tmax=302degC. Yellow/green GTB #12. (FAILED)	5205
J2-1105	2018/08/24	08:44:23	45.92654	-129.97953	239	15.0	1502.6	SAMPLE: J1105-GTB-05 at El Guapo. White bottle #17. Same location as majors. Tmax=330degC. (FAILED)	6227
J2-1105	2018/08/24	08:51:53	45.92654	-129.97953	240	15.0	1502.5	SAMPLE: J1105-GTB-06 at El Guapo. Same location as previous samples. Tmax=330degC. Red bottle #9.	6248
J2-1105	2018/08/24	09:27:52	45.92638	-129.97904	215	1.9	1518.9	SAMPLE: J1105-GTB-08 at Diva. Tmax=301degC. Same location as majors. Purple GTB bottle #11. (FAILED)	6356
J2-1105	2018/08/24	23:56:52	45.91736	-129.99299	226	1.3	1531.0	SAMPLE: J1105-GTB-11 at Vixen in the flow but not the sediment. Fired. Same location as the major sample with 321degC Tmax. Yellow GTB bottle #6.	8383

## 4.4 CTD Operations

2018 CTD casts were conducted consecutively while weather prevented ROV and AUV dives. Unfortunately, we discovered after the cruise that no data were logged for the 5th CTD cast (V18A-05) due to operator error.

CTD	latitude	longitude	depth	Site	Data File	20-Aug Time utc
V18A-01	45.92623	-129.97982	1500	International District	KM1812_cast1.hex	0329
V18A-02	45.91737	-129.99273	1510	Vixen Vent	KM1813_cast2.hex	0546
V18A-03	45.93314	-130.01271	1520	ASHES: Inferno Vent	KM1813_cast3.hex	0812
V18A-04	45.98872	-130.02713	1573	CASM	KM1813_cast4.hex	1108
V18A-05	45.92047	-129.96430	1558	Redwood Grove	KM1813_cast5.hex (failed to log data)	1345
V18A-06	45.94888	-129.95427	1535	New chimney mounds	KM1813_cast6.hex	1628
V18A-07	45.97836	-129.91438	1500	Background cast	KM1813_cast7.hex	1854



## 4.5 Axial Moorings

Chris Holm, Oregon State University

### Objectives:

Recover 4 Bottom Pressure Recorders (BPRs) (BPR South, BPR Central, BPR West, BPR North)

Recover 1 Ocean Bottom Hydrophone (OBH)

Service and replace BPR and OBH Mooring Hardware

Service 4 BPR Instruments

Deploy 4 BPR Moorings and one OBH

Acoustic survey of mooring locations (if time permits)

### OBH and BPR Recoveries

Day 1 on site the weather was determined to be unworkable for ROV or AUV operations so the decision was made to use the time to recover all moorings. Combined seas were 7-10ft with 25 to 30knt NW winds with gusts to 35knts. The ship was instructed to set up 1-2km 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 transducer was held over the stern mid-ship which on the Kilo Moana is open due to the catamaran design. The transducer was lowered until the first strip of white tape was close to the air sear interface. All releases had good communications and were released without issue. It was necessary to listen using the headphones on a few to hear all the return pings as the deck box did not pick up every ping. After release it took about 20 minutes on average before the glass balls where spotted off the bow.

All moorings were recovered on 8/19/2018 using the capstan fairlead to the A-frame using turning blocks. The Capstan line was brought over to the port rail near the stern and fixed with a snap hook rated to 1500lbs and fixed to the end of a 24' carbon fiber pole fabricated by OSU OOI. Two grappling hooks were also at the ready as the ship brought the glass balls down the port side. BPR North was recovered first using a grapple and ships stainless steel carabineer (rated to 1000lbs) on a pole. The carabineer was fouled with the grapple and side loaded upon lifting the first set of glass balls leaving it badly bent and at risk of failing at any time. A 3T Crosby snap hook on a stopper line (3/8" Spectra) was hooked in just below the first set of balls on the pear link and the line was made fast on a cleat before the glass balls were lowered to the deck. The carabineer was replaced with a 1/2" shackle and was hooked in to the pear link and the capstan was used to lift each section on board before stopping off and lowering to the deck. The last section of wire rope was brought over the wide mouth mooring block rigged to the a-frame.

The OBH mooring was next followed by BPR Center, BPR west, and BPR South. For these moorings the 24' pole and heavier snap hook was used and while grappling was attempted on each mooring the hook on a pole was the first successful connection on all but BPR Center. All mooring recoveries went smoothly after initial hook up was made and the mooring was towed out to stern before bringing onboard. No contact with the ship on any BPR or OBH instrument platforms was witnessed on recovery, BPR Center's glass balls did come into contact with the ship's hull during the "drive by" operation.

## Mooring Refurbishment and Deployment

The weather for 8/20/2018 was similar to 8/19/2018 grounding ROV and AUV operations, which made a quick turnaround of the moorings advantageous. The OBH and BPR south were deployed on 8/20/18 PDT.

### OBH Mooring

The OBH mooring was turned around first because it required the least amount of work to refurbish. The acoustic release was swapped with SN 54540, and OBH-6 was replaced with OBH-7. The rubber bicycle tubing was replaced with rubber edging from McMaster-Carr which was brought for the Mini BPR instruments. The aluminum guards on each end were removed and the stainless steel ¼-20 flat head screws were wrapped with electrical tape in order to attempt to isolate the SS from the aluminum as the guards were pretty badly corroded. In addition, some of the bike tubing was repurposed to use under the flat washers again to attempt isolation from the aluminum.



The best set of glass balls was selected from the group of recovered mooring gear for deployment of the OBH. The chain sections attached to the glass balls were not replaced, however all other chain, wire rope, line, and shackle connections were replaced with new equipment. All shackles were greased with Aquashield and hand tightened, cotter pins were installed and taped where they were near mooring line sections. Cotter pins were double checked before deployment and the acoustic release was tested prior to deployment. For deployment a slip line was attached to the pear link just below the first set of glass balls and another was attached to the pear link just below the last set of glass balls. The Balls were pushed off the deck by hand and lowered to the water using the slip line. Each set was then moved forward and subsequently pushed off continuing to slip the line off of a cleat. When clearing the first slip line, the line wrapped around the pipe attaching the first set of glass balls and took a bit of holding tension while it bounced in the waves before it let loose. The second slip line was cleared once the anchor was lifted with the capstan line using a brailer release provided by the ship.

This line was cleared without issue. The anchor was lowered to the water line and the release was tripped at 8/20/2018 22:45 UTC. This mooring is upright and the release was disabled.

### BPR South

BPR South's acoustic release was replaced with SN 35256 which was tested 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. This mooring received reused glass balls and the chain sections were not replaced, however decent looking sections were selected from all the available glass balls on board. The shackles, line, wire rope, and intermediate chain sections were all replaced. The BPR platform was also replaced on this mooring with a new one as the old table leg hardware showed signs of crevice corrosion on the stainless steel bolts. The U-Bolts were also replaced with grade 2 Titanium bolts and hardware provided. **Care should be taken to have extra Titanium nuts and washers available for this mooring on future turns, as stainless hardware should not be used on the Titanium U-Bolts.** 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 doubled checked against the mooring diagram before deployment. On this deployment the set of three glass balls were set on deck in the wrong order anchor side balls outboard and flag side balls inboard, which required some reshuffling while releasing the slip line, this ordering was missed during the pre-deployment mooring check. The slip line set up was the same as in the OBH deployment, the first slip line also fouled on this deployment in a similar way to the OBH however wrapped well enough to require that the line was cut loose, leaving ~5m of line attached to the top float set. The rest of the deployment continued without issue and the anchor was released at 08/21/2018 01:11:15 UTC. This Mooring is upright and the release was disabled.

### BPR North

BPR North's acoustic release was replaced with SN 54542 which was tested 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. This mooring was deployed with a new set of glass balls, chain, shackles, line, and wire rope. 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 doubled checked against the mooring diagram before deployment. For this deployment we used the same slip line configuration as the previous two with similar results. The first slip line fouled around the first set of glass balls, luckily this one like the OBH only had one wrap and eventually came off. The second slip line released with no issues. While we were fighting with the first slip line the second line came tight and a set of glass balls held over the transom was flexed with audible sounds of cracking plastic. Once the slip line was free, we lowered the set off the transom, no visible signs of damage were observed and we continued the deployment. The BPR north anchor was released at 08/21/2018 16:12:57. This mooring's release needed the power turned up to 9 and receive gate 9, it also indicated it was horizontal not vertical and returns were weak. This release was disabled.

### BPR Center

BPR Center's acoustic release was replaced with SN 33135. 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. This mooring was deployed with a new set of glass balls, chain, shackles, line, and wire rope. 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 doubled

checked against the mooring diagram before deployment. In addition all release codes were confirmed to be correct and the release was operational. On this deployment we finally learned from previous errors and only used a slip line in the pear link immediately below all of the glass balls. This meant the first set was allowed to drop, however the mooring line was used to control the decent. This went smoothly, and the second line was cleared without issue. This deployment went smoothly and the anchor was deployed at 08/21/2018 17:12:29. This mooring was upright and the releas was disabled.

### BPR West

BPR west's acoustic release was replaced with SN 54673. 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. All release codes were confirmed and the release was tested. This mooring was deployed with an old set of glass balls, however there was time to swap both sections of chain that secured the glass balls with exception of the steel pipe in which no replacement was available. The steel pipe appeared to be in reasonable condition as the best availabe was selected from the remaining sets. The BPR platform was also replaced due to obvious crevice corrosion on the old table legs. The U-bolts were swapped on this platform as they appeared to be in reasonable condition therefore these U-bolts are 316 Stainless Steel. The shackles, line, wire rope, and intermediate chain sections were all replaced. All shackes 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 doubled checked against the mooring diagram before deployment. On this deployment only one slip line was used on the pear link immediadly below the last set of glass balls and again the yalex moring line was used to control the decent of the first set of balls to the water. As with the other moorings a Brailer release provided by the ship and secured to the pear link immediately above the acoustic release was used to overboard the anchor and instrument platform and the anchor was released at 08/25/2018 14:47 UTC. This mooring is upright and the release was disabled.



Figure 4.6-1 Preparing the mooring for deployment (Morgan, Trevor, Chris and Matt)

Table 4.5-1: Recoveries

Instrument	Date (UTC)	Time (UTC)	Depth (m)	Latitude	Longitude	Comments
BPR-South-2	8/19/2018	23:53	1530	45.917787	-129.992868	time/location when instrument on deck
BPR-Center	8/19/2018	20:00	1530	45.944233	-130.016377	time/location when instrument on deck
BPR-West	8/19/2018	22:34	1418	45.911162	-129.990887	time/location when instrument on deck
BPR-North	8/19/2018	17:08	1578	45.971125	-130.020872	time/location when instrument on deck
OBH_Center	8/19/2018	21:24	1558	45.958567	-130.007243	time/location when instrument on deck

Table 4.5-2: Deployments

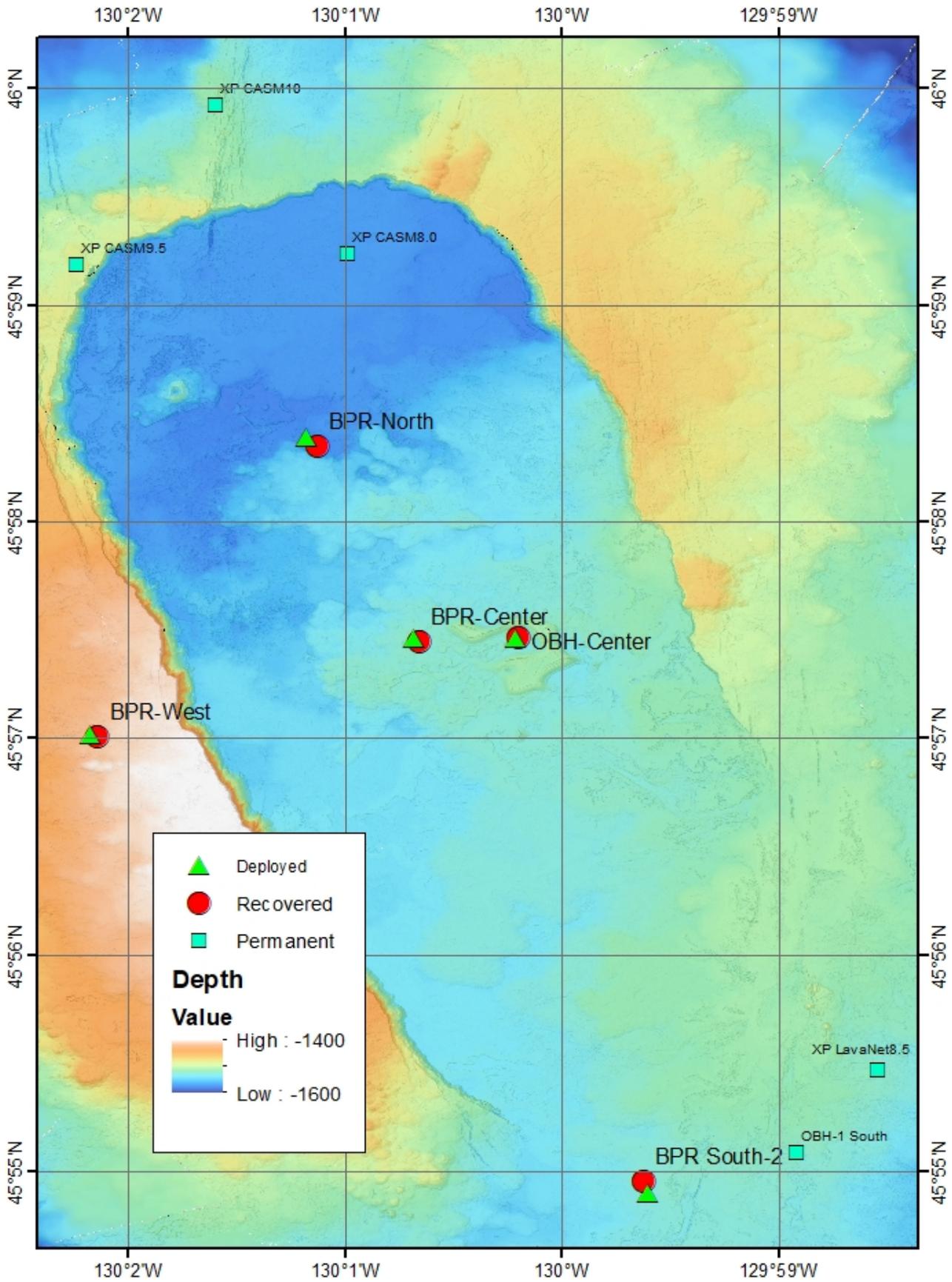
Instrument	Date (UTC)	Time (UTC) <sup>1</sup>	Depth (m)	Latitude <sup>2</sup>	Longitude <sup>2</sup>	Latitude <sup>3</sup>	Longitude <sup>3</sup>
BPR-South-2	8/21/2018	1:11:15	1537	45.915628	-129.993493	45.91516	-129.993333
BPR-Center	8/21/2018	17:12:29	1532	45.958578	-130.011127	45.957663	-130.011305
BPR-North	8/21/2018	16:12:57	1581	45.973843	-130.019435	45.973130	-130.019618
BPR-West	8/25/2018	21:47	1448	45.950393	-130.03683	45.950268	-130.036227
OBH	8/20/2018	22:45:00	1525	45.958245	-130.00408	45.957661	-130.003481

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

Table 4.5-3: Acoustic Release Codes

Instrument	Release S/N	Enable	Disable	Release	Comments
BPR-South-2	35256	107020	107045	126345	
BPR-Center	33135	321657	321674	335177	
BPR-North	54542	270107	270124	247370	Indicated it was Horizontal!
BPR-West	54673	271766	272014	250301	
OBH	54540	270013	270030	247336	

# KM18-13 Moorings Deployed and Recovered



## 4.6 Mapping

### 4.7.1 EM122 multibeam data collected on 2 expeditions to Axial: KM1812 and KM1813

Susan G. Merle

Throughout expeditions KM1812 and KM1813 multibeam seafloor data were collected during transits and when the ROV could not dive due to weather. Surveys at Axial included an extensive survey of the south rift zone, and re-survey of the caldera and north rift zone. Water column data (wcd) were collected concurrently with seafloor bathymetry and backscatter on the Cascadia margin. No water column data were collected on the Juan de Fuca plate (Figure 4.7.1-1).

**KM1812:** 5601 km<sup>2</sup> seafloor coverage. Chief scientist Meg Tivey.

Lines 0000 through 0015 - only seafloor bathymetry and backscatter logged.

Lines 0015 through 0058 - wcd also collected on the Cascadia margin.

Regarding the wcd on KM1812: The students on board the *Kilo Moana* monitored the wcd collection and were instructed to change the log file whenever they saw a methane flare in the wcd display. That is not a proper practice as it breaks the flare data into 2 separate files, and also creates a lot more files than would be logged if one had just allowed the log files to change automatically every hour, as is the usual practice.

**KM1813:** 8354 km<sup>2</sup> seafloor coverage. Co-Chief scientists Scott Nooner and Bill Chadwick.

Lines 0000\_20180818\_165655 through 0030\_20180827\_101041 – seafloor bathymetry and backscatter logged.

Lines 0000\_20180818\_165655 through 0001\_20180818\_184410 – wcd logged on the margin during transit.

Lines 0016\_0827\_024445 – 0030\_20180827\_101041 – wcd logged on the margin during transit.

At the present time the wcd on the margin have not been analyzed. The seafloor data will need additional processing, although it will be impossible to get rid of some of the persistent artifacts in the data. Those include “washboard” swath edges, possibly due to a bad calibration number entered into the data acquisition software, or the need to re-calibrate the EM122 system on the *Kilo Moana*. The washboard edges effect is worse in areas of flat seafloor, but persisted throughout the surveys. Another artifact that is present throughout are 2 particular areas of bad beams either side of nadir (Figure 4.7.1-2). The data will be processed and made available to the community at National Centers for Environmental Information (NCEI) and Marine Geoscience Data System (MGDS).

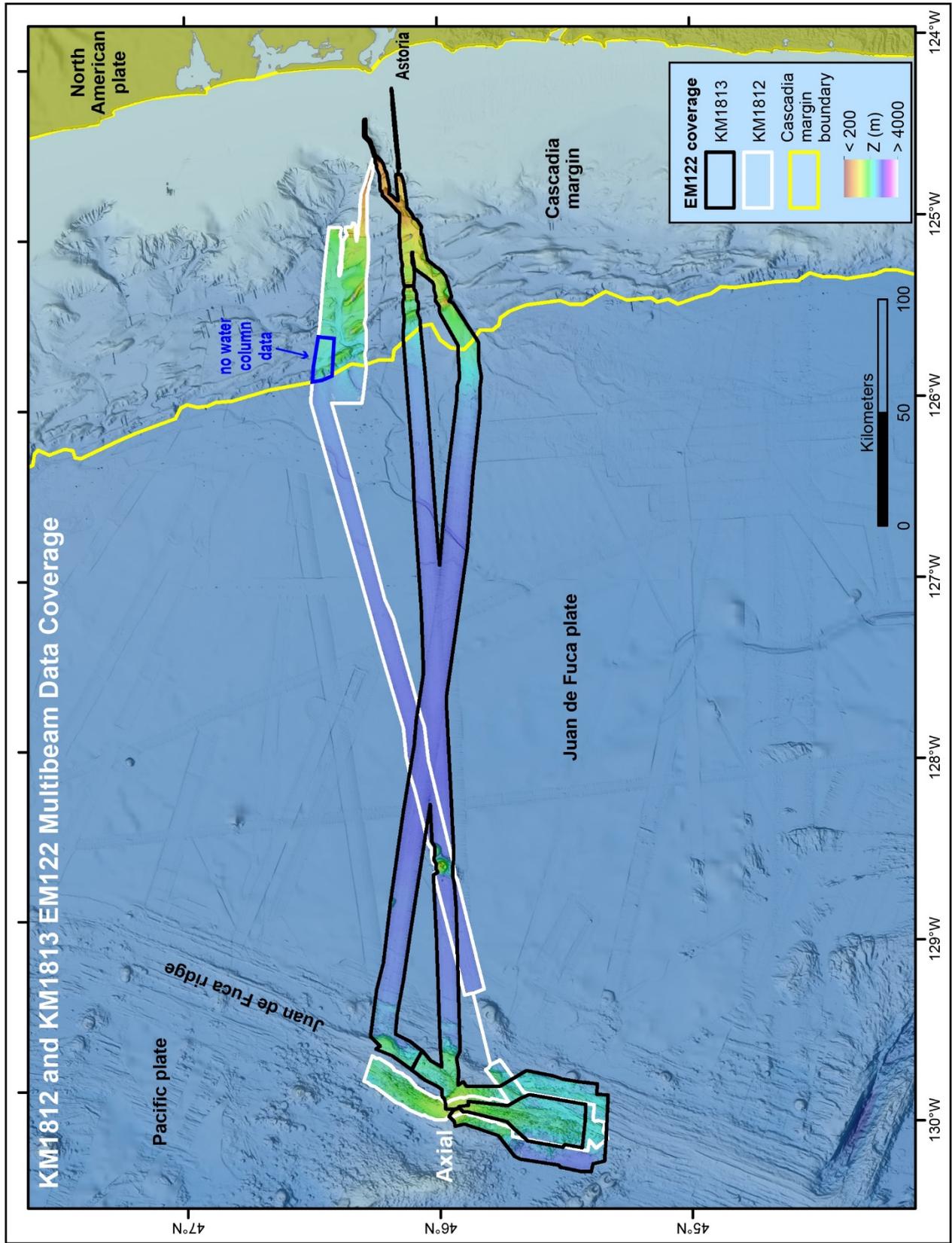


Figure 4.6.1-2 KM1812 and KM1813 EM133 data coverage.

# R/V Kilo Moana EM122 bathymetry evaluation

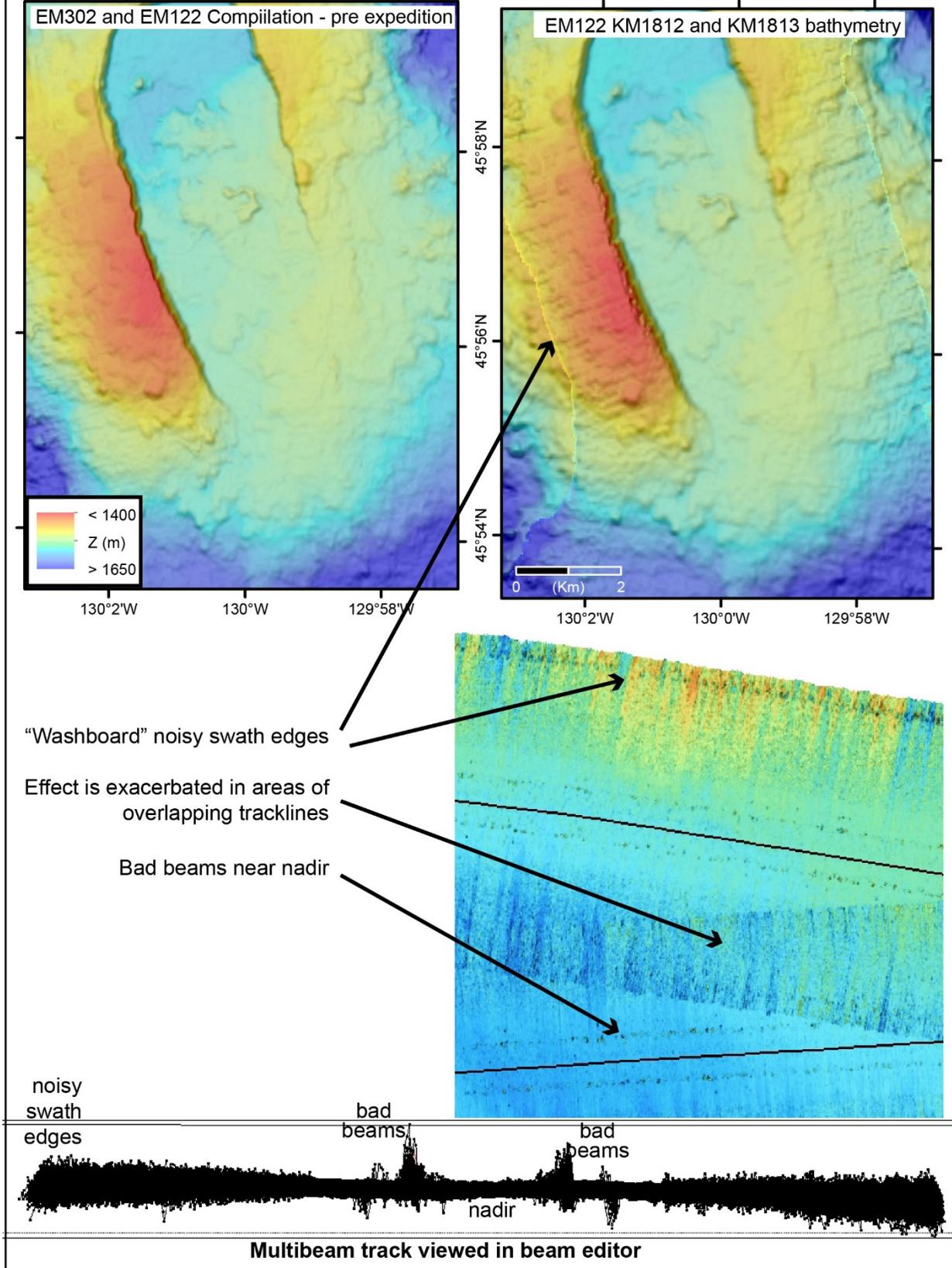


Figure 4.6.1-3 Bathymetry comparison.

## 4.6.2 Seafloor Mapping Using an MBARI Mapping AUV

David W. Caress, Jenny B. Paduan, Hans Thomas, Erik Trauschke, Emery Nolasco

### 4.6.2-1. Introduction

During KM1813 we deployed one of the Dorado class AUVs designed, built, and operated by MBARI to obtain 1-m- scale bathymetry and backscatter seafloor maps and chirp subbottom profiles. The purpose of these AUV surveys was to repeat a pattern of sparse survey lines extending across a 20-km N-S and 10-km E-W region that is centered on the Axial Seamount caldera. By comparing the 1-m resolution bathymetry with previous and future surveys, we will measure the vertical deformation of Axial Seamount due to subsurface processes. The caldera center BPR site has uplifted more than 1 m since the last eruption in 2015; this uplift results from the re-inflation of the subsurface magma reservoir. The repeated AUV surveys are being used to augment and expand the seafloor pressure measurement based deformation monitoring at Axial Seamount. The pressure data are higher vertical resolution ( $\pm 1$  cm) and are continuous in time, but are only being made at 10 benchmarks in the caldera and south rift zone. The AUV measurements of vertical depth change have a lower resolution of  $\pm 20$  cm, but can be made over a much larger area and are spatially continuous along survey tracklines. Thus, the two techniques are complementary.

Due to weather limitations precluding AUV recoveries while ROV *Jason* was diving, we were limited to two AUV mission opportunities during KM1813. Both surveys were successful, and the combined 175 km survey track covers all but one outer line of the planned repeat survey pattern (Figure 1). This continues a time series begun with MBARI Mapping AUV surveys in 2011, 2014, and 2016 and AUV *Sentry* in 2015 and 2017. Multibeam bathymetry, 110 kHz sidescan, and 1-6 kHz subbottom data were collected. For the first time, a PMEL MAPR was installed in the MBARI AUV; MAPR data were successfully collected during the second mission only.

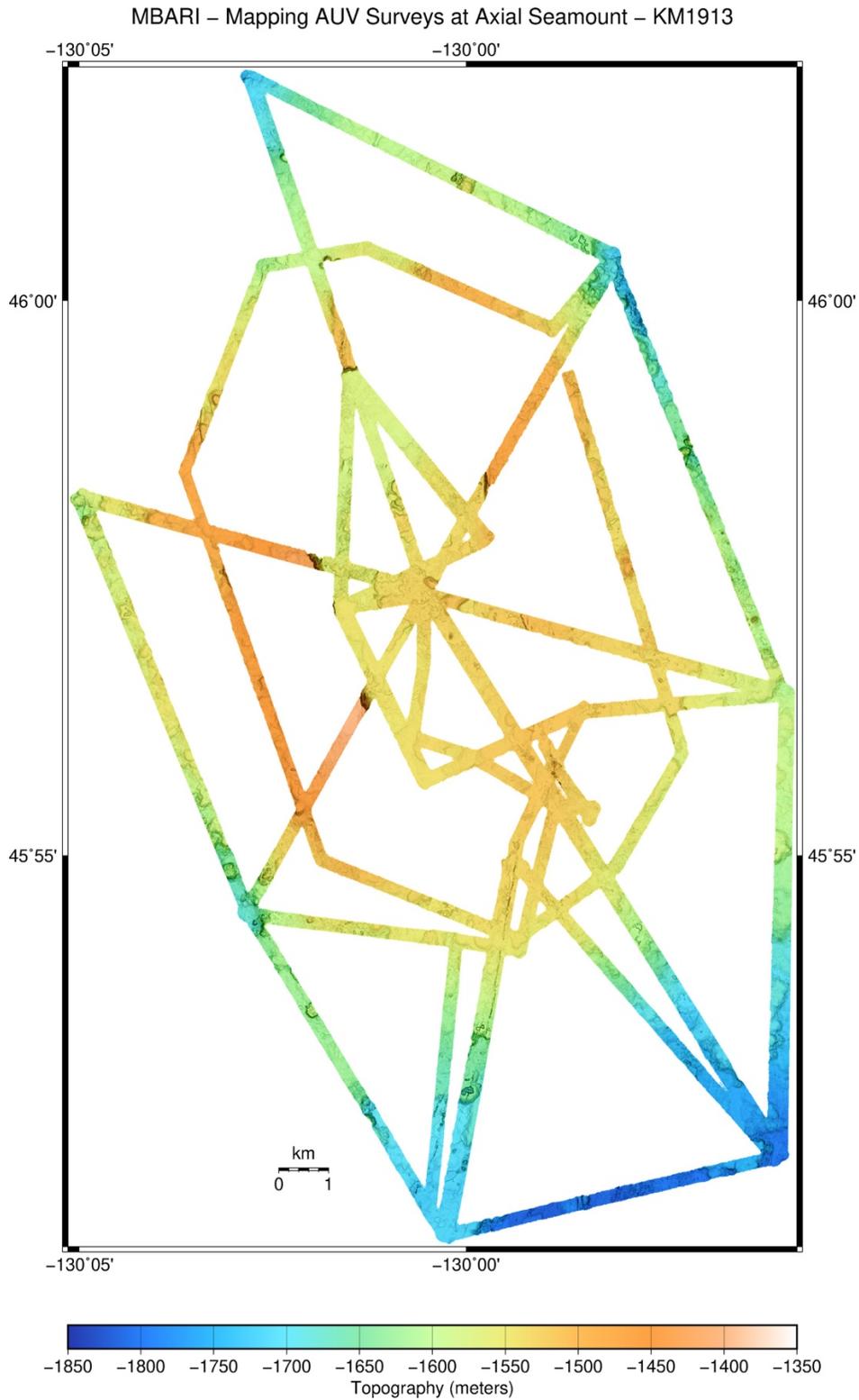


Figure 4.6.2-1. Coverage of the Axial Seamount summit by two Mapping AUV surveys during KM1813. These lines repeat coverage obtained in prior years using both MBARI Mapping AUVs and AUV *Sentry*.

## Overview of MBARI Mapping AUVs

The MBARI mapping AUVs are 0.53 m diameter, torpedo-shaped, Dorado class autonomous underwater vehicles equipped with 400 kHz multibeam sonar, 110 and 410 kHz sidescan sonars, and a 1-6 kHz subbottom profiler (Figure 2). All components of the vehicles are rated to 6,000 m depth. Using precise navigation and attitude data from a laser-ring-gyro based inertial navigation system (INS) integrated with a Doppler velocity log (DVL) sonar, MBARI Mapping AUVs can image the deep-ocean seafloor and shallow subsurface structure with much greater resolution than is possible with sonars operated from surface vessels. Typical survey operations use a vehicle speed of 1.5 m per second (3 knots) and an altitude of 50 m to achieve about 1 m horizontal and 10 cm vertical resolution. Mission durations are up to 20 hours, allowing survey tracklines as long as 100 km. Battery recharge and data download between missions requires about 5 hours. The MBARI Dorado AUVs are maintained and operated by the AUV Group within the Division of Marine Operations. Since 2006, some 255 successful surveys have been conducted using the Mapping AUVs, including the two achieved during this expedition. MBARI Mapping AUVs have been operated on several non-MBARI vessels, include *R/V Thomas Thompson*, *R/V Atlantis*, *CCGS Sir Wilfrid Laurier*, *Ocean Researcher 1*, *Ocean Researcher 5*, the icebreaker *Araon*, and now the *R/V Kilo Moana*.

Although the vehicle fielded during KM1813 has been in operation for over a decade, many key systems have been upgraded or replaced as the available mapping and navigation technology has improved. The systems integrated with the Mapping AUV on this expedition include:

- Multibeam sonar: Reson 7125-AUV 400 kHz
- Sidescan sonar: Edgetech FSAU 110 kHz chirp sidescan
- Subbottom sonar: Edgetech FSAU 1-6 kHz subbottom profiler
- CTD: SeaBird Electronics SBE49 Fastcat CTD
- Doppler Velocity Log (DVL): 300 kHz Teledyne-RDI Workhorse Navigator DVL
- Inertial Navigation System (INS): Kearfott SeaDevil w/300 kHz DVL
- Pressure Sensor: Paroscientific 8CB4000 4000-m rated Intelligent Depth Sensor
- Ultra Short Baseline tracking beacon: Sonardyne AvTrak 6G
- Acoustic Modem: Teledyne-Benthos 3G LF Acoustic Modem, directional transducer
- Batteries: Two MBARI-design 5 kWhr battery spheres using lithium ion battery packs from Inspired Energy.
- MAPR: Eh sensor, nephelometer, temperature and pressure sensors, provided by PMEL.

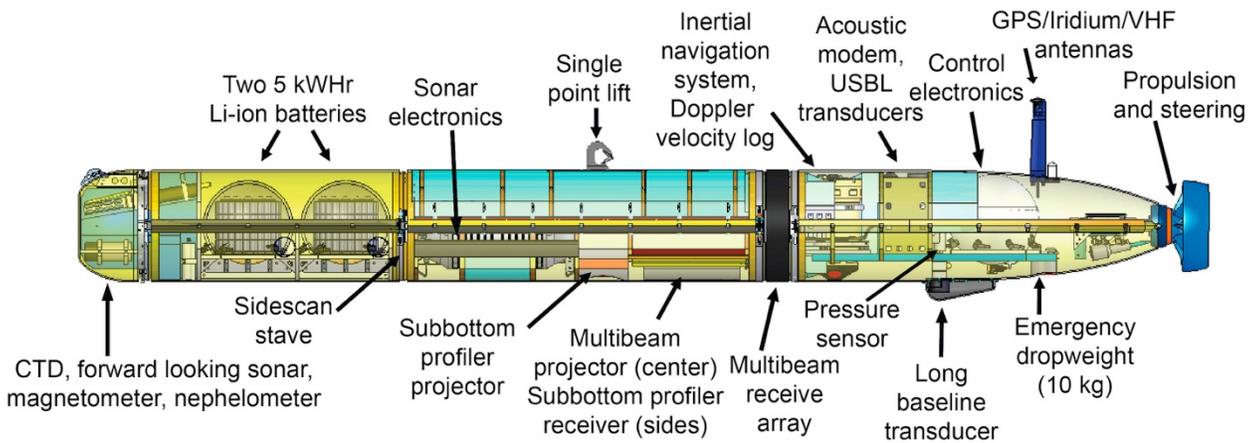
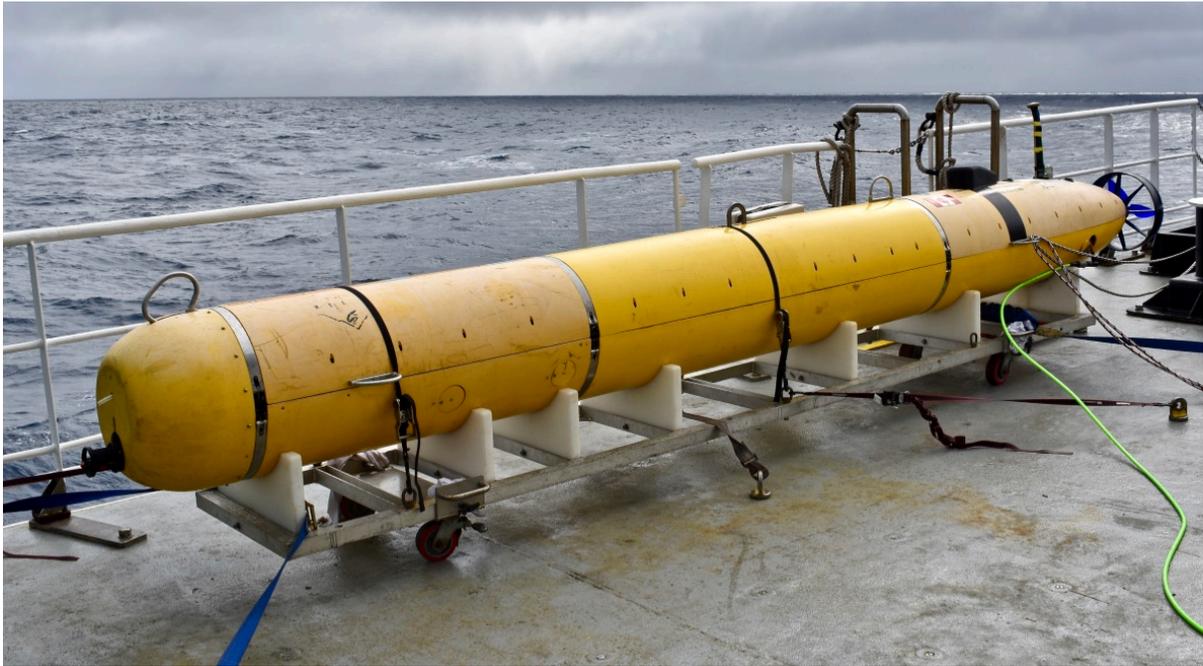


Figure 4.6.2-2: (Top) MBARI Mapping AUV secured on the *R/V Kilo Moana* aft deck during KM1813. The AUV was charged and maintained on the fantail. The AUV was launched from the stern using the ship's port crane, and recovered using the ship's stern A-frame. (Bottom) CAD drawing showing system level layout of the AUV internals.

## MBARI Mapping AUV Mission 20180822m2

### Navigation Totals:

Total Time: 16.0466 hours  
Total Track Length: 83.2036 km  
Average Speed: 5.1851 km/hr ( 2.8028 knots)

### Start of Data:

Time: 08 23 2018 03:33:14.880000 JD235 (2018-08-23T03:33:14.880000)  
Lon: -129.991013499 Lat: 45.915338393 Depth: 1528.7899 meters  
Speed: 3.7058 km/hr ( 2.0031 knots) Heading: 170.3770 degrees  
Sonar Depth: 1435.2000 m Sonar Altitude: 93.5900 m

### End of Data:

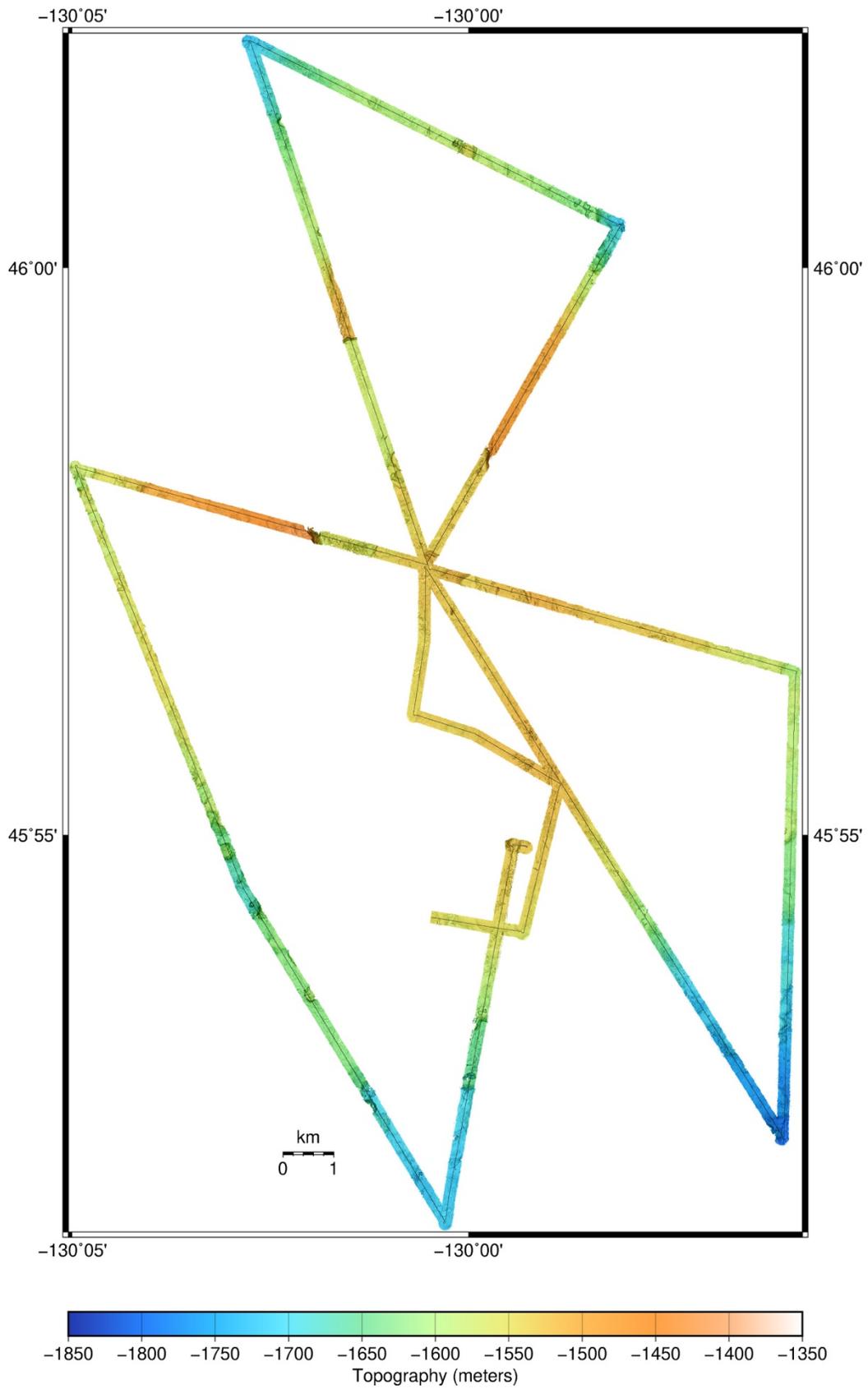
Time: 08 23 2018 19:36:02.575999 JD235 (2018-08-23T19:36:02.575999)  
Lon: -130.007880155 Lat: 45.904510962 Depth: 1545.0441 meters  
Speed: 5.5081 km/hr ( 2.9773 knots) Heading: 279.9493 degrees  
Sonar Depth: 1493.8965 m Sonar Altitude: 50.8988 m

### Limits:

Minimum Longitude: -130.084048156 Maximum Longitude: -129.929441503  
Minimum Latitude: 45.858422083 Maximum Latitude: 46.034585990  
Minimum Sonar Depth: 1369.3589 Maximum Sonar Depth: 1744.8722  
Minimum Altitude: 37.6349 Maximum Altitude: 167.6900  
Minimum Depth: 1419.5920 Maximum Depth: 1805.8867  
Minimum Amplitude: -16.2697 Maximum Amplitude: 85.9055  
Minimum Sidescan: 0.0000 Maximum Sidescan: 2652.7832

### Data Totals:

Number of Records: 180496  
Bathymetry Data (512 beams):  
Number of Beams: 92413952  
Number of Good Beams: 67771589 73.33%  
Number of Zero Beams: 8889741 9.62%  
Number of Flagged Beams: 15752622 17.05%  
Amplitude Data (512 beams):  
Number of Beams: 92413952  
Number of Good Beams: 67771589 73.33%  
Number of Zero Beams: 8889741 9.62%  
Number of Flagged Beams: 15752622 17.05%  
Sidescan Data (2048 pixels):  
Number of Pixels: 369655808  
Number of Good Pixels: 82522667 22.32%  
Number of Zero Pixels: 0 0.00%  
Number of Flagged Pixels: 287133141 77.68%



## MBARI Mapping AUV Mission 20180824m1

### Navigation Totals:

Total Time: 18.1327 hours  
Total Track Length: 92.2415 km  
Average Speed: 5.0870 km/hr ( 2.7497 knots)

### Start of Data:

Time: 08 24 2018 21:34:18.311000 JD236 (2018-08-24T21:34:18.311000)  
Lon: -129.978205603 Lat: 45.923911661 Depth: 1527.3563 meters  
Speed: 3.0714 km/hr ( 1.6602 knots) Heading: 323.2249 degrees  
Sonar Depth: 1458.4463 m Sonar Altitude: 68.9100 m

### End of Data:

Time: 08 25 2018 15:42:15.931999 JD237 (2018-08-25T15:42:15.931999)  
Lon: -129.978158583 Lat: 45.989327572 Depth: 1513.2450 meters  
Speed: 4.5136 km/hr ( 2.4398 knots) Heading: 341.8739 degrees  
Sonar Depth: 1456.7244 m Sonar Altitude: 56.5100 m

### Limits:

Minimum Longitude: -130.061939577 Maximum Longitude: -129.929597092  
Minimum Latitude: 45.858387213 Maximum Latitude: 46.009061948  
Minimum Sonar Depth: 1345.7491 Maximum Sonar Depth: 1769.1981  
Minimum Altitude: 31.2347 Maximum Altitude: 111.9728  
Minimum Depth: 1394.4458 Maximum Depth: 1838.0260  
Minimum Amplitude: -17.5562 Maximum Amplitude: 91.0086  
Minimum Sidescan: -262.5909 Maximum Sidescan: inf

### Data Totals:

Number of Records: 203929  
Bathymetry Data (512 beams):  
Number of Beams: 104411648  
Number of Good Beams: 76625550 73.39%  
Number of Zero Beams: 9772421 9.36%  
Number of Flagged Beams: 18013677 17.25%  
Amplitude Data (512 beams):  
Number of Beams: 104411648  
Number of Good Beams: 76625550 73.39%  
Number of Zero Beams: 9772421 9.36%  
Number of Flagged Beams: 18013677 17.25%  
Sidescan Data (2048 pixels):  
Number of Pixels: 417646592  
Number of Good Pixels: 93237397 22.32%  
Number of Zero Pixels: 0 0.00%  
Number of Flagged Pixels: 324409195 77.68%



## 4.7 MAPR deployments

Bill Chadwick

Sharon Walker at PMEL sent two MAPR instruments (Miniature Autonomous Plume Recorders) for use on the cruise. MAPRs have temperature and depth sensors, as well as an ORP sensor (oxidation reduction potential) and a nephelometer.

MAPR #63 was used on the CTD for 7 casts in a row and had fresh batteries to start. However, when the data were downloaded, the Excel file did not include all the CTD casts - it ended abruptly in the middle of the 3rd of the 7 casts, apparently because LOGIC battery voltage on that MAPR had discharged faster than normal. That MAPR will be checked after the cruise.

MAPR #62 was placed on the MBARI AUV for its first dive, and it recorded data successfully, but those data were never downloaded (due to operator error), and then were overwritten and lost during the second dive of the MBARI AUV. Fortunately, those data were successfully downloaded after the 2<sup>nd</sup> MBARI AUV dive. Sharon Walker processed the MAPR data.

## 4.8 Hydrothermal Vent Temperature Recorders

Bill Chadwick

During the Jason ROV dives, we recovered HOBO-style high-temperature probes (aka MISO) at Castle, Diva, Trevi, and Vixen hydrothermal vents (all anhydrite chimneys). A HOBO probe was recovered at Virgin vent in July 2018 by UW colleagues during an OOI operations & maintenance cruise. Unfortunately, the probe at Vixen died, so no useful data were recorded there. Low-temperature MTR recorders were recovered from Anemone and Marker 33 Vents.

The following temperature probes were deployed in 2017 and recovered in 2018:

Vent name	Probe ID	Dive deployed	Dive recovered
Castle	MISO 153	J2-965	J2-1105
Diva	HOBO 130	J2-965	J2-1105
Virgin	HOBO 129	J2-966	J2-1074
Vixen	HOBO 151	J2-967	J2-1105
Trevi	HOBO 104	J2-967	J2-1105
Anemone	MTR 3197	J2-966	J2-1104
Marker-33 Vent	MTR 3048	J2-967	J2-1105

From these new data we have updated long-term plots of these temperature data at each vent. In each plot, there are trends in the maximum recorded temperature, but 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 when probes with two independent sensors were used.

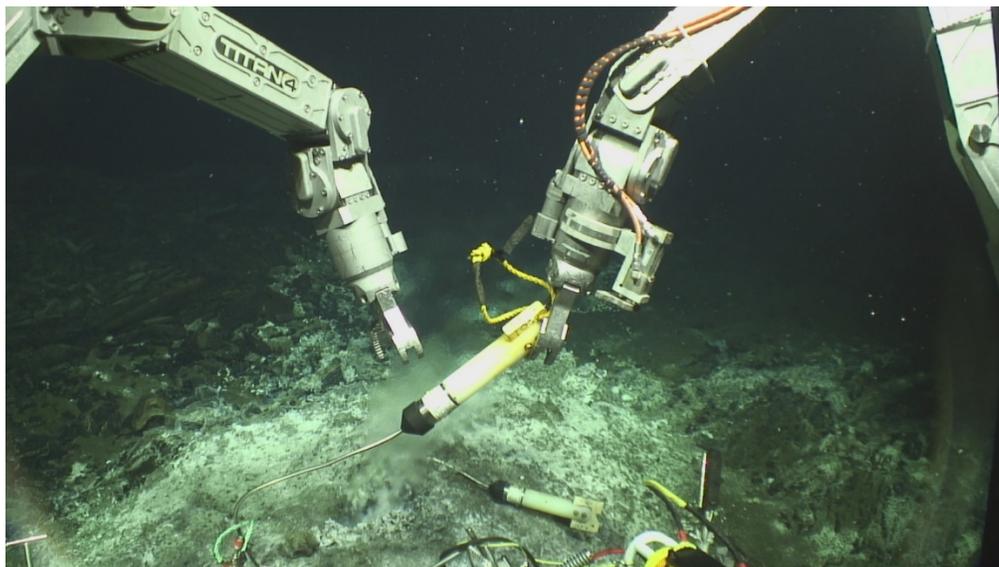
Observations:

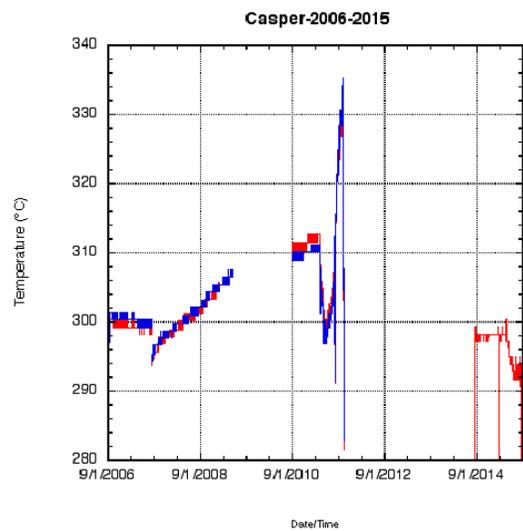
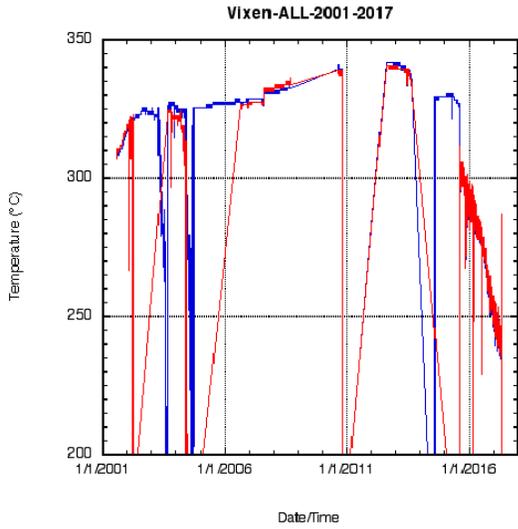
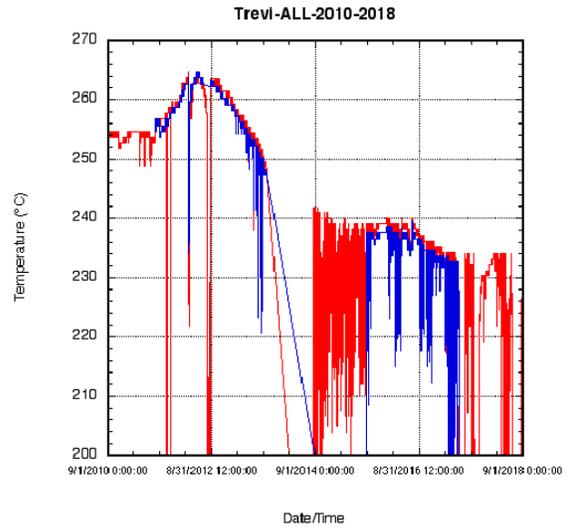
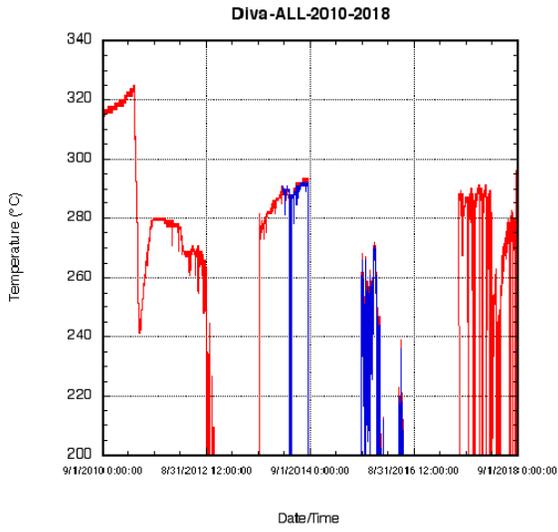
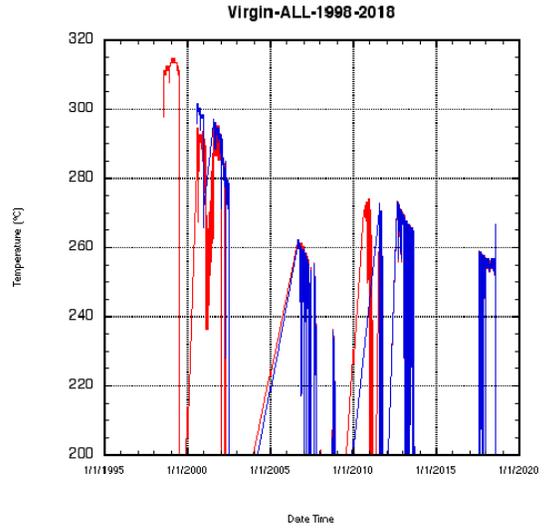
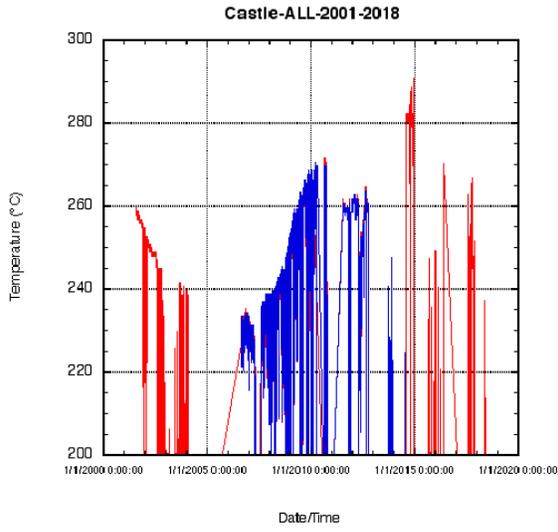
- The Castle and Vixen records are 2001-2018 and 2001-2017, respectively. Castle shows rising temperature leading up to the 2011 eruption, and perhaps the 2015 eruption, but the record is pretty incomplete since 2011 (it's difficult to keep the probe in the vent there). The Vixen record has a moderate rise in temperature from 2001-2013 and has been declining since then. There is an apparent steep decline from 2015-2017 but it could be due to the probe being on the edge of the fluid flow.
- The Diva and Trevi plots are both from 2010-2018. Diva was one of two probes showing a sudden temperature decrease during the 2011 eruption (the other was Casper; Vixen shows a small co-eruption decrease in 2015). Temperature at Diva rose before both the 2011 and 2015 eruptions and was lower afterward. At Trevi, temperature increased from 2011-2013 and has been declining since then.
- The long-term plot from Virgin (1998-2018) shows a declining temperature since the 1998 eruption, but the record is not very complete.

We currently have HOBO probes in the following vents: Castle, Diva, Vixen, and Trevi. A UW probe is in Virgin vent.

The following temperature probes were deployed in 2018:

Vent name	Probe ID	Dive Deployed
Castle	MISO 129	J2-1105
Diva	MISO 102	J2-1105
Vixen	MISO 101	J2-1105
Trevi	MISO 103	J2-1105
Anemone	MTR 3052	J2-1104
Marker-33 Vent	MTR 3028	J2-1105





## 4.9 Outreach and Education

Bill Chadwick, Teresa Atwill, Andra Bobbitt

As in previous years, we maintained an on-line Cruise Blog for outreach and education at the following URL:

<http://axial2018.blogspot.com>

Teresa Atwill (Lincoln County School District) was our teacher-at-sea this year and wrote all the entries on the cruise blog. The blog entries were posted almost daily (10 posts in total). The blogs describe the science teams and the research conducted onboard the ship, with background information to help readers better understand the geologic setting and significance of our research at Axial Seamount. Images and videos were embedded in the blogs to help illustrate the operations, the people, the submersible vehicles we were using, and life on board the *R/V Kilo Moana*.

List of Blog posts:

- Introduction to 2018's Expedition
- Navigation, Is Where It's At
- Kilauea Volcano versus Axial Seamount
- Finding the Right Ship
- In the Water! At Last!
- It's an AUV! Not a Torpedo
- Accurate and Precise
- The Dive Plan!
- Our Next Gen Scientists
- Summary of the 2018 Expedition



Figure 4.9-4 Teacher-at-sea Teresa Atwill.

## 5.0 JASON Imagery and Video

Bill Chadwick

The science camera on Jason this year was a new Sulis 4K video camera, so the video highlights are in higher resolution than before, and there was a new frame grabber integrated with the new camera. The video quality was very good, but we also noticed that the light sensitivity and the maximum zoom capability were a bit less than that was possible with the previous mini-Zeus camera.

### Automated H264 Continuous HD Video Recordings

Three 1080i camera streams (brow camera, pilot camera, science camera) 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.

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

Dive	Number of H264 .mkv files	Total file size
J2-1104	659	731.3 Gb
J2-1105	446	509.9 Gb
Total	1105	1.241 Tb

### 4K High-Definition video highlights

Highlight video was recorded to hard disk at a higher quality format than the H264 recordings. This year for the first time, the 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, making them considerably larger than in previous years. 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
J2-1104	49	659.2 Gb
J2-1105	48	701.9 Gb
Total	97	1.361 Tb

### HD video frame grabs

With the new Sulis 4K camera, frame grabs can be captured at two different resolutions in two different ways. Frame grabs that are captured by the video loggers during a dive are recorded in HD resolution (1920x1080 pixels, from two of the many cameras on Jason simultaneously). The choice of the two camera is selectable, but usually included the Science Camera and another. These are saved as cam1 and cam2\*.tif files (1920 x 1080 pixels) that are typically 6.2 Mb in size. File names include date and time.

Dive	Number of HD frame grabs	Total file size
J2-1104	2625	16.3 Gb
J2-1105	2057	12.8 Gb
Total	4682	29.1 Gb

## 4K video frame grabs

The 4K frame grabs from the Sulis camera have replaced the previous Super Scorpio digital still camera. These are 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
J2-1104	160	762.8 Mb
J2-1105	156	785.4 Mb
Total	316	1.548 Gb

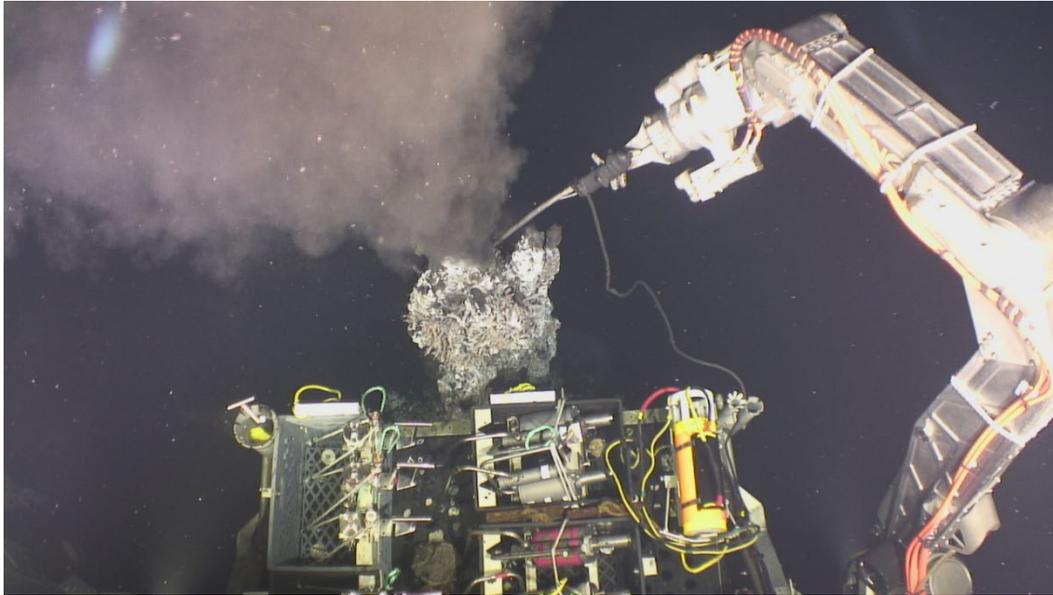


Figure 5-1 HD frame grab set to Brow camera: cam2\_20180824081332.tif.



Figure 5-2 HD Frame grab at same time as above set to Science camera: cam1\_20180824081332.tif.

## 6.0 JASON

### 6.1 Dive Statistics

**JASON -  
Lowering  
Summaries (All  
Times GMT)**

Lowering Id	Start/Launch	Start Ops	End Ops	End/On Deck	Bottom	Lowering
					(Hrs:Mns:Secs)	(Hrs:Mns:Secs)
<b>J2-1104</b>	2018/08/21 19:37	2018/08/21 20:40	2018/08/23 22:24	2018/08/24 00:11	49:43	52:33
<b>J2-1105</b>	2018/08/24 03:40	2018/08/24 04:42	2018/08/25 16:30	2018/08/25 17:39	35:47	37:59

On Bottom			Off Bottom			Max Depth During Dive
(DecDegs)	(DecDegs)	(mtrs)	(DecDegs)	(DecDegs)	(mtrs)	
45.93138	-129.99881	1517	45.93255	-130.01324	1362	1717
45.92001	-129.96287	1551	45.94536	-130.00912	1537	1717

## 6.2 Dive Goals and Summaries

### J2-1104:

DEPLOYMENT LOCATION: Benchmark AX-308

45° 55.896', -129° 59.928', Z=1533 m

Main goals: Make pressure measurements at array of seafloor benchmarks. Planned 3 transects of the benchmarks but dive cut short after 3<sup>rd</sup> visit to AX-106. Collected fluid samples at ASHES Vent Field at end of dive.

#### BASKET for this dive:

4 Major sampler bottles  
4 Gastight sampler bottles  
MPR instrument (electrically connected)  
2 HOBOS (101 & 103)

#### Also

Jason high-temp probe  
2 markers (243, 290)  
Benchmark cleaner brushes

#### Port Swing Arm

2 mini-BPRs & 1 MTR (3028)

#### Starboard Swing Arm

2 mini-BPRs & 1 MTR (3052)

#### TASKS:

1) Make pressure measurements at seafloor benchmarks (3 transects). Deploy all 4 Mini-BPRs on seafloor on 1<sup>st</sup> loop. Recover Mini-BPRs on 2<sup>nd</sup> or 3<sup>rd</sup> loop.

<b>Benchmark</b>	<b>Deploy</b>	<b>Recover</b>
AX-308 ->	Mini-BPR-08 (1 <sup>st</sup> loop)	None
AX-106 (ASHES) ->	None	None
AX-307 ->	Mini-BPR-09 (1 <sup>st</sup> loop)	Mini-BPR-10 (1 <sup>st</sup> or 2 <sup>nd</sup> )
AX-101 (Center) ->	None	None
AX-302 (Trevi) ->	Mini-BPR-12 (1 <sup>st</sup> loop)	Mini-BPR-05 (1 <sup>st</sup> or 2 <sup>nd</sup> )
AX-309 ->	None	None
AX-303 (M33 vent) ->	None (next dive)	Mini-BPR-02 (2 <sup>nd</sup> loop)
AX-310 (Int. Dist.) ->	None	None
AX-104 (Bag City) ->	None	None
AX-105 (S. Pillow Mound) ->	Mini-BPR-13 (1 <sup>st</sup> loop)	Mini-BPR-04

2) After 3<sup>rd</sup> visit to AX-106 transited to ASHES Vent Field

- ASHES: Virgin Vent: temp-probe then 1 Major, 1 Gastight (Left HOBOS at vent in place).
- ASHES: Inferno vent: temp-probe then 1 Major, 1 Gastight
- ASHES: Recovered MTR 3197 at Anemone diffuse vent. Deployed MTR-3052.

## **J2-1105:**

DEPLOYMENT LOCATION: New Chimneys

45° 55.192', -129° 57.748', Z=1560 m

Main goals: Explore new chimneys, finish pressure measurements at array of seafloor benchmarks. Collect opportunistic fluid samples & temp probes.

### BASKET for this dive:

4 Major sampler bottles  
4 Gastight sampler bottles  
MPR instrument (electrically connected)  
2 HOBOS (101 & 103)

### Also

Jason high-temp probe  
2 markers (205, 218)  
Cleaner brushes

### Port Swing Arm

1 Mini-BPR-10 & 1 MTR (3028)

### Starboard Swing Arm

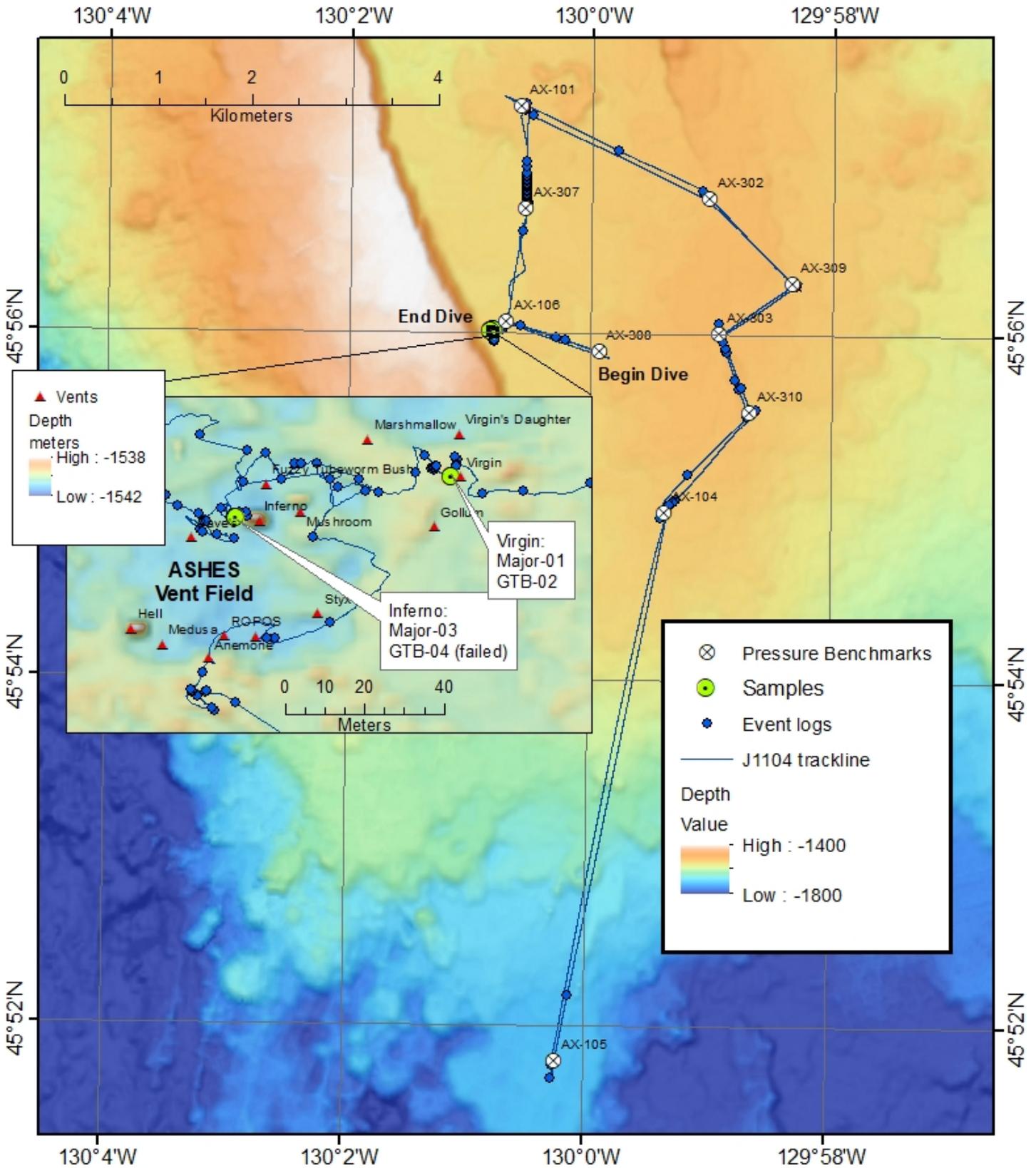
2 HOBOS (102, 129)

### TASKS:

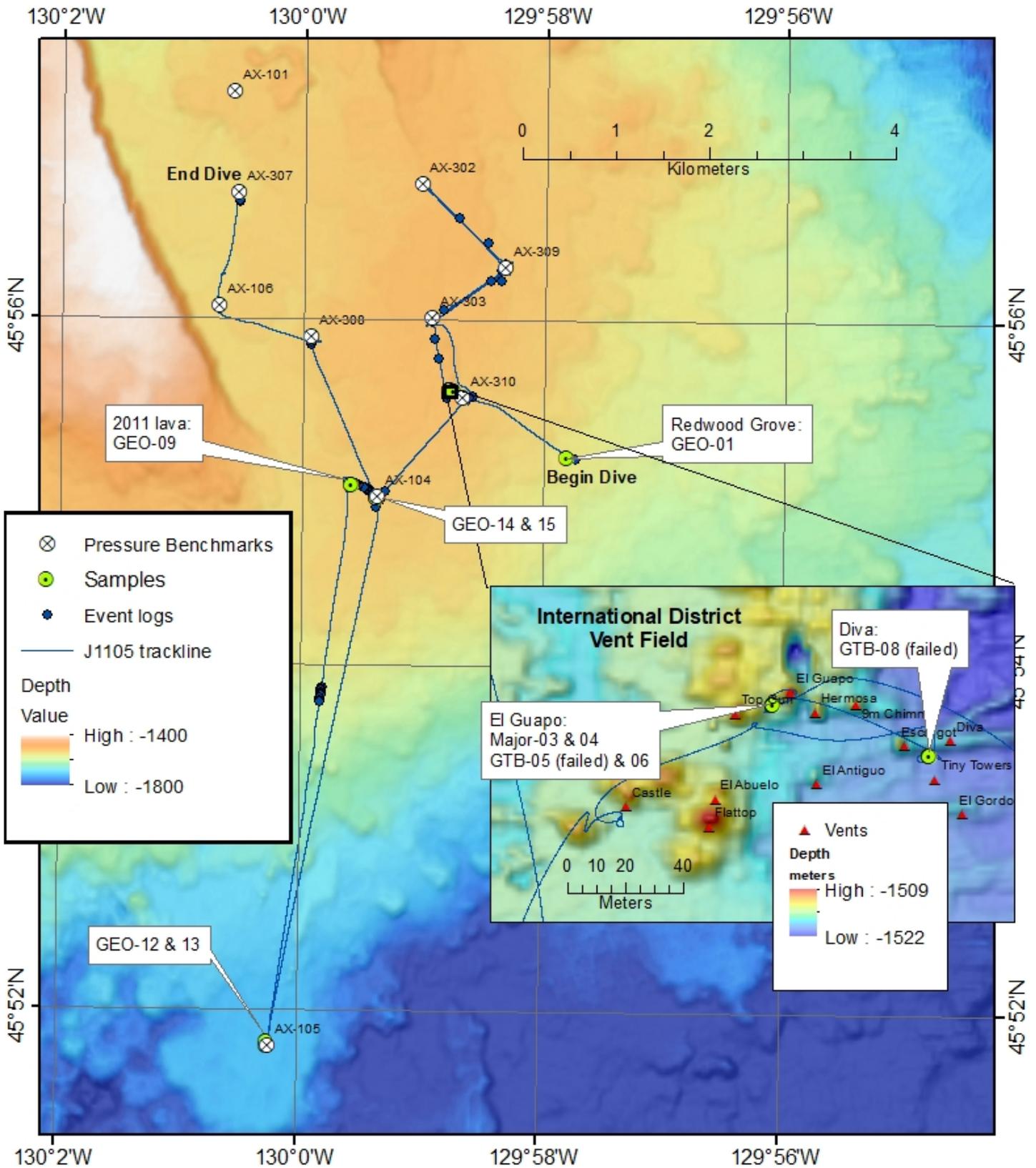
- 1) Explore New Chimney area. Took one rock sample from Redwood Grove.
- 2) Make pressure measurements at seafloor benchmarks. Deploy Mini-BPR-10 @ first visit to AX-303 (Marker 33 Vent). Later, recover Mini-BPR-04 from AX-105 (South Pillow Mound) during only visit there.
- 3) FLUID SAMPLING & TEMPERATURE SENSORS:
  - International District:
    - El Guapo (at top): temp-probe then 2 Majors, 2 Gastights
    - Diva: temp-probe then 1 Major, 1 Gastight; swap HOBOS 130 with HOBOS-102.
    - Castle: swap HOBOS 153 for HOBOS-129.
  - M33 vent: swap MTR 3048 in vent with MTR 3028 from left swing arm box
  - Trevi: recover HOBOS 104, temp-probe then 1 Major, 1 Gastight, deploy HOBOS-103.
  - Vixen vent: recover HOBOS 151, temp-probe, 1 Major, 1 Gastight, deploy HOBOS-101.
- 4) Deployed new marker, Mkr-243 at AX-101.
- 5) Took rock samples in 2011 lava near AX-104 and miscellaneous rock samples at AX-105 and again at AX-104.

### 6.3 Jason Dive Maps

## J2-1104



# J2-1105



## 6.4 Jason Navigation

### 6.4.1 Offsets

Navigation positions for 2018 Jason dives were very good. The pressure benchmarks locations are ideal to use as baseline positions from year to year. Table 6.4-1 lists offsets from Jason RENAV positions for each benchmark visit. A few additional offsets are listed for ASHES and International District sites. The offsets were generally less than 10 meters and in most cases within 5 meters of the benchmark which is within visual range detection by Jason's pilots and cameras. The exception is the position of AX-309 which had a total offset of 15 meters.

Offsets for benchmarks were measured from the 25-m bathymetry grid compiled of EM302 and EM122 data by Susan Merle prior this expedition. Offsets at ASHES and International District sampling locations used 2017 MBARI AUV bathymetry grids which were shifted to match historical vent locations. The ASHES grid (axauvd1m) was shifted 13.2 X and -5.3 Y (meters). International District was shifted 10.5X -5.6Y meters (axauvc1m). For sampling in those areas, the shifted grids were used as Jason underlay maps during the dive and the offsets listed in Table 6.4-1 were from these grids.

The Redwood Grove offset was measured from a new MBARI AUV bathymetry grid provided as a geotiff. The chimneys were relatively easy to find due to their morphology (tall and skinny relative to the flat lavas surrounding them) on Jason's scanning sonar.

Dive	location	Total offset (m)	E-W offset	N-S offset	Notes
J1104	AX-308	8	7E	1.5S	1st visit
J1104	AX-106	4	3E	2S	1st visit
	AX-307	5.3	4.9W	1.3S	
	AX-101	4.2	4.2W		
	AX-302	1.3		1.3S	
	AX-309	15	3.5E	15N	
	AX-303	5.3	2.7E	5.2S	
	AX-310	1		1S	
	AX-104	5.8	5.8E		
	AX-105	2.6	0.7W	2.5S	
	Inferno	3.6	3.6W		Using the shifted 2017 bathymetry for ASHES (c-grid)
	Virgin	1.6	1.6W		
J1105	Castle	4	2W	3.5S	Sampling: Using shifted 2017 bathy for Int'l (d-grid)
	El Guapo	5.8	4.3W	3.7S	
	Diva	5.8	3.2W	4.5S	
	Vixen	4.6	2.7W	3.2N	
	Redwood Grove	31	11E	28S	Offset with geotiff from MBARI (noted in nav 30m north)

\*Both dives had bad nav until bottom doppler reset

J1105 had some bad nav while sampling at Trevi 14:56:09; 14:57:28-15:28:15; 17:38:36 (kept logs and edited in a new stationary position).

## 6.4.2 Navigational Markers

Navigational markers were deployed on each dive to assist future site visits to these locations. On J2-1104 at AX-101 pressure benchmark, Mkr-243 was placed to the north of the site for better approach visibility. The old benchmark flag was not as visible compared to the newer marker design. Mkr-218 was placed at Vixen Vent on dive J2-1105 to quickly distinguish it from Casper on first approaches.

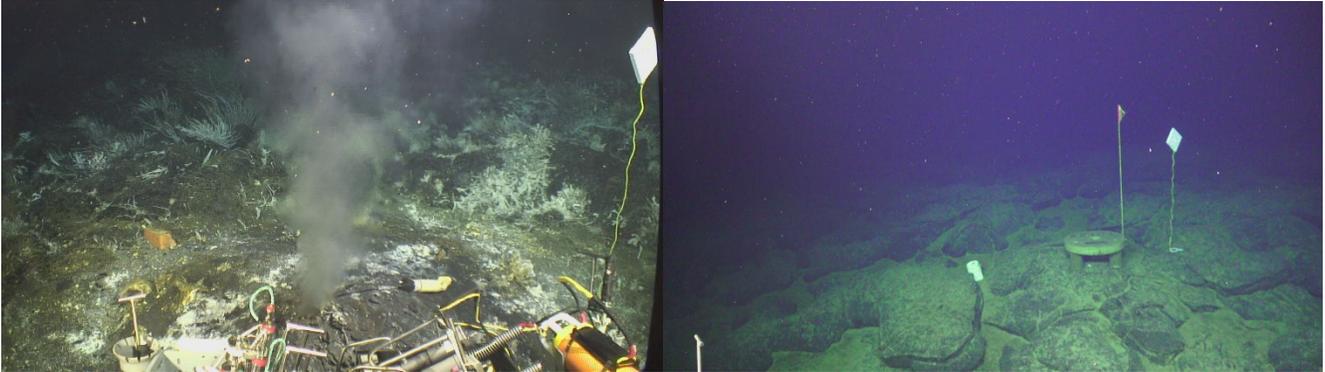


Figure 6.4.2-1 (left) Mkr-218 Vixen Vent with HOBOT in place. Figure 6.4.2-2 (right) Mkr-243 at AX-101 (tephra bucket to left).

Table 6.4.2-1 Marker Deployments

Dive	date	time	latitude	longitude	Head	Alt	depth	Comments	Virtual Van #
J2-1104	8/23	12:43:49	45.95520	- 130.00991	237	0.8	1528.9	<b>DEPLOY: Mkr-243.</b> DEPLOY marker Mkr-243 at AX-101. To the right of the benchmark landing at this heading.	3899
J2-1105	8/25	00:14:05	45.91736	- 129.99299	226	1.4	1531.0	<b>DEPLOY: Mkr-218 at Vixen</b> to the right of the samples out of way. Marker anchor in line with HOBOT orientation away from the vent.	8439

## 6.5 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, J1105-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. Sample metadata is submitted to SESAR (System for Earth Sample Registration) at [www.geosamples.org](http://www.geosamples.org).

dive	date	time	latitude	longitude	Gyro	altitude	depth	Comments	type	vv
J2-1104	2018/08/23	20:24:32	45.93366	-130.01324	149	0.8	1540.7	SAMPLE: J1104-Major-01 at Virgin Vent. Tmax=245.5degC. White Major bottle 6C. Tail had good flow.	fluid	4948
J2-1104	2018/08/23	20:31:21	45.93366	-130.01324	149	0.8	1540.6	SAMPLE: J1104-GTB-02 at Virgin Vent. Tmax=245.5degC. Green bottle 2. GTB shifted forward slightly when triggered. Same place as J1104-Major-01.	gas	4968
J2-1104	2018/08/23	21:42:10	45.93357	-130.01373	255	4.0	1537.8	SAMPLE: J1104-Major-03 at Inferno Vent. Taken from top of chimney at large black smoker excavated for good flow. Tmax=302 degC. Yellow bottle 20.	fluid	5181
J2-1104	2018/08/23	21:50:12	45.93357	-130.01373	254	4.1	1537.8	SAMPLE: J1104-GTB-04 at Inferno Vent. Same location as J1104-Major-03. Tmax=302degC. Yellow/green GTB #12.	gas	5205
J2-1105	2018/08/24	05:24:41	45.92012	-129.96326	20	6.7	1553.2	SAMPLE: J1105-geo-01. GEO-01 sample from 6 meters up on the southernmost chimney located 45.920121 -129.963264. (Nav offset is 30m to south from bathymetry map). At Redwood Grove chimney field.	geo	5739
J2-1105	2018/08/24	08:24:36	45.92654	-129.97953	239	15.0	1502.6	SAMPLE: J1105-Major-03 Sample Major at El Guapo. At upper part of the vent where active pieces were exploding off. Major bottle #2. Tmax=330degC.	fluid	6168
J2-1105	2018/08/24	08:30:38	45.92654	-129.97953	240	15.0	1502.6	SAMPLE: J1105-Major-04 at El Guapo. Major bottle #1. Good flow deflection and sample. Same location at El Guapo. Tmax=330degC.	fluid	6187
J2-1105	2018/08/24	08:44:23	45.92654	-129.97953	239	15.0	1502.6	SAMPLE: J1105-GTB-05 at El Guapo. White bottle #17. Same location as majors. Tmax=330degC.	gas	6227
J2-1105	2018/08/24	08:51:53	45.92654	-129.97953	240	15.0	1502.5	SAMPLE: J1105-GTB-06 at El Guapo. Same location as previous samples. Tmax=330degC. Red bottle #9.	gas	6248

dive	date	time	latitude	longitude	Gyro	altitude	depth	Comments	type	vv
J2-1105	2018/08/24	09:19:44	45.92638	-129.97904	215	1.8	1519.0	SAMPLE: J1105-Major-07 at Diva Vent. Anhydrite chimney knocked over prior to sampling for better flow. Red major bottle. Tmax=301degC.	fluid	6329
J2-1105	2018/08/24	09:27:52	45.92638	-129.97904	215	1.9	1518.9	SAMPLE: J1105-GTB-08 at Diva. Tmax=301degC. Same location as majors. Purple GTB bottle #11.	gas	6356
J2-1105	2018/08/24	23:14:22	45.91618	-129.98952	332	0.8	1530.7	SAMPLE: J1105-Geo-09 Pillow bud of 2011 lava near Bag City. Location 45.9167197 -129.989535. Heading is 332 and depth is 1530m. Sample taken below the ridge that AX-104 sits on in the 2011 flow. Placed in port biobox.	geo	8258
J2-1105	2018/08/24	23:50:45	45.91736	-129.99299	226	1.3	1531.1	SAMPLE: J1105-Major-10 at Vixen. Green bottle at Vixen with Tmax 321degC. Excavated venting orifice to get better flow.	fluid	8365
J2-1105	2018/08/24	23:56:52	45.91736	-129.99299	226	1.3	1531.0	SAMPLE: J1105-GTB-11 at Vixen in the flow but not the sediment. Fired. Same location as the major sample with 321degC Tmax. Yellow GTB bottle #6.	gas	8383
J2-1105	2018/08/25	05:11:04	45.86310	-130.00384	337	0.9	1716.8	SAMPLE: J1105-GEO-12 Sample of lava flow adjacent to AX-105 45.863154 -130.003826.	geo	9064
J2-1105	2018/08/25	05:14:42	45.86349	-130.00377	337	0.9	1716.8	SAMPLE: J1105-GEO-13 from same location as GEO-12.	geo	9072
J2-1105	2018/08/25	09:59:58	45.91610	-129.98948	42	1.6	1530.2	SAMPLE: J1105-GEO-14: Near Bag City (AX-104) Lat: 45.916163 Long: -129.989527 Depth: 1528.9 m. Sample was placed in the starboard-side forward crate with the major samplers. Sample crumpled when placed in box. Downslope of Bag City/AX-104 ~5m from benchmark.	geo	9666
J2-1105	2018/08/25	10:12:46	45.91612	-129.98949	43	1.7	1530.1	Sample: J1105-GEO-15 was collected by Morgan and is placed at the top of the starboard-side forward crate on top of sample J1105-GEO-14 which was collected by Haley. Downslope of Bag City/AX-104 ~5m from benchmark.	geo	9693

## 6.6 Jason Dive Logs

Positions shaded in gray were not the logged positions, they were changed in post-processing to more accurately reflect the true position.

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1104 Logger Comment	Virtual Van
2018/08/21	19:37:27	Nav bad until Doppler Reset				1.2	VEHICLE: VEHICLE in water	22
2018/08/21	19:40:41					2.8	Medea in water.	23
2018/08/21	19:41:22					3.9	<b>J2-1104 is the first dive of KM-18-13.</b>	24
2018/08/21	19:42:58					36.7	Deployment location at benchmark AX-308 (45deg 55.896'N - 129.59.928'W z=1533 m)	26
2018/08/21	19:43:44					54.1	<b>Main Goals:</b> Make pressure measurements at array of seafloor benchmarks. We will make 3 transects of the benchmarks and collect fluid samples at the end.	27
2018/08/21	19:44:53					82.4	In the basket for this dive are 4 major sampler bottles 4 gastight sampler bottles; the MPR instrument; 2 HOBOS (101	28
2018/08/21	19:45:42					94.8	2 mini-BPRs	29
2018/08/21	19:47:41					107.8	<b>Tasks:</b> [1] Make pressure measurements at seafloor benchmarks (3 transects). Deploy all 4 mini-BPRs on seafloor at first loop. Recover mini-BPRs on second or third loop.	30
2018/08/21	20:37:28			51	61.1	1469.4	TASKS: [2] On 3rd transect:	32
2018/08/21	20:38:32			359	46.8	1484.3	ASHES: Virgin vent: temp-probe then 1 major 1 gastight (HOBO that is there stays there)	33
2018/08/21	20:38:48			358	41.7	1489.3	ASHES: Inferno vent: temp-probe then 1 Major 1 Gastight	34
2018/08/21	20:39:27			357	27.9	1503.6	ASHES: Look for MTR 3197 at Anemone diffuse vent. If found recover. Regardless deploy new MTR from swing arm box	35
2018/08/21	20:40:12	45.93142	-129.99879	2	13.9	1517.1	Trevi: Recover HOBO 104 temp-probe then 1 major; 1 gastight; deploy HOBO	38
2018/08/21	20:40:33	45.93148	-129.99877	359	9.8	1520.8	Doppler Reset.	40
2018/08/21	20:40:48	45.93148	-129.99877	359	7.3	1523.6	NAV: NAV Doppler Reset	41
2018/08/21	20:40:55	45.93149	-129.99876	2	6.5	1524.1	VEHICLE: VEHICLE on bottom	42
2018/08/21	20:41:42	45.93151	-129.99873	359	4.3	1526.5	Vehicle on bottom: 45.931438N -129.998732 Depth: 1525.0	47
2018/08/21	20:42:04	45.93151	-129.99873	359	4.0	1526.9	Benchmark AX-308 is in sight. Navigating toward benchmark.	49

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1104 Logger Comment	Virtual Van
2018/08/21	20:44:23	45.93151	-129.99873	359	4.1	1526.8	TASKS: Vixen vent: recover HOBO 151; temp-probe; 1 major; 1 gastight; deploy HOBO.	54
2018/08/21	20:45:19	45.93151	-129.99873	359	3.9	1526.9	Ballasting vehicle. Benchmark AX-308 still in sight.	57
2018/08/21	20:46:57	45.93155	-129.99872	352	3.3	1527.6	Navigating toward AX-308.	61
2018/08/21	20:49:46	45.93158	-129.99869	277	3.3	1527.4	Arrived at AX-308. Planning to deploy mini-BPR from port swing arm.	72
2018/08/21	20:52:58	45.93158	-129.99868	272	3.5	1527.3	Removing mini-BPR #8 from port swing arm box.	79
2018/08/21	20:56:47	45.93158	-129.99870	267	1.0	1529.7	Placing mini BPR #8 back in port swing arm box in prep for brushing the benchmark.	96
2018/08/21	20:58:23	45.93158	-129.99870	267	1.0	1529.8	Brushing ash from previous eruption and biology from benchmark AX-308.	100
2018/08/21	20:59:13	45.93158	-129.99870	267	1.0	1529.7	Benchmark AX-308 tilted while brushing. Seems not to have been displaced.	103
2018/08/21	21:03:08	45.93158	-129.99871	267	1.0	1529.7	Still cleaning benchmark AX-308.	112
2018/08/21	21:04:29	45.93158	-129.99870	266	1.0	1529.7	Benchmark AX-308 Tilted again but seems not to have been displaced.	115
2018/08/21	21:05:01	45.93158	-129.99870	267	1.0	1529.7	Benchmark AX-308 tilted again but seems not to have been displaced.	118
2018/08/21	21:07:20	45.93158	-129.99870	266	1.0	1529.8	Benchmark cleaning is now complete. We are preparing to deploy BPR #8 at benchmark AX-308.	123
2018/08/21	21:07:37	45.93158	-129.99870	266	1.0	1529.7	Jason has removed BPR #8 from the port swing arm box.	125
2018/08/21	21:09:27	45.93158	-129.99871	265	1.0	1529.7	<b>DEPLOY: Mini-BPR #8 has been deployed at benchmark AX-308. Bill and Scott are happy with the placement.</b>	129
2018/08/21	21:11:36	45.93158	-129.99871	264	0.9	1529.8	The port swing arm box has been closed and returned to the interior of the vehicle.	135
2018/08/21	21:14:56	45.93158	-129.99871	265	0.9	1529.8	The MPR has been removed from the basket.	144
2018/08/21	21:17:52	45.93158	-129.99871	265	0.9	1529.8	The MPR has been placed on benchmark AX-308. Scott is happy with the placement and we are prepared to collect pressure measurements.	151
2018/08/21	21:18:38	45.93158	-129.99871	265	0.9	1529.8	<b>PRESSURE: PRESSURE Start AX-308</b>	154
2018/08/21	21:19:27	45.93158	-129.99871	265	0.9	1529.8	Lat: 45.931535 Long: -129.998714 Depth: 1529.0.	156
2018/08/21	21:38:09	45.93158	-129.99871	264	0.8	1529.7	Sensor is taking excessive time to cool to ambient temperatures. We are planning to spend additional time at benchmark AX-308 to allow time for the MPR to equilibrate.	195
2018/08/21	22:19:20	45.93155	-129.99868	261	0.8	1529.7	<b>PRESSURE: PRESSURE End</b>	278

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1104 Logger Comment	Virtual Van
2018/08/21	22:19:41	45.93155	-129.99868	261	0.9	1529.7	Jason is recovering the MPR from benchmark AX-308.	280
2018/08/21	22:20:37	45.93155	-129.99868	262	0.8	1529.7	The MPR has been returned and secured to the basket.	285
2018/08/21	22:21:22	45.93155	-129.99868	260	1.7	1528.9	Jason is off bottom. We are now beginning our transit to benchmark AX-106.	287
2018/08/21	22:23:12	45.93150	-129.99853	116	8.8	1521.7	Transit to benchmark AX-106 is ~1100 m and should take about one hour.	292
2018/08/21	22:23:21	45.93148	-129.99850	115	10.1	1520.4	The bottom is no longer in sight.	293
2018/08/21	22:23:42	45.93142	-129.99840	120	15.4	1515.0	TRANSIT: 1100 m at 288deg.	295
2018/08/21	22:59:53	45.93295	-130.00472	108	121.5	1415.2	Only 560m to go to the next benchmark-full speed ahead.	307
2018/08/21	23:15:59	45.93404	-130.00975	108	83.8	1450.1	Heading back down to bottom view.	308
2018/08/21	23:24:40	45.93449	-130.01136	109	8.1	1533.5	Can see the bottom again.	313
2018/08/21	23:27:19	45.93442	-130.01137	164	4.8	1536.4	Jellyfish swimming by.	319
2018/08/21	23:27:29	45.93440	-130.01138	177	5.3	1535.8	NAV: NAV Doppler Reset	320
2018/08/21	23:28:25	45.93431	-130.01151	265	4.9	1536.1	Looking for the benchmark. Rattail fish.	323
2018/08/21	23:29:02	45.93434	-130.01159	340	4.7	1535.9	There is the benchmark.	326
2018/08/21	23:30:06	45.93439	-130.01163	47	5.7	1535.8	Approaching AX-106 at ASHES.	329
2018/08/21	23:30:40	45.93443	-130.01158	75	2.4	1539.1	AX-106 does not have a mini BPR on the benchmark.	331
2018/08/21	23:31:50	45.93443	-130.01156	75	0.9	1540.2	On bottom in front of the benchmark.	334
2018/08/21	23:32:42	45.93443	-130.01156	75	0.9	1540.2	A few brittle stars are the recording platform but no more sweeping allowed.	337
2018/08/21	23:33:32	45.93443	-130.01156	75	0.9	1540.2	Retrieving the MPR from the basket with cable to the left.	340
2018/08/21	23:33:46	45.93443	-130.01156	75	1.0	1540.2	HIGHLIGHTS: HIGHLIGHTS HD highlights start	341
2018/08/21	23:33:59	45.93443	-130.01156	75	1.0	1540.2	Highlights of MPR placement on AX-106.	342
2018/08/21	23:34:44	45.93443	-130.01156	75	1.0	1540.2	Close up view of the placement.	345
2018/08/21	23:35:29	45.93443	-130.01156	75	1.0	1540.2	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	347
2018/08/21	23:35:47	45.93442	-130.01156	75	0.9	1540.2	<b>PRESSURE: PRESSURE Start AX-106</b>	349
2018/08/21	23:36:03	45.93442	-130.01156	75	0.9	1540.2	Starting AX-106 measurement.	351
2018/08/21	23:44:32	45.93444	-130.01152	75	0.9	1540.2	Noticed tilt numbers different than past years so lifting up device and will clean before measuring.	369
2018/08/21	23:44:46	45.93444	-130.01152	75	0.9	1540.2	<b>PRESSURE: PRESSURE End</b>	370
2018/08/21	23:44:56	45.93444	-130.01152	75	0.9	1540.2	Ended that measurement.	371

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1104 Logger Comment	Virtual Van
2018/08/21	23:45:26	45.93444	-130.01152	75	1.0	1540.2	Going to use the brush gently after all to see if there is some debris.	373
2018/08/21	23:45:44	45.93444	-130.01152	75	1.0	1540.2	Brushing now and no movement on the benchmark.	375
2018/08/21	23:47:01	45.93444	-130.01152	75	1.0	1540.2	Done brushing off the landing pad and storing the brush.	379
2018/08/21	23:47:42	45.93444	-130.01152	75	1.0	1540.2	Retrieving the MPR again to place on benchmark.	381
2018/08/21	23:48:09	45.93444	-130.01152	75	0.9	1540.3	Placing MPR on benchmark.	383
2018/08/21	23:48:52	45.93444	-130.01152	75	1.0	1540.3	<b>PRESSURE: PRESSURE Start AX-106</b>	385
2018/08/21	23:49:10	45.93444	-130.01153	75	0.9	1540.3	Starting the measurement again at AX-106.	387
2018/08/21	23:50:23	45.93443	-130.01154	75	0.9	1540.3	No improvement in the tilt measurement after brushing.	390
2018/08/21	23:59:49	45.93442	-130.01155	75	0.9	1540.3	Turns out that last year's tilt measurement may have been off as this one was the same as 2 visits ago.	410
2018/08/22	00:09:55	45.93446	-130.01158	75	0.9	1540.3	<b>PRESSURE: PRESSURE End</b>	431
2018/08/22	00:10:06	45.93446	-130.01158	75	0.9	1540.3	Finished pressure measurement.	433
2018/08/22	00:10:15	45.93446	-130.01158	75	0.9	1540.3	Retrieving the MPR from the benchmark.	434
2018/08/22	00:10:53	45.93446	-130.01158	75	1.0	1540.3	Decided to wait a minute.	436
2018/08/22	00:11:19	45.93445	-130.01158	75	1.0	1540.3	Now retrieving the MPR.	438
2018/08/22	00:12:26	45.93444	-130.01159	75	0.9	1540.3	Placing the MPR in the basket.	441
2018/08/22	00:13:28	45.93444	-130.01161	75	0.9	1540.3	Putting the bungee on the MPR and its ready to transit.	444
2018/08/22	00:14:51	45.93444	-130.01164	76	0.9	1540.3	Small adjustment with arm to put MPR closer into the vehicle.	448
2018/08/22	00:15:09	45.93444	-130.01165	75	1.4	1539.9	Preparing the ship to transit to next benchmark.	450
2018/08/22	00:15:15	45.93443	-130.01166	75	1.8	1539.6	Lifting off the bottom.	451
2018/08/22	00:16:12	45.93443	-130.01168	186	8.6	1532.9	Off the bottom and moving to AX-307.	454
2018/08/22	00:16:56	45.93426	-130.01174	187	10.4	1531.3	1200 meters of transit to AX-307. Out of bottom site.	456
2018/08/22	00:18:55	45.93386	-130.01193	192	38.4	1502.7	Coming up to a 100m for Jason to transit.	461
2018/08/22	00:19:09	45.93384	-130.01195	208	44.9	1495.9	Ship is starting its move north.	462
2018/08/22	00:22:06	45.93370	-130.01218	206	95.7	1444.3	Jason at 100m ready for the transit.	463
2018/08/22	01:05:12	45.94325	-130.00954	188	101.4	1438.3	Ship is at AX-307 so we are waiting for Medea and Jason.	464
2018/08/22	01:15:35	45.94513	-130.00907	188	65.2	1477.9	Heading down to the seafloor with Jason.	465
2018/08/22	01:16:59	45.94514	-130.00902	187	28.2	1515.0	NAV: NAV Doppler Reset	466
2018/08/22	01:17:45	45.94525	-130.00898	188	9.0	1534.1	There is the bottom.	469
2018/08/22	01:18:13	45.94528	-130.00895	188	5.8	1537.3	Beautiful sheet flow striations.	471

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1104 Logger Comment	Virtual Van
2018/08/22	01:19:10	45.94529	-130.00898	261	4.8	1538.4	Beautiful benchmark in view.	474
2018/08/22	01:20:26	45.94536	-130.00909	171	1.9	1541.0	AX-307 has a mini BPR and a fish guarding it.	477
2018/08/22	01:21:09	45.94535	-130.00912	170	0.9	1542.2	Mini BPR 10 is on the benchmark.	480
2018/08/22	01:21:55	45.94535	-130.00913	172	0.8	1542.5	Approaching the benchmark. There are a few sea stars in the landing zone.	482
2018/08/22	01:22:42	45.94535	-130.00914	172	0.8	1542.5	Going to try to wave the MPR above the landing area to move the critters.	485
2018/08/22	01:23:08	45.94535	-130.00914	173	0.8	1542.5	Releasing the MPR from the bungee.	487
2018/08/22	01:24:11	45.94536	-130.00914	173	0.8	1542.4	Removing the MPR from the basket.	490
2018/08/22	01:24:28	45.94536	-130.00914	172	0.8	1542.5	HIGHLIGHTS: Placing MPR on benchmark. HIGHLIGHTS HD highlights start	491
2018/08/22	01:25:20	45.94536	-130.00913	172	0.8	1542.5	Doing some cable management of the MPR.	494
2018/08/22	01:25:53	45.94536	-130.00913	173	0.8	1542.5	Waving the MPR over the landing pad.	496
2018/08/22	01:26:27	45.94536	-130.00913	173	0.8	1542.5	Got rid of some of the debris but one sea star won't leave.	498
2018/08/22	01:27:34	45.94536	-130.00913	173	0.8	1542.5	Placing MPR on the pad over the sea star.	502
2018/08/22	01:28:12	45.94536	-130.00913	173	0.8	1542.5	Sea star has left the landing zone as position the MPR.	504
2018/08/22	01:28:27	45.94536	-130.00913	173	0.8	1542.5	Nudging the MPR to the right.	505
2018/08/22	01:28:47	45.94536	-130.00913	173	0.8	1542.5	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	507
2018/08/22	01:29:04	45.94536	-130.00913	173	0.8	1542.5	<b>PRESSURE: AX-307 begin. PRESSURE Start</b>	509
2018/08/22	01:35:30	45.94536	-130.00913	173	0.8	1542.5	Navigation is spot on here at AX-307.	522
2018/08/22	01:49:03	45.94536	-130.00913	173	0.8	1542.6	<b>PRESSURE: Done at AX-307. PRESSURE End</b>	551
2018/08/22	01:49:38	45.94536	-130.00913	173	0.8	1542.6	Removing the MPR from the benchmark.	553
2018/08/22	01:50:09	45.94536	-130.00913	173	0.8	1542.6	Placing MPR back in its cradle on the basket.	555
2018/08/22	01:50:37	45.94536	-130.00913	173	0.8	1542.6	Moving MPR cable into the basket.	557
2018/08/22	01:52:25	45.94536	-130.00913	174	0.8	1542.5	Retrieving the port swing arm to get the mini-BPR for deployment.	561
2018/08/22	01:54:15	45.94536	-130.00913	173	0.8	1542.6	Opening the biobox and the MTR float is standing at attention.	566
2018/08/22	01:54:48	45.94536	-130.00913	173	0.8	1542.6	<b>DEPLOY: Grabbed the Mini-BPR #9 and placing on the seafloor until the older one is put in the biobox.</b>	568
2018/08/22	01:55:47	45.94537	-130.00912	173	0.8	1542.6	HIGHLIGHTS: HIGHLIGHTS HD highlights start	571
2018/08/22	01:56:41	45.94537	-130.00912	173	0.8	1542.6	<b>RECOVER: Grabbing old mini-BPR #10 from the benchmark.</b>	574

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1104 Logger Comment	Virtual Van
2018/08/22	01:57:40	45.94538	-130.00911	173	0.8	1542.7	Putting mini-BPR 10 in the port biobox	577
2018/08/22	01:59:45	45.94536	-130.00909	173	0.8	1542.6	Getting mini-BPR off the seafloor and placing on benchmark AX-307.	582
2018/08/22	02:01:17	45.94535	-130.00909	172	0.8	1542.7	Final placement position on the benchmark.	586
2018/08/22	02:01:25	45.94535	-130.00910	173	0.8	1542.7	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	587
2018/08/22	02:03:57	45.94535	-130.00910	173	0.8	1542.7	Lots of bio living on the marker line of AX-307.	593
2018/08/22	02:04:28	45.94535	-130.00909	173	0.8	1542.7	Top of the marker.	595
2018/08/22	02:05:02	45.94536	-130.00909	173	0.8	1542.7	Urchin view.	598
2018/08/22	02:06:01	45.94537	-130.00908	173	0.8	1542.7	Mkr-127 view at AX-307.	601
2018/08/22	02:07:02	45.94538	-130.00908	172	0.8	1542.7	Heading 356deg to next benchmark with a view of the bottom and range of 1100m.	604
2018/08/22	02:07:52	45.94542	-130.00910	356	3.5	1539.8	Correction it is 1008 meters to the next benchmark at AX-101.	606
2018/08/22	02:08:29	45.94553	-130.00908	357	2.8	1539.1	Old chain.	608
2018/08/22	02:08:44	45.94556	-130.00906	356	2.7	1539.0	Probably was the benchmark chain from deployment.	610
2018/08/22	02:10:04	45.94567	-130.00894	357	3.1	1539.0	Waiting for the ship to start heading north.	614
2018/08/22	02:11:09	45.94571	-130.00887	357	3.2	1538.9	Starting the transit at 0211-timing the transit along the bottom.	617
2018/08/22	02:14:19	45.94582	-130.00885	356	3.6	1538.5	Moving north at .68kts.	624
2018/08/22	02:14:27	45.94584	-130.00885	357	3.2	1538.8	Nice sea star.	625
2018/08/22	02:15:04	45.94592	-130.00886	356	3.9	1538.4	Moving over striated sheet flow with sediment.	628
2018/08/22	02:16:15	45.94601	-130.00889	355	3.7	1538.5	Small pressure ridge.	631
2018/08/22	02:18:04	45.94625	-130.00892	355	4.8	1538.6	Seems like a bit more sediment.	636
2018/08/22	02:19:09	45.94641	-130.00892	354	4.4	1538.6	Another ridge with some pillow-like forms.	639
2018/08/22	02:19:53	45.94654	-130.00892	356	3.4	1537.8	Larger pillows.	641
2018/08/22	02:20:46	45.94666	-130.00893	355	3.2	1537.7	Collapse area.	644
2018/08/22	02:20:53	45.94667	-130.00893	355	2.8	1538.0	Jelly	645
2018/08/22	02:21:04	45.94670	-130.00894	356	3.0	1537.7	Pillar in collapse.	647
2018/08/22	02:23:35	45.94697	-130.00892	355	3.6	1537.2	830 meters to go.	653
2018/08/22	02:23:39	45.94698	-130.00893	355	3.8	1537.1	Fish in collapse	654
2018/08/22	02:24:26	45.94715	-130.00893	357	5.4	1538.0	Nice collapse features.	656
2018/08/22	02:25:13	45.94732	-130.00893	357	3.5	1537.4	Collapse craters and pillows.	659
2018/08/22	02:26:27	45.94749	-130.00894	356	2.2	1539.1	Sea star on top of a pillow.	662

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1104 Logger Comment	Virtual Van
2018/08/22	02:26:45	45.94754	-130.00895	355	3.7	1538.8	Lava looks more broken up here.	664
2018/08/22	02:27:30	45.94767	-130.00897	355	4.1	1537.9	Moving on top of an intact flow with sea star.	666
2018/08/22	02:29:05	45.94777	-130.00902	356	2.4	1538.4	Little collapse pit with smoother pillows on top.	671
2018/08/22	02:30:52	45.94797	-130.00904	356	2.4	1538.4	Running along a collapse edge to port.	675
2018/08/22	02:31:07	45.94800	-130.00904	356	2.4	1538.5	Thirty-nine minutes to go to AX-101.	677
2018/08/22	02:31:51	45.94809	-130.00904	355	2.5	1538.5	Looks like a lava bridge in the collapse.	679
2018/08/22	02:33:25	45.94833	-130.00905	357	3.4	1538.2	Collapse features are matching the navigation and bathymetry really well.	683
2018/08/22	02:34:38	45.94857	-130.00905	358	3.0	1538.0	Flying over intact flow with sediment.	687
2018/08/22	02:35:43	45.94879	-130.00905	354	3.6	1537.3	Larger pillows.	690
2018/08/22	02:38:48	45.94935	-130.00902	355	3.5	1535.1	Large pillows as far as you can see.	697
2018/08/22	02:41:40	45.94986	-130.00898	358	4.7	1534.2	Heavy sediment with pillows peeking out.	704
2018/08/22	03:10:27	45.95499	-130.00983	7	5.7	1521.9	NAV: NAV Doppler Reset	764
2018/08/22	03:10:42	45.95504	-130.00983	6	5.7	1521.8	80 meters to AX-101.	766
2018/08/22	03:13:55	45.95521	-130.00994	240	0.8	1530.8	On site AX-101.	773
2018/08/22	03:17:09	45.95521	-130.00995	238	1.0	1531.0	Brushing brittle stars off of AX-101 before beginning MPR recording.	781
2018/08/22	03:23:47	45.95520	-130.00992	239	1.1	1530.9	HIGHLIGHTS: MPR placement at AX-101. HIGHLIGHTS HD highlights start	795
2018/08/22	03:26:50	45.95521	-130.00993	240	0.8	1530.9	HIGHLIGHTS: MPR in place. HIGHLIGHTS HD highlights stop	802
2018/08/22	03:27:11	45.95522	-130.00993	240	0.8	1530.9	<b>PRESSURE: PRESSURE Start AX-101</b>	804
2018/08/22	03:47:05	45.95520	-130.00995	240	0.8	1530.9	<b>PRESSURE: End pressure recording AX-101. PRESSURE End</b>	845
2018/08/22	03:47:25	45.95520	-130.00995	240	0.8	1531.0	Beginning transit to AX-302.	846
2018/08/22	03:52:03	45.95520	-130.00996	240	0.8	1530.9	MPR secured for transit to AX-302.	857
2018/08/22	05:05:59	45.95107	-129.99639	298	173.1	1354.5	930 meters to AX-302.	872
2018/08/22	05:43:40	45.94669	-129.98397	296	18.6	1503.0	NAV: NAV Doppler Reset	875
2018/08/22	05:44:40	45.94668	-129.98399	296	6.1	1515.8	Bottom in sight on approach to AX-302.	878
2018/08/22	05:46:37	45.94648	-129.98382	158	3.9	1518.2	AX-302 in sight.	883
2018/08/22	05:49:31	45.94640	-129.98380	230	1.7	1518.3	On site AX-302.	889
2018/08/22	05:51:21	45.94641	-129.98377	230	1.9	1518.3	HIGHLIGHTS: Placing miniBPR on seafloor prior to AX-302 MPR measurements. HIGHLIGHTS HD highlights start	894

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1104 Logger Comment	Virtual Van
2018/08/22	05:55:36	45.94640	-129.98378	232	1.0	1519.1	<b>DEPLOY: Mini-BPR 12 placed on seafloor prior to swap with Mini-BPR 5. DEPLOY SIO-BPR</b>	904
2018/08/22	05:56:18	45.94640	-129.98378	232	1.0	1519.1	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	906
2018/08/22	05:59:03	45.94641	-129.98378	232	1.0	1519.1	HIGHLIGHTS: MPR measurement AX-302. HIGHLIGHTS HD highlights start	913
2018/08/22	05:59:48	45.94641	-129.98379	232	1.0	1519.1	MPR in place on concrete benchmark AX-302.	915
2018/08/22	06:00:23	45.94642	-129.98379	232	0.9	1519.1	<b>PRESSURE: Start AX-302 MPR measurements.</b>	917
2018/08/22	06:00:44	45.94642	-129.98379	232	1.0	1519.1	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	919
2018/08/22	06:21:42	45.94642	-129.98381	233	1.0	1519.0	<b>PRESSURE: End pressure measurements at AX-302.</b>	962
2018/08/22	06:23:20	45.94639	-129.98376	233	1.0	1519.0	MPR placed back in cradle.	966
2018/08/22	06:27:55	45.94696	-129.98446	316	27.5	1494.3	Mini-BPR 5 was left on the benchmark until the second loop. Mini-BPR 12 was deployed on the seafloor by AX-302 and will be swapped on the second loop.	976
2018/08/22	06:29:18	45.94716	-129.98470	318	65.6	1455.7	Begin transit to AX-309.	977
2018/08/22	07:42:35	45.93809	-129.97159	287	10.1	1515.0	Bottom in sight.	981
2018/08/22	07:43:32	45.93814	-129.97169	287	6.0	1517.2	Lava pillars present.	984
2018/08/22	07:45:02	45.93825	-129.97194	308	8.3	1517.1	Many lava pillars and collapse structures present.	988
2018/08/22	07:51:54	45.93829	-129.97200	307	9.6	1515.9	NAV: NAV Doppler Reset	1006
2018/08/22	07:53:32	45.93835	-129.97187	307	6.6	1515.9	More collapse structures present.	1011
2018/08/22	07:54:05	45.93838	-129.97187	307	10.2	1515.9	Benchmark AX-309 in sight.	1013
2018/08/22	07:55:13	45.93841	-129.97197	308	7.0	1515.9	Navigating toward benchmark AX-309.	1016
2018/08/22	07:57:12	45.93848	-129.97203	284	2.8	1522.5	Arriving at Benchmark AX-309.	1023
2018/08/22	07:59:51	45.93848	-129.97204	249	1.8	1524.3	Arrived at benchmark AX-309. Marker 130 present at benchmark AX-309.	1029
2018/08/22	08:01:00	45.93849	-129.97204	249	1.7	1524.3	The MPR has been removed from the basket using the starboard swing arm.	1032
2018/08/22	08:04:06	45.93849	-129.97205	246	0.8	1525.8	Our current location is offset. We are currently 15 m north of the marker.	1040
2018/08/22	08:05:06	45.93848	-129.97205	246	0.8	1525.8	Jason is cleaning the MPR platform (black box) on benchmark AX-309.	1043
2018/08/22	08:06:16	45.93848	-129.97205	246	0.8	1525.8	The brush is being returned to the cradle in the basket.	1046
2018/08/22	08:11:38	45.93848	-129.97205	247	1.8	1525.8	The MPR has been placed on benchmark AX-309. Matt is happy with the placement.	1058

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1104 Logger Comment	Virtual Van
2018/08/22	08:11:59	45.93848	-129.97205	247	1.8	1525.8	<b>PRESSURE: PRESSURE Start AX-309</b>	1059
2018/08/22	08:12:47	45.93848	-129.97205	247	1.8	1525.8	Location of benchmark AX-309 is in a moderate-heavily sedimented ropy lava flow.	1062
2018/08/22	08:16:11	45.93848	-129.97205	247	0.8	1525.7	Current Jason position is at Lat: 45.938473N -129.9720456W Depth: 1524.2 m.	1070
2018/08/22	08:17:21	45.93848	-129.97205	247	0.9	1525.7	Jason is offset from target by ~15 m. (Jason is ~15 m NW of the target).	1073
2018/08/22	08:27:28	45.93848	-129.97205	247	0.9	1525.7	We are still conducting the pressure measurement.	1094
2018/08/22	08:31:40	45.93848	-129.97206	247	0.9	1525.6	We are observing an abnormally high pressure change of 0.15 psi / 10 minutes.	1104
2018/08/22	08:32:47	45.93848	-129.97207	247	0.9	1525.6	<b>PRESSURE: PRESSURE End</b>	1107
2018/08/22	08:34:21	45.93848	-129.97207	248	2.6	1523.2	The MPR has been removed from benchmark AX-309 and we have begun our ascent.	1111
2018/08/22	08:36:59	45.93842	-129.97200	269	10.0	1512.6	The MPR has been secured in the basket.	1117
2018/08/22	08:37:36	45.93843	-129.97200	329	10.5	1511.8	The bottom is no longer in sight and we have begun our transit to benchmark AX-303 (vent M33).	1120
2018/08/22	08:39:10	45.93836	-129.97191	71	44.7	1477.3	Transiting at 950 m at 236deg.	1123
2018/08/22	09:45:54	45.93337	-129.98226	96	8.5	1505.4	Bottom in sight. Benchmark in Sight.	1126
2018/08/22	09:46:11	45.93340	-129.98226	132	8.3	1505.4	NAV: NAV Doppler Reset	1128
2018/08/22	09:49:08	45.93342	-129.98224	127	6.0	1507.9	The MPR has been removed from the basket.	1135
2018/08/22	09:50:27	45.93342	-129.98221	173	2.5	1511.7	We are descending on benchmark AX-303 which is atop some large pillow basalts.	1138
2018/08/22	09:51:01	45.93342	-129.98221	182	1.2	1513.1	We are on bottom at AX-303.	1140
2018/08/22	09:51:25	45.93342	-129.98221	181	0.8	1513.5	We will be recovering mini-BPR #2 following the MPR measurement.	1142
2018/08/22	09:53:26	45.93342	-129.98221	177	0.8	1513.5	Jason is brushing the MPR platform (black box) on benchmark AX-303.	1147
2018/08/22	09:54:19	45.93342	-129.98221	177	0.8	1513.5	The brush has been returned to the basket.	1150
2018/08/22	09:58:13	45.93342	-129.98223	177	0.8	1513.5	The MPR has been placed on benchmark AX-303. Matt is happy with the placement.	1159
2018/08/22	09:58:36	45.93342	-129.98223	177	0.8	1513.5	<b>PRESSURE: PRESSURE Start AX-303</b>	1161
2018/08/22	09:59:32	45.93342	-129.98223	177	0.8	1513.5	Current position is at Lat: 45.93334N Long: -129.982169W Depth: -1511.9 m.	1164

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1104 Logger Comment	Virtual Van
2018/08/22	10:02:02	45.93342	-129.98223	177	0.8	1513.5	Matt has noted that the tilt is similar to the 2015 measurement but in disagreement with the 2017 measurement.	1170
2018/08/22	10:18:47	45.93343	-129.98223	177	0.8	1513.4	<b>PRESSURE: PRESSURE End</b>	1204
2018/08/22	10:19:31	45.93343	-129.98223	177	0.8	1513.4	The MPR has been removed from the benchmark.	1206
2018/08/22	10:20:27	45.93343	-129.98223	177	0.8	1513.4	<b>RECOVER: Mini-BPR #2 has been removed from the benchmark.</b>	1209
2018/08/22	10:21:17	45.93343	-129.98223	181	4.3	1509.8	We are off bottom.	1212
2018/08/22	10:21:53	45.93344	-129.98223	180	6.2	1507.6	The bottom is no longer in sight.	1214
2018/08/22	10:22:56	45.93344	-129.98223	181	6.0	1507.8	The MPR has been returned to and secured in the basket.	1217
2018/08/22	10:24:12	45.93344	-129.98224	181	6.0	1507.8	Mini-BPR #2 has been temporarily placed in the port-side forward basket with the gastight bottles while the swing arm is extended.	1221
2018/08/22	10:24:58	45.93344	-129.98225	181	6.0	1507.8	The bio box on the port-side swing arm has been opened.	1223
2018/08/22	10:25:40	45.93344	-129.98225	181	5.9	1507.8	Mini-BPR #2 has been removed from the port-side forward crate in the basket and has been placed in the bio box on the port-side swing arm.	1226
2018/08/22	10:27:29	45.93343	-129.98223	181	6.0	1507.8	The bio box on the port-side swing arm has been secured and returned to the interior of the vehicle.	1230
2018/08/22	10:28:24	45.93342	-129.98219	181	5.9	1507.8	We are beginning our transit to benchmark AX-310.	1233
2018/08/22	10:30:47	45.93372	-129.98207	15	15.3	1498.2	Benchmark AX-310 is ~1 km away at 160deg.	1239
2018/08/22	10:33:48	45.93447	-129.98234	2	69.5	1443.0	Correction: Transit is 900 m at 158deg.	1242
2018/08/22	10:47:47	45.93178	-129.98126	355	165.5	1348.7	Large jelly went by	1243
2018/08/22	10:47:54	45.93177	-129.98126	353	165.9	1348.8	Jelly	1244
2018/08/22	10:49:56	45.93164	-129.98120	355	166.4	1348.7	734 meters to the next benchmark.	1245
2018/08/22	11:23:51	45.92903	-129.97994	313	156.6	1348.7	Jelly.	1246
2018/08/22	11:35:59	45.92811	-129.97945	312	116.4	1355.2	Ship is at the AX-310 site. Lowering Jason out of tow-mode.	1247
2018/08/22	11:43:45	45.92602	-129.97786	183	10.4	1515.1	NAV: NAV Doppler Reset	1249
2018/08/22	11:44:14	45.92604	-129.97785	184	4.2	1522.2	On the bottom.	1251
2018/08/22	11:45:28	45.92588	-129.97788	199	3.4	1523.6	There is the benchmark and a bucket lid to the left at AX-310.	1254
2018/08/22	11:45:38	45.92587	-129.97790	204	3.6	1523.4	There is the OOI cable as well.	1256
2018/08/22	11:46:38	45.92585	-129.97788	202	3.5	1523.5	First picking up the MPR cable that is dangling below the basket.	1259
2018/08/22	11:48:54	45.92581	-129.97784	258	3.3	1524.2	Mkr-126 at AX-310.	1264

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1104 Logger Comment	Virtual Van
2018/08/22	11:49:14	45.92579	-129.97787	287	3.0	1524.4	Moving into position to deploy the MPR on the benchmark.	1266
2018/08/22	11:51:02	45.92579	-129.97787	285	1.2	1525.9	A couple of sea stars on the landing pad.	1271
2018/08/22	11:51:16	45.92579	-129.97787	284	1.3	1525.9	Retrieving the MPR from the basket.	1272
2018/08/22	11:51:33	45.92579	-129.97787	284	1.3	1525.9	HIGHLIGHTS: AX-310 HIGHLIGHTS HD highlights start	1274
2018/08/22	11:51:54	45.92579	-129.97787	284	1.3	1525.9	Placing MPR on the benchmark.	1275
2018/08/22	11:52:19	45.92578	-129.97788	284	1.3	1525.9	Placement looks good.	1277
2018/08/22	11:52:42	45.92578	-129.97788	285	1.3	1525.9	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	1279
2018/08/22	11:53:09	45.92578	-129.97788	285	1.3	1525.9	<b>PRESSURE: AX-310 first measurement. PRESSURE Start</b>	1281
2018/08/22	11:57:06	45.92579	-129.97788	285	1.3	1525.9	Nice filter feeder on the marker.	1290
2018/08/22	11:57:19	45.92579	-129.97788	285	1.2	1525.9	Close-up of the biology.	1291
2018/08/22	11:57:56	45.92580	-129.97787	285	1.2	1525.9	Several of the same type on top of the marker.	1293
2018/08/22	12:01:03	45.92580	-129.97786	285	1.3	1525.9	Nice view of the basket and instrument.	1301
2018/08/22	12:07:45	45.92581	-129.97787	285	1.3	1525.9	Benchmark flag anemone.	1315
2018/08/22	12:08:03	45.92581	-129.97787	285	1.3	1525.9	Nice new camera on Jason.	1317
2018/08/22	12:09:02	45.92581	-129.97786	285	1.3	1525.9	Filter feeding on the line.	1321
2018/08/22	12:09:53	45.92581	-129.97786	285	1.3	1525.9	Iris adjustment for a different view.	1323
2018/08/22	12:11:58	45.92580	-129.97786	285	1.3	1525.9	Another feeder on the line of the benchmark.	1328
2018/08/22	12:13:01	45.92579	-129.97787	285	1.3	1525.9	Rattail fish approaching the benchmark.	1331
2018/08/22	12:13:21	45.92579	-129.97788	285	1.3	1525.9	<b>PRESSURE: AX-310 first measurement complete. PRESSURE End</b>	1333
2018/08/22	12:13:35	45.92579	-129.97788	285	1.3	1525.9	Picking up MPR.	1335
2018/08/22	12:14:04	45.92579	-129.97788	286	1.2	1525.9	Placing MPR on the basket cradle.	1337
2018/08/22	12:14:26	45.92579	-129.97789	285	1.2	1525.9	MPR cable management.	1338
2018/08/22	12:15:45	45.92578	-129.97787	286	3.2	1524.5	Ready for ship to head to next benchmark at Bag City. Going to ask them to change the ship heading so not to go backwards.	1342
2018/08/22	12:18:27	45.92576	-129.97780	51	5.4	1522.1	220deg is the course to the benchmark at 1410 meters away.	1348
2018/08/22	12:21:54	45.92602	-129.97712	158	18.9	1509.3	Jason off bottom and in transit mode.	1356
2018/08/22	12:23:20	45.92607	-129.97695	81	32.1	1495.4	Taking the vehicle up to 1400m for the transit.	1360
2018/08/22	13:32:29	45.91738	-129.98796	44	133.2	1394.9	The ship is at the site at Bag City AX-104.	1361
2018/08/22	13:33:40	45.91713	-129.98825	43	119.6	1407.6	Jason is descending back down to the seafloor.	1362
2018/08/22	13:40:07	45.91633	-129.98957	45	15.6	1513.9	NAV: NAV Doppler Reset	1364

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1104 Logger Comment	Virtual Van
2018/08/22	13:40:47	45.91630	-129.98962	91	5.0	1524.7	There is the bottom with a lot of pillows.	1366
2018/08/22	13:41:05	45.91626	-129.98959	133	5.3	1524.4	There is the benchmark at Bag City AX-104.	1368
2018/08/22	13:42:12	45.91614	-129.98948	22	5.7	1524.3	Mrk-276 but the target file says marker 65.	1371
2018/08/22	13:43:17	45.91617	-129.98944	345	1.1	1528.2	Marker 65 is at the vent and Mkr-276 is at the benchmark.	1374
2018/08/22	13:43:47	45.91618	-129.98943	329	1.1	1528.2	Site doesn't look as black as last year. An old triangular benchmark next to this one.	1376
2018/08/22	13:43:58	45.91618	-129.98943	328	0.9	1528.4	Tube worms in the cracks of the rocks surrounding the benchmark.	1377
2018/08/22	13:44:37	45.91618	-129.98942	328	1.2	1528.3	Mrk-276 is very clean.	1380
2018/08/22	13:45:12	45.91618	-129.98942	327	1.0	1528.3	Retrieving the MPR from the basket. Light sediment on the benchmark.	1382
2018/08/22	13:46:23	45.91617	-129.98941	327	1.0	1528.3	HIGHLIGHTS: AX-104 Bag City. HIGHLIGHTS HD highlights start	1385
2018/08/22	13:46:29	45.91617	-129.98941	327	1.0	1528.3	Placing the MPR on the benchmark.	1386
2018/08/22	13:46:49	45.91617	-129.98941	327	1.0	1528.3	Getting the MPR into position on the landing pad.	1388
2018/08/22	13:47:44	45.91618	-129.98941	326	0.9	1528.3	Hard to see if position is good.	1391
2018/08/22	13:48:53	45.91618	-129.98942	327	1.0	1528.4	<b>PRESSURE: AX-104 Bag City started recording #1. Will check if MPR is level. PRESSURE Start</b>	1394
2018/08/22	13:49:02	45.91618	-129.98942	327	0.9	1528.4	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	1396
2018/08/22	13:51:03	45.91618	-129.98945	327	0.9	1528.4	Nav is only off 7m to the west of the vehicle but benchmark was very easy to find.	1401
2018/08/22	13:53:02	45.91618	-129.98945	326	0.9	1528.4	Looking at the placement of the MPR.	1406
2018/08/22	13:53:35	45.91618	-129.98944	326	0.9	1528.4	Snail living on the benchmark edge.	1408
2018/08/22	13:53:47	45.91618	-129.98944	326	0.9	1528.4	Limpets are also living on the benchmark.	1409
2018/08/22	13:54:20	45.91618	-129.98944	327	0.9	1528.4	Close-up of the tube worms.	1411
2018/08/22	13:54:47	45.91618	-129.98943	326	0.9	1528.4	Biology shot at Bag City.	1413
2018/08/22	13:55:16	45.91618	-129.98943	326	0.9	1528.4	Bill saw some sea spiders.	1415
2018/08/22	13:55:43	45.91618	-129.98943	326	0.9	1528.4	A cluster of sea spiders.	1417
2018/08/22	13:56:14	45.91617	-129.98942	327	0.9	1528.4	Shimmer in the cracks.	1419
2018/08/22	13:56:24	45.91617	-129.98942	327	0.9	1528.4	HIGHLIGHTS: Shimmer and biology. HIGHLIGHTS HD highlights start	1420
2018/08/22	13:57:25	45.91618	-129.98942	326	0.9	1528.4	Window of collapse with some drip-like features on the lava slab.	1423

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1104 Logger Comment	Virtual Van
2018/08/22	13:57:58	45.91618	-129.98942	326	0.9	1528.4	Zoom of the window and the lava drips.	1425
2018/08/22	13:58:33	45.91619	-129.98942	327	0.9	1528.4	Sea cricket? Different than the spider.	1428
2018/08/22	13:58:47	45.91619	-129.98942	326	0.9	1528.4	Not sure what it is but different than the spiders.	1429
2018/08/22	13:59:00	45.91619	-129.98942	326	0.9	1528.4	Drip close-up.	1430
2018/08/22	14:00:25	45.91619	-129.98944	326	0.9	1528.4	Close-up of the tubeworms.	1434
2018/08/22	14:01:04	45.91618	-129.98944	326	0.9	1528.4	Shimmer in the water beyond the tubeworms in the crack.	1437
2018/08/22	14:02:49	45.91617	-129.98943	327	0.9	1528.4	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	1441
2018/08/22	14:08:52	45.91621	-129.98943	326	0.9	1528.5	<b>PRESSURE: Finished. PRESSURE End</b>	1454
2018/08/22	14:09:13	45.91620	-129.98943	327	0.9	1528.5	MPR off of the benchmark.	1456
2018/08/22	14:09:25	45.91620	-129.98944	327	0.9	1528.5	Placing MPR in the cradle on basket.	1457
2018/08/22	14:10:07	45.91615	-129.98945	327	0.9	1528.5	Cable management.	1460
2018/08/22	14:10:56	45.91604	-129.98944	330	3.7	1525.6	The other marker is right next to the metal one but it is completely black.	1462
2018/08/22	14:11:33	45.91596	-129.98944	360	4.6	1524.7	Pulling off the site to start the long transit to the South Pillow Mound.	1465
2018/08/22	14:11:46	45.91596	-129.98943	13	4.4	1525.0	Can see many tubeworms living in the cracks below.	1466
2018/08/22	14:12:03	45.91598	-129.98939	10	4.6	1524.8	Smokey water here with the diffuse flow.	1468
2018/08/22	14:12:21	45.91604	-129.98936	14	6.5	1522.8	Asking ship to move as quickly as possible (1kt).	1469
2018/08/22	14:13:16	45.91631	-129.98920	13	12.4	1516.6	Out of bottom view.	1472
2018/08/22	18:20:24	45.86275	-130.00420	44	7.0	1712.0	Bottom in sight on approach to AX-105.	1531
2018/08/22	18:22:43	45.86304	-130.00388	30	2.7	1715.1	NAV: NAV Doppler Reset	1536
2018/08/22	18:23:47	45.86310	-130.00381	27	2.7	1715.2	AX-105 in sight.	1539
2018/08/22	18:28:27	45.86315	-130.00377	354	0.8	1717.0	<b>DEPLOY: Mini-BPR 13 deployed on seafloor by benchmark AX-105.</b>	1550
2018/08/22	18:28:27	45.86315	-130.00377	354	0.8	1717.0	HIGHLIGHTS: Mini-BPR 13 deployed on seafloor by benchmark AX-105. HIGHLIGHTS HD highlights start	1550
2018/08/22	18:28:39	45.86315	-130.00377	354	0.8	1717.1	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	1551
2018/08/22	18:29:34	45.86315	-130.00377	355	0.8	1717.1	HIGHLIGHTS: Placing MP HIGHLIGHTS HD highlights start	1554
2018/08/22	18:31:14	45.86315	-130.00377	355	0.8	1717.1	HIGHLIGHTS: MPR placed on benchmark AX-105. HIGHLIGHTS HD highlights stop	1558
2018/08/22	18:34:44	45.86315	-130.00377	355	0.8	1717.1	<b>PRESSURE: Begin pressure measurements at AX-105. PRESSURE Start</b>	1566

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1104 Logger Comment	Virtual Van
2018/08/22	18:54:57	45.86313	-130.00379	354	0.8	1717.1	<b>PRESSURE: PRESSURE End</b>	1612
2018/08/22	18:55:36	45.86313	-130.00379	354	0.8	1717.1	The MPR has been removed from benchmark AX-105.	1614
2018/08/22	18:56:09	45.86313	-130.00379	359	1.3	1716.5	We are leaving Mini-BPR #4 on the benchmark and mini-BPR #13 on the seafloor beside the benchmark.	1616
2018/08/22	18:56:23	45.86313	-130.00379	357	2.2	1715.8	Jason is off bottom.	1618
2018/08/22	18:57:31	45.86311	-130.00379	358	12.5	1705.9	The bottom is no longer in sight.	1621
2018/08/22	18:59:11	45.86306	-130.00378	358	18.6	1700.6	The MPR has been returned to and secured in the basket.	1625
2018/08/22	19:02:23	45.86316	-130.00378	357	18.2	1700.6	The starboard swing arm box has been secured and returned to the interior of the vehicle.	1633
2018/08/22	19:02:57	45.86322	-130.00378	358	18.0	1700.6	We have begun our transit to benchmark AX-104 (Bag City).	1635
2018/08/22	19:07:17	45.86155	-130.00427	183	74.9	1642.1	Transit: ~5961 m 11deg.	1644
2018/08/22	19:41:34	45.86959	-130.00212	198	163.6	1344.1	We are still in transit and are transiting in tow-mode high above the seafloor surface--the bottom is not in sight.	1714
2018/08/22	22:47:36	45.91613	-129.98911	206	6.3	1524.9	Bottom in sight.	2090
2018/08/22	22:48:12	45.91616	-129.98915	223	4.5	1525.5	Here we are at Bag City AX-104 for a second visit.	2092
2018/08/22	22:48:48	45.91618	-129.98929	262	4.4	1525.5	Still diffuse smoke from the venting with tubeworms in the cracks.	2094
2018/08/22	22:48:57	45.91619	-129.98934	261	4.9	1525.2	There is the benchmark.	2096
2018/08/22	22:49:27	45.91622	-129.98941	269	4.5	1525.4	NAV: NAV Doppler Reset	2098
2018/08/22	22:50:24	45.91622	-129.98941	267	4.6	1525.4	The "black" marker (65) is adjacent to the new marker at the benchmark.	2101
2018/08/22	22:50:42	45.91621	-129.98940	267	4.7	1525.3	Taking the bungee off the MPR.	2102
2018/08/22	22:51:20	45.91620	-129.98940	267	4.6	1525.3	Removing the MPR from the basket.	2104
2018/08/22	22:52:37	45.91615	-129.98944	333	2.3	1527.8	Coming around the front of the benchmark.	2108
2018/08/22	22:53:45	45.91616	-129.98943	335	1.1	1529.1	Placing the MPR on AX-104 benchmark. (Highlights have been on.)	2111
2018/08/22	22:54:53	45.91616	-129.98942	335	1.1	1529.1	Positioning the MPR on the landing zone.	2115
2018/08/22	22:55:51	45.91616	-129.98942	335	1.1	1529.1	Position looks good.	2117
2018/08/22	22:56:01	45.91616	-129.98942	335	1.1	1529.1	Checking with pilot cam.	2119
2018/08/22	22:56:24	45.91616	-129.98942	335	1.0	1529.1	<b>PRESSURE: AX-104 Bag City second measurement. PRESSURE Start</b>	2121
2018/08/22	22:56:53	45.91616	-129.98942	335	1.0	1529.1	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	2123

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1104 Logger Comment	Virtual Van
2018/08/22	23:17:31	45.91618	-129.98942	334	1.1	1529.1	<b>PRESSURE: AX-104 second measurement end. PRESSURE End</b>	2167
2018/08/22	23:17:58	45.91618	-129.98942	335	1.0	1529.1	Second time was actual end.	2169
2018/08/22	23:18:07	45.91618	-129.98942	335	1.0	1529.1	Removing MPR from benchmark.	2170
2018/08/22	23:18:46	45.91618	-129.98942	334	1.0	1529.1	Fixing up the cables on to the basket.	2172
2018/08/22	23:19:39	45.91616	-129.98944	302	3.1	1526.8	Coming off the bottom. Will prepare for launching of MBARI AUV.	2175
2018/08/22	23:20:24	45.91602	-129.98953	208	4.5	1525.6	Giving control of ship back to bridge for AUV launch.	2178
2018/08/22	23:22:24	45.91559	-129.99008	212	35.5	1495.1	Bringing Jason up to 1330m (200m off the bottom).	2183
2018/08/22	23:29:36	45.91617	-129.98935	213	199.9	1330.1	Jason will hold at this depth.	2198
2018/08/22	23:35:48	45.91624	-129.98925	60	93.1	1330.4	Waiting for AUV launch.	2211
2018/08/23	00:01:19	45.91664	-129.98900	70	198.4	1329.9	Ship will be moving .3kts ahead for the AUV launch.	2263
2018/08/23	00:02:50	45.91667	-129.98899	66	83.2	1329.9	AUV is off the deck.	2267
2018/08/23	00:05:42	45.91674	-129.98897	72	176.8	1329.9	AUV is in the water.	2274
2018/08/23	00:13:59	45.91695	-129.98889	93	111.0	1329.9	We are waiting here an hour for the AUV to descend.	2292
2018/08/23	03:59:41	45.91982	-129.98635	224	198.1	1329.7	Begin transit to AX-310.	2744
2018/08/23	04:54:02	45.92546	-129.97826	227	8.2	1518.9	Bottom in sight on approach to AX-310.	2854
2018/08/23	04:54:14	45.92545	-129.97827	229	8.4	1518.7	NAV: NAV Doppler Reset	2855
2018/08/23	04:55:15	45.92550	-129.97828	8	5.5	1522.1	NAV: NAV Doppler Reset	2858
2018/08/23	04:57:34	45.92578	-129.97789	291	2.9	1526.4	On site AX-310.	2864
2018/08/23	05:00:38	45.92581	-129.97787	289	1.1	1527.9	Brushing brittle stars off of MPR slot on AX-301.	2871
2018/08/23	05:04:27	45.92579	-129.97787	287	1.1	1528.0	HIGHLIGHTS: MPR placement on AX-310. HIGHLIGHTS HD highlights start	2880
2018/08/23	05:04:38	45.92579	-129.97787	287	1.1	1528.0	MPR out of cradle.	2881
2018/08/23	05:06:43	45.92579	-129.97788	288	1.1	1528.0	<b>PRESSURE: Start of pressure measurement at AX-310. PRESSURE Start</b>	2886
2018/08/23	05:06:59	45.92579	-129.97788	287	1.1	1528.0	HIGHLIGHTS: MPR recording started. HIGHLIGHTS HD highlights stop	2888
2018/08/23	05:29:45	45.92579	-129.97787	288	1.1	1528.0	<b>PRESSURE: End</b>	2934
2018/08/23	05:33:03	45.92579	-129.97786	292	3.3	1526.0	MPR in cradle.	2942
2018/08/23	05:33:15	45.92582	-129.97785	297	4.2	1525.1	Begin transit to AX-303.	2943
2018/08/23	05:55:14	45.92822	-129.97905	338	3.0	1518.0	Field of large pillow lavas.	2988

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1104 Logger Comment	Virtual Van
2018/08/23	06:22:03	45.93200	-129.98134	328	3.4	1513.1	Lava pillars on the way to AX-303.	3043
2018/08/23	06:27:39	45.93266	-129.98176	328	8.1	1511.4	NAV: NAV Doppler Reset	3055
2018/08/23	06:32:54	45.93337	-129.98219	354	2.3	1513.3	AX-303 in sight.	3067
2018/08/23	06:39:16	45.93340	-129.98217	179	0.8	1515.0	HIGHLIGHTS: Start of AX-303 MPR measurements. HIGHLIGHTS HD highlights start	3080
2018/08/23	06:41:01	45.93339	-129.98216	179	0.8	1515.0	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	3085
2018/08/23	06:41:43	45.93339	-129.98216	179	0.8	1515.0	<b>PRESSURE: Start MPR measurement at AX-303.</b> <b>PRESSURE Start</b>	3087
2018/08/23	07:01:37	45.93342	-129.98221	179	0.8	1515.0	<b>PRESSURE: PRESSURE End</b>	3128
2018/08/23	07:02:09	45.93342	-129.98221	179	0.8	1515.0	The MPR has been removed from the benchmark AX-303.	3130
2018/08/23	07:02:44	45.93343	-129.98221	180	1.4	1514.1	Jason is off bottom.	3134
2018/08/23	07:03:35	45.93347	-129.98220	179	4.7	1510.7	The MPR has been returned to and secured in the basket.	3137
2018/08/23	07:04:19	45.93348	-129.98220	180	4.6	1510.8	CORRECTION: The MPR has been returned to and secured in the basket NOW.	3139
2018/08/23	07:05:51	45.93335	-129.98219	180	11.4	1504.1	We have begun our transit to benchmark AX-309. We are transiting ~1 km at 56deg.	3143
2018/08/23	07:05:59	45.93332	-129.98219	180	13.1	1502.6	The bottom is no longer in sight.	3145
2018/08/23	08:00:24	45.93830	-129.97197	227	6.0	1517.2	Bottom in sight.	3255
2018/08/23	08:00:52	45.93833	-129.97198	294	7.3	1515.8	NAV: NAV Doppler Reset	3256
2018/08/23	08:01:53	45.93845	-129.97199	299	4.6	1518.4	Collapse structures abundant.	3260
2018/08/23	08:03:18	45.93849	-129.97204	241	3.9	1522.6	Benchmark AX-309 in sight.	3263
2018/08/23	08:03:26	45.93849	-129.97204	242	3.9	1522.6	HIGHLIGHTS: HIGHLIGHTS HD highlights start	3265
2018/08/23	08:03:58	45.93849	-129.97205	242	3.9	1522.7	The MPR has been removed from the basket.	3267
2018/08/23	08:05:50	45.93848	-129.97206	249	0.9	1526.2	Jason on bottom.	3271
2018/08/23	08:08:16	45.93848	-129.97206	249	0.9	1526.2	The MPR has been placed on the MPR platform (black rectangle) on benchmark AX-309. Matt is happy with the placement.	3277
2018/08/23	08:08:21	45.93848	-129.97206	249	0.9	1526.2	<b>PRESSURE: PRESSURE Start AX-309</b>	3278
2018/08/23	08:08:27	45.93848	-129.97206	249	1.2	1526.2	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	3280
2018/08/23	08:09:15	45.93848	-129.97206	249	1.1	1526.2	Jason location: Lat: 45.938450N Long: -129.972048W Depth: 1524.5 m.	3282
2018/08/23	08:28:25	45.93848	-129.97206	248	0.8	1526.1	<b>PRESSURE: PRESSURE End</b>	3322
2018/08/23	08:29:01	45.93848	-129.97206	248	1.1	1526.0	The MPR has been removed from the benchmark.	3324

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1104 Logger Comment	Virtual Van
2018/08/23	08:29:08	45.93848	-129.97206	249	0.9	1525.4	Jason is off bottom.	3325
2018/08/23	08:30:46	45.93848	-129.97206	249	9.2	1517.1	The bottom is no longer in sight.	3329
2018/08/23	08:31:43	45.93847	-129.97210	248	11.3	1515.0	The MPR has been returned to and secured in the basket.	3332
2018/08/23	08:31:53	45.93847	-129.97210	248	11.3	1515.1	We are beginning our transit to benchmark AX-302.	3334
2018/08/23	08:32:38	45.93843	-129.97202	142	10.6	1515.4	Transit is ~1260 m at 316 deg.	3336
2018/08/23	09:38:00	45.94633	-129.98374	142	9.6	1509.0	Bottom in sight.	3468
2018/08/23	09:38:08	45.94634	-129.98375	142	9.6	1509.0	NAV: NAV Doppler Reset	3469
2018/08/23	09:39:00	45.94637	-129.98381	8	4.0	1514.3	Benchmark AX302 in sight.	3472
2018/08/23	09:41:36	45.94641	-129.98379	237	3.3	1515.8	HIGHLIGHTS: HIGHLIGHTS HD highlights start	3478
2018/08/23	09:42:08	45.94641	-129.98379	241	3.2	1515.8	The MPR was removed from the basket.	3480
2018/08/23	09:43:10	45.94641	-129.98380	244	0.8	1518.2	VEHICLE: VEHICLE on bottom	3483
2018/08/23	09:46:08	45.94640	-129.98379	244	0.8	1518.2	The MPR was placed on the benchmark AX-302.	3490
2018/08/23	09:46:58	45.94640	-129.98379	244	0.8	1518.2	<b>PRESSURE: PRESSURE Start AX-302</b>	3493
2018/08/23	09:47:08	45.94640	-129.98379	244	0.8	1518.2	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	3494
2018/08/23	09:50:12	45.94640	-129.98378	244	0.8	1518.1	There appears to be warm or hot water in the area because the water appears to be shimmering in areas.	3501
2018/08/23	09:50:22	45.94640	-129.98378	244	0.8	1518.1	HIGHLIGHTS: HIGHLIGHTS HD highlights start	3502
2018/08/23	09:51:25	45.94641	-129.98378	244	0.8	1518.1	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	3506
2018/08/23	10:06:49	45.94641	-129.98379	244	0.8	1518.0	<b>PRESSURE: PRESSURE End</b>	3537
2018/08/23	10:07:53	45.94640	-129.98379	244	0.8	1518.0	The MPR was recovered from the benchmark and stowed in the basket.	3541
2018/08/23	10:10:29	45.94640	-129.98380	245	0.8	1518.0	The starboard biobox has been opened in preparation for storing mini-BPR #5.	3547
2018/08/23	10:10:49	45.94640	-129.98380	245	0.8	1518.0	<b>RECOVER: Mini-BPR #5 has been removed from benchmark AX-302.</b>	3548
2018/08/23	10:11:14	45.94640	-129.98380	245	0.8	1518.0	Mini-BPR #5 has been placed in the starboard biobox.	3550
2018/08/23	10:12:48	45.94641	-129.98380	245	0.8	1518.0	<b>DEPLOY: Mini-BPR #12 has been removed from the seafloor and is being placed on benchmark AX-302.</b>	3554
2018/08/23	10:13:23	45.94641	-129.98380	245	0.8	1518.0	Matt is happy with the placement of mini-BPR #12.	3557
2018/08/23	10:14:09	45.94641	-129.98380	245	0.8	1518.0	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	3559
2018/08/23	10:15:05	45.94641	-129.98380	245	0.8	1518.0	The starboard biobox has been closed and stored in the interior of the vehicle.	3562

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1104 Logger Comment	Virtual Van
2018/08/23	10:16:24	45.94642	-129.98380	243	1.4	1517.3	Jason is off bottom.	3566
2018/08/23	10:17:42	45.94641	-129.98380	242	10.5	1508.3	The bottom is out of sight.	3569
2018/08/23	10:18:05	45.94640	-129.98381	243	10.8	1507.9	The MPR has been secured in the basket.	3571
2018/08/23	10:18:25	45.94640	-129.98381	243	10.9	1507.9	We are beginning our transit to benchmark AX-101.	3573
2018/08/23	10:19:27	45.94638	-129.98382	243	10.6	1508.1	The transit to AX-101 is ~2200 m at 295 deg.	3576
2018/08/23	11:50:18	45.95429	-130.00823	130	56.9	1471.5	Descending in preparation for a MPR measurement at AX-101.	3758
2018/08/23	11:58:19	45.95521	-130.00964	140	44.4	1485.2	Waited for Medea to catch up and now heading down to seafloor.	3775
2018/08/23	11:59:47	45.95528	-130.00967	142	7.3	1522.6	There is the bottom.	3779
2018/08/23	12:03:01	45.95523	-130.00986	258	4.0	1525.7	Murky water this visit.	3787
2018/08/23	12:03:13	45.95522	-130.00987	256	4.0	1525.6	There is the benchmark.	3788
2018/08/23	12:03:32	45.95521	-130.00987	253	4.1	1525.6	NAV: NAV Doppler Reset	3790
2018/08/23	12:04:19	45.95521	-130.00991	255	3.6	1526.1	Tephra bucket and benchmark. Markers to either side but the marker at the benchmark is not all that visible.	3792
2018/08/23	12:05:04	45.95521	-130.00994	238	1.2	1528.8	Approaching the benchmark.	3795
2018/08/23	12:05:42	45.95520	-130.00992	239	1.1	1528.8	Couple of brittle stars occupying the landing zone.	3797
2018/08/23	12:06:29	45.95520	-130.00991	237	0.9	1528.9	Nudibranch.	3800
2018/08/23	12:07:02	45.95520	-130.00991	236	0.8	1529.0	HIGHLIGHTS: AX-101 Second visit. HIGHLIGHTS HD highlights start	3802
2018/08/23	12:07:13	45.95520	-130.00991	237	0.9	1529.0	Taking bungee off.	3803
2018/08/23	12:07:52	45.95520	-130.00991	236	0.9	1529.0	Bungee got overstretched and slid off the basket.	3805
2018/08/23	12:08:11	45.95520	-130.00991	237	0.9	1529.0	Retrieving the MPR off the basket.	3807
2018/08/23	12:08:30	45.95520	-130.00991	237	0.9	1528.9	Placing MPR on AX-101 benchmark.	3809
2018/08/23	12:09:07	45.95520	-130.00991	237	0.9	1528.9	Placement looks good.	3811
2018/08/23	12:09:34	45.95520	-130.00991	236	0.9	1528.9	<b>PRESSURE: AX-101 second measurement. PRESSURE Start</b>	3813
2018/08/23	12:09:42	45.95520	-130.00991	236	0.9	1528.9	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	3814
2018/08/23	12:10:04	45.95520	-130.00991	236	0.9	1529.0	Second measurement at AX-101 at Caldera Center.	3816
2018/08/23	12:16:56	45.95520	-130.00991	236	0.8	1528.9	Tilt is off so need to reposition the MPR on the landing pad.	3831
2018/08/23	12:17:41	45.95520	-130.00991	236	0.9	1528.9	Nudging the MPR and looks like it settled but tilt didn't change.	3833
2018/08/23	12:18:43	45.95520	-130.00991	236	0.8	1528.9	Giving it a nudge from behind to move it towards Jason.	3836
2018/08/23	12:19:09	45.95520	-130.00991	236	0.8	1529.0	That didn't work either so will lift it up completely and reposition.	3838

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1104 Logger Comment	Virtual Van
2018/08/23	12:20:02	45.95520	-130.00991	236	0.8	1528.9	The brittle star was still trying to hang on and it didn't look too good. It is still moving.	3841
2018/08/23	12:20:20	45.95520	-130.00991	236	0.8	1528.9	Placing MPR back on landing pad.	3842
2018/08/23	12:21:07	45.95520	-130.00991	236	0.8	1528.9	Popped back down and the tilt is still the same. Maybe last measurement was off.	3845
2018/08/23	12:27:25	45.95520	-130.00991	237	0.9	1528.9	Fish.	3859
2018/08/23	12:37:14	45.95520	-130.00991	236	0.8	1528.9	Fish.	3879
2018/08/23	12:38:15	45.95520	-130.00991	236	0.8	1528.9	Biology.	3882
2018/08/23	12:38:41	45.95520	-130.00991	236	0.8	1528.9	Two more minutes of measurements.	3884
2018/08/23	12:41:19	45.95520	-130.00991	236	0.8	1528.9	<b>PRESSURE: AX-101 second measurement finished. PRESSURE End</b>	3890
2018/08/23	12:41:35	45.95520	-130.00991	236	0.8	1528.9	Retrieving the MPR from the benchmark.	3892
2018/08/23	12:42:06	45.95520	-130.00991	236	0.8	1528.9	Placing MPR on the cradle in the basket.	3894
2018/08/23	12:42:36	45.95520	-130.00991	237	0.9	1528.9	Going to deploy a marker here so it is more visible.	3896
2018/08/23	12:43:35	45.95520	-130.00991	237	0.8	1528.9	Deploying marker. Mkr-243 is going to the right of the benchmark landing.	3899
2018/08/23	12:43:49	45.95520	-130.00991	237	0.8	1528.9	<b>DEPLOY: Mkr-243. DEPLOY marker Mkr-243 at AX-101.</b>	3900
2018/08/23	12:46:38	45.95520	-130.00991	236	2.4	1527.4	Saw old BPR anchor.	3907
2018/08/23	12:47:12	45.95520	-130.00990	237	2.4	1527.4	Switching Jason's DVL to another source.	3909
2018/08/23	12:48:04	45.95519	-130.00987	210	2.3	1527.3	NAV: NAV Doppler Reset	3912
2018/08/23	12:48:21	45.95522	-130.00988	255	2.2	1527.7	Good view of the markers and benchmark.	3913
2018/08/23	12:48:40	45.95520	-130.00989	224	2.2	1527.3	Tephra bucket is on one side and marker is on the other side of the benchmark.	3915
2018/08/23	12:48:52	45.95519	-130.00986	200	3.1	1526.3	There is the other marker behind.	3916
2018/08/23	12:49:42	45.95513	-130.00966	133	2.8	1526.9	Going to take a look at the SCPRA on the OOI cable to the SW.	3919
2018/08/23	12:50:02	45.95510	-130.00957	130	2.7	1526.8	Only 45 meters away from here.	3921
2018/08/23	12:50:22	45.95507	-130.00951	130	4.2	1526.9	Lots of sediment covering the lavas.	3922
2018/08/23	12:50:55	45.95500	-130.00938	146	5.4	1525.4	Ropey lava on an inflated lobe.	3925
2018/08/23	12:51:00	45.95499	-130.00938	158	4.3	1524.9	There is the instrument.	3926
2018/08/23	12:51:18	45.95494	-130.00932	153	3.4	1523.9	Getting a good view of the cable an instrument.	3927
2018/08/23	12:51:37	45.95491	-130.00928	154	2.4	1523.9	SCPRAA301 is located on a nice flat piece of lava.	3929
2018/08/23	12:52:02	45.95490	-130.00927	153	2.4	1523.8	Very nice view of the instrument SCPRAA301.	3931

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1104 Logger Comment	Virtual Van
2018/08/23	12:52:52	45.95491	-130.00926	154	2.7	1523.7	HIGHLIGHTS: HIGHLIGHTS HD highlights start	3933
2018/08/23	12:53:21	45.95491	-130.00925	154	2.8	1523.8	AUV is in range and should pass in 5 minutes. Jason will stay on the bottom.	3935
2018/08/23	12:54:26	45.95491	-130.00926	154	2.8	1523.8	AUV will pass by with about 100m to spare. Medea is at 32m to be below the AUV passing.	3939
2018/08/23	13:04:54	45.95490	-130.00925	154	2.9	1523.7	AUV took a turn at the center position so we're ready to head to next benchmark.	3961
2018/08/23	13:06:07	45.95490	-130.00924	154	2.9	1523.7	Next benchmark will be AX-307 at 1071 meters away due south.	3964
2018/08/23	13:09:26	45.95502	-130.00922	358	3.3	1523.7	Coming off the bottom to head to the next benchmark.	3972
2018/08/23	13:11:07	45.95554	-130.00922	357	5.7	1524.7	Transit will take about one hour.	3976
2018/08/23	14:20:46	45.94533	-130.00911	167	0.8	1541.3	At AX-107.	4116
2018/08/23	14:20:59	45.94533	-130.00911	167	0.8	1541.3	The MPR cable is caught on something in the basket.	4118
2018/08/23	14:21:56	45.94533	-130.00911	167	0.8	1541.3	A doppler reset had already been done.	4121
2018/08/23	14:22:25	45.94533	-130.00911	166	0.8	1541.3	Placing MPR on the benchmark	4123
2018/08/23	14:23:13	45.94533	-130.00911	166	0.8	1541.3	This is Magnesia West AX-307.	4125
2018/08/23	14:23:30	45.94533	-130.00911	166	0.8	1541.3	Correction earlier not AX-107-it is AX-307.	4127
2018/08/23	14:23:46	45.94533	-130.00911	166	0.8	1541.3	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	4128
2018/08/23	14:24:03	45.94533	-130.00911	166	0.8	1541.3	Marker Mkr-127 is at AX-307.	4130
2018/08/23	14:24:20	45.94533	-130.00911	166	0.8	1541.3	<b>PRESSURE: AX-307 second MPR measurement. PRESSURE Start</b>	4131
2018/08/23	14:26:40	45.94533	-130.00911	166	0.8	1541.3	Tilt looks good during measurement.	4138
2018/08/23	14:27:13	45.94533	-130.00911	166	0.8	1541.4	Nice view of the mini BPR and MPR on the benchmark.	4140
2018/08/23	14:27:52	45.94533	-130.00911	166	0.8	1541.4	Urchin tentacles are not combed over this time.	4142
2018/08/23	14:28:54	45.94533	-130.00911	166	0.8	1541.4	Another urchin and abundant brittle stars.	4146
2018/08/23	14:29:05	45.94533	-130.00911	166	0.8	1541.4	Less current than first measurement.	4147
2018/08/23	14:29:55	45.94533	-130.00911	166	0.8	1541.4	Nice picture of the urchin and brittle stars.	4150
2018/08/23	14:30:26	45.94533	-130.00911	166	0.8	1541.4	Sea cucumber.	4152
2018/08/23	14:32:03	45.94534	-130.00911	166	0.8	1541.4	Shrimp.	4156
2018/08/23	14:32:49	45.94534	-130.00911	166	0.8	1541.4	Side view of shrimp.	4158
2018/08/23	14:33:41	45.94535	-130.00911	166	0.8	1541.4	Shrimp startled when touched the ROV arm.	4161
2018/08/23	14:35:02	45.94535	-130.00911	166	0.8	1541.4	More views of the shrimp.	4165

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1104 Logger Comment	Virtual Van
2018/08/23	14:42:19	45.94536	-130.00911	166	0.8	1541.4	Incoming fish.	4180
2018/08/23	14:44:06	45.94532	-130.00912	166	0.8	1541.5	<b>PRESSURE: Second measurement at AX-307. PRESSURE End</b>	4185
2018/08/23	14:47:25	45.94529	-130.00908	357	8.1	1534.2	MPR secure for transit to AX-106.	4193
2018/08/23	16:04:55	45.93448	-130.01155	9	2.0	1539.3	AX-106 in sight.	4349
2018/08/23	16:07:19	45.93442	-130.01155	70	0.8	1540.1	On bottom at AX-106.	4354
2018/08/23	16:07:58	45.93441	-130.01156	70	0.8	1540.2	Brushing brittle stars off of MPR slot.	4357
2018/08/23	16:09:02	45.93441	-130.01157	69	0.8	1540.2	HIGHLIGHTS: Start of MPR recording at AX-106. HIGHLIGHTS HD highlights start	4360
2018/08/23	16:09:37	45.93441	-130.01157	68	0.8	1540.2	MPR out of cradle for deployment on AX-106.	4362
2018/08/23	16:11:43	45.93442	-130.01156	69	0.9	1540.2	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	4367
2018/08/23	16:11:59	45.93443	-130.01156	69	0.8	1540.2	<b>PRESSURE: MPR recording at AX-106. PRESSURE Start</b>	4369
2018/08/23	16:31:23	45.93442	-130.01157	69	0.8	1540.3	<b>PRESSURE: End pressure measurement AX-106. PRESSURE End</b>	4408
2018/08/23	16:34:46	45.93443	-130.01158	69	0.8	1540.4	MPR secured in cradle and basket in for transit to AX-308.	4416
2018/08/23	16:35:29	45.93441	-130.01159	95	3.8	1537.6	Begin transit to AX-308.	4419
2018/08/23	17:32:50	45.93157	-129.99897	71	3.2	1528.2	NAV: NAV Doppler Reset	4534
2018/08/23	17:33:17	45.93157	-129.99888	83	2.8	1528.2	AX-308 in sight.	4536
2018/08/23	17:35:05	45.93157	-129.99872	271	1.8	1529.3	On site AX-308.	4541
2018/08/23	17:37:51	45.93158	-129.99870	272	0.9	1530.2	HIGHLIGHTS: Start of pressure measurement AX-308. HIGHLIGHTS HD highlights start	4547
2018/08/23	17:38:06	45.93158	-129.99870	272	0.9	1530.2	MPR out of cradle for placement on benchmark.	4549
2018/08/23	17:40:12	45.93158	-129.99870	273	0.9	1530.2	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	4554
2018/08/23	17:41:06	45.93158	-129.99870	272	0.9	1530.2	<b>PRESSURE: Pressure measurement AX-308. PRESSURE Start</b>	4557
2018/08/23	18:01:19	45.93160	-129.99881	272	0.9	1530.2	<b>PRESSURE: End of measurements at AX-308 PRESSURE End'</b>	4598
2018/08/23	18:01:43	45.93159	-129.99878	272	0.9	1530.3	MPR secure in cradle.	4600
2018/08/23	18:02:43	45.93153	-129.99857	272	4.8	1526.5	Off bottom and positioning for MBARI AUV drive by.	4603
2018/08/23	18:29:35	45.93273	-130.00341	93	188.7	1351.0	MBARI AUV drive by.	4658
2018/08/23	19:06:45	45.93435	-130.01155	354	9.9	1531.4	Bottom hardly in sight. Benchmark flag in sight.	4733
2018/08/23	19:06:50	45.93434	-130.01156	354	10.4	1531.0	NAV: NAV Doppler Reset	4734
2018/08/23	19:08:26	45.93445	-130.01160	66	1.3	1540.7	Jason is on bottom.	4739

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1104 Logger Comment	Virtual Van
2018/08/23	19:12:30	45.93445	-130.01161	66	0.8	1541.1	A brittle star is on the MPR platform. We are attempting to remove it prior to the measurement.	4748
2018/08/23	19:12:45	45.93445	-130.01161	66	0.8	1541.1	The brittle star has been removed.	4749
2018/08/23	19:14:13	45.93445	-130.01161	66	0.8	1541.1	The MPR is now on the platform. Matt is happy with the placement.	4753
2018/08/23	19:14:44	45.93445	-130.01161	67	0.8	1541.1	<b>PRESSURE: PRESSURE Start AX-106.</b>	4755
2018/08/23	19:15:05	45.93445	-130.01161	67	0.8	1541.1	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	4757
2018/08/23	19:34:46	45.93445	-130.01161	67	0.8	1541.2	<b>PRESSURE: PRESSURE End</b>	4797
2018/08/23	19:35:19	45.93445	-130.01161	66	0.8	1541.2	The MPR has been removed from benchmark AX-106.	4799
2018/08/23	19:37:00	45.93446	-130.01161	66	1.0	1541.2	The MPR has been returned to the basket.	4804
2018/08/23	19:37:46	45.93446	-130.01162	66	0.8	1541.0	Jason is off bottom. We are beginning our transit to the Virgin Vent.	4806
2018/08/23	19:38:22	45.93445	-130.01165	9	3.0	1539.2	We are transiting along bottom 150 m at 236 deg.	4808
2018/08/23	19:39:48	45.93445	-130.01180	244	2.9	1539.2	Transiting over moderately sedimented lobate sheet-flows.	4812
2018/08/23	19:41:47	45.93440	-130.01183	239	5.6	1536.5	Morphology of sea-floor crust is transitioning on small spatial scales from lobate sheet-flow to pillow mounds.	4817
2018/08/23	19:44:53	45.93405	-130.01231	238	3.0	1539.0	Ropy texture to seafloor morphology.	4824
2018/08/23	19:45:29	45.93398	-130.01236	235	1.6	1539.8	We are transitioning between two interesting seafloor morphologies--ropy flow to smooth sheet flow.	4827
2018/08/23	19:48:48	45.93398	-130.01237	236	2.3	1539.8	Highly dissected seafloor crust.	4834
2018/08/23	19:50:03	45.93398	-130.01237	223	1.6	1540.0	Octopus!	4839
2018/08/23	19:50:12	45.93398	-130.01237	208	1.6	1539.9	HIGHLIGHTS: HIGHLIGHTS HD highlights start	4840
2018/08/23	19:52:37	45.93398	-130.01237	174	2.4	1539.3	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	4846
2018/08/23	19:53:09	45.93398	-130.01237	192	2.7	1538.9	We are continuing our transit to the Virgin Vent.	4848
2018/08/23	19:53:27	45.93398	-130.01237	192	2.7	1538.8	Transitioning atop the OOI cable.	4850
2018/08/23	19:54:06	45.93398	-130.01237	220	3.7	1537.8	The morphology of seafloor crust in this region is highly fractured ropey lava flows.	4852
2018/08/23	19:54:26	45.93398	-130.01237	236	4.1	1537.7	NAV: NAV Doppler Reset	4854
2018/08/23	19:56:40	45.93365	-130.01292	261	2.1	1539.3	The seafloor is more sedimented in this region presumably with weathered hydrothermal materials.	4859
2018/08/23	19:57:38	45.93363	-130.01308	271	3.1	1538.5	The donut from the old APL is within sight.	4862
2018/08/23	19:58:16	45.93362	-130.01317	281	3.5	1537.8	We have arrived at the Virgin Vent.	4864

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1104 Logger Comment	Virtual Van
2018/08/23	20:00:19	45.93370	-130.01323	170	4.0	1537.8	We plan to collect a temperature measurement; 1 gastight; and 1 major sample here.	4869
2018/08/23	20:01:06	45.93370	-130.01323	170	4.1	1537.7	The temperature probe has been removed from the basket.	4872
2018/08/23	20:02:43	45.93369	-130.01323	173	1.6	1540.1	HIGHLIGHTS: HIGHLIGHTS HD highlights start	4876
2018/08/23	20:02:59	45.93369	-130.01323	172	1.0	1540.7	Jason is on bottom in prep for taking temperature measurements and collecting fluid samples.	4878
2018/08/23	20:06:04	45.93366	-130.01324	172	1.0	1540.7	We are deconstructing the anhydrite chimney in prep for measurement and sampling.	4885
2018/08/23	20:06:51	45.93366	-130.01324	172	1.0	1540.7	Jason is now collecting temperature measurements of the Virgin Vent.	4887
2018/08/23	20:07:48	45.93366	-130.01323	173	1.0	1540.7	HIGHLIGHTS: HIGHLIGHTS HD highlights start	4890
2018/08/23	20:08:59	45.93366	-130.01324	173	1.0	1540.7	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	4894
2018/08/23	20:10:55	45.93368	-130.01328	173	1.0	1540.7	Maximum Temperature Reading: 245.5 degC.	4899
2018/08/23	20:11:04	45.93368	-130.01328	173	1.0	1540.7	The temperature probe has been removed from the vent.	4900
2018/08/23	20:11:58	45.93368	-130.01328	173	1.0	1540.7	We are attempting to remove the anhydrite vent from the area. HOBO # MISO-020 is stuck in the anhydrite chimney.	4903
2018/08/23	20:13:29	45.93368	-130.01328	156	1.7	1540.0	We are moving JASON closer to the vent to help with deconstruction of the anhydrite chimney and removal of the HOBO.	4907
2018/08/23	20:14:06	45.93368	-130.01328	150	0.8	1540.7	Jason is on bottom again.	4909
2018/08/23	20:14:28	45.93368	-130.01328	150	0.8	1540.7	We are removing the HOBO from the anhydrite chimney and will re-deploy into the vent following fluid sampling.	4911
2018/08/23	20:14:53	45.93368	-130.01328	150	0.8	1540.7	The HOBO has been removed from the anhydrite chimney.	4912
2018/08/23	20:15:05	45.93368	-130.01328	150	0.8	1540.7	A large block of anhydrite has covered the vent opening.	4914
2018/08/23	20:15:29	45.93368	-130.01328	149	0.8	1540.7	The HOBO has been placed on the seafloor. We will re-deploy into the vent following fluid sampling.	4916
2018/08/23	20:15:45	45.93368	-130.01328	149	0.8	1540.7	JASON is removing blocks of anhydrite from the area immediately surrounding the vent opening.	4917
2018/08/23	20:16:15	45.93368	-130.01328	150	0.8	1540.7	The large block of anhydrite blocking the vent opening has been removed.	4919
2018/08/23	20:17:21	45.93368	-130.01328	149	0.8	1540.7	HIGHLIGHTS: HIGHLIGHTS HD highlights start	4922
2018/08/23	20:18:12	45.93368	-130.01328	149	0.8	1540.7	We are preparing to take a major fluid sample using the red (22) sampler.	4925
2018/08/23	20:19:12	45.93368	-130.01328	149	0.8	1540.7	JASON has removed the red (22) major sampler from the basket.	4928

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1104 Logger Comment	Virtual Van
2018/08/23	20:19:49	45.93368	-130.01328	149	0.8	1540.7	The ram on the fluid sampler is too long to be used with Jason's starboard arm.	4930
2018/08/23	20:20:06	45.93368	-130.01328	149	0.8	1540.7	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	4932
2018/08/23	20:20:15	45.93368	-130.01328	149	0.8	1540.7	We have decided to attempt using another major sampler.	4933
2018/08/23	20:20:42	45.93368	-130.01328	149	0.8	1540.7	The red (22) major sampler has been returned to the starboard side forward basket.	4935
2018/08/23	20:22:03	45.93368	-130.01328	149	0.8	1540.7	We are going to attempt to use the white (6c) major sampler on the vixen vent.	4939
2018/08/23	20:22:41	45.93368	-130.01328	149	0.8	1540.7	Jason has removed the white (6c) major sampler from the starboard side forward basket.	4941
2018/08/23	20:22:46	45.93368	-130.01328	149	0.8	1540.7	HIGHLIGHTS: HIGHLIGHTS HD highlights start	4942
2018/08/23	20:23:18	45.93368	-130.01328	150	0.8	1540.7	There appear to be no issues with the white (6c) major fluid sampler.	4944
2018/08/23	20:24:32	45.93368	-130.01328	149	0.8	1540.7	<b>SAMPLE: Sample Major J1104-Major-01 at Virgin Vent.</b>	4948
2018/08/23	20:26:36	45.93368	-130.01328	150	0.8	1540.7	J1104-Major-01; White major bottle 6C;	4953
2018/08/23	20:27:01	45.93368	-130.01328	149	0.8	1540.7	The white major bottle has been returned to the starboard side forward crate.	4955
2018/08/23	20:27:11	45.93368	-130.01328	149	0.8	1540.7	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	4956
2018/08/23	20:27:22	45.93368	-130.01328	149	0.8	1540.7	The tail had good flow and Kevin feels good about the measurement	4957
2018/08/23	20:27:37	45.93368	-130.01328	149	0.8	1540.7	Tmax for sample J1104-Major-01 was 245.0degC.	4959
2018/08/23	20:28:43	45.93368	-130.01328	149	0.8	1540.7	Jason has removed the green gastight bottle (GT-2) from the port-side forward crate.	4962
2018/08/23	20:31:21	45.93368	-130.01328	149	0.8	1540.6	<b>SAMPLE: J1104-GTB-02 Sample GTB</b>	4968
2018/08/23	20:31:31	45.93368	-130.01328	149	0.8	1540.6	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	4970
2018/08/23	20:32:04	45.93368	-130.01328	148	0.8	1540.7	J1104-GTB-02: When triggered the GTB shifted forward slightly. Bill still feels confident in the measurement.	4972
2018/08/23	20:33:21	45.93368	-130.01328	147	0.8	1540.7	The green GTB has been returned to the port-side forward crate.	4975
2018/08/23	20:34:29	45.93368	-130.01328	149	0.8	1540.6	HOBO # MISO-020 has been returned to the vent.	4979
2018/08/23	20:35:50	45.93369	-130.01327	148	0.8	1540.7	The Green GTB (02) has been secured in the port-side forward basket.	4982
2018/08/23	20:36:14	45.93369	-130.01327	149	0.8	1540.7	There is a slight offset of <5m between the Virgin Vent target and our current location.	4984

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1104 Logger Comment	Virtual Van
2018/08/23	20:37:08	45.93369	-130.01327	149	0.8	1540.6	We are attempting to change the orientation of the HOBO such that the electronics are not directly in the flow.	4987
2018/08/23	20:38:59	45.93369	-130.01327	149	0.8	1540.6	The probe itself is straight and changing the orientation without damaging the instrument is not possible.	4992
2018/08/23	20:39:28	45.93369	-130.01327	149	0.8	1540.6	We are leaving the probe in the vent at the current orientation.	4994
2018/08/23	20:40:22	45.93369	-130.01327	149	1.5	1539.9	JASON is off bottom and we are beginning our transit to the Inferno Vent.	4996
2018/08/23	20:42:55	45.93371	-130.01330	149	2.3	1539.4	JASON is attempting to move the MPR wires onto the basket and out of the way of hydrothermal fluids at subsequent vents.	5003
2018/08/23	20:44:24	45.93367	-130.01332	181	1.3	1539.6	We are transiting along the bottom to the Inferno Vent.	5007
2018/08/23	20:45:10	45.93362	-130.01340	244	2.6	1538.7	Currently we were passing marker #121 and the Covis camera.	5009
2018/08/23	20:45:38	45.93365	-130.01345	284	2.9	1538.4	We are now passing the Mushroom vent.	5011
2018/08/23	20:46:06	45.93369	-130.01354	280	3.0	1538.5	We are crossing over an OOI cable.	5013
2018/08/23	20:47:14	45.93369	-130.01360	231	3.1	1538.3	The Inferno Vent in sight on the Pilot's camera.	5018
2018/08/23	20:48:48	45.93369	-130.01358	209	3.0	1538.2	Medea is transiting over so that Jason is able to continue transit to the Inferno Vent.	5024
2018/08/23	20:50:35	45.93366	-130.01363	208	3.5	1538.1	Inferno is now in sight.	5029
2018/08/23	20:52:37	45.93371	-130.01366	208	3.3	1538.3	We are waiting for Medea.	5034
2018/08/23	20:55:40	45.93372	-130.01370	273	4.0	1538.2	The OOI BOTPT instrument junction box and additional cable is in sight.	5041
2018/08/23	20:56:31	45.93376	-130.01381	275	3.9	1538.2	A cabled OOI hydrophone and connection point is now in view.	5044
2018/08/23	21:00:02	45.93370	-130.01401	136	3.1	1538.8	Something is wrong with the video logging station--Tina's on it.	5052
2018/08/23	21:01:11	45.93362	-130.01389	125	2.4	1539.4	We're taking a good look at the OOI's BOTPT Instrument. Video logging is still down.	5055
2018/08/23	21:02:03	45.93360	-130.01386	112	6.2	1535.5	We are continuing our transit to the Inferno vent. Inferno is in sight.	5058
2018/08/23	21:02:32	45.93358	-130.01381	112	3.9	1538.1	We have arrived on station at the Inferno Vent.	5060
2018/08/23	21:04:08	45.93356	-130.01380	111	3.8	1538.3	We are preparing to collect a temperature measurement; 1 major; and 1 gastight sample.	5064
2018/08/23	21:04:26	45.93356	-130.01380	110	3.8	1538.3	We have added manual highlights to capture the vent. Video logging is still down.	5066
2018/08/23	21:06:25	45.93354	-130.01381	161	5.1	1537.1	There appear to be three active black smokers atop the Inferno vent and a few large anhydrite chimneys.	5071
2018/08/23	21:06:39	45.93354	-130.01380	159	5.1	1537.1	Manual highlight END.	5072

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1104 Logger Comment	Virtual Van
2018/08/23	21:06:51	45.93353	-130.01377	125	5.2	1537.0	Video logging station is still down.	5073
2018/08/23	21:07:13	45.93352	-130.01373	110	4.9	1537.1	We are attempting to locate an ideal chimney for sampling at the Inferno Vent.	5075
2018/08/23	21:09:19	45.93357	-130.01372	222	3.9	1538.1	HIGHLIGHTS: HIGHLIGHTS HD highlights start	5080
2018/08/23	21:10:04	45.93357	-130.01371	222	3.9	1538.1	Video Logging station is back online.	5083
2018/08/23	21:10:36	45.93357	-130.01370	222	3.9	1538.1	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	5085
2018/08/23	21:12:04	45.93358	-130.01371	222	3.9	1538.1	Kevin has identified a target chimney and we are attempting to land close by.	5089
2018/08/23	21:13:37	45.93358	-130.01372	222	3.9	1538.1	HIGHLIGHTS: HIGHLIGHTS HD highlights start	5093
2018/08/23	21:13:48	45.93358	-130.01372	222	3.9	1538.1	The MPR has been removed from the cradle. We are rotating it to get the cable out of the way of the vent.	5094
2018/08/23	21:15:53	45.93358	-130.01373	222	4.0	1538.1	The MPR has been returned to and secured in the cradle.	5099
2018/08/23	21:17:01	45.93357	-130.01374	222	3.9	1538.1	The temperature probe has been removed from the basket.	5103
2018/08/23	21:17:10	45.93357	-130.01374	223	3.9	1538.1	HIGHLIGHTS: HIGHLIGHTS HD highlights start	5104
2018/08/23	21:17:42	45.93357	-130.01374	233	3.9	1538.2	Tina has replaced the hard drive and we now have a fresh 1 TB hard drive worth of data.	5106
2018/08/23	21:21:52	45.93356	-130.01372	236	2.8	1539.1	The temperature probe has been inserted into a black smoker chimney.	5115
2018/08/23	21:22:17	45.93356	-130.01373	236	2.8	1539.1	The temperature probe slipped out of the vent.	5117
2018/08/23	21:22:47	45.93357	-130.01373	237	2.8	1539.1	Jason has reinserted the temperature probe into the chimney.	5119
2018/08/23	21:24:00	45.93357	-130.01373	237	2.8	1539.1	The temperature probe is not fully inserted into the chimney. We are going to try again.	5123
2018/08/23	21:24:37	45.93357	-130.01373	238	2.7	1539.1	The placement of the temperature probe is much better now.	5125
2018/08/23	21:26:19	45.93357	-130.01373	238	2.7	1539.1	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	5129
2018/08/23	21:26:32	45.93357	-130.01373	238	2.7	1539.1	Maximum Temperature: 278.0degC.	5131
2018/08/23	21:26:58	45.93357	-130.01373	238	2.7	1539.1	Previous year's temperature was 305 degC. We are going to attempt a higher vent for an additional temperature probe measurement and for fluid sampling.	5133
2018/08/23	21:29:28	45.93357	-130.01373	255	4.0	1537.9	We are attempting to find a more ideal chimney to sample.	5139
2018/08/23	21:30:19	45.93357	-130.01373	255	4.0	1537.9	Kevin and Bill have identified a new target chimney and we are attempting to insert the temperature probe.	5141
2018/08/23	21:31:48	45.93356	-130.01373	254	4.0	1537.9	We had to remove the edifice of the chimney. The vent site is very small but the probe is within the flow	5145

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1104 Logger Comment	Virtual Van
2018/08/23	21:32:08	45.93356	-130.01373	254	4.0	1537.9	Max Temp: 250 degC.	5147
2018/08/23	21:32:21	45.93356	-130.01373	254	4.0	1537.9	We are attempting to identify a new chimney to sample from.	5148
2018/08/23	21:32:57	45.93356	-130.01373	255	4.0	1537.9	We removed a large black smoker chimney at the top of the Inferno vent to sample.	5151
2018/08/23	21:33:25	45.93357	-130.01373	255	4.1	1537.9	The temperature probe has been inserted into the vent.	5153
2018/08/23	21:35:11	45.93358	-130.01373	255	4.1	1537.9	<b>Max Temp: 302 degC.</b>	5159
2018/08/23	21:35:29	45.93358	-130.01373	255	4.1	1537.9	We intend to collect major and gastight samples from this vent.	5161
2018/08/23	21:35:56	45.93358	-130.01374	255	4.1	1537.9	The temperature probe has been returned to the basket.	5163
2018/08/23	21:38:01	45.93357	-130.01374	254	4.0	1537.9	The yellow (20) major sampler is being removed from the basket in prep for sampling.	5169
2018/08/23	21:38:54	45.93357	-130.01373	255	4.1	1537.8	HIGHLIGHTS: HIGHLIGHTS HD highlights start	5173
2018/08/23	21:41:52	45.93357	-130.01373	255	4.0	1537.8	The Yellow (20) major sampler probe has been placed in the vent.	5179
2018/08/23	21:42:10	45.93357	-130.01373	255	4.0	1537.8	<b>SAMPLE: J1104-Major-03 Sample Major at Inferno.</b>	5181
2018/08/23	21:43:33	45.93357	-130.01372	255	4.1	1537.8	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	5185
2018/08/23	21:44:26	45.93357	-130.01372	254	4.0	1537.9	J1104-Major-03: Yellow (20) sample was fired. Kevin and Bill are happy with the sampling.	5188
2018/08/23	21:44:50	45.93357	-130.01372	254	4.0	1537.9	The Yellow (20) major sampler has been placed back in the basket.	5189
2018/08/23	21:45:44	45.93357	-130.01372	254	4.0	1537.9	We are preparing to take a gastight fluid sample using the yellow/green gastight sampler (GT-12).	5192
2018/08/23	21:47:43	45.93357	-130.01372	254	4.1	1537.9	The Yellow/Green gastight bottle (GT-12) has been removed from the basket.	5197
2018/08/23	21:48:05	45.93357	-130.01372	254	4.1	1537.8	HIGHLIGHTS: HIGHLIGHTS HD highlights start	5199
2018/08/23	21:49:49	45.93357	-130.01373	254	4.0	1537.8	The yellow/green GTB (GT-12) is placed nicely in the vent.	5203
2018/08/23	21:50:12	45.93357	-130.01373	254	4.1	1537.8	<b>SAMPLE: J1104-GTB-04 Sample GTB</b>	5205
2018/08/23	21:50:22	45.93357	-130.01373	254	4.0	1537.8	When triggered the GTB moved slightly out of the vent.	5206
2018/08/23	21:50:43	45.93357	-130.01374	254	4.1	1537.8	J1104-GTB-04: This sample used the yellow/green GTB.	5208
2018/08/23	21:51:14	45.93357	-130.01374	254	4.0	1537.9	The yellow/green GTB has been returned to the port-side forward crate.	5210
2018/08/23	21:53:17	45.93359	-130.01376	245	4.8	1537.1	Jason is off bottom.	5215
2018/08/23	21:53:38	45.93357	-130.01373	163	6.0	1536.0	We are preparing to transit to the Anemone diffuse vent where we will look for MTR-3197.	5217

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1104 Logger Comment	Virtual Van
2018/08/23	21:54:09	45.93365	-130.01371	68	8.4	1533.3	If we find MTR-3197 we will recover it. Regardless we will deploy a new MTR.	5219
2018/08/23	21:55:01	45.93366	-130.01351	142	7.4	1533.6	Transit is ~41 m at 191 deg.	5222
2018/08/23	21:56:48	45.93364	-130.01350	233	4.3	1536.5	MTR-3197 last year was at 240 deg at a depth of 1534 m (VV #7321 from cruise # RR1712).	5226
2018/08/23	21:57:36	45.93363	-130.01343	248	3.6	1537.3	We are transiting by a large OOI instrument.	5229
2018/08/23	21:59:20	45.93352	-130.01356	253	10.0	1531.3	The bottom is no longer in sight. We are exploring the height of the OOI instrument (~10 m).	5235
2018/08/23	22:02:22	45.93333	-130.01351	235	3.1	1537.9	Driving toward Anemone Vent with Mkr-129. Cracks with diffuse flow below.	5242
2018/08/23	22:03:24	45.93329	-130.01364	241	2.6	1539.5	Some small markers with no readable numbers.	5248
2018/08/23	22:03:42	45.93329	-130.01366	242	1.6	1540.2	Old marker with a can.	5249
2018/08/23	22:06:00	45.93322	-130.01380	192	2.4	1539.6	We see a marker in the distance.	5255
2018/08/23	22:07:07	45.93313	-130.01378	125	2.0	1539.1	Marker #129 is attached to MTR #3197. We will recover the MTR.	5258
2018/08/23	22:07:25	45.93314	-130.01378	128	1.9	1539.2	HIGHLIGHTS: HIGHLIGHTS HD highlights start	5262
2018/08/23	22:09:36	45.93317	-130.01382	141	0.8	1540.2	We will recover MTR # 3197 and replace it with MTR # 3052 located in the starboard side biobox.	5267
2018/08/23	22:10:42	45.93317	-130.01383	141	0.9	1540.1	<b>RECOVER: MTR 3197 at Anemone has been recovered and is encrusted in biology.</b>	5270
2018/08/23	22:11:01	45.93318	-130.01383	141	0.8	1540.1	The MTR has been placed in the starboard side biobox.	5272
2018/08/23	22:11:24	45.93318	-130.01383	140	0.8	1540.2	MTR #3052 has been removed from the starboard side biobox.	5274
2018/08/23	22:11:52	45.93318	-130.01383	140	0.8	1540.2	<b>DEPLOY: MTR #3052 has been deployed in the same location in which the previous MTR was recovered from.</b>	5275
2018/08/23	22:12:07	45.93318	-130.01383	141	0.8	1540.1	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	5277
2018/08/23	22:15:05	45.93317	-130.01380	142	0.9	1540.1	The starboard side biobox has been secured in the interior of the vehicle.	5284
2018/08/23	22:15:29	45.93318	-130.01379	141	2.5	1538.2	Jason is off bottom and we are beginning our transit to benchmark AX-307.	5286
2018/08/23	22:16:20	45.93315	-130.01373	140	9.0	1532.0	Transit is ~1350 m at 15.6 deg.	5288
2018/08/23	22:16:47	45.93307	-130.01361	139	10.9	1530.3	CORRECTION: We are waiting to hear from Bill and the Captain whether or not we will be recovering the AUV. We are holding here.	5290
2018/08/23	22:21:16	45.93260	-130.01319	143	99.1	1441.1	Bill and the Captain have decided to recover the AUV located ~3 km south of here.	5300

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1104 Logger Comment	Virtual Van
2018/08/23	22:21:41	45.93259	-130.01320	142	112.7	1427.7	In route to the recovery site we may pass the caldera wall and Bill has asked that we fly lower at that time	5302
2018/08/23	22:22:07	45.93257	-130.01321	173	123.8	1415.5	We have started our ascent into the water column and the bottom is no longer in sight.	5304
2018/08/23	23:05:10	45.93265	-130.01336	295	133.2	1297.0	Going to abort this dive to recover the AUV.	5391
2018/08/23	23:05:22	45.93265	-130.01336	307	135.5	1297.2	Will be bringing up Jason at 30m/min.	5392
2018/08/23	23:07:04	45.93266	-130.01334	355	100.2	1297.0	Jason is currently at 1300m depth over the caldera rim SW of ASHES about 100m away.	5397
2018/08/23	23:08:46	45.93265	-130.01332	37	108.0	1297.0	VEHICLE: Vehicle has been off bottom since ASHES when we were en route to pickup up AUV under assumption that we'd recover with Jason in water. VEHICLE off bottom	5401

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1105 Logger Comment	vv
Nav bad until Doppler Reset							Main goals: Explore new chimneys and finish pressure measurements at seafloor benchmarks.	
							Collect opportunistic fluid samples and swap out temperature probes.	
							Basket: 4 majors; 4 GTB's; MPR; 2 HOBOS; 2 markers; Jason temperature probe and brush.	
							Port swing arm: Mini BPR and MTR.	
							Starboard swing arm: 2 HOBOS.	
							Tasks: 1) Explore new chimney area. (If active we would have sampled and deployed a marker).	
							2) Make pressure measurements at benchmarks. Deploy mini BPR at AX-303 and recover mini BPR at AX-105.	
							3) Fluid sampling and temperature sensors: International District El Guapo (2 GTBS and 2 Majors); Diva (1 GTB	
							M33 Vent: swap MTRs	
							Trevi: swap HOBOS (not enough Majors or GTBs to sample).	
							Vixen: swap HOBOS and take samples (Major	
2018/08/24	03:40:27					2.5	VEHICLE: VEHICLE in water	5507
2018/08/24	03:40:36					2.6	Start J2-1105	5508
2018/08/24	04:40:44	45.92009	-129.96304	298	20.6	1538.0	NAV: NAV Doppler Reset	5613
2018/08/24	04:42:22	45.92	-129.96295	298	5.3	1555.1	Bottom in sight for new chimney dive.	5617
2018/08/24	04:43:10	45.92002	-129.96295	298	4.1	1556.3	Low sediment.	5620
2018/08/24	04:43:34	45.92004	-129.96295	298	4.5	1555.9	On descent sonar had large targets with shadows.	5622
2018/08/24	04:45:42	45.92013	-129.96306	330	2.9	1558.0	Moving upslope 330 degrees towards first target.	5627
2018/08/24	04:45:57	45.92013	-129.96306	312	6.6	1555.0	Sulfide feature rather than lavas.	5629
2018/08/24	04:46:15	45.92015	-129.96309	312	10.1	1551.8	HIGHLIGHTS: First chimney or column feature. HIGHLIGHTS HD highlights start	5630
2018/08/24	04:47:22	45.92018	-129.96311	311	23.0	1537.6	Top is dead at about 20 meters tall.	5633
2018/08/24	04:47:28	45.92018	-129.96311	312	22.3	1538.1	No tube worms.	5635
2018/08/24	04:47:52	45.92019	-129.96312	312	22.2	1538.3	Altitude 22 meters.	5636
2018/08/24	04:48:12	45.9202	-129.96314	312	22.3	1538.7	Same location as NewSentry2017 target.	5638
2018/08/24	04:48:54	45.9202	-129.96316	313	21.5	1539.1	New chimney #1 located 45.920186 -129.963130	5641
2018/08/24	04:49:07	45.92019	-129.96316	313	21.8	1538.8	Base of chimney 1 is a lava flow.	5642

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1105 Logger Comment	vv
2018/08/24	04:49:41	45.92019	-129.96316	313	21.6	1539.0	HIGHLIGHTS: End highlight of Chimney 1. HIGHLIGHTS HD highlights stop	5644
2018/08/24	04:49:59	45.92018	-129.96316	312	20.2	1540.3	Moving northwest to explore other chimneys.	5646
2018/08/24	04:50:55	45.92019	-129.96318	312	18.1	1543.7	Small cup corals.	5649
2018/08/24	04:51:08	45.92019	-129.96318	313	18.5	1543.5	Yellow sulfur along chimney.	5650
2018/08/24	04:51:42	45.92018	-129.96317	313	18.2	1543.7	HIGHLIGHTS: Limpets and iron staining. HIGHLIGHTS HD highlights start	5652
2018/08/24	04:52:16	45.92018	-129.96317	313	18.2	1543.6	Lots of small anemones.	5654
2018/08/24	04:53:38	45.92014	-129.9632	311	20.5	1540.3	Two additional chimneys adjacent to New Chimney 1.	5658
2018/08/24	04:53:55	45.92013	-129.96323	311	21.9	1539.3	All are dead with no indication of recent activity.	5660
2018/08/24	04:54:05	45.92013	-129.96324	311	22.3	1538.7	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	5661
2018/08/24	04:55:41	45.92018	-129.96339	325	18.6	1538.4	HIGHLIGHTS: HIGHLIGHTS HD highlights start	5665
2018/08/24	04:57:04	45.92018	-129.96347	12	17.4	1538.4	Double chimney northwest of first chimney.	5669
2018/08/24	04:57:11	45.92019	-129.96348	22	17.3	1538.3	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	5670
2018/08/24	04:57:32	45.9202	-129.96352	45	17.3	1538.3	All chimneys so far are similar height around 18-20m.	5672
2018/08/24	04:58:29	45.92026	-129.96351	128	20.2	1538.2	HIGHLIGHTS: HIGHLIGHTS HD highlights start	5675
2018/08/24	04:59:54	45.92023	-129.9634	247	20.6	1538.3	Northwestern most chimney located at 45.920232 - 129.963486	5679
2018/08/24	05:01:16	45.92019	-129.96336	262	16.3	1538.5	Bathymetry overlay is offset roughly 30 meters to the north.	5682
2018/08/24	05:01:26	45.92021	-129.96335	197	20.8	1538.3	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	5684
2018/08/24	05:03:35	45.92018	-129.96334	341	13.6	1538.3	Moving Jason and Medea to the south to approach the base of the chimneys.	5689
2018/08/24	05:07:58	45.92005	-129.96328	359	12.4	1548.4	Approaching first chimney from the south.	5699
2018/08/24	05:08:16	45.92007	-129.96328	359	9.6	1550.9	HIGHLIGHTS: Approaching first chimney from the south. HIGHLIGHTS HD highlights start	5700
2018/08/24	05:08:50	45.92008	-129.96329	359	6.3	1553.7	Base of the first chimney is lava.	5702
2018/08/24	05:09:40	45.9201	-129.9633	359	6.7	1553.5	Chimneys are over a km southeast of International District outside of previous eruption lava flows.	5705
2018/08/24	05:10:21	45.92012	-129.9633	17	5.6	1554.2	Chimney narrows at the base.	5707
2018/08/24	05:15:42	45.92013	-129.96333	41	1.9	1555.2	Setting Jason down for a rock sample.	5719
2018/08/24	05:16:08	45.92014	-129.96333	40	1.8	1555.6	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	5721

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1105 Logger Comment	vv
2018/08/24	05:24:41	45.92012	-129.96326	20	6.7	1553.2	<b>SAMPLE: J1105-geo-01.</b> GEO-01 sample from 6 meters up the southern most chimney located 45.920121 -129.963264. At Redwood Grove chimney field.	5739
2018/08/24	05:25:47	45.92007	-129.96329	34	7.0	1553.2	GEO-01 placed in basket in free space behind next to hobos.	5742
2018/08/24	05:25:54	45.92007	-129.9633	33	6.7	1553.4	Blob sculpin spotted.	5744
2018/08/24	05:27:18	45.92011	-129.96331	4	3.4	1557.0	Chimneys offset 40-50 meters due south of bathymetry.	5747
2018/08/24	05:28:56	45.92011	-129.96332	15	2.6	1557.8	Sea cucumber swimming beneath blob sculpin.	5752
2018/08/24	05:31:28	45.9201	-129.96332	15	2.8	1557.7	Close up shots of blob sculpin.	5758
2018/08/24	05:32:13	45.9201	-129.96331	15	3.1	1557.3	VEHICLE: Off bottom for transit to AX-310. VEHICLE off bottom	5760
2018/08/24	05:34:02	45.92016	-129.96312	65	24.2	1527.0	Leaving <b>Redwood Grove Chimneys</b> for AX-310.	5765
2018/08/24	05:38:04	45.91998	-129.96222	106	95.0	1466.2	Transit to AX-310.	5774
2018/08/24	06:52:51	45.92595	-129.97776	78	8.1	1519.4	Bottom in sight.	5924
2018/08/24	06:53:13	45.92591	-129.97776	263	8.4	1520.1	NAV: NAV Doppler Reset	5926
2018/08/24	06:54:50	45.92589	-129.97778	235	5.3	1522.6	Benchmark in sight.	5930
2018/08/24	06:55:06	45.92585	-129.97781	237	5.7	1523.7	Traversing sheet flows.	5932
2018/08/24	06:56:04	45.92579	-129.97789	288	1.9	1527.5	Arrived at Benchmark AX-310. Marker 126 and OOI cable present at this site.	5935
2018/08/24	06:56:30	45.92579	-129.97789	289	2.0	1527.4	Jason on bottom.	5937
2018/08/24	06:57:52	45.92579	-129.97788	288	2.1	1527.4	The MPR has been removed from the basket.	5940
2018/08/24	06:58:14	45.92579	-129.97788	288	2.1	1527.4	HIGHLIGHTS: HIGHLIGHTS HD highlights start	5942
2018/08/24	07:01:38	45.9258	-129.97789	290	1.1	1528.1	The MPR has been placed on benchmark AX-310. Matt is happy with the placement.	5950
2018/08/24	07:01:44	45.9258	-129.97789	290	1.1	1528.1	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	5951
2018/08/24	07:01:53	45.9258	-129.97789	290	1.1	1528.1	<b>PRESSURE: PRESSURE Start AX-310</b>	5952
2018/08/24	07:03:23	45.9258	-129.97788	290	1.1	1528.0	Current Jason location is: Lat: 45.925784N Long: -129.977829W Depth:1528	5956
2018/08/24	07:21:48	45.92579	-129.97789	291	1.1	1528.0	<b>PRESSURE: PRESSURE End AX-310</b>	5994
2018/08/24	07:22:27	45.92579	-129.97789	291	1.1	1528.0	The MPR has been removed from benchmark AX-310.	5997
2018/08/24	07:23:32	45.92579	-129.97788	292	1.1	1528.0	The MPR has been returned to the basket.	6000
2018/08/24	07:23:47	45.92579	-129.97788	292	1.1	1528.0	We are beginning our transit to El Guapo.	6001
2018/08/24	07:24:13	45.92578	-129.97788	292	1.1	1528.0	We will be transiting along the bottom. The target was ~15 m off last year.	6003

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1105 Logger Comment	vv
2018/08/24	07:24:37	45.92578	-129.97788	292	1.0	1528.0	We will identify our target by identifying the closely located marker # 153.	6005
2018/08/24	07:28:03	45.92574	-129.97799	283	2.8	1526.2	We are traversing atop some OOI instrumentation	6013
2018/08/24	07:28:44	45.92579	-129.97806	299	2.7	1526.4	The seafloor morphology in this region is heavily sedimented sheet flows.	6015
2018/08/24	07:31:14	45.92596	-129.97826	299	2.8	1523.0	We appear to be navigating upslope on more heavily fractured rock.	6021
2018/08/24	07:33:02	45.92604	-129.97831	307	2.3	1522.4	We are crossing an interesting transition in seafloor morphology from heavily fractured rock to relatively smooth sheet flows.	6026
2018/08/24	07:37:55	45.92617	-129.97853	318	2.2	1521.7	HIGHLIGHTS: HIGHLIGHTS HD highlights start	6037
2018/08/24	07:38:12	45.92617	-129.97852	318	2.2	1521.7	Large ropy lava flow structure present here.	6038
2018/08/24	07:39:40	45.92617	-129.97851	319	3.3	1520.6	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	6042
2018/08/24	07:40:55	45.92631	-129.97869	318	1.7	1521.7	Hydrothermal seep present here.	6046
2018/08/24	07:41:46	45.92639	-129.97881	319	3.1	1520.5	Traversing over the OOI Cable.	6048
2018/08/24	07:42:55	45.92651	-129.97898	314	3.4	1519.4	We're traversing across ridges with heavy alteration and hydrothermal remains.	6052
2018/08/24	07:44:24	45.92652	-129.97901	280	3.4	1520.7	Abrupt transition to pillow flows.	6056
2018/08/24	07:45:57	45.92652	-129.97902	272	2.6	1520.1	We are traversing atop large pillow mounts.	6060
2018/08/24	07:49:01	45.92662	-129.97937	272	6.5	1513.9	NAV: NAV Doppler Reset	6067
2018/08/24	07:50:17	45.92658	-129.97946	250	3.6	1514.2	We have reached some hydrothermal vents which we believe might be El Guapo.	6070
2018/08/24	07:51:43	45.92656	-129.9795	251	10.0	1507.5	The ROV is ascending through the water column to the top of the vent to identify it as El Guapo.	6074
2018/08/24	07:53:04	45.92654	-129.97953	250	14.3	1503.3	The top of the vent has a large black smoker chimney on it. Scott believes it is El Guapo.	6078
2018/08/24	07:55:33	45.92655	-129.97954	219	14.4	1503.0	We are going to traverse East in search of marker #153 to insure that this vent is indeed El Guapo.	6084
2018/08/24	07:58:52	45.92655	-129.97944	191	2.7	1515.1	We have found marker #169.	6091
2018/08/24	07:59:36	45.92656	-129.97944	198	2.9	1514.9	We are confident that the vent we've just left is indeed El Guapo.	6094
2018/08/24	08:00:50	45.92656	-129.9795	221	7.6	1509.6	Looking at all three vents: 9 Meter; Hermosa; El Guapo. 220 deg.	6097
2018/08/24	08:01:10	45.92655	-129.97952	220	8.6	1508.8	HIGHLIGHTS: HIGHLIGHTS HD highlights start	6099
2018/08/24	08:01:24	45.92654	-129.97954	221	8.7	1508.7	We have arrived back at El Guapo.	6101

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1105 Logger Comment	vv
2018/08/24	08:03:37	45.92652	-129.97955	221	14.7	1502.9	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	6106
2018/08/24	08:04:05	45.92652	-129.97955	221	14.8	1502.8	Jason is getting in position for collecting fluid samples.	6108
2018/08/24	08:05:00	45.92652	-129.97954	221	14.7	1502.9	Small pieces of the vent are exploding off the active portion of the vent without any interaction from the ROV.	6111
2018/08/24	08:07:23	45.92654	-129.97954	221	14.8	1502.8	The temperature probe has been removed from the basket.	6116
2018/08/24	08:07:50	45.92654	-129.97954	221	14.8	1502.9	We are attempting to move the wires for the MPR on top of the basket and away from the vent.	6118
2018/08/24	08:09:00	45.92655	-129.97955	221	14.8	1502.8	The MPR wires have been successfully moved out of the way of the hydrothermal vent.	6122
2018/08/24	08:11:12	45.92654	-129.97956	239	15.1	1502.7	Jason is in position for fluid sampling.	6127
2018/08/24	08:11:55	45.92653	-129.97956	239	15.1	1502.7	The temperature probe has been inserted into the vent.	6130
2018/08/24	08:13:12	45.92653	-129.97955	239	15.1	1502.7	The maximum temperature is 312 degC.	6133
2018/08/24	08:13:27	45.92653	-129.97955	239	15.1	1502.7	We have removed some of the upper part of the vent and are reinserting the temperature probe.	6135
2018/08/24	08:15:17	45.92652	-129.97954	239	15.1	1502.7	Cory has noted the presence of a black tube worm.	6139
2018/08/24	08:16:37	45.92653	-129.97953	239	15.1	1502.7	We have a new maximum temperature of 329 degC.	6143
2018/08/24	08:17:13	45.92653	-129.97953	239	15.1	1502.7	CORRECTION: New maximum temperature of <b>330 degC</b> .	6145
2018/08/24	08:17:32	45.92653	-129.97953	239	15.1	1502.7	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	6147
2018/08/24	08:19:31	45.92653	-129.97954	239	15.1	1502.7	We are preparing to collect two major samples and two gastight bottle samples.	6152
2018/08/24	08:21:26	45.92654	-129.97954	240	15.0	1502.7	The Major 2 sampler with two pieces of blue tape has been removed from the basket.	6157
2018/08/24	08:21:34	45.92654	-129.97954	240	15.1	1502.6	HIGHLIGHTS: HIGHLIGHTS HD highlights start	6158
2018/08/24	08:22:18	45.92654	-129.97953	239	15.1	1502.7	The sampling wand has been inserted into the vent.	6160
2018/08/24	08:24:36	45.92653	-129.97954	239	15.0	1502.6	*Note there was no J1105 sample #2	6168
2018/08/24	08:24:36	45.92653	-129.97954	239	15.0	1502.6	<b>SAMPLE: J1105-Major-03</b> Sample Major at El Guapo. At upper part of the vent where active pieces were exploding off.	6168
2018/08/24	08:25:29	45.92652	-129.97956	239	15.0	1502.6	J1105-Major-03: This sample was collected using major sampler 2 (Major 2). The sampling wand deflected flow when inserted into the vent and watch leaders were happy with the collection.	6171
2018/08/24	08:25:57	45.92652	-129.97956	239	15.0	1502.6	The sampler has been removed from the vent.	6173
2018/08/24	08:29:10	45.92654	-129.97954	240	15.0	1502.6	The Major 2 sampler has been returned to the starboard side forward crate on the basket.	6180

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1105 Logger Comment	vv
2018/08/24	08:29:36	45.92654	-129.97954	240	15.0	1502.6	Major sampler 1 has been removed from the basket.	6182
2018/08/24	08:30:06	45.92655	-129.97953	240	15.0	1502.6	HIGHLIGHTS: HIGHLIGHTS HD highlights start	6184
2018/08/24	08:30:23	45.92655	-129.97953	240	15.0	1502.6	The sampling wand for Major 1 has been inserted into the vent. Watch leaders are happy with the placement.	6185
2018/08/24	08:30:38	45.92655	-129.97953	240	15.0	1502.6	SAMPLE: <b>J1105-Major-04</b> Sample Major	6187
2018/08/24	08:31:20	45.92655	-129.97953	240	15.0	1502.6	Sample J1105-Major-04 was collected using the Major 1 sampler with three pieces of white tape on the outside.	6191
2018/08/24	08:31:29	45.92655	-129.97953	240	15.0	1502.6	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	6193
2018/08/24	08:32:02	45.92655	-129.97953	240	15.0	1502.6	J1105-Major-04: The sampling wand deflected flow and the watch leaders were happy with the collection.	6195
2018/08/24	08:32:08	45.92655	-129.97953	240	15.0	1502.6	The sampling wand has been removed from the vent.	6196
2018/08/24	08:33:01	45.92655	-129.97953	240	15.0	1502.6	The wires to the MPR are in the way of the starboard-side forward basket in which the Major 1 sampler needs to be returned. We are attempting to move the wire with the port side arm.	6199
2018/08/24	08:35:59	45.92654	-129.97956	240	15.0	1502.6	The MPR wires have successfully been moved out of the way of the starboard-side forward basket.	6206
2018/08/24	08:37:08	45.92653	-129.97956	240	15.0	1502.6	The Major 1 sampler has been returned to the starboard-side forward crate.	6209
2018/08/24	08:40:49	45.92652	-129.97954	240	15.0	1502.6	The white gastight bottle has been removed from the port-side forward crate.	6217
2018/08/24	08:41:19	45.92652	-129.97954	240	15.0	1502.6	HIGHLIGHTS: HIGHLIGHTS HD highlights start	6219
2018/08/24	08:43:48	45.92653	-129.97953	240	15.0	1502.6	The sampling wand for the white GTB has been inserted into the vent. Watch leaders are satisfied with the placement.	6225
2018/08/24	08:44:23	45.92653	-129.97953	239	15.0	1502.6	SAMPLE: <b>J1105-GTB-05</b> Sample GTB	6227
2018/08/24	08:45:07	45.92653	-129.97953	240	15.0	1502.6	J1105-GTB-05: This sample was collected using the white GTB.	6230
2018/08/24	08:46:44	45.92653	-129.97954	240	15.0	1502.6	The white GTB has been returned to the port-side forward basket.	6234
2018/08/24	08:48:12	45.92654	-129.97954	239	15.0	1502.6	The Red GTB has been removed from the port-side forward basket.	6238
2018/08/24	08:48:17	45.92654	-129.97954	240	15.0	1502.6	HIGHLIGHTS: HIGHLIGHTS HD highlights start	6239
2018/08/24	08:50:34	45.92653	-129.97954	240	15.0	1502.5	The sampling wand for the red GTB has been inserted into the vent. Matt is happy with the placement.	6245
2018/08/24	08:51:53	45.92653	-129.97954	240	15.0	1502.5	SAMPLE: <b>J1105-GTB-06</b> Sample GTB	6248

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1105 Logger Comment	vv
2018/08/24	08:52:20	45.92653	-129.97953	240	15.0	1502.5	J1105-GTB-06: This sample was collected using the red GTB sampler.	6250
2018/08/24	08:52:26	45.92653	-129.97953	240	15.0	1502.5	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	6252
2018/08/24	08:52:52	45.92653	-129.97953	240	14.9	1502.6	The sampling wand for the red GTB has been removed from the vent.	6253
2018/08/24	08:53:39	45.92653	-129.97954	239	14.9	1502.6	The red GTB has been returned to the port-side forward basket.	6256
2018/08/24	08:56:53	45.92656	-129.97949	214	13.6	1502.9	We have left the El Guapo vent and are transiting to Diva.	6263
2018/08/24	08:57:19	45.92658	-129.97947	218	9.5	1506.3	We will identify Diva by marker 150 (Mkr-150).	6265
2018/08/24	08:59:25	45.92649	-129.97925	211	7.0	1514.1	We have just transited past Hermosa and the 9m Chimney.	6271
2018/08/24	09:01:00	45.92639	-129.97906	218	5.3	1515.0	We are transiting past Marv Lilly's pig at Escargot.	6275
2018/08/24	09:01:11	45.92639	-129.97903	209	5.4	1514.7	The OOI junction box is in sight.	6276
2018/08/24	09:01:39	45.92638	-129.979	213	4.3	1517.5	Marker 150 is in sight.	6278
2018/08/24	09:02:21	45.92637	-129.97901	225	3.5	1518.1	We are planning to take a temperature measurement; 1 major; 1 gastight; and to swap HOBO 130.	6280
2018/08/24	09:04:18	45.92638	-129.97902	215	2.9	1518.5	We are on bottom at the Diva Vent (Marker 150).	6285
2018/08/24	09:05:49	45.92637	-129.97904	215	1.8	1519.1	We are removing HOBO #130 from the vent.	6289
2018/08/24	09:05:55	45.92638	-129.97904	215	1.9	1519.1	HIGHLIGHTS: HIGHLIGHTS HD highlights start	6291
2018/08/24	09:06:12	45.92638	-129.97904	214	1.8	1519.1	The hobo is encrusted into the vent.	6292
2018/08/24	09:07:10	45.92638	-129.97904	214	1.8	1519.1	HOBO #130 has been laid on the seafloor beside the vent. We will recover once we have collected our temperature measurements and fluid samples.	6295
2018/08/24	09:08:30	45.92638	-129.97904	215	1.8	1519.1	We are going to knock the chimney edifice over.	6299
2018/08/24	09:08:44	45.92638	-129.97904	215	1.8	1519.1	We have knocked the anhydrite edifice of the chimney over.	6300
2018/08/24	09:09:03	45.92638	-129.97904	215	1.8	1519.1	The temperature probe wand has been inserted into the vent.	6302
2018/08/24	09:14:07	45.92637	-129.97904	215	1.8	1519.0	Max temperature from the Diva Vent: 301 degC.	6313
2018/08/24	09:15:09	45.92637	-129.97904	216	1.7	1519.1	Location of the Diva Chimney is: Lat: 45.926395N Long: -129.979102W Depth: 1517.1 m.	6316
2018/08/24	09:18:02	45.92638	-129.97905	215	1.7	1519.0	The Red major sampler has been removed from the starboard-side aft basket.	6323
2018/08/24	09:18:07	45.92639	-129.97905	215	1.7	1519.0	HIGHLIGHTS: HIGHLIGHTS HD highlights start	6324
2018/08/24	09:19:27	45.92638	-129.97906	215	1.8	1519.0	The sampling wand for the major red sampler has been inserted into the vent. Matt is happy with the placement.	6328
2018/08/24	09:19:44	45.92638	-129.97907	215	1.8	1519.0	SAMPLE: <b>J1105-Major-07</b> Sample Major	6329

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1105 Logger Comment	vv
2018/08/24	09:21:13	45.92637	-129.97908	215	1.8	1519.0	CORRECTION: The current sample is actually a MAJOR sample.	6335
2018/08/24	09:21:34	45.92637	-129.97908	216	1.7	1519.0	SAMPLE: J1105-Major-07 Sample Major	6337
2018/08/24	09:21:44	45.92637	-129.97908	215	1.7	1519.0	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	6338
2018/08/24	09:22:15	45.92636	-129.97908	215	1.7	1519.0	Correction: Sample J1105-GTB-07 has NOT been collected yet. The previous sample was indeed a MAJOR sample collected with the major red sampler.	6340
2018/08/24	09:22:29	45.92636	-129.97908	215	1.7	1519.0	The major red sampler has been returned to the starboard side aft crate.	6342
2018/08/24	09:26:00	45.92636	-129.97904	215	1.7	1519.0	The purple GTB (GT-11) has been removed from the portside forward crate.	6350
2018/08/24	09:26:38	45.92637	-129.97904	216	1.8	1518.9	HIGHLIGHTS: HIGHLIGHTS HD highlights start	6352
2018/08/24	09:27:14	45.92637	-129.97904	215	1.9	1518.9	The sampling wand for the purple GTB (GT-11) has been inserted into the vent. The watch leader is satisfied with the placement.	6354
2018/08/24	09:27:52	45.92638	-129.97904	215	1.9	1518.9	SAMPLE: <b>J1105-GTB-08</b> Sample GTB	6356
2018/08/24	09:28:27	45.92638	-129.97905	215	1.7	1519.0	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	6359
2018/08/24	09:28:36	45.92639	-129.97905	215	1.7	1519.0	Sample J1105-GTB-08 was collected using the purple GTB (GT-11). The sampling wand deflected flow and the watch leader was satisfied with the collection.	6360
2018/08/24	09:29:07	45.92639	-129.97905	216	1.8	1518.9	The purple GTB (GT-11) sampler has been returned to the port-side forward crate in the basket.	6362
2018/08/24	09:29:22	45.92639	-129.97905	215	1.7	1519.0	We are now planning to replace HOBO #130.	6363
2018/08/24	09:31:17	45.92639	-129.97905	217	1.7	1518.9	HIGHLIGHTS: HIGHLIGHTS HD highlights start	6368
2018/08/24	09:31:49	45.92638	-129.97905	217	1.7	1518.9	The right swing arm box has been extended and HOBO #102 has been removed.	6370
2018/08/24	09:33:21	45.92637	-129.97904	217	1.8	1518.8	HOBO	6374
2018/08/24	09:33:37	45.92637	-129.97904	218	1.7	1518.9	<b>DEPLOY: HOBO #102</b> has been deployed in the Diva Vent.	6376
2018/08/24	09:34:59	45.92637	-129.97904	223	3.8	1517.3	Jason is off bottom.	6380
2018/08/24	09:35:06	45.92637	-129.97904	222	3.8	1517.3	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	6381
2018/08/24	09:37:48	45.92637	-129.97903	222	3.3	1517.8	<b>RECOVER: HOBO #130</b> has been recovered and placed in the starboard side swing arm box.	6387
2018/08/24	09:38:09	45.92638	-129.97903	223	3.3	1517.8	HOBO #129 has been removed from the starboard side swing arm box.	6389
2018/08/24	09:41:16	45.92639	-129.97902	223	3.2	1517.8	The float on the HOBO #130 broke off and is unrecoverable.	6396

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1105 Logger Comment	vv
2018/08/24	09:41:59	45.92639	-129.97903	222	2.9	1518.1	The biobox on the starboard side swing arm has been secured and the box stowed in the vehicle's interior.	6399
2018/08/24	09:42:59	45.92638	-129.97903	222	11.9	1509.2	Jason is ascending 30 m in prep for our transit to castle where we will swap HOBO #153.	6402
2018/08/24	09:43:10	45.92639	-129.97905	223	15.3	1505.8	The bottom is no longer in sight.	6403
2018/08/24	09:44:10	45.92649	-129.97905	223	27.0	1496.2	The transit to Castle is ~76 m at 256 deg.	6406
2018/08/24	09:50:44	45.92649	-129.97946	285	21.6	1496.0	We are passing a large chimney at 17 m altitude (Hermosa?).	6420
2018/08/24	09:52:18	45.92648	-129.97961	58	12.0	1495.9	We are passing another chimney at 12 m altitude.	6424
2018/08/24	10:00:29	45.92633	-129.97999	109	15.3	1501.3	Jason is beginning the descent back to the seafloor from 20 m altitude.	6442
2018/08/24	10:00:50	45.92632	-129.98002	110	7.7	1509.0	Bottom in sight.	6443
2018/08/24	10:01:45	45.92623	-129.98016	131	6.6	1510.2	We are transiting atop large pillow basalts.	6446
2018/08/24	10:02:17	45.92616	-129.98011	89	6.9	1510.0	There is a large amount of hydrothermal alteration on the seafloor in this region.	6448
2018/08/24	10:02:43	45.92613	-129.9801	66	6.7	1509.0	We appear to be transiting by the castle vent now.	6450
2018/08/24	10:03:36	45.92622	-129.98007	143	5.6	1508.1	HIGHLIGHTS: HIGHLIGHTS HD highlights start	6457
2018/08/24	10:04:56	45.92616	-129.97999	266	5.8	1511.5	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	6461
2018/08/24	10:05:43	45.92618	-129.98003	295	2.9	1514.7	HIGHLIGHTS: HIGHLIGHTS HD highlights start	6463
2018/08/24	10:06:36	45.92619	-129.98002	296	2.7	1514.7	<b>RECOVER: HOBO #153</b> has been removed from the vent.	6466
2018/08/24	10:07:26	45.92619	-129.98002	296	2.7	1514.7	Castle vent is sparsely covered in blue and white mats and has abundant tube worms.	6469
2018/08/24	10:08:58	45.92618	-129.98001	295	2.7	1514.7	We are excavating a small portion of vent in prep for deploying HOBO #129.	6473
2018/08/24	10:09:07	45.92617	-129.98001	296	2.7	1514.7	A large portion of the vent appears to be unstable.	6474
2018/08/24	10:10:46	45.92616	-129.98	296	2.7	1514.7	We have excavated an anhydrite chimney to deploy HOBO 129 in.	6478
2018/08/24	10:11:10	45.92616	-129.98001	295	2.7	1514.7	HOBO #129 has been deployed in the castle vent.	6480
2018/08/24	10:11:20	45.92616	-129.98001	295	2.8	1514.7	<b>DEPLOY: HOBO-129</b> DEPLOY HOBO temp probe	6481
2018/08/24	10:12:40	45.92616	-129.98002	296	2.7	1514.7	When dropped HOBO #129 seemed to fall out of the vent and was at risk of falling out of the vent and downslope. We are redeploying the instrument.	6485
2018/08/24	10:15:16	45.92618	-129.98002	287	3.5	1513.8	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	6491
2018/08/24	10:18:29	45.92619	-129.98002	281	3.2	1514.0	HOBO #129 has been redeployed in the vent.	6499

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1105 Logger Comment	vv
2018/08/24	10:18:48	45.92619	-129.98002	281	3.2	1514.1	The watch leader is satisfied with the placement of HOBO #129.	6500
2018/08/24	10:19:29	45.92619	-129.98002	281	3.1	1514.1	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	6503
2018/08/24	10:23:15	45.92619	-129.9801	130	7.5	1507.0	Jason is off bottom.	6513
2018/08/24	10:27:56	45.92614	-129.98014	121	6.3	1510.3	HOBO #153 was dropped while attempting to stow it. We are descending to recover the dropped HOBO now.	6526
2018/08/24	10:28:26	45.92616	-129.98013	97	1.2	1515.5	HOBO #153 is in sight.	6528
2018/08/24	10:31:14	45.92627	-129.98014	98	1.2	1515.5	HOBO #153 has been recovered and HOBO #153 has been secured in the bio box on the starboard side swing arm.	6534
2018/08/24	10:31:34	45.92625	-129.98015	97	2.1	1514.4	Jason is off bottom.	6536
2018/08/24	10:31:47	45.92623	-129.98015	99	2.9	1513.9	The starboard-side swing arm has been returned to the interior of the vehicle.	6537
2018/08/24	10:32:01	45.9262	-129.98016	99	3.4	1513.4	We are transiting atop large pillow mounds.	6539
2018/08/24	10:32:49	45.92601	-129.98013	213	15.8	1500.6	We are beginning our transit to M33 vent ~850 m away at 349 deg.	6541
2018/08/24	10:33:23	45.92584	-129.98013	202	28.1	1487.0	At M33 Vent we will swap MTR #3048 with MTR #3028 in the port-side swing arm box.	6543
2018/08/24	10:33:38	45.92573	-129.98014	200	30.1	1482.9	The bottom is no longer in sight.	6545
2018/08/24	11:02:41	45.92954	-129.98126	177	127.5	1292.0	Continuing to M33 benchmark AX-303.	6604
2018/08/24	11:21:54	45.93151	-129.98175	163	98.2	1415.8	Ship and vehicles are at the AX-303 site so Jason is descending to the seafloor.	6644
2018/08/24	11:25:23	45.93331	-129.98222	273	6.5	1507.9	There is the bottom.	6651
2018/08/24	11:25:49	45.93327	-129.98219	329	5.6	1508.6	Jason is at the M33 vent site south of the benchmark.	6653
2018/08/24	11:26:22	45.93318	-129.98212	327	6.3	1508.2	Milky water.	6655
2018/08/24	11:26:58	45.93316	-129.98222	335	5.0	1509.3	There is the marker at the vent site. Can see the MTR as well.	6658
2018/08/24	11:27:11	45.93315	-129.98222	340	2.2	1511.9	Going to swap out the MTR.	6659
2018/08/24	11:27:26	45.93316	-129.98223	337	2.0	1512.3	NAV: NAV Doppler Reset	6661
2018/08/24	11:27:53	45.93318	-129.98223	335	1.3	1512.9	Lots of debris here including old dive weights.	6662
2018/08/24	11:28:07	45.93319	-129.98223	353	0.8	1513.3	HIGHLIGHTS: M33 vent at Mkr166. HIGHLIGHTS HD highlights start	6664
2018/08/24	11:28:46	45.93319	-129.98223	0	0.8	1513.3	Lava here looks really old but in reality is only 7 years old. Lots of sediments.	6666
2018/08/24	11:29:51	45.93319	-129.98223	1	0.9	1513.2	Good close-up of the MTR still in a good flow of diffuse water. Worms and limpets.	6669

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1105 Logger Comment	vv
2018/08/24	11:30:15	45.93319	-129.98223	1	0.9	1513.2	Port biobox is open to grab the new MTR.	6671
2018/08/24	11:30:51	45.93319	-129.98223	1	0.9	1513.2	Grabbing MTR 3028 for Mkr-33 Vent.	6673
2018/08/24	11:31:26	45.93319	-129.98223	2	0.9	1513.2	Cursor latitude is 45.93318 -129.98225.	6676
2018/08/24	11:31:43	45.93319	-129.98223	2	0.9	1513.2	Placing MTR next to old MTR until the other one is removed.	6677
2018/08/24	11:32:20	45.93319	-129.98223	2	0.9	1513.2	<b>RECOVER: Grabbing MTR 3048</b> and placing in port biobox. Lots of biology growing on its line.	6679
2018/08/24	11:32:37	45.93319	-129.98223	3	0.9	1513.2	Created a snow storm of floc.	6681
2018/08/24	11:32:57	45.93319	-129.98223	2	0.9	1513.2	<b>DEPLOY: Placing MTR 3028</b> in the mini-snowblower.	6683
2018/08/24	11:33:28	45.93319	-129.98223	2	0.9	1513.2	Position is cursor.	6685
2018/08/24	11:34:15	45.93319	-129.98223	2	0.9	1513.2	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	6687
2018/08/24	11:36:05	45.93319	-129.98223	4	1.7	1512.5	Moving north 30m to the benchmark.	6692
2018/08/24	11:36:34	45.93319	-129.98223	2	1.5	1512.3	There is the benchmark. AX303 at M33 Vent.	6694
2018/08/24	11:37:58	45.93327	-129.98218	332	3.0	1510.9	Clump of tubeworms and venting just south of the benchmark.	6698
2018/08/24	11:38:21	45.93332	-129.98215	297	3.3	1510.8	Benchmark flag is much more visible than the old marker on metal benchmark with its reflective tape.	6699
2018/08/24	11:39:03	45.93342	-129.98217	201	2.7	1511.4	Old metal benchmark is just to the west of the cement benchmark. It is located closer to the patches of white staining.	6702
2018/08/24	11:39:31	45.93344	-129.98219	184	0.8	1513.2	Circling the vehicle to line up with the MPR landing zone (vehicle faces due south for measurement).	6704
2018/08/24	11:39:50	45.93345	-129.9822	183	0.8	1513.2	Benchmark is very clean and no brittle stars.	6705
2018/08/24	11:41:20	45.93346	-129.98222	183	0.8	1513.2	Navigation is excellent at this location.	6709
2018/08/24	11:41:31	45.93346	-129.98222	183	0.8	1513.2	HIGHLIGHTS: AX-303. HIGHLIGHTS HD highlights start	6711
2018/08/24	11:41:42	45.93346	-129.98222	183	0.8	1513.2	Retrieving the MPR and placing it on the benchmark.	6712
2018/08/24	11:43:06	45.93343	-129.98222	183	0.8	1513.2	Getting the placement just right on the benchmark.	6716
2018/08/24	11:44:39	45.93341	-129.9822	182	0.8	1513.2	Looks like it is riding up on the edge.	6720
2018/08/24	11:45:14	45.93341	-129.9822	182	0.8	1513.2	Finer adjustment required.	6722
2018/08/24	11:47:46	45.93341	-129.98219	182	0.8	1513.2	Tilt numbers looks good but the cement that is chipped away is making it look offset. This looks good.	6729
2018/08/24	11:47:52	45.93341	-129.98219	182	0.8	1513.2	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	6730
2018/08/24	11:48:07	45.93341	-129.98219	182	0.8	1513.2	<b>PRESSURE: AX-303 measurement. PRESSURE Start</b>	6732
2018/08/24	11:51:27	45.93343	-129.98222	182	0.8	1513.2	Still some diffuse venting near the benchmark.	6740
2018/08/24	11:51:55	45.93344	-129.98222	182	0.8	1513.2	Nearby tubeworms.	6742

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1105 Logger Comment	vv
2018/08/24	11:56:06	45.93343	-129.98221	182	0.8	1513.1	Biology close-ups.	6751
2018/08/24	11:58:04	45.93342	-129.98222	183	0.8	1513.1	Glassy surfaces on the lavas.	6756
2018/08/24	12:08:29	45.93341	-129.98225	183	0.8	1513.1	<b>PRESSURE: AX-303 PRESSURE End</b>	6778
2018/08/24	12:09:00	45.93338	-129.98228	183	0.8	1513.1	PRESSURE: Really end now . PRESSURE End	6780
2018/08/24	12:09:07	45.93338	-129.98229	182	0.8	1513.1	Picking up MPR.	6781
2018/08/24	12:09:28	45.93336	-129.98232	182	0.8	1513.1	MPR on basket.	6783
2018/08/24	12:10:21	45.93334	-129.98234	182	0.8	1513.1	Need to deploy the mini BPR next.	6785
2018/08/24	12:11:11	45.93334	-129.98234	183	1.0	1512.9	Coming off the bottom to open the port biobox.	6788
2018/08/24	12:11:32	45.93334	-129.98234	182	0.9	1513.0	Back in front of the benchmark with the biobox out.	6790
2018/08/24	12:13:27	45.93334	-129.98235	180	0.8	1513.1	Opening the biobox.	6795
2018/08/24	12:14:03	45.93334	-129.98235	180	0.8	1513.0	HIGHLIGHTS: Deploying mini BPR 10 at AX303. HIGHLIGHTS HD highlights start	6797
2018/08/24	12:15:27	45.93334	-129.98236	181	0.8	1513.0	Got the BPR and moving it to the benchmark.	6801
2018/08/24	12:15:52	45.93334	-129.98236	181	0.8	1513.0	<b>DEPLOY: mini BPR 10</b> at AX-303 DEPLOY SIO-BPR	6802
2018/08/24	12:16:00	45.93334	-129.98236	180	0.8	1513.1	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	6804
2018/08/24	12:16:17	45.93334	-129.98236	180	0.8	1513.0	Mini BPR-10 is on the benchmark.	6805
2018/08/24	12:16:23	45.93334	-129.98236	180	0.9	1513.0	Closing the biobox.	6806
2018/08/24	12:17:03	45.93334	-129.98236	182	1.4	1512.2	Leaving the benchmark and ready to transit.	6809
2018/08/24	12:19:07	45.93329	-129.98243	219	6.9	1506.5	Next is AX-309 at 970m away.	6814
2018/08/24	13:10:20	45.93713	-129.97406	230	42.3	1477.0	Jason heading down to seafloor near benchmark AX-309 RSN-PN.	6917
2018/08/24	13:19:45	45.93822	-129.97228	216	10.4	1511.4	NAV: NAV Doppler Reset	6937
2018/08/24	13:20:19	45.93819	-129.97228	164	4.1	1517.4	On the bottom near a collapse feature.	6939
2018/08/24	13:20:45	45.93817	-129.97232	19	4.3	1517.2	Beautiful collapse and windows.	6941
2018/08/24	13:21:02	45.93823	-129.97229	26	3.4	1517.8	Big fish.	6943
2018/08/24	13:21:09	45.93826	-129.97226	25	6.2	1517.7	Fish.	6944
2018/08/24	13:21:36	45.93833	-129.97219	27	4.1	1517.2	There is the benchmark down in the collapse.	6946
2018/08/24	13:22:41	45.93846	-129.97212	124	6.2	1518.5	Coming over the high lava into the collapse.	6949
2018/08/24	13:23:13	45.93846	-129.97204	201	3.1	1521.3	Beautiful lava rim and window in the wall.	6951
2018/08/24	13:23:37	45.93844	-129.97205	238	1.9	1522.8	Marker 130 is at AX-309. Mkr-130.	6953
2018/08/24	13:24:02	45.93845	-129.97205	239	0.8	1524.2	Landing in front of the benchmark.	6955
2018/08/24	13:24:24	45.93845	-129.97206	239	0.8	1524.4	Brittle star almost center on the landing pad.	6957

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1105 Logger Comment	vv
2018/08/24	13:25:11	45.93845	-129.97206	239	0.8	1524.4	Brittle star is not moving off the pad.	6959
2018/08/24	13:25:28	45.93844	-129.97205	239	0.8	1524.4	Retrieving MPR.	6961
2018/08/24	13:25:37	45.93844	-129.97205	239	0.8	1524.4	HIGHLIGHTS: AX-309. HIGHLIGHTS HD highlights start	6962
2018/08/24	13:26:03	45.93844	-129.97205	239	0.8	1524.4	Placing MPR on the benchmark.	6964
2018/08/24	13:26:51	45.93844	-129.97205	239	0.8	1524.4	Nudging the MPR into place.	6966
2018/08/24	13:27:16	45.93844	-129.97205	239	0.8	1524.4	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	6968
2018/08/24	13:27:21	45.93844	-129.97205	239	0.8	1524.4	Placement looks good and tilt is good.	6969
2018/08/24	13:27:36	45.93844	-129.97205	239	0.8	1524.4	<b>PRESSURE: AX-309. PRESSURE Start</b>	6971
2018/08/24	13:29:22	45.93844	-129.97205	239	0.8	1524.4	Nav is 9m due north of the benchmark position.	6975
2018/08/24	13:31:04	45.93845	-129.97205	239	0.8	1524.4	Urchin and brittle star on seafloor next to benchmark.	6980
2018/08/24	13:33:26	45.93845	-129.97205	239	0.8	1524.4	Urchin close-up.	6986
2018/08/24	13:34:34	45.93845	-129.97205	239	0.8	1524.4	"Hair-plug" urchin is what these look like.	6989
2018/08/24	13:42:39	45.93846	-129.97205	239	0.8	1524.4	Another urchin close-up.	7006
2018/08/24	13:43:41	45.93847	-129.97205	239	0.8	1524.4	Cluster of sand eating creatures.	7009
2018/08/24	13:45:44	45.93847	-129.97205	239	0.8	1524.4	Just realized we haven't seen pyrosomes on this trip. Last year there were so many.	7014
2018/08/24	13:47:33	45.93847	-129.97205	239	0.8	1524.4	PRESSURE: AX-309 finished. PRESSURE End	7019
2018/08/24	13:47:49	45.93847	-129.97205	239	0.8	1524.4	Placing MPR on the basket.	7020
2018/08/24	13:49:02	45.93847	-129.97205	264	4.3	1520.1	Taking off from here to transit to AX-302 at Trevi. 1270 meters away.	7024
2018/08/24	14:56:09	45.94628	-129.98378	270	4.5	1514.2	Bottom in sight on approach to Trevi.	7172
2018/08/24	14:57:28	45.94628	-129.98378	266	2.1	1515.0	AX-302 in sight.	7176
2018/08/24	14:58:24	45.94628	-129.98378	229	1.0	1517.2	VEHICLE: AX-302. VEHICLE on bottom	7179
2018/08/24	14:59:42	45.94628	-129.98378	229	0.8	1517.4	MPR out of cradle for pressure measurement at AX-302.	7182
2018/08/24	14:59:49	45.94628	-129.98378	229	0.8	1517.4	HIGHLIGHTS: HIGHLIGHTS HD highlights start	7183
2018/08/24	15:01:57	45.94628	-129.98378	229	0.8	1517.4	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	7189
2018/08/24	15:02:24	45.94628	-129.98378	229	0.8	1517.4	<b>PRESSURE: MPR recording at AX-302. PRESSURE Start</b>	7191
2018/08/24	15:22:22	45.94628	-129.98378	229	0.8	1517.5	<b>PRESSURE: End</b> MPR measurements at AX-302. PRESSURE End	7231
2018/08/24	15:22:41	45.94628	-129.98378	229	0.8	1517.5	Transit to Trevi for temperature reading and HOB0 replacement.	7233
2018/08/24	15:25:10	45.94628	-129.98378	190	2.7	1515.3	Approaching Trevi vent.	7239

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1105 Logger Comment	vv
2018/08/24	15:25:45	45.94628	-129.98378	142	1.3	1516.3	HOBO in place is on its side adjacent to vent.	7241
2018/08/24	15:26:00	45.94628	-129.98378	121	1.7	1516.4	HIGHLIGHTS: Trevi temperature measurement and HOBO replacement. HIGHLIGHTS HD highlights start	7243
2018/08/24	15:28:15	45.94628	-129.98378	150	0.8	1516.8	VEHICLE: Vehicle on bottom at Trevi for HOBO replacement. VEHICLE on bottom	7248
2018/08/24	15:28:46	45.94649	-129.98411	150	0.9	1516.8	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	7250
2018/08/24	15:29:08	45.94315	-129.97863	150	0.9	1516.8	HIGHLIGHTS: Trevi temperature probe. HIGHLIGHTS HD highlights start	7252
2018/08/24	15:30:40	45.94071	-129.97461	149	0.8	1516.9	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	7256
2018/08/24	15:36:48	45.94621	-129.98364	149	0.8	1516.9	<b>Trevi Tmax 223degC</b> Heading 149.5.	7269
2018/08/24	15:38:10	45.94612	-129.9835	149	0.8	1517.0	Replacing HOBO at Trevi.	7273
2018/08/24	15:41:35	45.94629	-129.9838	149	0.9	1516.9	<b>DEPLOY: HOBO-103 deployment.</b> HIGHLIGHTS HD highlights start	7281
2018/08/24	15:57:47	45.94627	-129.98375	149	0.9	1517.0	HIGHLIGHTS: HOBO 103 deployment. HIGHLIGHTS HD highlights stop	7314
2018/08/24	16:00:47	45.94628	-129.98378	149	0.9	1517.0	HIGHLIGHTS: Recovering HOBO 104. HIGHLIGHTS HD highlights start	7321
2018/08/24	16:00:57	45.94628	-129.98378	149	0.9	1517.0	<b>RECOVER: HOBO 104 recovered.</b>	7323
2018/08/24	16:02:24	45.94626	-129.98377	150	0.9	1517.1	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	7327
2018/08/24	16:04:52	45.94621	-129.98365	149	1.3	1516.9	HOBO 104 secured for transit to AX-309.	7332
2018/08/24	17:11:33	45.93809	-129.97257	239	1.9	1523.9	AX-309 in sight.	7467
2018/08/24	17:13:36	45.93872	-129.97215	243	0.8	1525.6	VEHICLE: MPR out of cradle for pressure measurements AX-309. VEHICLE on bottom	7472
2018/08/24	17:13:49	45.93865	-129.97203	243	0.8	1525.6	HIGHLIGHTS: MPR measurement AX-309. HIGHLIGHTS HD highlights start	7473
2018/08/24	17:14:34	45.93848	-129.97182	243	0.8	1525.7	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	7476
2018/08/24	17:15:35	45.93839	-129.97184	243	0.8	1525.6	<b>PRESSURE: AX-309 MPR recording. PRESSURE Start</b>	7479
2018/08/24	17:35:35	45.93711	-129.97266	243	0.8	1525.8	<b>PRESSURE: PRESSURE End</b>	7520
2018/08/24	17:38:36	45.94628	-129.98378	244	9.6	1516.7	MPR in cradle for transit to AX-303.	7527
2018/08/24	18:35:27	45.93421	-129.98057	279	101.5	1414.7	NAV: NAV Doppler Reset	7642
2018/08/24	18:43:14	45.9336	-129.98194	227	5.6	1510.6	Bottom in sight on approach to AX-303.	7658
2018/08/24	18:50:59	45.93342	-129.98222	173	0.9	1514.5	We are on station at benchmark AX-303.	7675
2018/08/24	18:51:15	45.93342	-129.98222	173	0.9	1514.5	The MPR has been removed from the basket.	7676
2018/08/24	18:51:21	45.93342	-129.98222	174	0.9	1514.5	HIGHLIGHTS: HIGHLIGHTS HD highlights start	7677

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1105 Logger Comment	vv
2018/08/24	18:58:18	45.93343	-129.98222	174	0.9	1514.5	The MPR has been placed on benchmark AX-303. The watch leader is satisfied with the placement.	7692
2018/08/24	18:58:23	45.93343	-129.98222	173	0.9	1514.5	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	7693
2018/08/24	18:58:27	45.93343	-129.98222	173	0.9	1514.5	<b>PRESSURE: PRESSURE Start AX-303</b>	7695
2018/08/24	19:00:02	45.93343	-129.98222	174	0.9	1514.5	Jason's Current Location: Lat: 45.933404N Long: -129.982195W Depth: 1513.3 m.	7699
2018/08/24	19:19:27	45.93343	-129.98222	174	0.9	1514.6	<b>PRESSURE: PRESSURE End</b>	7739
2018/08/24	19:19:52	45.93343	-129.98222	174	0.9	1514.6	The MPR has been removed from the benchmark.	7740
2018/08/24	19:20:36	45.93342	-129.98222	174	0.9	1514.6	The MPR has been returned to the basket.	7743
2018/08/24	19:21:20	45.93342	-129.98222	174	1.1	1514.5	Jason is off bottom.	7745
2018/08/24	19:22:41	45.93322	-129.9822	175	16.5	1499.1	We are beginning our transit to AX-310. The transit is 935 m at 160 deg.	7749
2018/08/24	19:22:48	45.93319	-129.98219	177	18.0	1497.7	The bottom is no longer in sight.	7750
2018/08/24	20:38:23	45.92599	-129.97653	80	127.0	1401.4	We have resumed control of the ship following the AUV launch.	7902
2018/08/24	20:40:25	45.92576	-129.97696	81	123.8	1404.4	We are resuming transit to benchmark AX-310.	7908
2018/08/24	20:47:26	45.92571	-129.97789	122	49.3	1479.3	We have begun our descent to the seafloor.	7923
2018/08/24	20:49:15	45.92578	-129.97796	130	9.4	1518.1	10 m off bottom. Bottom in sight. Benchmark in sight.	7927
2018/08/24	20:49:41	45.92579	-129.97792	123	9.4	1518.2	NAV: NAV Doppler Reset	7929
2018/08/24	20:49:51	45.92578	-129.97792	124	7.4	1520.4	We are descending on benchmark AX-310.	7930
2018/08/24	20:52:35	45.92578	-129.97786	288	1.2	1527.6	The MPR has been removed from the basket.	7937
2018/08/24	20:52:49	45.92578	-129.97786	288	1.2	1527.6	HIGHLIGHTS: HIGHLIGHTS HD highlights start	7938
2018/08/24	20:54:52	45.92579	-129.97787	288	1.2	1527.6	The MPR has been placed on the platform. The watch leader is satisfied with the placement.	7943
2018/08/24	20:55:04	45.92579	-129.97787	287	1.2	1527.6	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	7945
2018/08/24	20:55:20	45.92579	-129.97787	287	1.2	1527.6	<b>PRESSURE: PRESSURE Start AX-310</b>	7946
2018/08/24	20:56:01	45.92579	-129.97788	287	1.2	1527.6	Location of benchmark AX-310 is Lat: 45.925737N Long: -129.977857W Depth: 1526.4 m.	7949
2018/08/24	21:15:44	45.92578	-129.97787	288	1.2	1527.5	<b>PRESSURE: PRESSURE End</b>	7989
2018/08/24	21:16:03	45.92577	-129.97787	288	1.2	1527.6	The MPR has been removed from the benchmark.	7991
2018/08/24	21:16:42	45.92577	-129.97788	289	1.2	1527.5	The benchmark has been secured in the basket.	7993
2018/08/24	21:16:58	45.92576	-129.97788	285	1.7	1527.2	Jason is off bottom.	7995
2018/08/24	21:17:17	45.92578	-129.97782	193	4.6	1524.1	We are beginning our transit to bag city at ~1400 m bearing 220 deg.	7996

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1105 Logger Comment	vv
2018/08/24	21:18:10	45.92566	-129.97768	134	11.0	1517.8	The bottom is no longer in sight.	7999
2018/08/24	22:26:40	45.91672	-129.9885	29	126.3	1403.4	We are beginning our descent to Bag City.	8137
2018/08/24	22:26:49	45.91668	-129.98853	28	124.2	1405.3	The current altitude is 125 m.	8138
2018/08/24	22:35:05	45.9161	-129.98959	79	10.3	1520.9	Altitude is currently 10 m.	8156
2018/08/24	22:35:25	45.91611	-129.98953	37	8.2	1523.0	The bottom is in sight.	8158
2018/08/24	22:36:22	45.9161	-129.98945	29	4.2	1526.0	NAV: NAV Doppler Reset	8160
2018/08/24	22:36:43	45.91614	-129.98943	26	4.3	1526.7	Switching to RDI.	8162
2018/08/24	22:37:09	45.91619	-129.98944	346	2.6	1527.7	Marker 276 is in sight alongside an old heavily sedimented benchmark.	8164
2018/08/24	22:38:02	45.91619	-129.98944	344	1.2	1529.0	CORRECTION: Marker 276 is in sight alongside an old heavily sedimented benchmark.	8167
2018/08/24	22:39:07	45.91618	-129.98944	342	1.5	1528.8	Marker 65 seems to mark the location of the old metal benchmark.	8170
2018/08/24	22:39:31	45.91618	-129.98943	347	0.8	1529.3	There are patches of tubeworms on the seafloor in this region.	8172
2018/08/24	22:39:47	45.91617	-129.98942	355	1.8	1528.7	Jason is having trouble landing at this benchmark which is located on a large ledge.	8173
2018/08/24	22:41:57	45.91618	-129.98942	341	0.8	1529.4	Jason has landed at benchmark AX-104 (Bag City).	8179
2018/08/24	22:44:03	45.91618	-129.98942	342	0.8	1529.4	The MPR has been removed from the basket.	8184
2018/08/24	22:44:30	45.91618	-129.98942	340	0.8	1529.5	HIGHLIGHTS: HIGHLIGHTS HD highlights start	8186
2018/08/24	22:45:05	45.91618	-129.98942	340	0.8	1529.5	Checking the MPR placement.	8188
2018/08/24	22:47:46	45.91618	-129.98942	340	0.8	1529.4	<b>PRESSURE: AX-104 Bag City Start. HIGHLIGHTS HD highlights start</b>	8194
2018/08/24	23:05:25	45.91617	-129.98941	340	0.8	1529.4	Measurement started around 2247 at Bag City AX-104.	8231
2018/08/24	23:07:34	45.91617	-129.98942	340	0.8	1529.3	<b>PRESSURE: AX-104 PRESSURE End</b>	8236
2018/08/24	23:07:49	45.91617	-129.98942	341	0.8	1529.3	Recovering the MPR.	8237
2018/08/24	23:08:12	45.91618	-129.98943	341	0.8	1529.3	Placing the MPR on its cradle in the basket.	8239
2018/08/24	23:09:06	45.91618	-129.98944	340	0.8	1529.4	MPR cable management.	8242
2018/08/24	23:10:06	45.91617	-129.98945	342	1.9	1528.3	Leaving the site.	8245
2018/08/24	23:10:33	45.91615	-129.98944	341	2.6	1528.5	Going to look for a sample of 2011 lava for Morgan near Bag City.	8247
2018/08/24	23:11:11	45.91615	-129.98945	341	1.9	1529.9	Rocks here look fairly solid. Looking for a small pillow bud.	8249
2018/08/24	23:12:30	45.91618	-129.98949	332	0.8	1530.8	Bringing out the port biobox.	8253
2018/08/24	23:13:23	45.91618	-129.9895	332	0.8	1530.7	Attempting to get a pillow bud in the 2011 lava flow.	8255

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1105 Logger Comment	vv
2018/08/24	23:14:22	45.91618	-129.98952	332	0.8	1530.7	<b>SAMPLE: J1105-Geo-09</b> Bud of 2011 lava near Bag City. Sample Geo	8258
2018/08/24	23:14:25	45.91618	-129.98952	332	0.8	1530.7	Very nice sample.	8260
2018/08/24	23:15:17	45.91619	-129.98953	332	0.8	1530.8	J1105-Geo-09 2011 Lava bud placed in Port biobox. Location 45.9167197 -129.989535. Heading is 332 and depth is 1530m.	8262
2018/08/24	23:17:24	45.91622	-129.98964	296	6.3	1525.1	Sample taken from below the ridge that AX-104 sits upon in the new 2011 lava.	8268
2018/08/24	23:17:40	45.91623	-129.98966	297	7.9	1523.6	Headed for Vixen to do some sampling.	8269
2018/08/24	23:19:03	45.91629	-129.98978	298	6.7	1524.3	Heading at 296 toward Vixen.	8273
2018/08/24	23:19:37	45.91632	-129.98981	298	5.4	1525.3	Driving over 2011 lavas.	8275
2018/08/24	23:20:42	45.91643	-129.99001	297	4.8	1525.2	Flattened pillow lavas with some sediment.	8278
2018/08/24	23:21:40	45.91652	-129.99017	298	4.0	1525.2	Large pillow features.	8281
2018/08/24	23:22:50	45.91662	-129.99032	298	4.0	1525.0	Flattened pillows. Coming up to a collapse or ridge.	8284
2018/08/24	23:23:40	45.91668	-129.99043	297	3.7	1525.1	On to sheet flow.	8287
2018/08/24	23:24:08	45.91672	-129.9905	297	7.0	1525.1	Coming to the other side of the collapse channel.	8289
2018/08/24	23:24:35	45.91675	-129.99057	296	7.3	1525.2	Back into large pillow lobes.	8291
2018/08/24	23:25:52	45.91683	-129.99069	297	4.1	1525.2	A lot more sediment coating here and a large crab.	8294
2018/08/24	23:26:52	45.91688	-129.99077	297	4.0	1525.1	Can see old staining below the pillows (rusty brown).	8297
2018/08/24	23:27:30	45.91692	-129.99084	299	4.7	1524.9	Here is a ridge with collapse feature and bridge across.	8300
2018/08/24	23:28:34	45.91699	-129.99098	298	5.1	1525.1	Flattened lobate flow on other side with some windows of collapsed pillows.	8303
2018/08/24	23:29:55	45.91704	-129.99113	296	4.9	1525.1	Some larger collapsed areas.	8307
2018/08/24	23:31:28	45.91707	-129.99136	296	6.1	1525.1	Flattened lobate flow with old staining.	8311
2018/08/24	23:35:12	45.91732	-129.99216	297	6.3	1525.2	Flying a bit high over these flattened lobate flows. Can see sediment between rocks. Must be in older flow.	8319
2018/08/24	23:36:23	45.91742	-129.99238	294	6.1	1525.3	Looking for Vixen at Mkr-57.	8322
2018/08/24	23:37:26	45.91747	-129.99261	265	7.2	1524.9	Turning to look west where nav says this should be.	8326
2018/08/24	23:38:42	45.91746	-129.99266	270	5.4	1526.6	Still looking with Nav saying only 16m away.	8329
2018/08/24	23:39:36	45.91744	-129.99283	267	4.7	1527.8	There is the donut from a previous energy experiment.	8332
2018/08/24	23:41:52	45.91737	-129.99297	201	3.1	1529.3	There is Mkr-128. Casper Vent.	8337
2018/08/24	23:42:08	45.91734	-129.99298	196	1.9	1530.5	There is Vixen but don't see its marker. There is the HOBO.	8339
2018/08/24	23:42:36	45.91736	-129.99299	229	0.8	1531.6	Looks like the HOBO is still in the flow.	8341

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1105 Logger Comment	vv
2018/08/24	23:43:28	45.91736	-129.99299	225	1.3	1531.1	Order of events here is temperature then sample.	8344
2018/08/24	23:44:01	45.91736	-129.99299	225	1.3	1531.1	Can see pieces of old structure that was over the vent.	8346
2018/08/24	23:44:09	45.91736	-129.99299	226	1.3	1531.1	Grabbing the temperature wand.	8347
2018/08/24	23:45:45	45.91736	-129.99299	226	1.3	1531.1	Heading is 226 and position is 45.917345 -129.992968 while take Vixen's temperature.	8351
2018/08/24	23:46:15	45.91735	-129.99299	226	1.3	1531.1	High temperature with Jason probe is 321degC.	8353
2018/08/24	23:47:50	45.91735	-129.99299	226	1.2	1531.1	HIGHLIGHTS: HIGHLIGHTS HD highlights start	8357
2018/08/24	23:48:17	45.91735	-129.99299	226	1.2	1531.1	Retrieving Green Major from the back of the basket.	8359
2018/08/24	23:50:45	45.91735	-129.99299	226	1.3	1531.1	<b>SAMPLE: J1105-Major-10</b> Green bottle at Vixen with Tmax of Sample Major	8365
2018/08/24	23:51:12	45.91735	-129.99299	226	1.3	1531.1	J1105-Major-10 cont. Bottle is filling after excavating a larger hole directly in the 321deg vent.	8367
2018/08/24	23:51:50	45.91735	-129.99299	226	1.3	1531.1	Placing the green major back into the aft of the basket.	8369
2018/08/24	23:53:25	45.91735	-129.99299	225	1.3	1531.1	Securing the major in the basket.	8374
2018/08/24	23:54:10	45.91735	-129.99299	225	1.3	1531.1	Retrieving the Yellow GTB from the basket for the next sample at Vixen.	8376
2018/08/24	23:55:20	45.91736	-129.99299	226	1.3	1531.1	Grabbed the yellow GTB.	8379
2018/08/24	23:56:52	45.91736	-129.99298	226	1.3	1531.0	<b>SAMPLE: J1105-GTB-11</b> at Vixen in the flow but not the sediment. Fired. Sample GTB	8383
2018/08/24	23:57:20	45.91736	-129.99298	225	1.3	1531.0	J1105-GTB-11 Fired in the orifice of Vixen at same place as major. Tmax was 321degC.	8385
2018/08/24	23:57:46	45.91736	-129.99298	226	1.3	1531.0	Taken with the yellow GTB GT-6 bottle. J1105-GTB-011 is the sample.	8387
2018/08/24	23:58:07	45.91736	-129.99298	226	1.3	1531.0	Putting the GTB back into the basket but need a bit of management with other arm first.	8389
2018/08/24	23:58:33	45.91736	-129.99298	226	1.4	1531.0	Port arm is holding the bungee out of the way.	8391
2018/08/24	23:58:59	45.91736	-129.99298	226	1.3	1531.0	Placing GTB back into its holder in the basket. Yellow GT-6 is in place.	8393
2018/08/25	00:00:00	45.91736	-129.99298	226	1.3	1531.0	Putting the bungee on the GTB.	8396
2018/08/25	00:04:42	45.91736	-129.99298	227	1.2	1531.1	<b>DEPLOY: HOBO 101</b> at Vixen to replace HOBO 151. DEPLOY HOBO temp probe	8406
2018/08/25	00:05:34	45.91736	-129.99298	227	1.3	1531.0	Deployed HOBO 101 at Vixen directly down the orifice just sampled. Lying next to old HOBO.	8409

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1105 Logger Comment	vv
2018/08/25	00:06:26	45.91736	-129.99298	228	1.3	1531.1	Repositioning HOBO 101 slightly away and more downward nozzle pointing. Could tell that the old HOBO was in the same orifice as it moved.	8412
2018/08/25	00:07:03	45.91736	-129.99298	227	1.3	1531.1	<b>RECOVER: HOBO 151</b> recovered at Vixen. Chalcopyrite on nozzle. RECOVER HOBO temp probe	8414
2018/08/25	00:07:18	45.91736	-129.99298	227	1.3	1531.0	Fool's gold covering the nozzle of the HOBO 151 at Vixen.	8415
2018/08/25	00:07:31	45.91736	-129.99298	228	1.3	1531.1	Nice view.	8417
2018/08/25	00:07:48	45.91736	-129.99298	227	1.3	1531.1	Gold!	8418
2018/08/25	00:08:29	45.91736	-129.99299	228	1.2	1531.1	Getting some close-ups of the mineral deposit.	8421
2018/08/25	00:09:09	45.91736	-129.99299	228	1.2	1531.1	More views of the nozzle.	8423
2018/08/25	00:10:57	45.91736	-129.99299	227	1.2	1531.1	Securing the HOBO in the aft of the basket behind the GTBs.	8428
2018/08/25	00:12:03	45.91736	-129.99299	227	1.2	1531.1	Bungee over the two HOBOS 104	8431
2018/08/25	00:12:23	45.91736	-129.99299	227	1.3	1531.0	Going to deploy a marker here to improve discovery and avoid confusion with Casper.	8432
2018/08/25	00:13:06	45.91736	-129.99299	226	1.3	1531.0	Aiming to put the marker to the right of the current heading of 226 in the right-front of the basket.	8435
2018/08/25	00:13:22	45.91736	-129.99299	226	1.3	1531.0	Grabbing Marker 218.	8436
2018/08/25	00:14:05	45.91736	-129.99299	226	1.4	1531.0	<b>DEPLOY: Mkr-218 at Vixen</b> to the right of the samples out of way. DEPLOY marker	8439
2018/08/25	00:14:20	45.91736	-129.99299	226	1.3	1531.0	DEPLOY: Deployed. DEPLOY marker	8440
2018/08/25	00:14:43	45.91736	-129.99299	226	1.2	1531.0	Mkr-218 anchor is in line with the HOBO orientation away from the vent.	8442
2018/08/25	00:14:52	45.91736	-129.99299	226	1.2	1531.0	Zoom in of the HOBO placement before leaving.	8443
2018/08/25	00:14:59	45.91736	-129.99298	226	1.2	1531.0	Placement looks good.	8445
2018/08/25	00:17:29	45.91732	-129.9929	117	4.4	1527.8	Headed to the South Pillow Mounds 4-hours away after working at Vixen.	8451
2018/08/25	00:17:36	45.91732	-129.9929	126	4.4	1527.8	Still ahead of schedule.	8452
2018/08/25	00:19:11	45.9172	-129.99268	127	2.5	1529.7	AX-105 is 6072m away bearing 008. (Long transit).	8456
2018/08/25	00:20:21	45.91732	-129.9927	347	2.8	1529.6	On our way south over pillows.	8459
2018/08/25	01:41:15	45.89781	-129.99688	16	107.9	1355.6	SAMPLE CORRECTIONS	8622
2018/08/25	01:41:40	45.89769	-129.9969	16	122.9	1355.6	Many of the samples were logged incorrectly-use the following corrections!!!!!!!!	8624
2018/08/25	01:42:17	45.89748	-129.99695	18	100.1	1355.6	Correction: There is NO SAMPLE #2. J1105-xxx-02 DOES NOT EXIST.	8626

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1105 Logger Comment	vv
2018/08/25	01:44:06	45.89724	-129.997	17	145.3	1355.6	EL GUAPO: J1105-MAJOR-03 used Major bottle #2 with 2 pieces of blue tape. (First El Guapo Major sample).	8631
2018/08/25	01:44:57	45.89715	-129.99702	17	145.3	1355.3	EL GUAPO: J1105-MAJOR-04 Sampled El Guapo with major bottle #1 with 3 pieces of white tape.	8634
2018/08/25	01:45:43	45.89699	-129.99705	19	119.1	1355.5	EL GUAPO: J1105-GTB-05 using white bottle GT-17.	8636
2018/08/25	01:46:19	45.89696	-129.99706	17	100.8	1355.5	EL GUAPO: J1105-GTB-06 used Red bottle GT-9	8638
2018/08/25	01:47:55	45.8967	-129.99711	17	152.9	1355.5	DIVA: J1105-MAJOR-07 Used the red major sampler (logged both as J1105-gtb-07 and major-05 incorrectly)	8643
2018/08/25	01:49:03	45.89648	-129.99715	18	135.2	1355.5	DIVA: J1105-GTB-08 Used the Purple GT-11 bottle (logged incorrectly as GTB-07)	8646
2018/08/25	01:49:50	45.89638	-129.99718	18	194.4	1355.5	Samples after this were logged correctly (**remember that there sample #2 was skipped J1105-XXX-02 doesn't exist).	8648
2018/08/25	04:20:08	45.86345	-130.00371	48	6.6	1711.3	Bottom in sight AX-105.	8950
2018/08/25	04:24:10	45.8632	-130.00379	1	0.8	1716.9	VEHICLE: Mini-BPR swap at AX-105. VEHICLE on bottom	8959
2018/08/25	04:24:21	45.8632	-130.00379	2	0.8	1716.9	HIGHLIGHTS: MPR recording AX-105. HIGHLIGHTS HD highlights start	8960
2018/08/25	04:25:40	45.8631	-130.00379	1	0.8	1716.9	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	8964
2018/08/25	04:26:18	45.86309	-130.00379	1	0.8	1716.9	<b>PRESSURE: MPR measurement AX-105. PRESSURE Start</b>	8966
2018/08/25	04:46:17	45.86315	-130.00379	2	0.8	1717.0	<b>PRESSURE: End of MPR measurement. PRESSURE End</b>	9007
2018/08/25	04:47:37	45.86314	-130.00378	1	0.8	1717.0	MPR in cradle.	9012
2018/08/25	04:48:34	45.86314	-130.00378	2	0.8	1717.0	HIGHLIGHTS: Mini-BPR 4 recovery. HIGHLIGHTS HD highlights start	9015
2018/08/25	04:48:52	45.86314	-130.00378	1	0.8	1717.0	<b>RECOVER: Swapping mini BPR 4 for 13 on seafloor.</b>	9016
2018/08/25	04:49:49	45.86314	-130.00379	1	0.8	1717.0	<b>DEPLOY: Mini BPR 13 on benchmark AX-105.</b>	9019
2018/08/25	04:49:59	45.86314	-130.00379	1	0.8	1717.0	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	9021
2018/08/25	05:11:04	45.8631	-130.00384	337	0.9	1716.8	<b>SAMPLE: J1105-GEO-12 grab sample of lava flow adjacent to AX-105 45.863154 -130.003826</b>	9064
2018/08/25	05:14:42	45.86349	-130.00377	337	0.9	1716.8	<b>SAMPLE: J1105-GEO-13 from same location as GEO-12.</b>	9072
2018/08/25	05:16:07	45.86349	-130.00373	21	3.0	1715.0	Begin transit to AX-104.	9076
2018/08/25	08:58:36	45.9152	-129.98976	180	90.4	1441.0	Jason is having issues with a thruster. Despite this we are attempting to descend as rapidly as possible to the bottom.	9523
2018/08/25	09:03:29	45.91633	-129.98966	213	59.8	1471.6	We are at 61 m altitude.	9534
2018/08/25	09:07:53	45.91644	-129.98962	213	14.9	1515.8	We are at 15 m altitude.	9543
2018/08/25	09:08:23	45.91644	-129.98956	202	7.8	1522.9	Bottom in sight.	9545

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1105 Logger Comment	vv
2018/08/25	09:08:52	45.91636	-129.98955	184	8.7	1522.3	NAV: NAV Doppler Reset	9547
2018/08/25	09:09:41	45.91622	-129.9895	146	7.0	1524.9	Marker #276 in sight.	9550
2018/08/25	09:11:59	45.91617	-129.98945	9	1.3	1529.4	We are attempting to land at benchmark AX-104 (marker #276).	9556
2018/08/25	09:13:00	45.91617	-129.98944	11	0.8	1529.7	We have landed on the bottom at benchmark AX-104.	9559
2018/08/25	09:13:52	45.91617	-129.98941	338	1.1	1529.7	We are off bottom again attempting to land in a better spot for sampling.	9561
2018/08/25	09:15:25	45.91618	-129.9894	316	1.0	1529.7	We have landed on bottom.	9566
2018/08/25	09:15:52	45.91619	-129.9894	316	1.0	1529.7	The MPR has been removed from the basket.	9567
2018/08/25	09:16:11	45.91619	-129.98941	315	1.0	1529.7	HIGHLIGHTS: HIGHLIGHTS HD highlights start	9569
2018/08/25	09:18:00	45.91619	-129.98942	315	1.0	1529.7	The MPR has been placed on the benchmark. The watch leader is satisfied with the placement.	9574
2018/08/25	09:18:13	45.91618	-129.98942	315	1.0	1529.7	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	9575
2018/08/25	09:18:17	45.91618	-129.98942	315	1.0	1529.7	<b>PRESSURE: PRESSURE Start AX-104</b>	9576
2018/08/25	09:24:39	45.91615	-129.98942	315	1.0	1529.6	While taking the MPR measurement we noticed some drips on one of the rocks nearby the benchmark AX-104	9590
2018/08/25	09:27:56	45.91615	-129.98942	315	1.0	1529.6	Current location is Lat: 45.916178N Long: -129.989460W Depth: 1528.2 m.	9598
2018/08/25	09:39:25	45.91615	-129.98942	315	1.0	1529.5	<b>PRESSURE: PRESSURE End AX-104</b>	9622
2018/08/25	09:39:47	45.91615	-129.98942	315	1.0	1529.5	The MPR has been removed from the benchmark.	9623
2018/08/25	09:40:52	45.91615	-129.98942	316	1.0	1529.5	The MPR has been placed back in the basket.	9626
2018/08/25	09:41:17	45.91615	-129.98942	315	1.3	1529.2	We are off bottom.	9628
2018/08/25	09:41:47	45.91615	-129.98942	324	2.9	1527.7	We are beginning our transit to AX-308. We are going to stop for GEO samples along the way.	9630
2018/08/25	09:44:18	45.91613	-129.98949	41	1.5	1530.3	Jason is on bottom.	9636
2018/08/25	09:58:38	45.91612	-129.98948	42	1.7	1530.2	<b>SAMPLE: J1105-GEO-14 Sample Geo</b>	9666
2018/08/25	09:59:58	45.9161	-129.98948	42	1.6	1530.2	J1105-GEO-14: Near Bag City (AX-104) Lat: 45.916163 Long: -129.989527 Depth: 1528.9 m. Sample was placed in the starboard-side forward crate with the major samplers. Sample crumpled when placed in box.	9670
2018/08/25	10:11:03	45.91613	-129.98949	44	1.8	1530.0	<b>SAMPLE: J1105-GEO-15 Sample Geo</b>	9693
2018/08/25	10:12:04	45.91613	-129.98949	44	1.8	1530.0	J1105-GEO-15: Lat: 45.916166 Long: -129.989501 Depth: 1529.0 m.	9696

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1105 Logger Comment	vv
2018/08/25	10:12:46	45.91612	-129.98949	43	1.7	1530.1	J1105-GEO-15 was collected by Morgan and is placed at the top of the starboard-side forward crate on top of sample J1105-GEO-14 which was collected by Haley.	9698
2018/08/25	10:13:34	45.91611	-129.98948	43	1.7	1530.1	Both samples (J1105-GEO-14 and 15 were collected in a highly-fractured pile of rock. Both samples appear to have a significant amount of glass underneath a devitrified rind.	9701
2018/08/25	10:14:02	45.9161	-129.98947	43	1.8	1530.0	Victor is collecting a small sample from the same pile J1105-GEO-14 and 15 were collected from.	9703
2018/08/25	10:16:48	45.91606	-129.98943	84	5.1	1526.0	The previous collection was failed and we are beginning our transit to benchmark AX-308.	9709
2018/08/25	10:16:51	45.91606	-129.98943	98	6.0	1525.4	Jason is off bottom.	9710
2018/08/25	10:17:15	45.916	-129.98939	135	5.2	1525.3	The transit to benchmark AX-308 is ~1873 m bearing 337 deg.	9712
2018/08/25	10:18:27	45.91583	-129.98916	137	14.4	1516.6	The bottom is no longer in sight.	9716
2018/08/25	11:41:14	45.93081	-129.99891	182	11.6	1519.7	NAV: NAV Doppler Reset	9882
2018/08/25	11:41:21	45.93083	-129.99892	184	11.6	1519.5	There is the bottom.	9883
2018/08/25	11:42:31	45.93104	-129.99891	184	11.2	1519.4	Approaching bottom near AX-308.	9887
2018/08/25	11:45:41	45.93138	-129.99894	185	2.6	1527.6	There is the bottom. Facing away from the benchmark location.	9895
2018/08/25	11:47:05	45.9314	-129.99892	99	3.3	1527.4	Turning around to face the benchmark location.	9899
2018/08/25	11:48:50	45.93151	-129.99876	23	3.1	1526.9	There is the benchmark with its mini BPR.	9903
2018/08/25	11:50:13	45.93156	-129.99867	271	2.5	1527.8	Settling the ROV down in front of the benchmark.	9908
2018/08/25	11:50:36	45.93157	-129.99869	268	2.4	1527.8	No marker at this site but the bicycle flag on the benchmark is highly visible.	9910
2018/08/25	11:53:19	45.93157	-129.99871	270	1.2	1528.9	ROV had a ground in one of the vertical thrusters so will hang on to the MPR during this deployment.	9916
2018/08/25	11:53:27	45.93157	-129.99871	270	1.2	1528.9	HIGHLIGHTS: HIGHLIGHTS HD highlights start	9918
2018/08/25	11:53:34	45.93157	-129.9987	270	1.2	1528.9	Placing MPR on the benchmark.	9919
2018/08/25	11:54:33	45.93157	-129.9987	270	1.2	1528.9	Checking the MPR placement.	9922
2018/08/25	11:55:22	45.93156	-129.99869	270	1.2	1528.9	Placement tilt is good.	9924
2018/08/25	11:55:34	45.93156	-129.99869	270	1.2	1528.9	HIGHLIGHTS:	9926
2018/08/25	11:55:43	45.93156	-129.99869	270	1.3	1528.9	<b>PRESSURE: AX-308. PRESSURE Start AX-308</b>	9927
2018/08/25	11:57:28	45.93157	-129.99869	270	1.2	1528.9	Jason is not releasing the MPR while recording due to the stability issue with loss of one of the thrusters.	9932
2018/08/25	12:15:13	45.93157	-129.99869	269	1.3	1528.7	<b>PRESSURE: PRESSURE End AX-308</b>	9968

Date	Time	Latitude	Longitude	Gyro	Altitude	Depth	J2-1105 Logger Comment	vv
2018/08/25	12:15:26	45.93157	-129.99869	269	1.3	1528.7	Done with measurement and picking up the MPR.	9970
2018/08/25	12:15:50	45.93157	-129.99869	269	1.2	1528.7	Placing MPR in the basket.	9971
2018/08/25	12:16:56	45.93157	-129.99872	269	1.2	1528.7	Grabbing the MPR cable to secure it over the basket.	9976
2018/08/25	12:18:29	45.93159	-129.9988	340	3.6	1526.2	Course 288 at 1049 meters to AX-106 the next benchmark.	9980
2018/08/25	12:19:08	45.93161	-129.99875	104	3.5	1526.3	Turning Jason around for tow mode to the next recording.	9982
2018/08/25	13:25:50	45.93452	-130.0116	203	13.9	1526.3	Jason is at the target location and will go down to the seafloor.	10116
2018/08/25	13:26:00	45.93451	-130.01161	204	11.5	1528.7	At AX-106 ASHES benchmark location.	10118
2018/08/25	13:26:51	45.93449	-130.01166	188	3.5	1536.9	Landing in front of the marker-precision piloting by Jimmy.	10120
2018/08/25	13:27:29	45.93441	-130.0116	115	2.9	1537.3	Lining up for the measurement.	10123
2018/08/25	13:29:53	45.93444	-130.01154	63	1.1	1539.0	In position to sample.	10130
2018/08/25	13:30:30	45.93444	-130.01155	63	1.1	1539.1	HIGHLIGHTS: AX-106 HIGHLIGHTS HD highlights start	10133
2018/08/25	13:30:45	45.93443	-130.01155	63	1.1	1539.0	Placing MPR on the benchmark at AX-106.	10134
2018/08/25	13:31:26	45.93443	-130.01155	63	1.1	1539.0	MPR is on the benchmark. Jason will not release the device again for this measurement.	10137
2018/08/25	13:31:33	45.93443	-130.01155	63	1.1	1539.0	Placement looks good. Checking tilt.	10138
2018/08/25	13:32:02	45.93443	-130.01155	63	1.1	1539.0	<b>PRESSURE: AX-106. PRESSURE Start</b>	10140
2018/08/25	13:32:13	45.93443	-130.01155	63	1.1	1539.0	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	10141
2018/08/25	13:51:28	45.93443	-130.01155	63	1.1	1539.0	Tilt was moving during this measurement. Not sure why but there is some movement in arm even though MPR looks stable.	10181
2018/08/25	13:52:21	45.93443	-130.01156	63	1.1	1539.0	<b>PRESSURE: PRESSURE End</b>	10183
2018/08/25	13:52:32	45.93443	-130.01156	63	1.1	1539.0	Retrieving MPR from benchmark.	10185
2018/08/25	13:52:38	45.93443	-130.01156	63	1.1	1539.0	Placing MPR in basket.	10186
2018/08/25	13:53:29	45.93442	-130.01157	63	1.0	1539.0	Placing MPR cable over the basket.	10189
2018/08/25	13:53:41	45.93442	-130.01157	64	1.1	1539.0	Ready for transit to AX-307.	10190
2018/08/25	13:54:37	45.93441	-130.01155	67	3.3	1537.1	Lift off and on the way to AX-307.	10193
2018/08/25	13:55:26	45.93433	-130.01155	188	5.8	1534.4	1200m away at 009 deg.	10196
2018/08/25	15:53:54	45.94507	-130.00901	355	39.9	1502.1	NAV: NAV Doppler Reset	10434
2018/08/25	15:55:23	45.94525	-130.00905	355	11.4	1530.8	AX-307 in sight.	10437
2018/08/25	15:57:47	45.94536	-130.00909	180	0.9	1541.2	VEHICLE: On site AX-307. VEHICLE on bottom	10443
2018/08/25	15:59:15	45.94536	-130.00909	180	0.8	1541.3	HIGHLIGHTS: AX-307 MPR recording. HIGHLIGHTS HD highlights start	10447

<b>Date</b>	<b>Time</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Gyro</b>	<b>Altitude</b>	<b>Depth</b>	<b>J2-1105 Logger Comment</b>	<b>vv</b>
2018/08/25	16:00:01	45.94536	-130.00909	180	0.8	1541.3	HIGHLIGHTS: HIGHLIGHTS HD highlights stop	10450
2018/08/25	16:06:00	45.94537	-130.00913	189	0.9	1541.3	<b>PRESSURE: MPR measurement AX-307. PRESSURE Start</b>	10463
2018/08/25	16:25:13	45.94535	-130.00912	189	1.0	1541.4	<b>PRESSURE: PRESSURE End</b>	10502
2018/08/25	16:29:02	45.94538	-130.00912	192	2.7	1539.8	MPR secured in cradle.	10511
2018/08/25	16:29:50	45.9454	-130.00912	190	3.7	1538.7	MPR strapped in cable.	10513
2018/08/25	16:30:13	45.94541	-130.00907	190	3.8	1538.6	Dropping weights for ascent.	10515
2018/08/25	16:39:43	45.94451	-130.00884	162	55.4	1484.9	Ascending for vehicle recovery.	10535
2018/08/25	17:39:37	45.94466	-130.00892	348	195.8	1.4	VEHICLE: VEHICLE out of water	10631

