Alaska Amphibious Community Seismic Experiment
Cruise Report

Leg 2 Recovery: WHOI OBSs and multibeam surveying

MGL1907 R/V *Marcus G. Langseth*

27 August 2019 – 12 September 2019

Kodiak, AK, USA to Kodiak, AK, USA

Figure 1.1*. Science party for the AACSE OBS recovery leg 2*

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1. Overview and Project Motivation

The Alaska Amphibious Community Seismic Project (AACSE) is a shore-crossing broadband seismic array designed to investigate subduction zone structure and seismicity across the Alaska Peninsula (Abers et al., 2019). We deployed an array of 75 broad-band ocean bottom seismometers (OBSs) and 30 broad-band land seismometers from May 2018 to September 2019. The array covers a ~650 km along-strike segment of the subduction zone, including the Alaska Peninsula and Kodiak Island, and reaches ~250 km seaward of the trench. It densifies and extends offshore the EarthScope Transportable Array (TA) in the region. Data from the array can be used to evaluate along-strike variations in incoming plate structure, densely sample the megathrust, and extend across the arc to allow imaging of the deep volcanic system.

This is a "community" experiment. The experiment was designed through open community forums and workshops in response to the March 2016 Dear Colleague Letter (DCL 16-061) requesting community-based proposals for a large amphibious seismic array located in the GeoPRISMS focus area of the Alaska-Aleutian subduction zone. The project objectives align with multiple goals outlined in various community science planning documents from the NSF-GeoPRISMS and NSF-EarthScope programs, as well as the nascent Subduction Zones in Four Dimensions (SZ4D) initiative. All data collected through the project will be immediately open to the community upon instrument recovery and archival via the IRIS Data Management Center (http://ds.iris.edu/ds/nodes/dmc/) as soon as logistically feasible.

The Alaska-Aleutian megathrust has generated more M>8 earthquakes in the last century that any other system, including the second-largest earthquake ever recorded, the 1964 M9.2 event. The Alaska Peninsula margin between the Sanak Islands and Kodiak Island encompasses the southern extent of the 1964 rupture area and portions of 2-3 additional historical megathrust ruptures (M8.3 in 1938, M8.2 in 1946) (Figure 2.2). The region also contains a so-called 'seismic gap' near the Shumagin Islands that has not ruptured in at least ~150 yrs (Davies et al., 1981). These along-strike variations in earthquake rupture history are accompanied by variations in plate coupling (Li & Freymueller, 2018), seismicity patterns (Shillington et al, 2015) and arc magma composition (Kelemen et al., 2003). Given that large-scale subduction zone geometry and tectonic parameters such as convergence rate and angle and plate age are relatively consistent across the margin, these along-strike variations make the region an excellent place to test competing theories for understanding controls on slip behavior and magmatism at subduction zones.

The large community-based seismic dataset developed by AACSE will allow investigators to address broad, fundamental questions related to subduction zone processes (from GeoPRISMS Subduction Cycles and Deformation, EarthScope and Alaska-Aleutians GeoPRISMS implementation plans):

1. *What changes in physical properties cause variation in seismic coupling, the occurrence of great earthquakes and aseismic creep on subduction megathrusts?*
2. *Is the subducting uppermost mantle hydrated and what controls variations in hydration along-strike?*
3. *What controls variations in volcanic arc crust/mantle structure, volcanic composition and the geometry of the arc melt production region?*
4. *How does the flow and volatile release generated by subduction zones interact with large-scale plate flow and the evolution of sub-continental mantle?*

Deployment of the ocean bottom seismometers took place during two cruises aboard the R/V *Sikuliaq* in the spring-summer of 2018. Recovery took place on two cruises in summer 2019, one on the *Sikuliaq* and this second one on the *R/V Marcus G. Langseth*. Additional data collection took place during several on-shore campaigns and a June, 2019 *Langseth* leg deploying airguns across the array. This report outlines objectives and outcomes of the second, final recovery leg aboard the *Langseth*.

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References

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Kelemen, P. B., Yogodzinski, G. M., & Scholl, D. W. (2003). Along-strike variation in the Aleutian Island Arc: Genesis of high Mg# andesite and implications for continental crust. In J. Eiler (Ed.), *Inside the Subduction Factory, Geophys. Monogr. Ser., vol. 138* (Vol. 138, pp. 223–276). Washington, DC: Amer. Geophys. Un.

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Shillington, D. J., Bécel, A., Nedimovic, M. R., Kuehn, H., Webb, S. C., Abers, G. A., et al. (2015). Link between plate fabric, hydration and subduction zone seismicity in Alaska. *Nat. Geosci.*, *8*, 961–964.

Figure 2.1*. OBS recovery.*

2. Cruise Objectives.

The AACSE Recovery Leg 2 cruise objectives were to recover thirty broadband ocean bottom seismometers deployed in July 2018 (of 75 total for experiment), and collect multibeam data in several critical deep water gaps. We recovered a total of 30 instruments including 25 broadband OBS WD46-WD70 and 5 Keck OBS WS71-WS75 (with strong motion sensor). The seismometers are from Woods Hole Oceanographic Institute. Temperature probes from University of Washington (Paul Johnson and Joan Gomberg, PIs) were deployed with all instruments. All of the OBS instruments were deployed on cruise SKQ201816S and recorded continuously in place for approximately 14 months. Use of the *Langseth* with its EM122 multibeam system allows wide-swath mapping in deep water, and several days as well as dog-legs between sites were devoted to surveys on both sides of the trench and the aftershock zone of a M7.9 earthquake off Kodiak in January 2018.

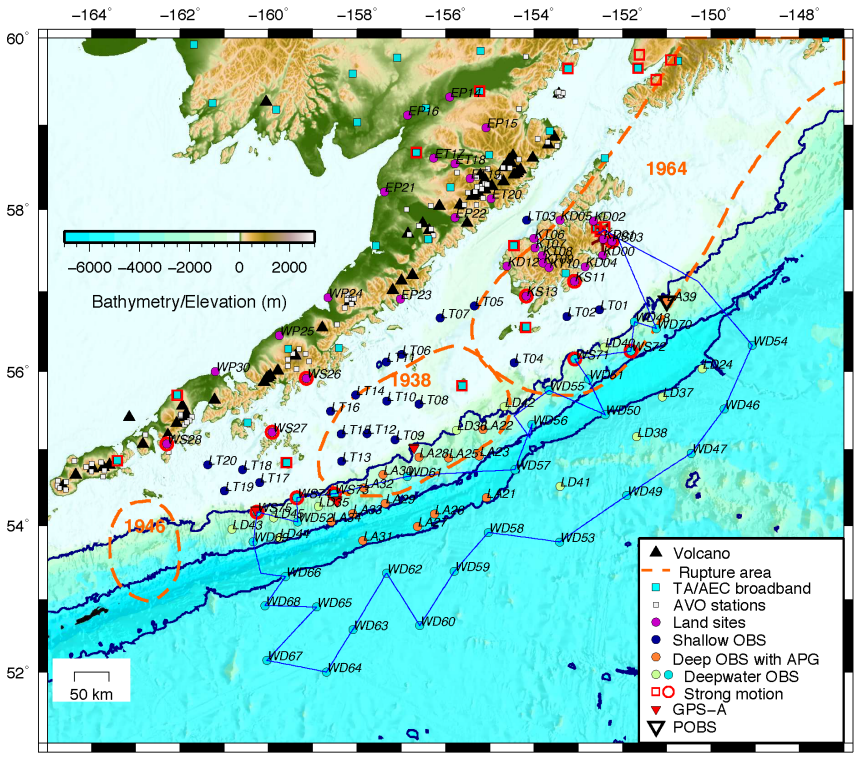


Figure 2.2: *AACSE as deployed in 2018, and planned cruise track without multibeam surveys (blue).*

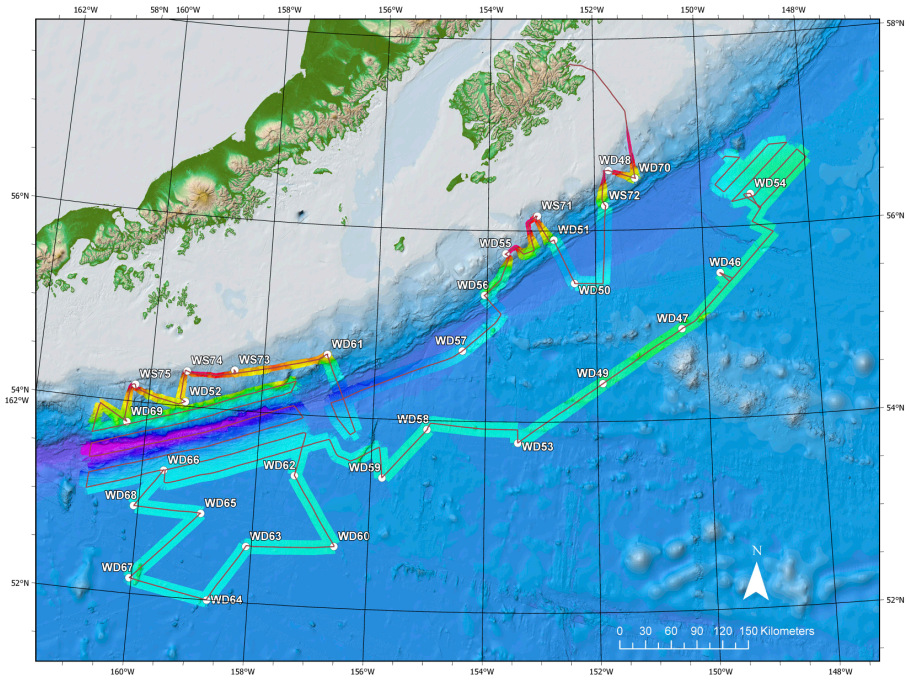


Figure 2.3*. MGL1907 – AACSE Recovery Leg 2 actual ship track and multibeam coverage.*

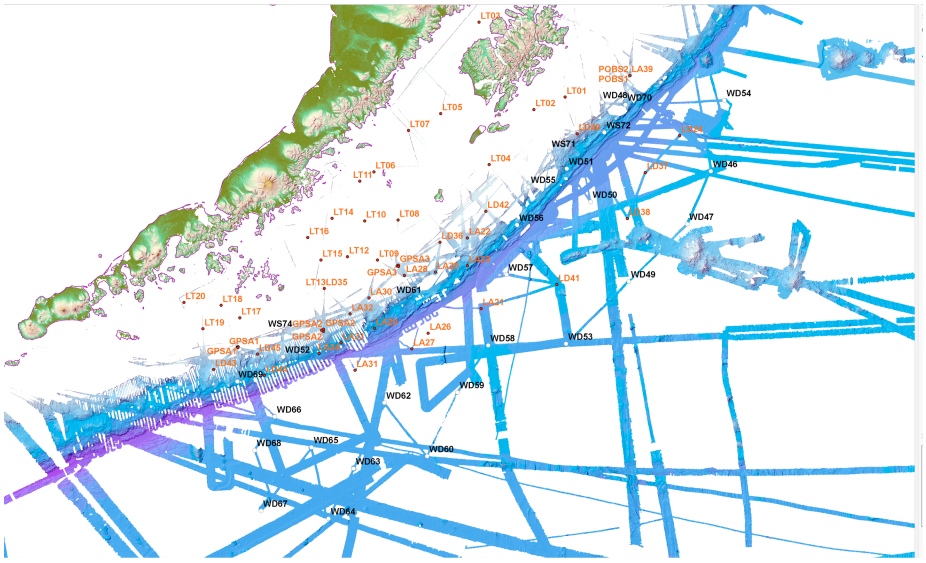


Figure 2.4. *Multibeam data off the Alaska Peninsula prior to 2018-2019 AACSE data collection*

List 1: Science Party, AACSE recovery leg 2

Participant	**Affiliation**	**Role**
Geoff Abers	Cornell Univ	Chief Scientist
Peter Haeussler	USGS-Anchorage	Co-Chief Scientist
Bill Danforth	USGS-Woods Hole	Multibeam Specialist
Igor Eufrasio	Northwestern	Apply-to-Sail - Grad Student
Heather Fisher	Sci. Fun for Everyone	Apply-to-Sail – Geosci. Professional
Cong Li	Univ. Massachusetts	Apply-to-Sail - Grad Student
Ginevra Moore	Uni. Washington	Apply-to-Sail - Grad Student
Em Schnorr	U.C. Santa Cruz	Apply-to-Sail - Grad Student
Zhenyang Zhou	Washington U. St. Louis	Apply-to-Sail - Grad Student
Tim Kane	WHOI	OBSIC Expedition Leader
Dan Kot	WHOI	OBS technician
Brian Kelly	WHOI	OBS technician
Jennifer McKee	WHOI//USGS Santa Cruz	OBS technician

List 2: Crew and Science Staff, AACSE recovery leg 2

Name	**Position**
Crum, Breckenridge C.	Master
Chrjapin, Jeffrey W.	Chief Mate
Reed, Reece W.	2nd Mate
Quinn, Tara J.	3rd Mate
Cereno, George G.	Bosun
Robison, William J.	AB
Purves, Rodrick M.	AB
Morgan, James A,	AB
Perito, Christian A.	OS
Douglas, Julian J.	OS
Tucke, Matthew S.	Chief Engr.
Levine, Isaac D.	1st A/ Engr.
Valdiconza, Luke A.	3rd A/Engr.
Neubelt, Dominique E.	3rd A/Engr.
Kononchik, Gregory R.	Oiler
Hempstead, Barry K.	Oiler
Davis Jr, Steven P.	Oiler
Rosson, Eric J.	Steward
Martires, Leoncio R.	Cook
Jensvold, Todd P.	Tech
Martinson, Dave	Tech
Spoto, Thomas	Tech
Shaver, Shaun	Tech

3. Cruise Narrative
Days and times are local times unless specified.

Saturday 8/25/19
WHOI OBS personnel arrive in Kodiak

Sunday 8/25/19
All remaining science personnel and Apply-to-Sail (A2S) participants arrive in Kodiak.
1000 Langseth arrives in Kodiak at Coast Guard dock
co-Chiefs & first student (Moore) tour Langseth, deal with lengthy USCG security process (40 minutes).
Co-chiefs & A2S participants join Kodiak land team (Susan Schwartz, Dan Sampson & Michael Mann) for pre-cruise post-land-recovery dinner (local fish). Lodging at Shelikof Lodge (Abers & A2S) or Best Western (USGS and WHOI personnel)

Monday 8/26/19

0830-1030 Science party moves on to Langseth, finalized shore shopping. Lunch aboard, followed by shipboard safety and behavior training and ship tour. Co-Chiefs with Captain and science leads conduct vessel and survey risk assessment.
1500 Langseth departs – earlier than originally planned in order to depart during slack tide. Travel ~ 5 kts departing harbor
1600 Multibeam (MB) and Knudsen start. Added MB waypoints en route to site. Transit speed of 10 kts once out of harbor. Transit to first site, roughly 12 hr. Transit deviates from straight path to fill in multibeam
1710 regular watch rotations begin. Start 30 minute watchstander log

2356 launch **XBT #1**

Watches

Co-Chiefs: 0400 – 1600: Abers; 1600 – 0400: Haeussler
WHOI-OBSIC: 1800 – 0600: Kott, Kelley; 0600 – 1800: Kane, McKee
LDEO-sciTech: 0000 – 1200: Martinson, Spoto; 1200-2400: Jensvold, Shaver
Apply-to-sailors:
0600-1400 - Ginevra Moore and Igor Eufrasio
1400-2200 - Cong Li and Em Schnorr
2200-0600 - Heather Fisher and Zhenyang Zhao

Tuesday 8/27/19 (jd 239)
First full day of OBS recoveries and data collection. Good weather, calm seas.

WD70
0157 turn off MB, Knudsen, ADCP at 1 mile from OBS WD70
0200 recovery begins for WD70; all hands; slow first OBS for learning
0320 release begins
0432 WD70 on surface
0444 WD70 onboard, depart
Depth: 3253 m. Rise time: 100 min; 33 m/min.

Calm seas. Neither the radio beacon nor strobe worked, but OBS was spotted visually in ship's search light from bridge.

Station Recovery notes:

- OBS recovery procedure is described in Section 4. Sonar is turned off before using acoustics – 15 minutes before arrival for first stations, upon arrival for rest. Sonar is turned back on once first lines are secured to OBS. Throughout the procedure, a monitoring script records acoustic ranging to provide data on ascent rate and expected rise time. The WHOI OBSIC group conducts extensive post-recovery assessment, disassembly and downloading described in Section 4.
- Information on XBTs, sensor water depths and recovery, temperature sensor ID#s, and other parameters are given in tables and appendices below.
- For many transits between stations, waypoints were added to better fill in multibeam gaps – typically offsetting the track from that done during the deployment cruise. Only the most significant deviations are noted in the narrative.
- OBS rise rates below are calculated in two ways, from the difference between surfacing and burn time (neither of which are well known) or from robust regression on the slope of the range-vs-time curve, although drift of the monitoring vessel is another unknown (See Appendix 5).

WD48
0624 fifteen minutes from site, sonar secured
0631 stopped at WD48 for recovery
0716 sensor locked
0720 estimated release time
0751 visual siting
0812 WD48 onboard, depart.
Water depth: 1324 m Rise time: 33 minutes Rate: 40 m/min (actual) 23 m/min (apparent)
Temperature sensors: Iceland (#S9406) and two Tidbits (#20233080 and #20233093)

Multibeam test. Transit to next (WS72) slowed to 8 kts, compared with 10-10.5 kts prior, to test effect on multibeam. Analysis the next day by Danforth shows that MB quality is higher at 10 knots: 600 rpm at 85% pitch is optimal as documented in 2011 assessment report on Langseth EM122 (Gates and Yearta, 2011); we confirm. This allows faster transits while MB mapping.

1030 fire drill and muster

WS72
1130 stopped for WS72 recovery
1214 sensor locked
1223 estimated release time
1445 WS72 visual on site
1450 WS72 onboard, depart 1503
Temperature sensors: one Antares (#1854489) and one Tidbit (#20233118).
Water depth: 4142 m Rise time: 144 min Rate: 30 m/min
Notes: This is a "Keck" station with additional strong-motion channels. Data for this station are incomplete suggesting a failure. Inspection of data shows a power glitch on 2018:240 (28 Aug.) after which broadband channels stopped producing intelligible data, current draws and Q330 temperature

increased, and voltages dropped. Accelerometer and DPG channels operated until 2019:103 (13 Apr.). This pattern is very similar to failure on WD56 and suggests further engineering comparison of the two is warranted.

1436 **XBT #2** cast, while crossing trench

2329 **XBT #3**? cast (has same raw file as #4)

Wednesday 8/28/19 (jd 240)

Second full day of OBS recoveries with calm – even glassy – seas and blue skies. All science party got into the rhythm of shipboard life and watchstanding duties. Found out from Sikuliaq crew that they were unable to wake up and recover three Lamont OBSs. We are considering how to visit those sites and work them into our plan and see if we have better success. Also, weather forecast shows a large storm hitting us over the weekend. We are assessing how to optimize our OBS pickup time prior to the storm and multibeam mapping during storm.

WD50
2138 (8/27) sonar secured
2140 (8/27 local) stopped for WD50 recovery
2213 (8/27) estimated release time (double pings); probably 2208
0000 WD50 on surface
0031 WD50 onboard, sonar restarted
Temperature sensors: two Tidbits (#20233132 and #20233120)
Water depth: 4987 m Rise time: 142 m Rate: 35 m/min (from spot time) 43 m/min (from ranges)

WD51
0350 Stopped for WD51 recovery
0444 completed release sequence
0552 expected at surface
0540 on surface
0619 WD51 on board, sonars back on
Water depth: 4361 m Rise time: 106 min; Rate: 41 m/min, both methods
Temperature sensors: one Antares (#1854129), one Tidbit (#20233101).
Note: Temperature sensor types & serial numbers did not match the deployment logsheet. Mixed in original with WS71?
Note: Strobe not working

WS71
0846 stopped for WS71 recovery, sonar secured. New procedure, sonar stays on until ship is stopped on site.
0906 release command; 0910 first double ping.
0955 WS71 on surface 1001 visual siting
1038 WS71 onboard, sonar back on
Temperature sensors: one Iceland (#S9417) and two Tidbits (#20233113 and #20233085).
Water depth: 1555 Rise time: 45 min Data status: OK
Note: Seismometer not locked when on surface, even though used 15 min in lock cycle. Temperature sensors did NOT match installation notes; looks like deploy notes swapped with WD51 listing. Sea stars took ride.

WD55
1533 stopped for WD55 recovery, sonar secured
1623 WD55 sited on surface
1655 WD55 onboard, sonar back on
Temperature sensors: one Iceland (#S9430) and two Tidbits (#20233109 and #20233126)
Water depth: 1284 m Rise time: 42 min, 31 m/min (burn to surface), 31 m/mn (regression)

WD56
2024 stopped for WD56 recovery, sonar off
2240 est. time on surface
2306 WD56 on board, sonar back online
Temperature sensors: one Antares (#1854114) and one Tidbit (#20233131)
Water depth: 4060 m Rise time: 122 min. Rise rate: 34 m/min (regression)
Note: Inspection of data shows that this instrument did not record for the full duration. It was deployed 2018:200, and broadband channels seem to have failed 2018:230 (one month). This prompted an increased power draw as indicated by voltage and current logs, and the instrument stopped recording on 2019:101. This pattern is very similar to failure on WS72 and suggests further engineering comparison of the two is warranted.

2145 **XBT #5** launched (2350 in 30-min logfile?)

Thursday 8/29/19 (jd 241)
OBS pickup operations went well during the day, except the attempt to talk to LA27, which we also could not communicate with. OBS techs were having issues being able to download data off of the recovered OBSs. Storm forecast is showing winds in upper 30 kts and seas over 9 feet on Sept. 1. Added a whiteboard entry in Main Lab showing OBS name of station we are heading toward, estimated arrival time, and next station name.

WD57
0441 stopped for WD57 recovery
0626 on surface
0643 OBS WD57 onboard, sonar resumed
Temperature sensors: Two Tidbits (#20233088 and #20233104)
Water Depth: 5053 m. Rise time: 115 min. Rate: 45 m/min (regression)

LA27 (LDEO instrument)
1722 arrived at site of LDEO OBS LA27, turn off sonar – Pickup Leg1 could not communicate.
Tim Kane cycles through both sets of acoustic codes for both Release commands, at all available gains.
1937 after two hours of trying acoustic commands, with no response, gave up and departed

1330 First science talk (Geoff Abers, AACSE overview)

1929 **XBT #6** launch

Friday 8/30/19 (jd 242)

Start regular activities: ping-editing of MB data, rise time compilation; first OBS data peek. After a day of difficulty, OBSIC personnel succeed in accessing Quanterra baler data disks to commence download.

WD61
0306 at site WD61, sonar secured
0417 WD61 on surface
0443 WD61 on board, sonar resumed
Water depth: 2067 m Rise time: 63 min, rate: 32 m/min (regression)
Temperature sensors: one Iceland (#S9419) and two Tidbits (#20233103 and #20233102)

WS73
1130 on site WS73, sonar off
1240 est. on surface
1317 WS73 onboard, sonars on
Water depth: 2133 m Rise time: 74 min, rate: 27 m/min (regression)
Temperature sensors: one Iceland (#S9431) and two Tidbits (#20337825 and #20216910)
Data Note: OBS system is dead after retrieval, primary batteries were drained. It appears that it died within minutes of landing on sea floor. No data.

1430 Engine room tour with Dominique Neubelt, most A2S students

WS74
1653 on site WS74, sonars off
1803 WS74 onboard, sonars on
Water depth: 903 m Rise time: 37 min, rate: 29 m/min (regression)
Temperature sensors: one Iceland (#S9413) and two Tidbits (#20233123 and #20233084)

WD52
2034 on sight WD52, sonar off
2200 est. time on surface
2232 WD52 onboard, sonars on
Water depth: 2564 m Rise time: 87 min, rate: 29 m/min (observed) 27 m/min (regression)
Temperature sensors: one Iceland (#S9422) and two Tidbits (#20233124 and #20233083)

1800 Peter Haeussler gave science talk on Alaska tectonics

2141 **XBT #7** launch

Saturday, 8/31/19 (jd243)
Day started rather blustery, but mostly relatively calm seas and winds 12-18 kts and blue skies and increasing winds and waves through day. Could see Shumagin Islands in distance during WD69 pickup. Started survey area A at end of day after waves and winds picked up.

WS75
0226 On site WS75, sonars off
0329 est. time on surface

0358 WS75 onboard, sonars on
Water depth: 1109 m Rise time: 42 min. rate: 26 m/min.
Temperature sensors: one Iceland (#S9435) and two Tidbits (#20233086 and #20233133)
Note: This is first OBS that did not rise after first try; took two Release sequences. Had numerous additional pings during communication. Acoustic data were not recorded successfully.

0600 1 hour delay at 4 kts due to ship traffic

WD69
0730 on site WD69, sonars off
0930 Recovery of WD69 shipside. Seas getting big, some difficulty tagging and pulling OBS as ship was being blown over it, but recovered intact using A frame to separate OBS from ship.
0952 WD69 onboard, sonars on. Shumagin Islands visible in distance.
Water depth: 3896 m Rise time: 117 min, rate: 33 m/min
Temperature sensors: one Antares (#1854472) and one Tidbit (#20216909)

Heavy weather setting in, winds 25-30 kts (increasing through day).

LD43 (LDEO instrument site)
The Leg 1 team tried and failed to recover an OBS at this site. Pickup Leg1 could not communicate.
1200 at site of LDEO OBS LD43 turn off sonar
We cycle through Enable commands - three cycles of all gains, both transducer codes, no response after 1 h 30 min. Seas are too heavy to attempt burn/release & recover, so goal is just to ascertain if we can communicate. We cannot.
1330 no response, give up and depart. Start 3.5 day multibeam survey.

Survey A: Multibeam survey of both sides of trench in Shumagin region. Four lines 130 nm long.
1655 start first line, due south of LD43

In heavy storm and winds across starboard rail, main deck is closed and cannot reach WHOI OBS container. As a result, a hiatus in data downloading. Ship only making five knots on transits, but 8 kts downwind. Multibeam data quality is poor to the SW, to windward, and results in a number of missed pings. In retrospect, we could have narrowed the beams to possibly improve data quality.

1800 Ginevra Moore gives science talk about Seattle Fault chirp imaging

Sunday 9/01/2019 (jd 244)
Continuing Multibeam Survey A of region around Shumagin trench. Heavy seas, sustained winds of 35-40 kts from S changing to SW to W. Ship's mates estimate waves at 18 feet with largest to roughly 25 feet. First 1.5 of four lines underway. Most people feeling the effects of the storm at some level, with at least one A2S student quite sea sick. Main deck shipping water and hazardous to walk out on.

0302 **XBT #8** launched

0944 finish first line near 157° 23.6'W. Average speed 7.9 kts
transit to second line directly into wind, average 3.6 kts. Heavy water over deck.

1155 start second line (54 13.99 N, 157 28.92W) heading into wind. Averaging 5 kts. OBSIC personnel are able to reach WHOI van by late afternoon along this heading, as winds are blowing seas over port rail away from main deck area.

1215 **XBT #9** launched

Monday 9/02/2019 (jd245)
Continuing Multibeam Survey A of region around Shumagin trench. Slow speed on this (2nd) line (5-ish kts) as going into the waves to the WSW. Reduced max angle of multibeam to 45° at 09:35 to partly compensate for degraded signal (noisy on this heading). Throughout the day the wind subsided to 20-25 kts.

0040 **XBT #10** launch

1103 **XBT #11** launch

1220 end second line, cross trench near 160° 56' W. Average speed on second line 5.3 kts

1332 start third line just south of trench. Increased MB range to 65°

1800 Bill Danforth science talk on multibeam system operations

Tuesday 9/03/2019 (jd246)
Continuing Multibeam Survey A of region around Shumagin trench, which is showing beautiful outer rise normal faults, the thrust front, gullies and lateral extent of structures. Backscatter illuminates fault scarps nicely. Ginevra developed a good Knudsen processing workflow. Storm is over, seas are relatively calm, and all are back in normal action. Survey speed back up to 9-10 kts.

0101 **XBT #12** launch

0350 end third line travelling ENE, average speed 9.5 kts downwind
0452 start fourth (final) line to WSW, headwind. Wind speed reduced to 15-20 kts, 8.5-9.5 kts SOG
1000 Whale siting – two, probably humpback

1600 – OBS lab tour: Tim Kane showed science party details of OBS construction and discussed automated steps in deployment and recovery

Wednesday 9/04/2019 (jd247)
Finished MB survey area A and began additional OBS pickups. Storm forecast for coming weekend should be short and be a good time for more bottom mapping. Goal is to recover 7-8 OBSs in next 48 hours before storm. Watching weather: looks like gets bad Fri-Sat 9/6-9/7. Plan is to change order so get WD60 immediately after WD63, while weather should be good, then go to WD62. If weather is good we recover WD62, if not we can begin 1-1.5 day MB survey (adding to Survey A) and end at WD62.

WD66
0313 on site for recovery of WD66, sonar off
0340 locked, released
0515 WD66 seen on surface
0541 WD66 onboard, sonar restarted
Water Depth: 4941 m. Rise time 110 min, rate ~42 m/min very fast. R/F beacon not working.
Temperature Sensors: Two Tidbits (20233081, 20233087)

0353 **XBT** #14

WD68
0914 on site for recovery, sonar off
0918 Guralp lock command
0923 sent burn/release command
1111 spotted on surface
1130 OBS WD68 secured, sonar back on
Water Depth: 4715 m.
Rise time: 108 min, 43 m/min (observed) - Fast
Temperature Sensors: Two Tidbits (20233090, 20233097)

WD65
1549 on site WD65, sonar ssecured
1555 Guralp locked
1614 Burn / release
1829 Observed on surface
1847 WD65 on deck, sonars on
Water Depth: 4718 m. Rise time 135 min, rate 35 m/min (from times
Temperature Sensors: Two Tidbits (20233098, 20216908)

Today, students practiced "elevator pitches" – short talks explaining their research and its significance to someone who doesn't know anything about geology.

Thursday 9/05/2019 (jd248)
Continue rapid recovery of OBSs in southeast corner of array. Brackets are set up for ping-pong and cribbage tournaments.

WD67
0141 On site WD67, sonar off
0210 Released
0340 visual siting and RDF signal for WD57
0401 on deck, sonar restarted
Water Depth: 4652 m. Rise time: 90 min, rate close to 40 m/min
Temperature sensors: Antares 1854130 Tidbit 20233091 ** Tidbit appears to be broken

WD64
0915 on site WD64, sonars off

0922 start burn command (maybe 13 min. to double ping)
1135 visual siting
1207 WD64 onboard, sonars on
Water depth: 4754 m Rise time: 133 m, rate: 33 m/min
Temperature Sensors: Two tidbits 20233079, 20233094 (*second Tidbit sensor broken)
Data Note: LH2/HH2 broadband channel looks dead throughout the deployment

WD63
1623 on site WD63, sonars off
1625 Guralp locked
1634 WD63 off sea floor
1816 WD64 on surface from radio, visual
1828 OBS WD63 recovered, sonars on
Water Depth: 4656 Rise time: 102 min, 44 m/min observed
Temperature Sensors: One Antares one Tidbit (1854469, 20233108)
Data Note: LHZ/HHZ broadband channel looks dead throughout the deployment

Talk today was Cong Li, showing his eastern US receiver-function imaging.

Friday 9/06/2019 (jd249)
Finished pickup of this suite of OBSs in southwest part of array and began second MB survey. Storm is starting to pick up as recovering the last OBS, WD64, around lunchtime. Then, headed north to continue the trench-parallel lines in the Shumagin segment. The storm peaked around dinner time, followed with sudden clearing and a sunny evening. The cribbage tournament started with both co-chief's washing out in the first round, and ping-pong pros are making their presence felt in that tournament. Early watches practiced donning survival 'gumby' suits.

WD60
0033 on site WD60, sonars off
0035 Guralp locked
0042 WD60 rising
0229 WD60 on surface, visual/flasher and RDF
0257 WD62 on board, sonars on
Water Depth: 4519 m   Rise Time: 115 minutes, rate ~40 m/min
Temperature Sensors: One Antares one Tidbit, #s 1854488, 20233096

WD62
0813 On site WD62, sonars off
0815 Guralp locked
0822 WD62 rising, left sea floor
1030 Visual siting
1050 OBS WD62 on board, sonars on
Water Depth: 4625 m Rise Time: 128min rate about 36 m/min
Temperature Sensors: One Antares one Tidbit, #s 1854414, 20233092
Recovery was in some wind and rain but seas were still reasonable; flag damaged by hull on recovery.

1352: Start Multibeam survey B, turned to SW

1450: **Deployed XBT** #15

1800 Talk by Em Schnorr on glacial seismology and seismic monitoring of debris flows

WD59
1859 On site WD59, sonars off
1922 Guralp locked
1940 WD59 rising, left sea floor
2140 Visual siting
2150 OBS WD59 on board, sonars on
Water Depth: 4550 m Rise Time: 120 min rate about 38 m/min
Temperature Sensors: One Antares one Tidbit, #s 1854411, 20233107
Flag was lost on recovery, RDF did not work. Data looks fine.

Saturday 9/07/2019 (jd250)
Today, finishing multibeam survey B and heading for final series of OBS pickups.

0130 Turned NE for start of second/final line on MB survey B

WD58
0210 On site WD58, sonars off
0212 Guralp lock command sent
0221 WD58 rising, left sea floor
0407 visual siting
0414 WD58 on board, sonars on, proceed to next site
Water depth: 4493 m Rise time: 106 min rate 42 m/min
Temperature sensors: Antares 1854410 Tidbit 20233125
Recovery smooth, data looks good

0548 **XBT** #17 (note: there is no #16, was accidentally skipped in sequence)

0407 Visual siting
0414 OBS WD58 on board, sonars on
Water Depth: 4493 m Rise Time: 174 min rate about 31 m/min
Temperature Sensors: One Antares one Tidbit, #s 1854410, 20233125
No problems during recovery.

1600 Heather Fisher led discussion of several papers on Shumagin seismic gap

Sunday 9/08/2019 (jd251)
Continue recovery of last set OBSs on the Pacific plate, progressing eastward across the study area. Good weather makes recoveries smooth and multibeam data quality good. The ship track largely progresses straight between OBSs with minor deviations to avoid redundancy with past cruises.

0808 **XBT** #18 launched

WD53
1103 On site WD53, sonars off
1109 Guralp locked
1114 WD53 rising, left sea floor
1312 Visual siting
1321 OBS WD53 on board, sonars on
Water Depth: 4646 m Rise Time: 118 min rate about 39 m/min
Temperature Sensors: One Antares, one Tidbit, #s 1854471, 20233719
No problems during recovery. Data look good.

WD49
2011 On site WD49, sonars off
2014 Guralp locked
2048 WD49 rising, left sea floor
2201 Visual siting
2217 OBS WD49 on board, sonars on
Water Depth: 4091 m Rise Time: 102 min rate about 38 m/min
Temperature Sensors: One Antares, one Tidbit, #s 1854482, 20233078
Easy recovery. Data look OK.

1800 Group meeting reads three papers about the 2018 M7.9 earthquake, and discusses priorities for surveying the aftershock zone.

Monday 9/09/2019 (jd252)
Final day of OBS pickups. After WD47 we enter the aftershock area of the 2018 M7.9 earthquake, and start planning MB survey – mostly focused on the aftershock zone. Captain relays target of 0800 on 9/12 at Humpback Rock near Kodiak (57 43.7N, 152 12.3W).

WD47
0442 On site WD47, sonars off
0445 Guralp lock command sent.
0500 WD47 release command sent, leaves sea floor
0650 Visual siting
0713 OBS WD47 on board, sonars on
Water Depth: 3999 m Rise Time: 110 min rate initially 35 m/min then 42 m/min last 30 min
Temperature Sensors: One Antares one Tidbit, #s 1854415, 20233111
Recovery smooth, not clear if strobe worked.
Data Notes: Low data volume: Broadband channels failed immediately upon deployment, and system failed 2019:040 (9_Feb_2019). DPG channel looks OK. Sensor did not lock during recovery.

WD46
1253 On site WD46, sonars off
1306 Tried acoustics BB1, failed to Enable, switch to BB2
1309 WD46 release command sent, leaves sea floor

1526 Visual siting
1537 OBS WD46 on board, sonars on
Water Depth: 4349 m Rise Time: 110 min rate initially 35 m/min then 42 m/min last 30 min
Temperature Sensors: One Antares one Tidbit, #s 1854468, 20233121
Recovery smooth, not clear if strobe worked.
Note: Acoustics on first channel (BB1) did not work, had to go to BB2. Because BB2 did not have locking command, sensor did not lock. Tried and failed with BB1 during ascent.
Data Notes: Low data volume: Broadband channels failed immediately upon deployment, and system failed 2019:044 (3_Feb_2019). DPG channel looks OK. Sensor did not lock during recovery. Problem and failure mode looks very similar to WD47.

1800 Talk: Zhenyang Zhou discussed his seismic research in Antarctica

Tuesday 9/10/2019 (jd253)
Last OBS pickup is early this morning, which went smoothly. OBS operators devote rest of time to finishing downloads of last OBSs, securing to deck and packing. Cruise continues with roughly 40 hours of multibeam mapping in Survey area C, focusing on aftershock zone of January, 2018 M7.9 earthquake, and adjacent part of forearc on way back to Kodiak. Science party focuses on data reduction and organization.

WD54
0136 On site WD54, sonars off
0141 Guralp lock command sent
0145 WD54 release command sent, leaves sea floor
0333 visual siting
0356 OBS WD54 on board, sonars on, starting multibeam survey in vicinity of Kodiak earthquake
Water depth: 4533 Rise time: 108 min est 42 m/min
Temperature Sensors: Antares 1854108 and Tidbit 20233100
Data Notes: Looks like H2 horizontal channel failed about 2019:098, was fine before that. All other channels look OK.

1800 Igor Eufrasio gives student talk on his potential field research on the mid-continent rift.

Wednesday 9/11/2019 (jd254)
Continued multibeam and Knudsen chirp data acquisition on the aftershock area of the 2018 Kodiak earthquake and a section of the lower slope. Seas are very calm, multibeam data quality is high. Overall we see low relief but small (tens of m) N-S features, probably faults, all sub-parallel to the main apparent fault plane for the 2018 earthquake.

0359 Launch **XBT # 24**, out of sequence

1100 Completed survey of 2019 aftershock area. ross the trench to head to start of a trench-parallel line part way up the slope.

1400 Start final trench-parallel line in 2-3 km water depth. Increase pitch to maximum speed (90%) to reach Kodiak on time.

Thursday 9/12/2019 (jd255)
At 0000, ended final trench-parallel line and turned to port. Regular watch rotations ended.

0800 reach Humpback Rock at entrance to passage to Kodiak

1030 dock at USCG, end of MCL1907. Science party disembarks after lunch, 1230.

Friday 9/13/2019
Science party leaves Kodiak after overnight onshore.

4. OBS Recovery Operations

The WHOI engineers took responsibility for the recovery of the OBS instruments, with assistance from the A2S participants. Two different sensor packages were deployed: a 4-pod package with broadband sensor only ("BBOBS") and a 6-pod package ("Keck") with broadband and strong motion sensors (see section 5 OBS instrumentation specifics). All instruments also include a differential pressure gauge (DPG). *Langseth* personnel undertook all A-frame operations, while the WHOI OBS Engineers controlled most of the tag lines and worked the release lines, and A2S participants did most acoustic release work, assisted with tag lines, and with disassembly. WHOI engineers secured instruments and performed post-recovery operations.

Procedure for all OBS recoveries: Fifteen minutes from arrival at site, OBS lab and main science lab receives first warning of approach from bridge. (at 1st two sites, turn off onboard sonar/acoustics here). At 1 mi out set up log sheet and logging of Edgetech acoustic ranging (through WD50, turn off sonar here). After full stop, begin acoustic Enable, then lock Guralp, then burn/release (A2S participants are fully trained to do all acoustics after 2nd or 3rd OBS). Prior to running acoustic communication, turn off multibeam, Knudsen 3.5 kHz, and ADCP. Once burn/release is initiated, estimate rise time from burn time /apparent "double ping" time indicating seafloor reflection, either at a default rate (30 m/min for Keck, 35 or 40 m/min for others) or try to estimate from range changes of first few minutes ranging. Bridge is notified of estimated surface time once it is calculated. Once sited or in radio contact, the bridge radios OBS & main lab when in radio contact. The bridge maneuvered the vessel such that the pickup was on the starboard side and the instrument would drift toward the vessel in its lee (i.e. vessel would drift slightly forward and downwind toward the instrument). All instruments were recovered from the starboard side of the vessel using the A-frame and a winch, after tagging with lines and hooks over the starboard rail to the main deck. The A frame is used to lift the OBS onboard, then it is secured to deck. At that point, the bridge is notified that it is safe to get underway to the next site and the sonar systems are restarted. The A2S volunteers photo-document the procedure, documents/removes UW temperature sensors, and assists with cleaning and initial disassembly.

Post-recovery procedures. Once an instrument is recovered, it is secured to a rack that is bolted to the ships deck prior to getting underway. Once secured, the sensor arm and transducers mounted on the instrument are removed for shipping purposes. While the instrument is being broken down, one OBS technician will bring the aluminum sensor sphere into the van and another technician will plug an instrument checkout cable into the recovered instrument to begin the instrument debrief. This instrument checkout cable provides the ability to interrogate the instrument, logging the system state of health, placing the instrument into various modes where historical information may be obtained and to get a clock check. The clock check is performed within minutes of recovery to ensure the most accurate clock assessment

has been made. The instrument has been keeping time with a SeaScan clock for the duration of the deployment. The SeaScan clock was synchronized with GPS time just prior to deployment. The SeaScan is a very stable crystal oscillator clock which by design is most accurate at 4 degrees C (ocean bottom temperature), which is why making a time check as soon as possible makes for the most accurate assessment of the time loss or gain that the clock has made during deployment. Inside the van we have two types of GPS receivers who's output is made available to the host computer. A script running on the computer will parse the NMEA strings coming from the GPS receivers, stripping GPS time from the strings and simultaneously comparing GPS time to the time the instrument thinks it is (SeaScan clock). After the clock check is performed and time drift logged, a series of system checks are performed and settings made to gain information about the system and place it in a data download mode. The instrument is then moved off the recovery rack to allow for the next recovery. The instrument is secured on deck in a new location and connected to a new cable to begin the data download process. All data the instrument recorded during deployment will be transferred to and external hard disk drive. This download is performed over Ethernet using the penetrator cables that pass through the glass spheres to the Quanterra Q330 and Baler. This allows the extraction of data from the Baler without having to open the glass spheres. After all data downloads have been performed, multiple copies, usually 4, are made and distributed amongst OBS personnel or others in the Science Party to ensure the data makes it back to WHOI where it is clock corrected and cut into SEGY. Finally, the aluminum sphere which houses the Guralp 3T sensor is brought into the van and opened up. Inside the sphere, the internal gimbal system is unlocked to allow the insertion of a special foam pack that is designed for use only during shipment of the sensor. On the sensor control board, there is a flash card which is removed and the data on the flash card is downloaded onto a PC. This flash card contains engineering data specific to the 3T sensor and the leveling system. The flash card contains files that have recorded the history of this sensors leveling, gimbal locking, sensor lock and unlock, centering, tilt and system voltage over the course of deployment.

During each deployment the watch party took detailed notes on the location, time, depth, acoustic range status and weather conditions during the deployment, as well as other pertinent information. These were recorded in two places (1) the cruise eLog logbook (Appendix 8), and (2) on information sheets, which were scanned and collated into pdf files (Appendix 11). Station deployment locations (Table 1), OBS survey locations (Table 2), and OBS serial numbers (Table 2) are provided.

University of Washington Temperature probes had been attached to all OBS frames in order to measure temperature changes related to turbidity currents (Table 3). These were photographed, removed and cataloged as part of the instrument break-down, by A2S volunteers. The three styles of temperature sensors were Antares, Iceland, and Tidbit. One or two Tidbit style probes were attached to each OBS package, Iceland CT was attached to shallow water OBS, and Antares temperature probes were attached to the mid- and deep-water OBS. Temperature probes were removed and serial numbers recorded (associated with OBS frame number), and stored in a separate case for return to Paul Johnson of UW.

Table 1. OBS Location and Recovery Information

AACSE Station Name	WHOI OBS ID	Bottom Date (UTC)	Bottom Time (UTC)	Surveyed Station Latitude (decimal degrees)	Surveyed Station Longitude (decimal degrees)	Surveyed Station Depth (m)	Epi-sensor Y/N	Recovery Date (UTC)	Recovery : Time (UTC)
WD46	S73	7/12/18	22:05:28	55.52139	-149.70373	4348.7	N	9/9/19	21:09:37
WD47	S71	7/13/18	6:31:18	54.95135	-150.44479	3998.5	N	9/9/19	12:43:05
WD48	S69	7/22/18	2:25:51	56.62737	-151.73134	1323.5	N	8/27/19	15:04:55
WD49	S38	7/13/18	16:50:34	54.39908	-151.89947	4090.7	N	9/9/19	4:14:55
WD50	S05	7/21/18	9:44:00	55.44953	-152.39176	4986.6	N	8/28/19	6:03:03
WD51	S70	7/21/18	1:45:13	55.90509	-152.77177	4361.0	N	8/28/19	11:58:00
WD52	S61	7/18/18	16:39:00	54.04662	-159.34622	2563.6	N	8/31/19	4:38:05
WD53	S59	7/14/18	2:57:44	53.77945	-153.42291	4645.7	N	9/8/19	19:05:36
WD54	S30	7/22/18	18:34:00	56.33143	-149.06667	4520.4	N	9/10/19	9:41:40
WD55	S65	7/20/18	14:49:00	55.76163	-153.66282	1283.5	N	8/28/19	23:34:36
WD56	S48	7/20/18	7:59:00	55.32227	-154.04708	4059.9	N	8/29/19	4:21:40
WD57	S19	7/19/18	23:52:51	54.73639	-154.43431	5053.3	N	8/29/19	12:22:17
WD58	S01	7/14/18	15:14:21	53.90623	-155.03535	4493.3	N	9/8/19	10:12:22
WD59	S23	7/14/18	23:17:38	53.38371	-155.79939	4550.3	N	9/8/19	3:05:23
WD60	S37	7/15/18	9:01:32	52.64488	-156.57982	4518.7	N	9/6/19	8:35:41
WD61	S66	7/19/18	10:50:38	54.64761	-156.86828	2066.7	N	8/30/19	11:09:02
WD62	S27	7/14/18	17:55:27	53.36196	-157.33188	4625.6	N	9/6/19	16:15:12
WD63	S45	7/16/18	2:49:25	52.59007	-158.09358	4656.4	N	9/6/19	0:24:50
WD64	S42	7/16/18	10:21:13	52.00108	-158.69156	4753.9	N	9/5/19	17:16:21
WD65	S67	7/16/18	19:12:13	52.89906	-158.91238	4718.2	N	9/4/19	23:54:40
WD66	S72	7/17/18	22:20:57	53.31452	-159.61757	4941.1	N	9/4/19	11:17:23
WD67	S68	7/17/18	5:12:39	52.16256	-160.03583	4651.5	N	9/5/19	9:43:24
WD68	S46	7/17/18	14:38:00	52.91760	-160.08115	4715.1	N	9/4/19	17:17:29
WD69	S22	7/18/18	5:35:32	53.78207	-160.34289	3895.9	N	8/31/19	15:28:23
WD70	S53	7/22/18	6:29:00	56.54107	-151.23441	3252.9	N	8/27/19	10:43:00
WS71	S87	7/20/18	20:25:45	56.15695	-153.07892	1554.8	Y	8/28/19	16:48:48
WS72	S86	7/21/18	21:14:17	56.25775	-151.81063	4141.7	Y	8/27/19	19:59:17
WS73	S80	7/19/18	1:48:39	54.41996	-158.51328	2132.9	Y	8/30/19	19:24:02
WS74	S85	7/18/18	20:26:26	54.36919	-159.36163	902.9	Y	8/31/19	0:59:27
WS75	S84	7/18/18	10:58:17	54.17963	-160.25691	1108.9	Y	8/31/19	10:29:34

Note: Recovery time corresponds to when Guralp Lock command (Burn-2) was sent, except WD46 for which lock command could not be sent, and time is departure from sea floor. Survey information is from Deployment cruise.

IRIS-DMC/FDSN Network Code is XD (2018-2019) for all AACSE OBSs.

Table 2. WHOI OBS Configuration and Descriptions

WHOI OBS Instrument Configuration, AACSE Deployment, SKQ201816S, 2018-07-24										
Site	Drop date & time (UTC)	OBS	Q330 Tag ID	DPG S/N	Episensor (Strong Motion) S/N	Seismom. ID	Guralp S/N	BB1 Reply Freq (kHz)	BB2 Reply Freq (kHz)	Radio Freq (MHz)
WD58	2018-07-14 13:29	S01	2017	14002	N/A	A047	T3G35	11.50	13.00	154.585
WD50	2018-07-21 07:49	S05	2957	6007	N/A	B026	T3L70	11.50	13.00	154.585
WD57	2018-07-19 21:57	S19	0237	14005	N/A	B033	T34006	11.50	13.00	154.585
WD69	2018-07-18 04:05	S22	2956	9043	N/A	B030	T3L78	11.50	13.00	154.585
WD59	2018-07-14 21:30	S23	2955	6018	N/A	B031	T34005	11.50	13.00	154.585
WD62	2018-07-14 16:07	S27	2953	6005	N/A	A021	T3J96	11.50	13.00	154.585
WD54	2018-07-22 16:50	S30	0242	6013	N/A	A007	T33996	11.50	13.00	154.585
WD60	2018-07-15 07:16	S37	0276	6001	N/A	A025	T3L45	11.50	13.00	154.585
WD49	2018-07-13 15:15	S38	0223	6019	N/A	B036	T33990	11.50	13.00	154.585
WD64	2018-07-16 08:30	S42	2952	005	N/A	B039	T34008	11.50	13.00	160.725
WD63	2018-07-16 01:01	S45	2950	09042	N/A	B041	T33994	11.50	13.00	154.585
WD68	2018-07-17 12:49	S46	0257	6021	N/A	B032	T33992	11.50	13.00	154.585
WD56	2018-07-20 06:20	S48	0127	14001	N/A	B028	T34002	11.50	13.00	154.585
WD70	2018-07-22 05:14	S53	2948	024	N/A	A010	T3G37	11.50	13.00	154.585
WD53	2018-07-14 01:11	S59	2947	14007	N/A	A008	T3L01	11.50	13.00	154.585
WD52	2018-07-18 15:40	S61	2014	42	N/A	A004	T3L03	11.50	13.00	154.585
WD55	2018-07-20 14:19	S65	2001	035	N/A	B042	T33993	11.50	13.00	154.585
WD61	2018-07-19 10:01	S66	2003	6017	N/A	B040	T34009	11.50	13.00	154.585
WD65	2018-07-16 17:23	S67	2004	6009	N/A	B035	T34001	13.00	13.00	154.585
WD67	2018-07-17 03:25	S68	2005	6020	N/A	A014	T3L68	11.50	13.00	160.785
WD48	2018-07-22 01:55	S69	2140	9040	N/A	A020	T3G41	11.50	13.00	160.725
WD51	2018-07-21 00:04	S70	2018	056	N/A	A022	T33999	11.50	13.00	154.585
WD47	2018-07-13 04:57	S71	2019	6006	N/A	A024	T3L05	11.50	13.00	160.785
WD66	2018-07-17 20:24	S72	2020	09034	N/A	B027	T33995	11.50	13.00	160.725
WD46	2018-07-12 20:24	S73	2021	6002	N/A	B037	T34010	11.50	13.00	154.585
WS73	2018-07-19 00:48	S80	2006	9031	2836	A002	T3G38	11.50	13.00	154.585
WS75	2018-07-18 10:26	S84	2010	14003	2870	A013	T3L02	11.50	13.00	154.585
WS74	2018-07-18 20:01	S85	2011	048	2865	A015	T3G30	11.50	13.00	154.585
WS72	2018-07-21 19:17	S86	2012	14004	2863	A016	T3J97	11.50	13.00	154.585
WS71	2018-07-20 19:41	S87	2015	002	2866	A018	T3L46	11.50	13.00	154.585

Table 3. List of University of Washington temperature sensors recovered.

	DEPLOY			LOGGED IN DEPLOYMENT				RECOVER		LOGGED ON RETRIEVAL			
Site	Date-Time	OBS	Depth	Antares	Iceland	Tidbit 1	Tidbit 2	Date (UTC)	Time (UTC)	Antares	Iceland	Tidbit 1	Tidbit 2
WD46	12-Jul-18 20:24	S73	4348.7	1854468		20233121		9-Sep-19	21:05:57	1854468		20233121	
WD47	13-Jul-18 4:57	S71	3998.5	1854415		20233111		9-Sep-19	12:42:01	1854415		20233111	
WD49	13-Jul-18 15:15	S38	4090.7	1854482		20233078		9-Sep-19	04:13:35	1854482		20233078	
WD53	14-Jul-18 1:11	S59	4645.7	1854471		20233119		8-Sep-19	19:03:30	1854471		20233119	
WD62	14-Jul-18 16:07	S27	4625.6	1854414		20233092		6-Sep-19	16:13:38	1854414		20233092	
WD59	14-Jul-18 21:30	S23	4550.3	1854411		20233107		8-Sep-19	03:04:11	1854411		20233107	
WD58	14-Jul-18 13:29	S01	4493.3	1854410		20233125		8-Sep-19	10:11:10	1854410		20233125	
WD60	15-Jul-18 7:16	S37	4518.7	1854488		20233096		6-Sep-19	08:32:10	1854488		20233096	
WD63	16-Jul-18 1:01	S45	4656.4	1854469		20233108		6-Sep-19	00:23:49	1854469		20233108	
WD64	16-Jul-18 8:30	S42	4753.9			20233079	20233094	5-Sep-19	17:16:21			20233079	20233094
WD65	16-Jul-18 17:23	S67	4718.2			20233098	20216908	5-Sep-19	02:43:00			20233098	20216908
WD67	17-Jul-18 3:25	S68	4651.5	1854130		20233091		5-Sep-19	09:41:00	1854130		20233091	
WD68	17-Jul-18 12:49	S46	4715.1			20233090	20233097	4-Sep-19	17:15:00			20233090	20233097
WD66	17-Jul-18 20:24	S72	4941.1			20233081	20233087	4-Sep-19	11:15:00			20233081	20233087
WD69	18-Jul-18 4:05	S22	3895.9	1854472		20216909		31-Aug-19	15:24:00	1854472		20216909	
WD75	18-Jul-18 10:26	S84	1108.9		S9435	20233086	20233133	31-Aug-19	10:27:00		S9435	20233086	20233133
WD52	18-Jul-18 15:40	S61	2563.6		S9422	20233124	20233083	31-Aug-19	06:32:00		S9422	20233124	20233083
WD74	18-Jul-18 20:01	S85	902.9		S9413	20233123	20233084	31-Aug-19	02:03:00		S9413	20233123	20233084
WD73	19-Jul-18 0:48	S80	2132.9		S9431	20337825	20216910	30-Aug-19	19:21:00		S9431	20337825	20216910
WD61	19-Jul-18 10:01	S66	2066.7		S9419	20233103	20233102	30-Aug-19	11:07:00		S9419	20233103	20233102
WD57	19-Jul-18 21:57	S19	5053.3			20233088	20233104	29-Aug-19	12:20:00			20233088	20233104
WD56	20-Jul-18 6:20	S48	4059.9	1854114		20233131		28-Aug-19	04:20:00	1854114		20233131	
WD55	20-Jul-18 14:19	S65	1283.5		S9430	20233109	20233126	28-Aug-19	23:32:00		S9430	20233109	20233126
WD71	20-Jul-18 19:41	S87	1554.8	1854129		20233101		28-Aug-19	16:46:00		S9417	20233113	20233085
WD51	21-Jul-18 0:04	S70	4361		S9417	20233113	20233085	28-Aug-19	11:54:00	1854129		20233101	
WD50	21-Jul-18 7:49	S05	4986.6			20233132	20233120	28-Aug-19	05:48:00			20233132	20233120
WD72	21-Jul-18 19:17	S86	4147.7	1854489		20233118		27-Aug-19	19:48:00	1854489		20233118	
WD48	22-Jul-18 1:55	S69	1323.5		S9406	20233080	20233093	27-Aug-19	15:01:00		S9406	20233080	20233093
WD70	22-Jul-18 5:14	S53	3252.9	1854481		20233105		27-Aug-19	10:25:00	1854481		20233105	
WD54	22-Jul-18 16:50	S30	4520.4	1854108		20233100		10-Sep-19	09:37:44	1854108		20233100	

Notes: (1) WD51 and WD71 s/n at recovery do not match deployment notes; seem to have been swapped. (2) WD64 and WD67 Tidbit's appear to be broken.

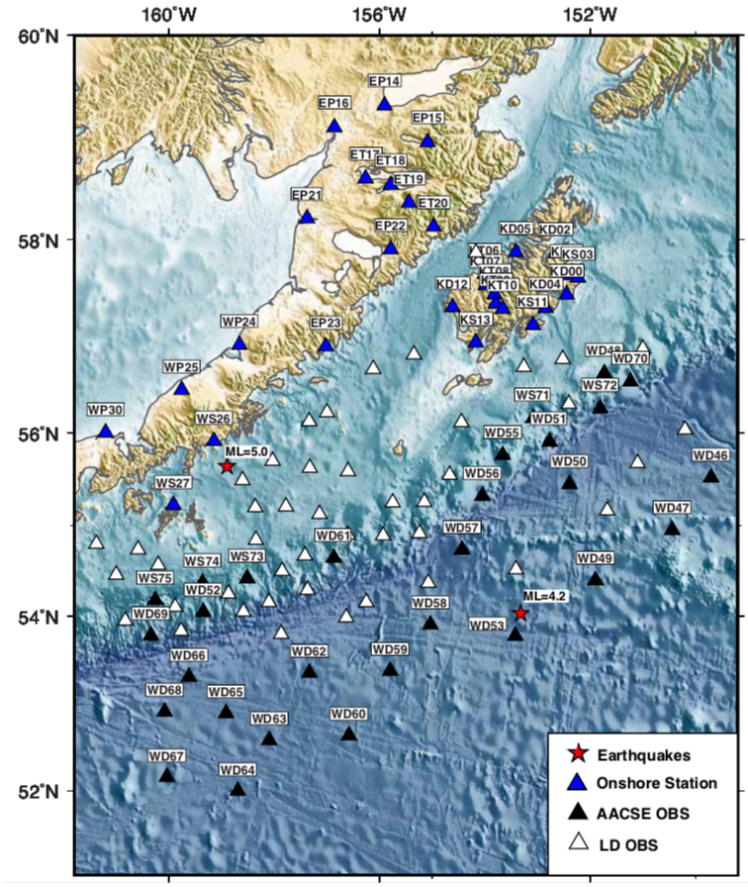
5. Bathymetric and subbottom data collection and processing

Bathymetry data was collected using Kongsberg Seafloor Information Systems (SIS) data acquisition software in conjunction with a Simrad EM122 Multibeam Echo Sounder transmitting at 12 kHz. Sound velocity profiles were collected at least once daily using eXpendable BathyThermographs (XBT), and the data from the XBT's were then loaded in the SIS software to ensure proper sound ray tracing through the water column. After each line segment, the raw data files were copied from the data acquisition computer to a separate workstation and imported and imported into the Quality Positioning Services (QPS) Qimera bathymetric processing software for inspection and removal of extraneous soundings. At the end of the survey a final cleaned Qimera grid was exported to several grid formats and a color-coded shaded relief TIF image, then added to an ArcGIS project containing the trackline navigation, OBS station locations, XBT locations, final grids from MGL1903, and other ancillary data.

Subbottom seismic reflection chirp data were collected using a Knudsen Engineering Limited (KEL) 3260 Chirp echosounder operating at 3.5 kHz. Preliminary processing and QA/QC of the KEL Chirp data was accomplished using a series of scripts that utilize the seismic processing packages SIOSeis (sioseis.ucsd.edu) and SeismicUnix (github.com/JohnStockwellJr/SeisUnix).

See Appendices 3 and 4 for detailed information on the multibeam and subbottom data collection and processing techniques used during the MGL1907 survey, respectively, and Appendix 7 for XBT information.

6. Examples of recovered seismic data



All OBS data were downloaded for initial inspection while underway. They have not yet had time corrections applied or appropriate metadata associated; those operations will be done at the WHOI OBSIC after data are returned. As an initial step in quality control, several record sections were generated of three representative earthquakes: ML=4.2 and ML=5.0 earthquakes within the array, and the Mw7.1 Anchorage earthquake of Nov. 30, 2018 a few hundred km distant. These examples were generated by A2S participants Cong Li and Em Schnorr.

Figure 6.1. *Distribution of the broadband seismic stations deployed in the study region. The blue triangles represent the onshore stations, the black triangles for the WHOI OBSs recovered in this cruise, and the white triangles for the LDEO OBSs. The background color is the bathymetry/topography. Two local earthquakes were chosen for checking the quality of data.*

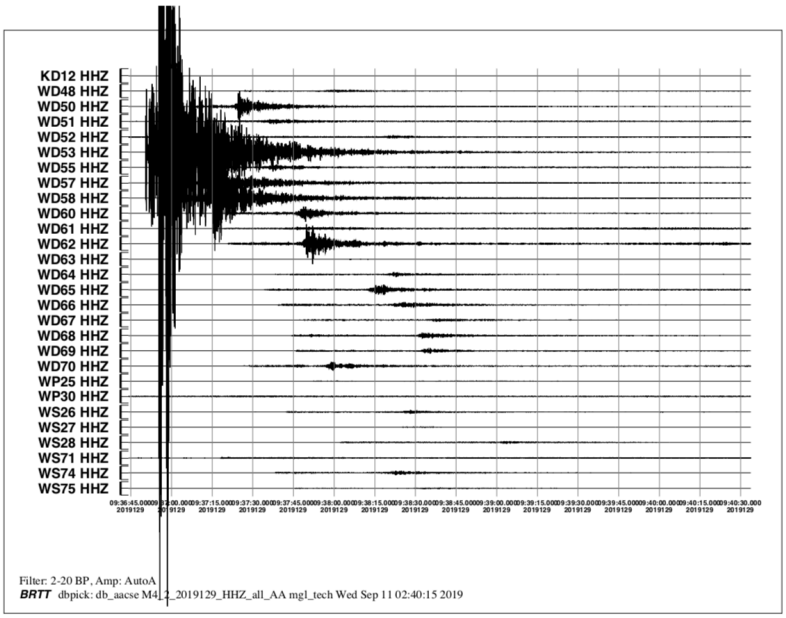


Figure 6.2. *Seismograms recorded by 100 samples per second (sps) broad band vertical components of both onshore and offshore stations. The M_L=4.2 earthquake was at UTC time 09:36:44 on May 9th, 2019. The locations of earthquake and stations are shown in Figure 6.1, labeled ML=4.2. The waveforms were band-pass filtered 2-20 Hz and were normalized by the largest amplitude for all of the displayed traces. The amplitude of seismograms in WD53 is much larger than in other stations because of the close distance from the earthquake.*

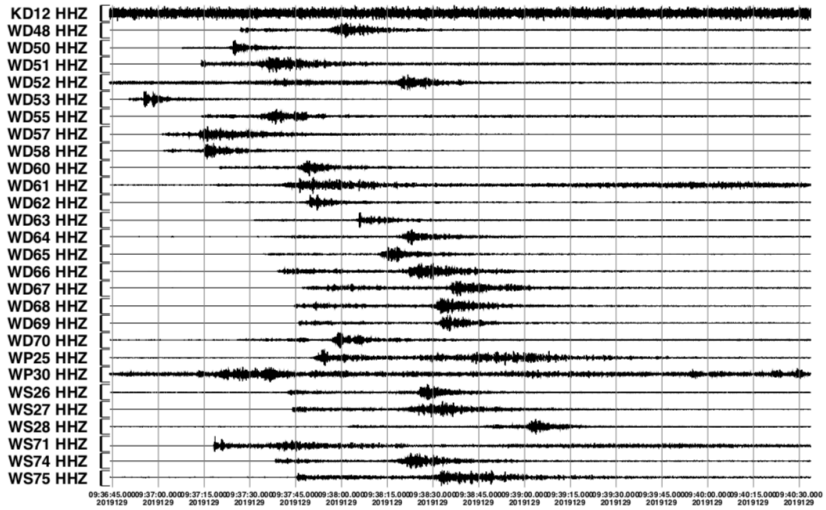


Figure 6.3. *Similar as Figure 6.2 but the seismograms were normalized by the largest amplitude of each trace individually. The data recorded by onshore station WP30 are noisy, and KD12 had a non-recording sensor (onshore).*

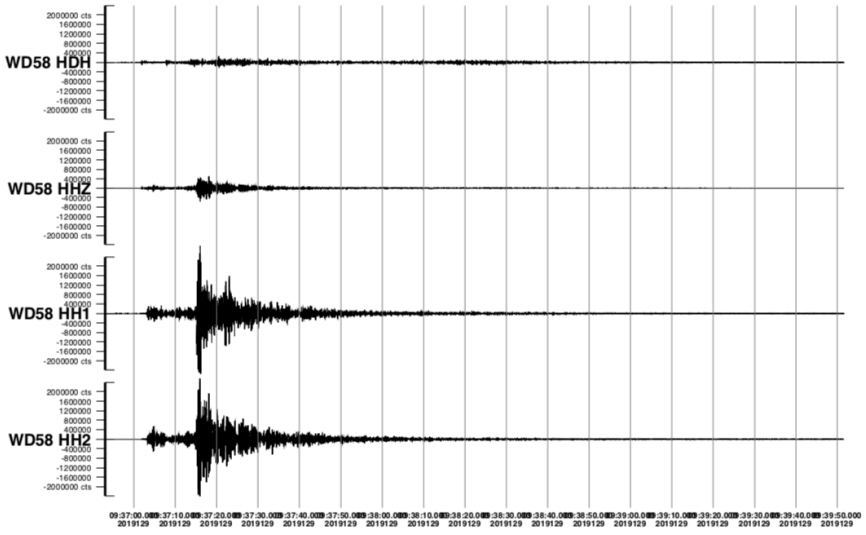


Figure 6.4. *Seismograms recorded by the broad band seismometer (HHZ, HH1, HH2) and DPG (HDH) at station WD58; locations ML=4.2 earthquake and station are shown in Figure 6.1. The waveforms were band-pass filtered at 2-20 Hz and were normalized by the largest amplitude for all of the displayed traces.*

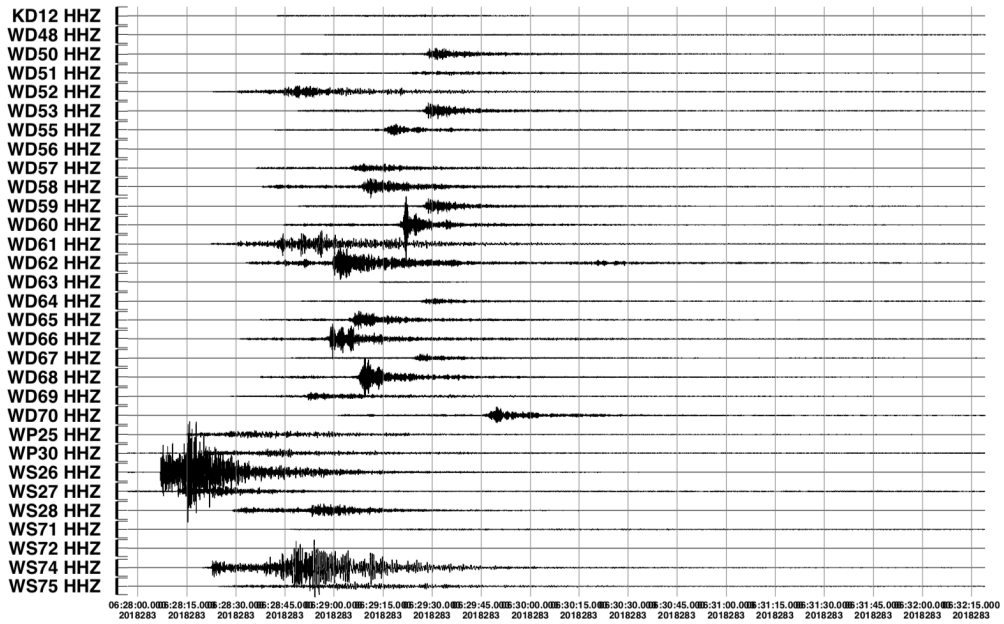


Figure 6.5. *Seismograms recorded by broad band vertical components of both onshore and offshore stations. The ML=5.0 earthquake was happened at UTC time of 06:27:58 on October 10th, 2018. The locations of earthquake and stations are shown in Figure 6.1. The waveforms were band-pass filtered with 2-20 Hz and were normalized by the largest amplitude for all of the displayed traces.*

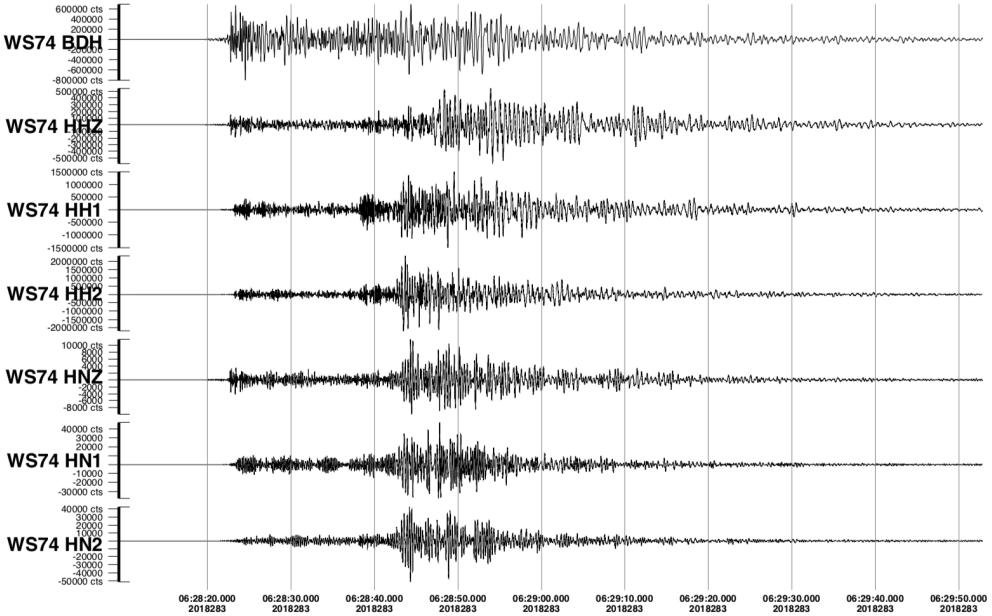


Figure 6.6. *Seismograms recorded by the broad band seismometer (HHZ, HH1, HH2), accelerometer (HNZ, HN1, HN2) and DPG (BDH) at station WS74. The locations of ML=5.0 earthquake and station WS74 are shown in Figure 6.1. The waveforms were band-pass filtered with 2-20 Hz and were normalized by the largest amplitude of each trace individually.*

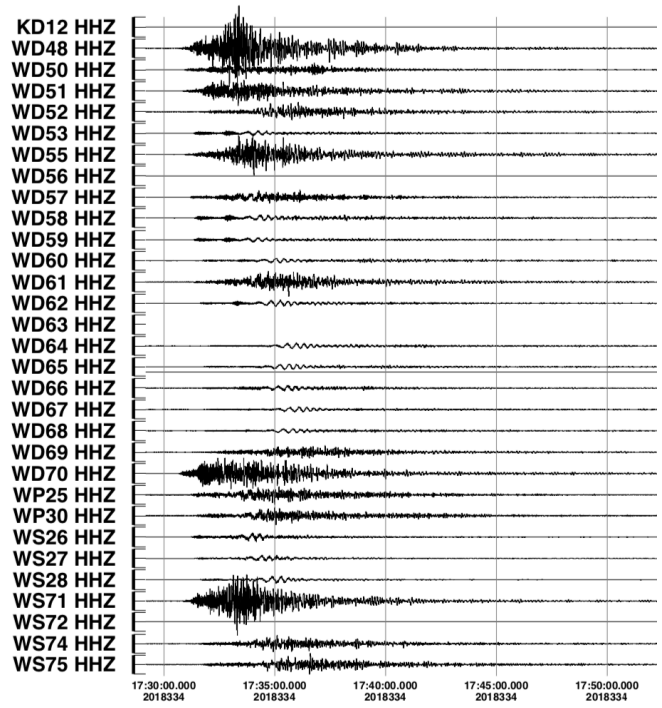


Figure 6.7. *Seismograms recorded by the broad band vertical components of both onshore and offshore stations. The ML=7.1 earthquake was happened at UTC time of 17:29:50 on November 30th, 2018 near Anchorage. The locations of stations are shown in Figure 6.1. The waveforms were not filtered and were normalized by the largest amplitude for all of the displayed traces.*

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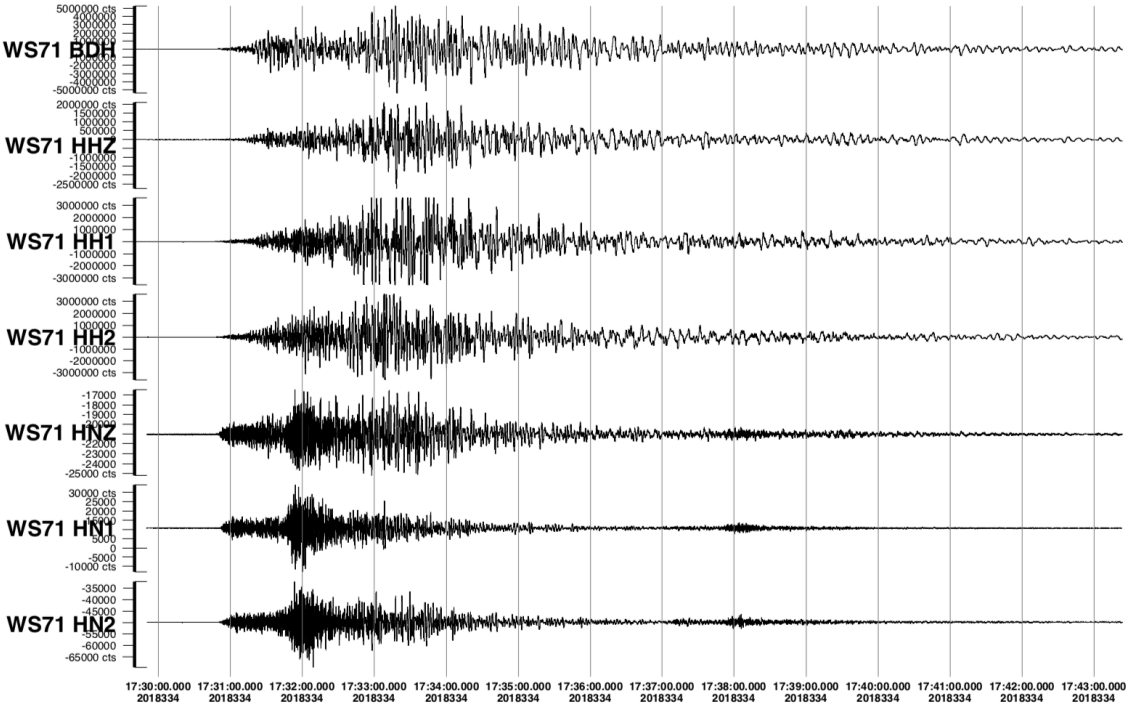


Figure 6.8*. Seismograms recorded by the broad band seismometer (HH*), accelerometer (HN*) and DPG (BDH) at station WS74 for the Anchorage earthquake. The waveforms are not filtered and are normalized by the largest amplitude of each trace individually. The broadband seismograms (channels HHZ, HH1, HH2) are clipped because of the strong ground motions.*

7. Acknowledgments

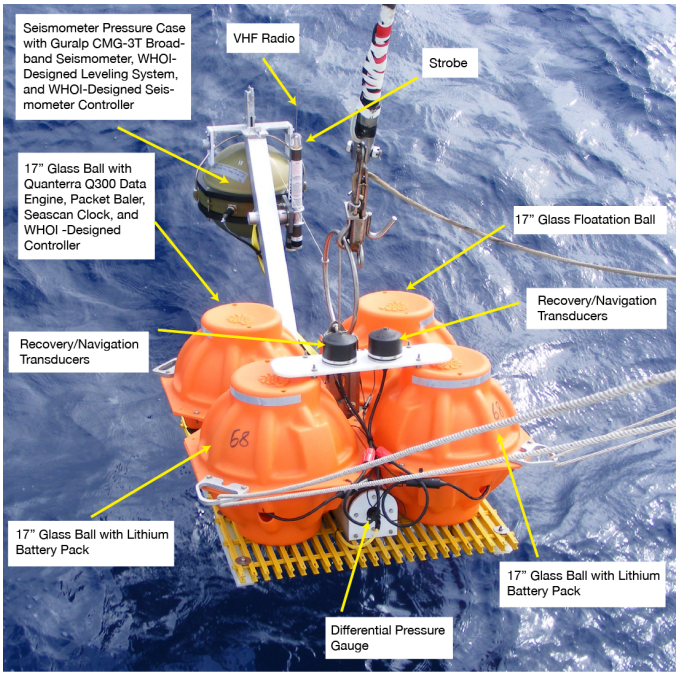
The OBS instruments used in this project were provided by the Ocean Bottom Seismograph Instrument Center (www.obsip.org) at WHOI, which is funded by the National Science Foundation. OBSIC data from this project will be archived by OBSIC at the IRIS Data Management Center as soon as possible after recovery, and will be open to the scientific community immediately (www.iris.edu). AACSE is supported by National Science Foundation grant OCE-1654568 to Cornell, from GeoPRISMS, MGG, EarthScope and PREEVENTS programs. Thanks to Kiara Daly for helping post blogs from sea, the AACSE PI team for planning and logistical support. We thank Captain Breck Crum and the entire crew of the *R/V Marcus G. Langseth* for ensuring a safe, productive, and enjoyable expedition, and the Lamont Marine Office for facilitating this expedition.

Appendix 1. Glossary of Acronyms

A2S	Apply-to-Sail
AACSE	Alaska Amphibious Community Science Experiment
ADCP	Acoustic Doppler Current Profiler
BBOBS	Broadband OBS
DCL	Dear Colleague Letter (NSF)
DPG	Differential Pressure Gauge
IRIS	Incorporated Research Institutions for Seismology
LDEO	Lamont-Doherty Earth Observatory of Columbia University
MB	Multibeam Sonar
NSF	National Science Foundation
OBS	Ocean Bottom Seismometer
OBSIC	Ocean Bottom Seismometer Instrument Center
RDF	Radio Direction Finder
SZ4D	Subduction Zones in Four Dimensions Initiative
USCG	United States Coast Guard
USGS	United States Geological Survey
UTC	Universal Time Code
UW	University of Washington
WHOI	Woods Hole Oceanographic Institution
XBT	Expendable Bathy-thermograph

Appendix 2. Instrument specifications, with photos

WHOI Broadband OBS

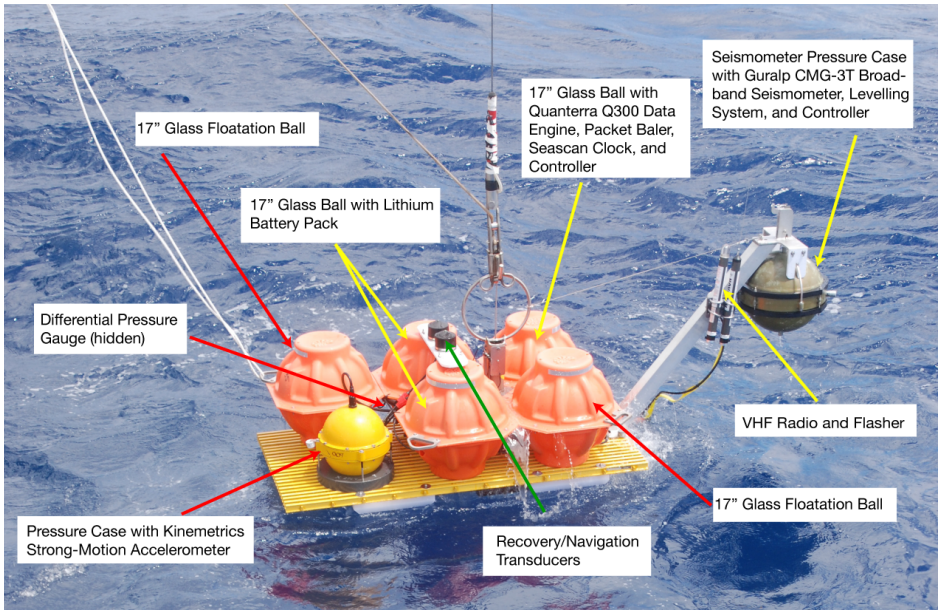


WHOI Broadband OBS Specifications

Physical	Three 17" *Nautilus* glass ball pressure housings holding: (i) data-logger, storage device, controllers; (ii) acoustic-release board, WHOI recovery board, and lithium batteries; (iii) lithium batteries. One 17" *Benthos* ball for floatation. A 14" I.D. Al sphere holds seismometer and leveling system. Leveling is via a gravity-driven, 2-axis gimbal system that can be locked in place by motor-driven disk brakes mounted on each gimbal axis in order to record ground motion with high fidelity. A WHOI-designed controller is capable of locking/unlocking the seismometer masses, centering the masses, and activating/de-activating the disk brakes. The controller also carries a compass, temperature, and tilt sensor. The controller is capable of automatically monitoring seismometer tilt and initiating a leveling procedure if necessary. Air-weight (less 175 lb. anchor but with one-year battery pack) is 530 lbs. Water-weight on bottom (less sensor) is 65 lb. Buoyancy (less anchor) is 66 lbs. Descent rate: ~43 m/min. Ascent rate: ~43 m/min.
Data Logger	*Quanterra Q330* 6-channel data engine with 24-bit A/Ds. Simultaneous sample rates of 200, 100, 50, 40, 20, 10, and 1 Hz. *Quanterra Packet Baler* storage device with 20 GByte rotary disk drive.
Clock	*Seascan* low-power, digitally-temperature-compensated (DTCXO), clock with drift rate, before end-point correction, of < 5 ms/day.
Sensors	*Guralp CMG-3T* seismometer with a velocity response that is flat from 120 s to 50 Hz. The CMG-3T model used draws less current than a conventional unit, at the cost of reduced dynamic range. When deployed, the seismometer package is mechanically decoupled from motion of the OBS frame. Seismometer package has a water weight of 21 lbs. Differential Pressure Gauge (DPG) long-period pressure sensor.

Recording Duration	Lithium battery pack for ~15 months recording at up to 100 Hz. Separate keep-alive battery for clock.
Operation	Operated in closed-ball mode i.e. programming of acquisition parameters, offloading of data, clock setting, etc., all done through penetrators. Glass spheres carry an electronic vacuum gauge to ensure spheres are well sealed prior to deployment.

WHOI Keck OBS



WHOI Keck OBS Specifications

Physical	Three 17" *Nautilus* glass ball pressure housings holding: (i) data-logger, storage device, controllers; (ii) acoustic-release board, WHOI recovery board, and lithium batteries; (iii) lithium batteries. Two 17" *Nautilus/Benthos* balls for floatation. A 14" I.D. Al sphere holds seismometer and leveling system. Leveling is via a gravity-driven, 2-axis gimbal system that can be locked in place by motor-driven disk brakes mounted on each gimbal axis in order to record ground motion with high fidelity. A controller is capable of locking/unlocking the seismometer masses, centering the masses, and activating/de-activating the disk brakes. The controller also carries a compass, temperature and tilt sensor. The controller is capable of automatically monitoring seismometer tilt and initiating a leveling procedure if necessary. Air-weight (less 175 lb anchor but with one-year battery pack) is 745 lb. Water weight on bottom (less sensor) is 75 lb. Buoyancy (less anchor) is 42 lb. Descent rate: ~40 m/min. Ascent rate: ~32 m/min.
Data Logger	*Quanterra Q330* 6-channel data engine with 24-bit A/Ds. Simultaneous sample rates of 200, 100, 50, 40, 20, 10, and 1 Hz. *Quanterra Packet Baler* storage device with 20 GByte rotary disk-drive.
Clock	*Seascan* low-power, digitally-temperature-compensated (DTCXO), clock with drift rate, before end-point correction, of < 5 ms/day.
Sensors	*Guralp CMG-3T* seismometer with a velocity response that is flat from 120 s to 50 Hz. The CMG-3T model used draws less current than a conventional unit, at the cost of reduced dynamic range. When deployed, the seismometer package is mechanically decoupled from motion of the OBS frame. Seismometer package has a water weight of 21 lbs.

	Kinemetrics Episensor strong-motion 3-axis accelerometer mounted on a gravity-driven, 2-axis gimbal system. Differential Pressure Gauge (DPG) long-period pressure sensor.
Recording Duration	Lithium battery pack for ~15 months recording at up to 100 Hz. Separate keep-alive battery for clock.
Operation	Operated in closed-ball mode i.e. programming of acquisition parameters, offloading of data, clock setting, etc, all done through penetrators. Glass spheres carry an electronic vacuum gauge to ensure spheres are well sealed prior to deployment.

Appendix 3. Multibeam Echo Sounding (MBES) and Backscatter with examples

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Acquisition

Bathymetry and backscatter data were collected using a Kongsberg EM-122 multibeam echosounder and SIS (v3.9.2) acquisition software. The system consists of two hull-mounted transducer arrays (Figure A3.1): A transmit unit located along the ship centerline that forms a 150° athwartship and a 1° alongship transmit beam that is divided into 9 pitch, roll, and yaw compensated sectors in deep waters (> 1000 m) nominally at 12 kHz (10.5 – 13.0 kHz), and a receive unit that form 1° athwartship x 30° alongship receive beams and is located abaft and oriented athwartships. The system forms a swath of 288 one degree receive beams that produce an across-track profile of 432 high density, equidistant soundings.

Figure A3.1. *Bottom view of the Kongsberg EM122 transmit and receive arrays.*

Motion and position of the vessel was measured using an Applanix POS-MV system and sent to the SIS acquisition software. The POS-MV inertial measurement unit (IMU) records heave, pitch, and roll data, and the dual antenna setup the system utilizes measures heading. Position comes from the system primary antenna. These data are sent to the SIS acquisition software via serial cables at a rate of 25 Hz. The Navigation Reference Point (NRP) is the zero offset for the multibeam frame of reference. The offsets between the multibeam arrays and the NRP were measured during system installation.

A patch test is required to measure any residual linear and angular offsets after installation, and the last full patch test was done in 2012. Evaluations of roll and heading were done in 2015 and 2018 and it was determined that the parameters for roll and heading did not need to be changed. As a result, the vessel configuration was not changed for MGL1907 (Figure A3.2a, b). The only disagreement with the 2012 patch test findings is the value for the IMU roll offset which was found to be -0.57 in 2012. Between that time and now the roll offset has been set to -0.54.

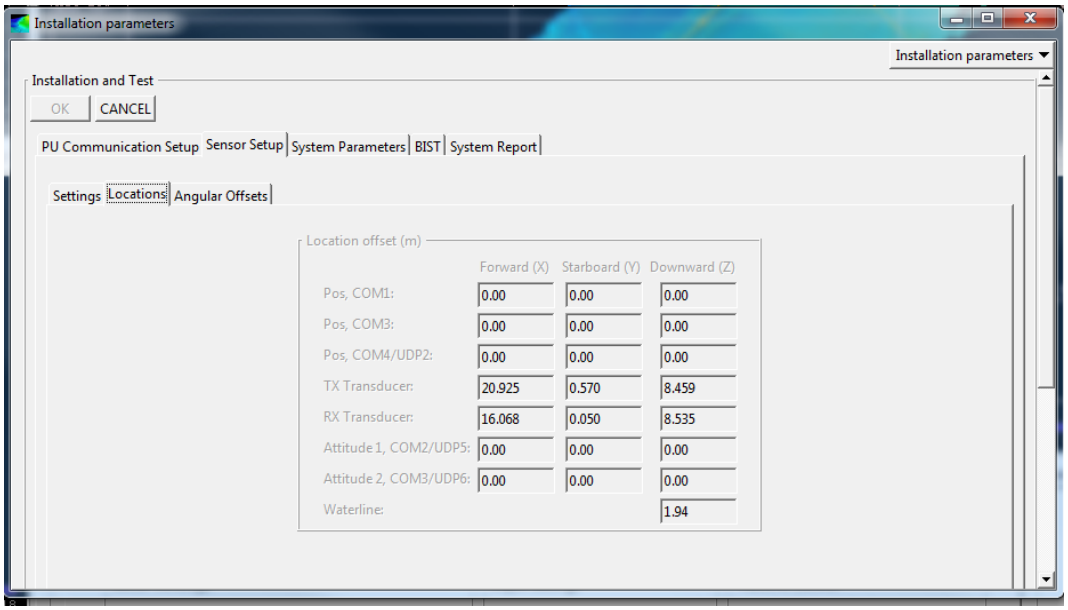

Figure A3.2a. *Location offsets of the transmit (tx) and receive (rx) arrays relative to the POS-MV IMU*

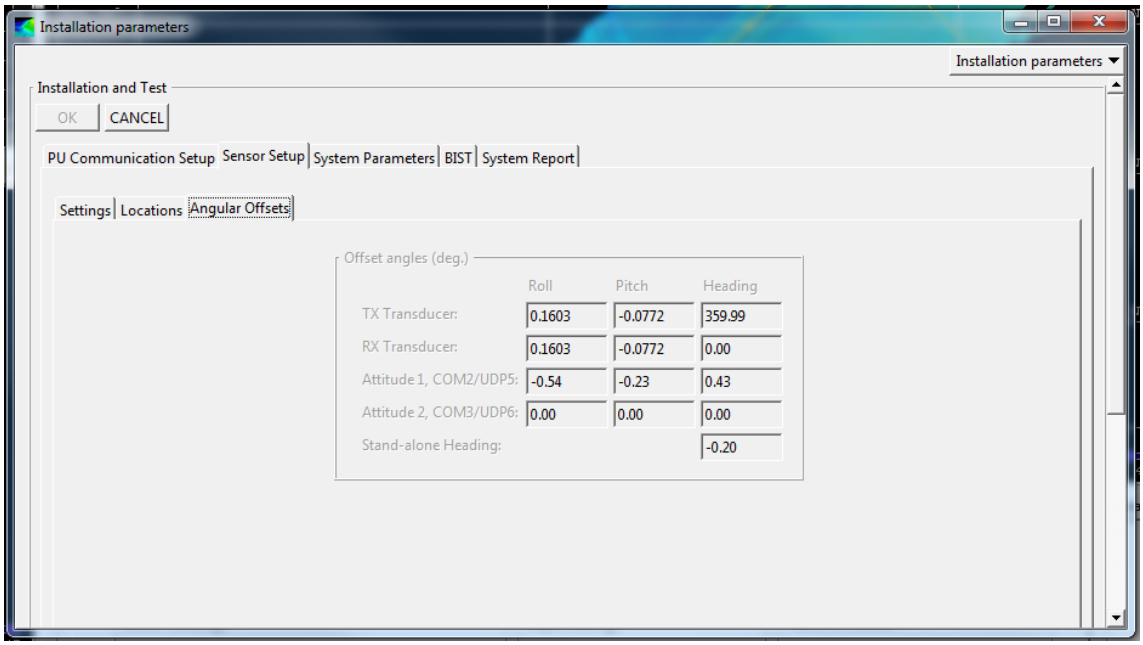

Figure A3.2b. *Static angular offsets of the EM122 TX and RX arrays and the POS-MV IMU*

The SIS software processes range/angle data from each ping during acquisition, merging position, motion sensor and hull mounted sound velocity data, as well as the current sound velocity profile to derive 432 sounding solutions compensated for vessel motion and water column sound velocity variations in a swath athwart-ships for each transmitted ping. The transmit signal is also automatically tilted +/- 4 degrees from the athwart-ships centerline using the SIS software to help reduce noise from cavitation and bubbles, and to achieve a better bottom detect away from the direct specular reflection at nadir. Sound velocity (SV) information entered into SIS was obtained from the Applied Micro Systems Micro SV mounted on the transducer gondola and a total of 21 expendable bathy thermograph (XBT) probes deployed throughout the cruise (Figure A3.2; Appendix 7). All the XBT profiles were processed with the python program SVP

Editor (v.1.0.5; Jonathan Beaudoin, UNH) to augment cast data with values from the World Ocean Atlas (2009) at the same coordinates, extending profiles to 6 km depth and sending them to the SIS acquisition system. Data were collected nearly continuously throughout the cruise, effectively mapping the seafloor along the course of the ship's track. Kongsberg raw sonar data (.all) and water column (*.wcd) files (Table 1) were copied from the *Langseth* network file server (fserve) to a local computer for processing.

***Table A3.1**. Summary of raw and processed multibeam data.*

Data type	Comment
Level 0: Raw Kongsberg Sonar (*.all)	Direct import to QPS Qimera and FMGT
Level 0 Raw Water Column (*.wcd)	Correlate (match filtered) traces
XBT (*.EDF) ASCII profile data	Qimera imports XBT from *.all files, can import EDF
Qimera Project	Requires Qimera software
Grid and Raster Exports	SD, GeoTIFF, GMT Grid, Esri ascii raster

Processing

QPS Qimera (v1.7.6) was used to post-process the bathymetric data. The measurement offsets between the multibeam transducers and the inertial measurement unit (IMU), and angular offsets (roll, pitch, and heading) of the transducer and IMU were imported from the Kongsberg raw sonar (.all) files. Though this information was used to calculate the sounding positions and depths in SIS, it is also necessary in Qimera for subsequent calculation of total propagated uncertainty (TPU) and re-application of sound velocity corrections.

The processing flow consisted of first using Qimera to add Kongsberg (.all) files into the project database, where Qimera creates an internal QPD format. Navigation was visually inspected, soundings were referenced to instantaneous sea level at the time of observation, and sound velocity information was re-applied. Data from each file were then added to a dynamic surface with a 125-meter node spacing and enabled with a combined uncertainty and bathymetric estimator (CUBE) surface. The surface editing tool was used to apply medium spline filter to remove erroneous soundings overall. Manual selection and rejecting of soundings were then done using the Qimera swath editor and 3D editor tools. There was consistent noise in deep water along the nadir line and just adjacent to either side of nadir in the first transmit sectors port and starboard. This was presumed to be a combination of noise from the Knudsen Chirp transmit pulse, which was being triggered by the EM122, and sidelobe interference in the first sectors across track away from nadir somewhat corresponding to the transition from amplitude to phase detect. (Figure A3.3). Most of this noise was cleaned from the data without adverse effects on

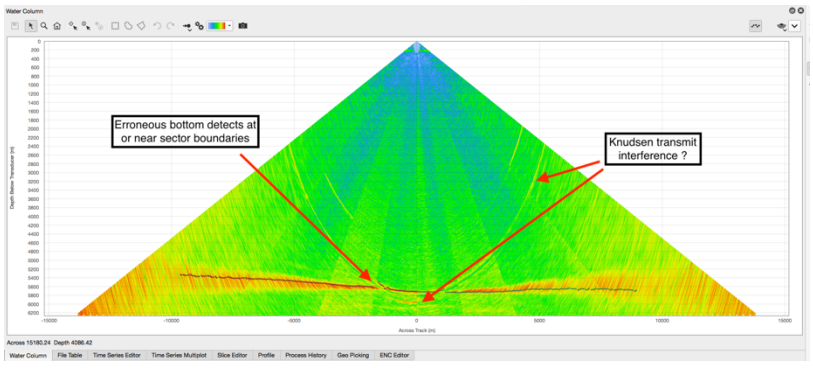

***Figure A3.3.** Possible sources of noise in the multibeam data*

the gridded surface. Particular problem areas were along nadir and where slope abruptly changed on the shelf slope and around seamounts. After cleaning, a final static surface was created in Qimera that was exported as 32-bit GeoTIFF.

The QPS Fledermaus Geocoder Toolbox (FMGT v7.8.9) was used to post-process the backscatter data. Data were imported from the Kongsberg raw (.all) files, and the automatic processing option was utilized with the EM122 beam time series selected as the backscatter source. A single tile mosaic was computed using a 100 m per pixel resolution, and the histogram of the resulting image was manually stretched to accentuate the contrast between zones of high and low backscatter.

Water column data was not systematically processed, though the data were viewed in the Qimera water column dock window for quality control. Most of the water column showed cross talk from the Knudsen chirp, possibly where the Knudsen was pinging internally, and side-lobe interference.

Known Problems

Kongsberg EM122 data exhibit a "washboard" artifact on the outer edges of the swath, possibly caused by latency in the transmission of attitude data, or variations in offset measurements that have developed since 2012 between the multibeam units, the POS-MV, and the NRP. The artifact worsened as sea state increased and is more noticeable as the swath width widens. While noticeable on sun-illuminated, vertically exaggerated surfaces, the error induced by this artifact is less than one percent of the depth. This artifact is documented in previous MGL cruise reports, and a full

Artifacts caused by the Knudsen Chirp is an issue. Perhaps the only way to deal with it is to not acquire the chirp where there are abrupt changes in slope.

Artifacts in the backscatter are caused by setting the transmit mode to Auto in the SIS software and can be alleviated by setting the water depth modes manually. The various transmit modes for the EM122 (shallow, medium, deep, very deep) differing transmit sectors and frequencies, thus the received backscatter response will vary from mode to mode. This can be compensated for during acquisition by requesting a custom "bscorr.txt" file from Simrad that is based on data previously collected using the system in all modes. However, the backscatter variations encountered using different modes can also be empirically compensated for in the FMGT software. During the majority (>90%) of the cruise in waters deeper than 500 meters, we kept the EM122 in "deep" mode to avoid these variations in received backscatter data.

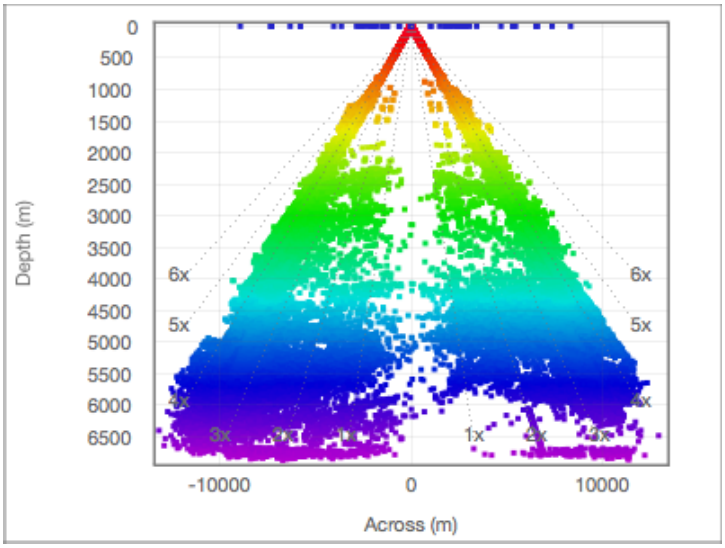

Figure A3.4*. Extinction plot showing the EM122 swath coverage in various water depths.*

Initial Results

Multibeam bathymetry and backscatter were acquired along approximately 2661 nautical miles (4930 km) of trackline with useable swath widths up to 18 km across,

generally 3 to 4 times water depths between 30 and 6800 m (Figure A3.4). Edited bathymetry data were used to create a 125-m per pixel Qimera dynamic surface. This surface was exported to QPS Fledermaus

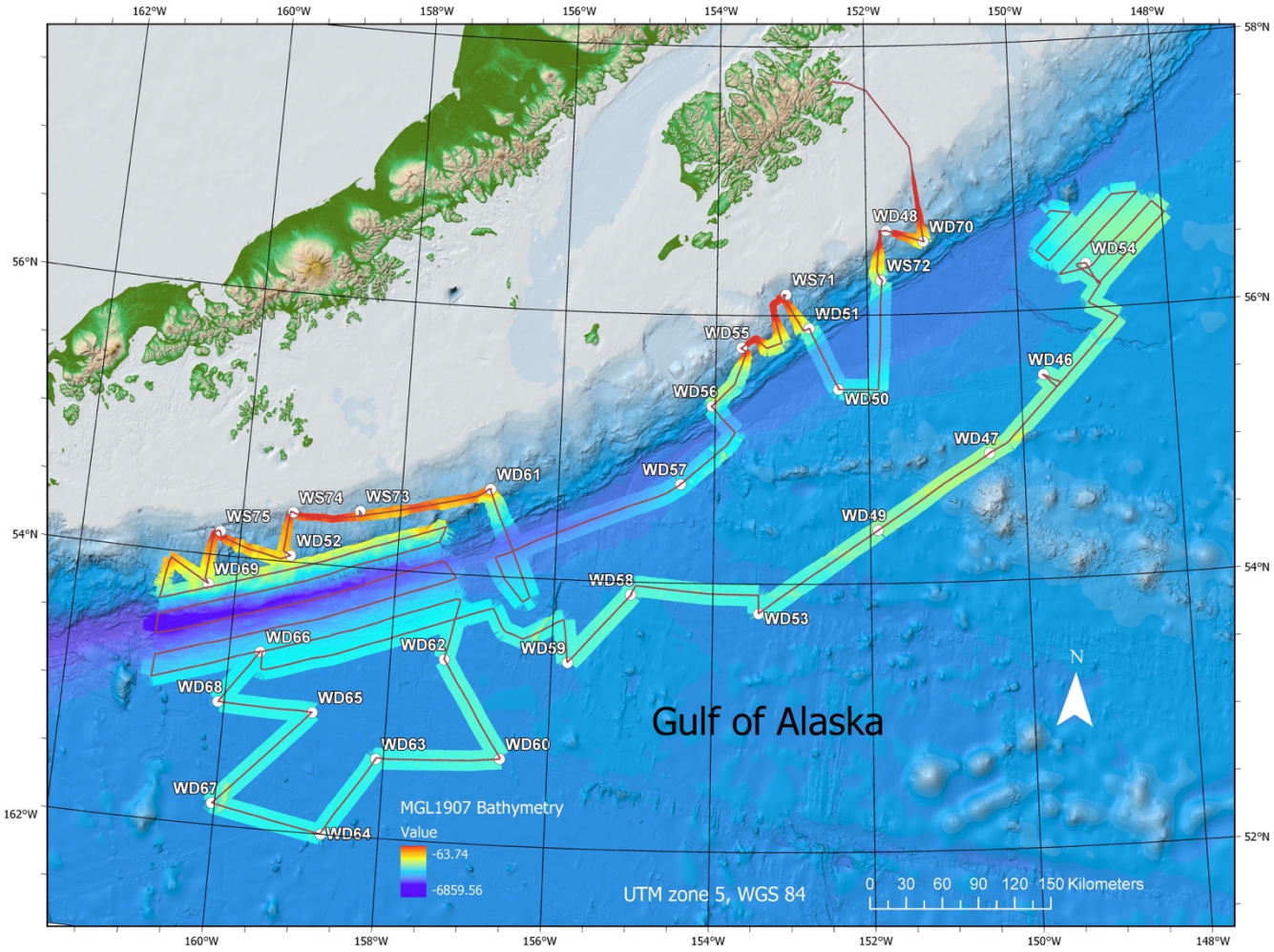

Figure A3.5. *Map showing EM122 bathymetric coverage for MGL1907*

SD, Esri ascii rasters, and 32-bit GeoTIFF formats for display (Figure A3.5). Backscatter data were exported from FMGT as a single tile mosaic in Fledermaus SD and GeoTIFF formats also at 125 m per pixel (Figure A3.6).

The multibeam data acquired during MGL1907 are of generally excellent quality and imaged a variety of geologic features of interest while surveying along the axis of the Aleutian subduction zone and trench (Figures A3.7, 8). Other high quality multibeam bathymetry exists in the surveyed area and was used as a guide for our transits and mapping surveys so that we filled in bathymetric gaps existing along the margin. During a 48-hour storm the multibeam data quality degraded significantly due to bubble washdown. This may have been alleviated by decreasing the swath angles to 45 degrees port/starboard and putting the multibeam into "very deep" mode which would have enabled an FM pulse for all transmit sectors.

The backscatter data are of good quality even with minimum auto processing using the FMGT software. Backscatter data helped to illuminate subtle changes in seabed geology and morphology and was a useful data set for illuminating various fault patterns and lineaments observed within the subduction zone. More information could be derived from these data with further processing.

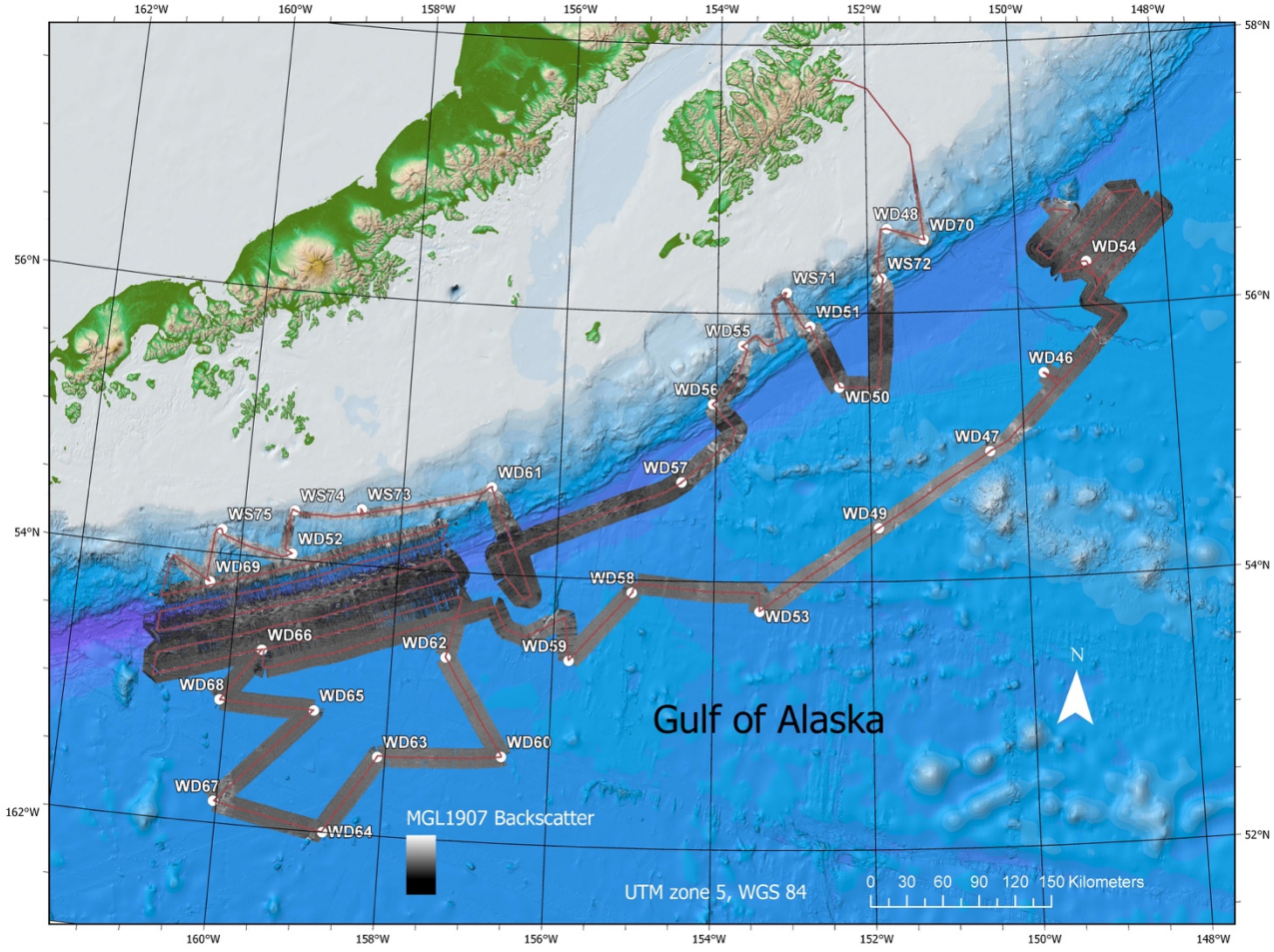

Figure A3.6. *Map showing EM122 backscatter coverage for MGL1907*

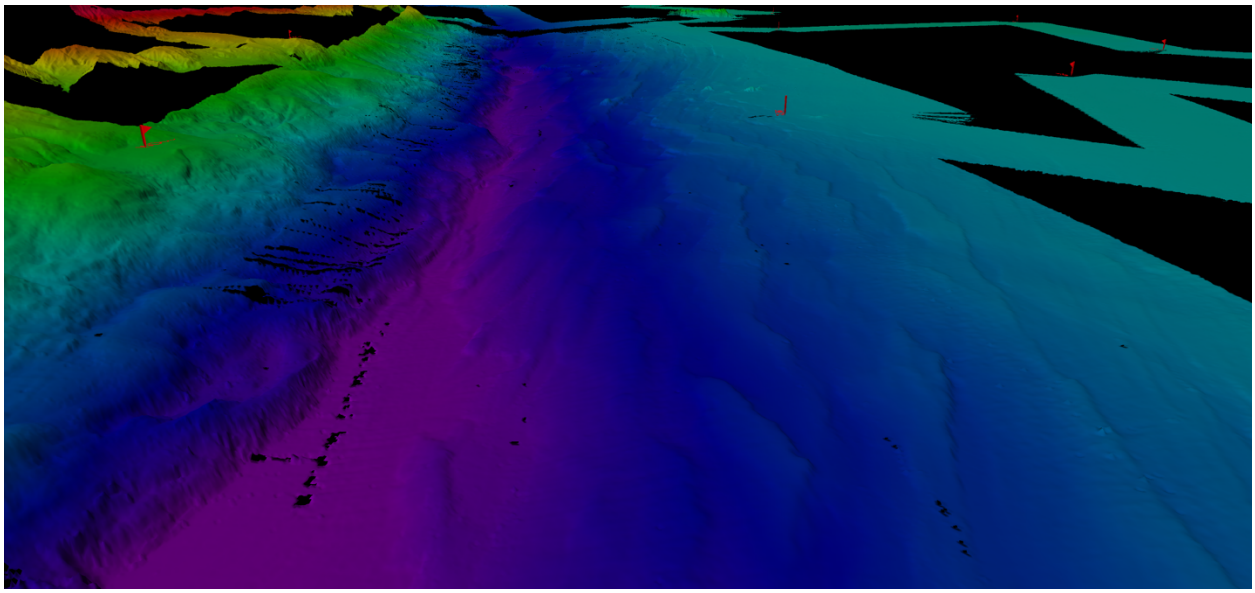

Figure A3.7. *Perspective view from the southwest looking northeast along the axis of the Aleutian Trench. Notice the intricate faulting on the forearc subducting plate. Red flags indicate OBS stations.*

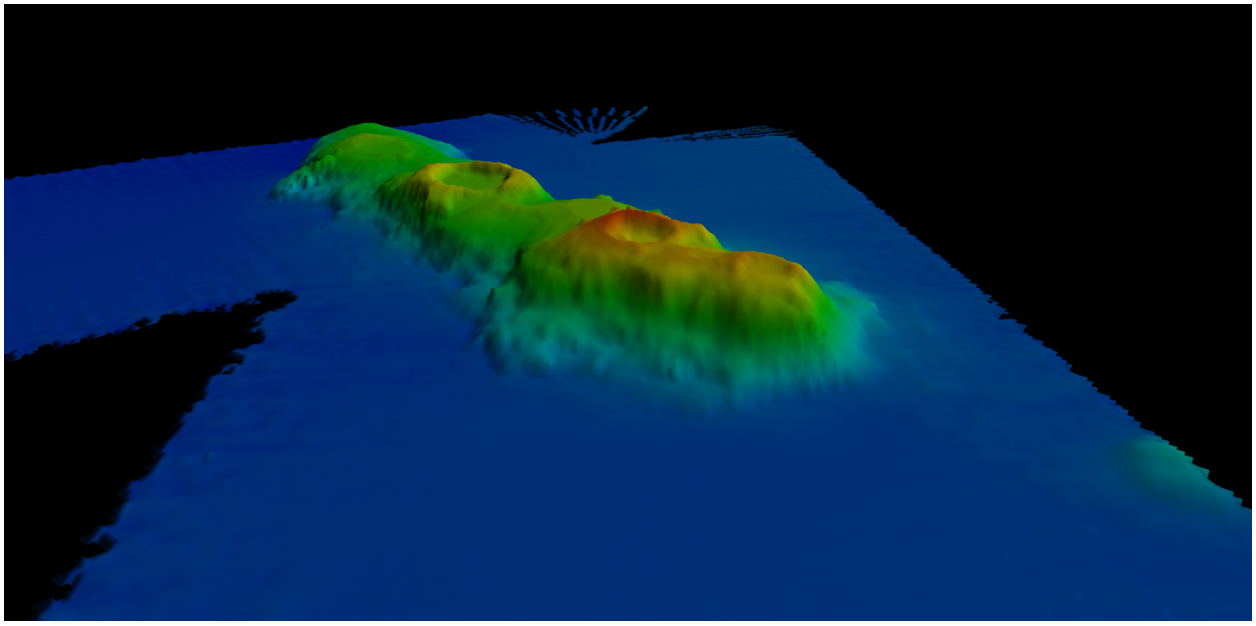

Figure A3.8. *Perspective looking southwest at OBS station WD67 highlighting a series of volcanoes initially mapped during the 2018 Sikuliaq cruise SKQ2018-16S,*

Appendix 4. Knudsen 3.5 kHz Sub-bottom profiler acquisition, processing and examples

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- Much of the processing on MGL1907 followed the workflow outlined for MGL1903. This report is derived from and includes segments from the MGL1903 report (written by David S. Foster, USGS Woods Hole, MA dfoster@usgs.gov)

System and GPS to transducer offsets

Chirp data were collected using a Knudsen Engineering Limited (KEL) 3260 Chirp echosounder. The 3260 is configured with a four-by-four, array of sixteen 3.5 kHz Massa TR-1075 transducers. The transducer array is located in the sonar pod of the R/V Lanseth adjacent to the EM122 multibeam transducers. The transducers are 20.2 m forward of the navigation reference point and C-Nav GPS antenna.

Knudsen Chirp Acquisition

KEL SounderSuite (v.2.73) software was used to record the data. Table A4.1 summarizes the parameters used in the SounderSuite software. The chirp data are acquired continuously along the cruise track and recorded within a 200 m or 500 m window, in water depth < 200 m and > 200 m respectively. A manual deep-water delay was applied to keep the seafloor and subbottom reflections within the data window. Ping rates were variable depending on water depth. At the beginning of cruise MGL1903, they attempted to trigger the chirp system internally and use the multiple pings mode to increase spatial resolution. The system was only able to ping about every 5 seconds, regardless of trace lengths and ping rates in both deep and shallow water. As a result the ping rate was set by external ping rates of the EM122 MBES. For MGL1907, we followed the same acquisition triggering scheme for the Knudsen. This resulted in good spatial resolution in shallow water. Raw data consist of (a) KEL Binary (KEB) envelope detected trace data, (b) KEL ASCII (KEA), and (c) SEG-Y format trace data, which are recorded on the acquisition computer hard drive. SEG-Y files recorded the correlate (match filtered) trace data. Data are copied from the Langseth file server (fserve) to a workstation computer for processing. KEB files can be played back or converted to SEG-Y format using KEL software. KEA files recorded user selected attributes and for this cruise include record number (original FFID), date, time (hhmmss), depth in meters, transmit power, pulse length, latitude, longitude, and position time in seconds.

Table A4.1. *SounderSuite Echo Control Client (v 2.35) settings*

Transmit Parameters	Settings
Tx Pulse	8, 16, and 32.0 ms (longer pulse length with depth)
Tx Power	Variable 1-3 (Generally Powers 1on the shelf, 2on the slope, 3 for deep > 3000 m)
Gain Mode	Manual
Gain Value	Variable 10-48 dB
TVG Mode	None
Process Shift	None
Draft	None
Tx Blanking	40.0 m
Global Tx	Mixed
Range (data window)	200 m (266 ms) or 500 m (666 ms)
Phase (deep-water delay)	Manual (depth dependent)

Depth Limits	0-9000 m
Multiple Pings	Disabled (did not work, internal trigger didn't work)
Sound Speed	1500 m/s
Ping Rate	The internal ping rate was not working
Tracking Gate	20 to 50 m
Echogram	Uncompensated
Sync Mode	External slave to EM122
Channel Parameters	Settings
Waveform	Chirp: Envelope Detect Square Law
Center Frequency Band	3.5 kHz
Frequency Bandwidth	3 kHz
Filter Windowing	Decimation, Main Signal, Analytic, Lowpass, Transmit all set to rectangular
SEG-Y Carrier Type	Filtered (match filtered – correlate)

Processing

Preliminary processing and QA/QC of the SEGY Chirp data was accomplished using a series of scripts that utilize the seismic processing packages SIOSeis (sioseis.ucsd.edu) and SeismicUnix (github.com/JohnStockwellJr/SeisUnix). The following process steps were applied, and SEG-Y files written at each step as indicated. Table A4.2 indicates where the output for each segy file is stored.

1) Shot numbers (FFID) were renumbered consecutively for each file starting with one and written to a SEG-Y file. The original FFID numbers in the SEG-Y trace headers and KEA files will not match the renumbered shots; however, trace sequence number was changed in the trace header to match the original FFID as shot number within reel. These files have the original trace lengths and varying deep-water delays as well as the original correlate trace data.
2) The raw correlate traces were converted to envelope detected traces using SIOSeis as described by Paul Henkart (sioseis.ucsd.edu/examples) and written to a SEG-Y file.
3) SIOSeis read the envelope SEG-Y files, set a common trace length, and a common deep-water delay time for each file, which resulted in traces that were padded with zero sample values outside of the original data window. The resulting trace length depended on the range of data and delay times for each file.
4) Some files that had total padded trace lengths that exceeded the SEG-Y format maximum number of samples (65,536) had to be resampled so as not to exceed this limitation. The resampled files were also padded and set to a common delay. All files with common trace lengths and delays were written to a SEG-Y file. These files can be used to decide where to split the full-resolution segy files into profile segments that have smaller trace ranges.
5) SeismicUnix was used to extract SEG-Y trace headers (shot number, geographic coordinates, date and time, which were parsed using Unix utilities and were concatenated into ASCII navigation files (East, North, Lon, Lat, Filename, ImageName, Shot, Year, JD_UTC). Easting and Northings (WGS 84 UTM Zone 3 North) were derived from the geographic coordinates using the program "proj".
6) SIOSies was used to remove sea-surface swell (heave) from the trace data. The previous cruise report (MGL1903) mentioned that using the water-bottom picking SIOSeis process WBT did not work well due to dropouts in the trace data. So we instead implemented a python script and Seismic

Unix to extract the swdep header from the segy files. These water bottom values were filtered based on difference between adjacent automated water bottom picks, and then converted from milliseconds to seconds. The picked horizon was moved into the KnudsenProcessing/wbt/ks directory and used in the SIOSeis process WBT and Swell. The static shifted traces resulted in significant improvement in the resolution of the data (Figure A4.1). 8-bit gray scale PNG images of the swell filtered data were also created for browsing purposes. The swell filtered SEG-Y files were saved and loaded to Kingdom Suite as an additional data type (envelope-swell). Deep water data were not swell filtered due to ping rates of several seconds and sea surface swell with similar periods.

7) SeismicUnix was used to plot 8-bit gray scale PNG images of the envelope and padded trace data. These images are useful for browsing trace data from each file. Three different plotting scripts were used depending on the processing sequence/end processing step of the file. The three processing end-points include a) sio_pad, b) sio_resamp, and c) sio_swell_wbtedit. These were plotted using a) plot_kel_pad, b) plot_kel_resamp, and c) plot_kel_s respectively.
8) For each line, figures including both the profile and maps of the navigation for that profile with regional bathymetry and MGL1907 multibeam bathymetry were created. These show approximate distance and depth conversions using distances between points in the navigation file and a constant wave velocity of 1500 m/s. Vertical exaggerations using these approximations are noted in these images as well. This step was completed locally on a student's computer. Figures were then moved to the machine where the rest of processing was completed.

Table A4.2. *Utilized processing scripts for each step are listed, along with the directory structure associated with each processing step within the* KnudsenProcessing *directory.*

step	Utilized script	Saved directory	Naming structure
1	sio_renum	/segy/renum	[lineno]_[Julian day]_[HHMM]_renum.sgy
2	sio_mkenv	/segy/env	[lineno]_[Julian day]_[HHMM]_env.sgy
3	sio_pad	/segy/pad	[lineno]_[Julian day]_[HHMM]_env_pad.sgy
4	sio_resamp	/segy/resamp	[lineno]_[Julian day]_[HHMM]_resamp.sgy
5a	read_kel_pad	/nav /bin	[lineno]_[Julian day]_[HHMM]_env_pad.nav [lineno]_[Julian day]_[HHMM]_env_pad.su
6	Make_sioaddwbt Sio_swell_wbtedit	/segy/mute_swell	[lineno]_[Julian day]_[HHMM]_env_pad_s.segy
7a	plot_kel_pad	/png_files/pad	[lineno]_[Julian day]_[HHMM]_env_pad.png
7b	plot_kel_resamp	/png_files/resamp	[lineno]_[Julian day]_[HHMM]_resamp.png
7c	plot_kel_s	/png_files/swell	[lineno]_[Julian day]_[HHMM]_s.png
8	plotallknuds.py plototherline.py	/png_files/maps /ps_files/maps	[lineno]_[Julian day]_[HHMM]_[_env_pad/_s/_resamp].png [lineno]_[Julian day]_[HHMM]_[_env_pad/_s/_resamp].ps

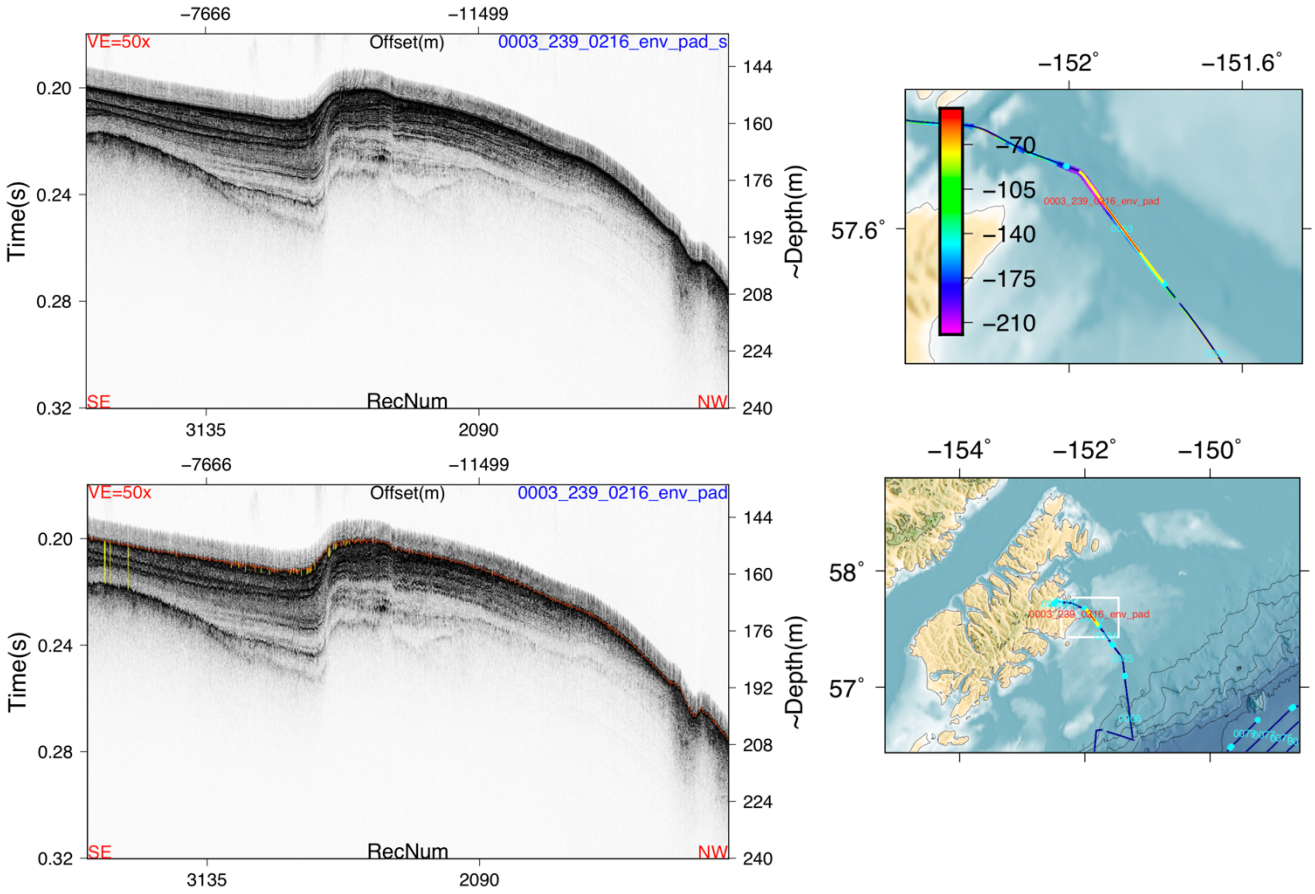


Figure A4.1. *Bottom left, subset of chirp 0003_239_0216 after application of common deep-water delay and padding trace data to a common length. Top left, the same profile after application of a 19-point swell filter to apply a static correction to the traces caused by vessel heave. Swell filtering was applied to data collected on the shelf and shelf break for the lines leaving Kodiak. Vertical scale assumes a velocity of 1500 m/s. The yellow line in the bottom profile shows the unfiltered water bottom profile that was automatically picked by the Knudsen acquisition software and stored in the segy headers. The red line shows a filtered version of this line. The top profile was swell corrected using the water bottom profile indicated by the red line. Top right map: navigation of this profile (extracted from the segy header), with the multibeam track from MGL1907 shown beneath the profile (units of meters). Bottom right map: the location of this profile relative to Kodiak Island is shown, with the area of the top right map outlined in white. The locations and line numbers of other profiles are also included, and the black lines indicate 1000 meter contours.*

Known Problems

There are trace dropouts (zero amplitude) traces throughout the profiles. The source of these dropouts is not known but has been observed in previous *Langseth* cruises. Manual delays set by watch standers resulted in some sections of the data to be truncated (very difficult to track around seamounts and continental slope), but the overall method of changing the delay manually and maintain a relatively small data window resulted in good vertical resolution by keeping the sample rate small. The internal trigger for the KEL Chirp was not working, thus the chirp system was triggered from the ping rate of the EM122 MBES. This resulted in limited spatial resolution in deep water (> 500 meters). Shot intervals in deep water were up to 100 meters, while in shallow water they were about 2 meters apart. Deep water data were not swell filtered due to ping rates of several seconds and sea surface swell with similar periods.

In the plotting steps of the processing flow, we ran into a common error that shifted the entire profile deeper by the difference between the *actual* minimum-delay-window-time and the delay-window-time of the *first trace.* This error only occurred when the first trace had a time delay that was greater than the minimum delay for that profile. (i.e., when the profile went from deeper to shallower with increasing trace number). Many of the png files created using the plotting scripts within the KnudsenProcessing directory thus have an added uniform delay in two way travel time. The information in the segy headers seems correct, but there may have been an error earlier on in the workflow that caused this error, likely in the padding step. The times indicated on the profiles in the /png_files/maps directory (and the ps_files/maps directory) have correct two way travel times indicated. The mute_swell scripts did not mute all traces above the water bottom for profiles with multiple time window delay values. This error may be related to the plotting error mentioned above.

Data Summary

All profiles went through preliminary processing, with most lines processed up to Level 2 (padded envelope traces with common time delays). The exceptions to this include 1) profiles on the shelf leaving Kodiak – which were corrected with a swell filter, 2) profiles that had time ranges exceeding the maximum number of time samples, and 3) profiles that were acquired coming into Kodiak, not leaving enough time for processing and copying data before docking and departing the work station.

Table A4.3. *Summary of raw and processed Knudsen 3.5 kHz data.*

Data type	Trace length	Deep water Delay	Comment
Level 0 Seismic (KEB)	Variable	Variable	Read or convert with KEL software
Level 0 Seismic (SEG-Y)	Variable	Variable	Correlate (match filtered) traces
Level 0 Attribute (KEA)	N/A	N/A	Select attributes in ASCII format
Level 1Seismic (SEG-Y)	Variable	Variable	Envelope traces
Level 2 Seismic (SEG-Y)	Common	Common	Padded traces with common delay or resampled padded traces with a common delay
Level 3 Swell filtered (SEG-Y	Common	Common	Swell filtered static shifted
Images of chirp data	Common	Common	PNG format
GIS (Esri shape and ASCII CSV)	N/A	N/A	Trackline, Unique shot point, and 500 shot-point intervals

Initial Results

This section gives some examples of the SEGY Chirp data that illustrate some of the records acquired during MGL1907. Each profile has two maps above indicating the position of the line relative to the rest of the survey. The left map shows a broader map view of where the line is positioned; black lines indicate 1000 meter contours; all survey lines are shown in navy, with line numbers in cyan, and the beginning and end of each line shown with a cyan dot; the line being shown is indicated in red. The right map shows the region inside of the white box on the left map, with the multibeam data collected during MGL1907

shown beneath the profiles in units of meters. The profile shows the vertical exaggeration in the top left corner, and cardinal directions of profile ends in the bottom corners. Approximate offsets were calculated using the distance between traces in the navigation of the segy headers. Approximate depths were calculated using a constant water and shallow sediment velocity of 1500 meters/second.

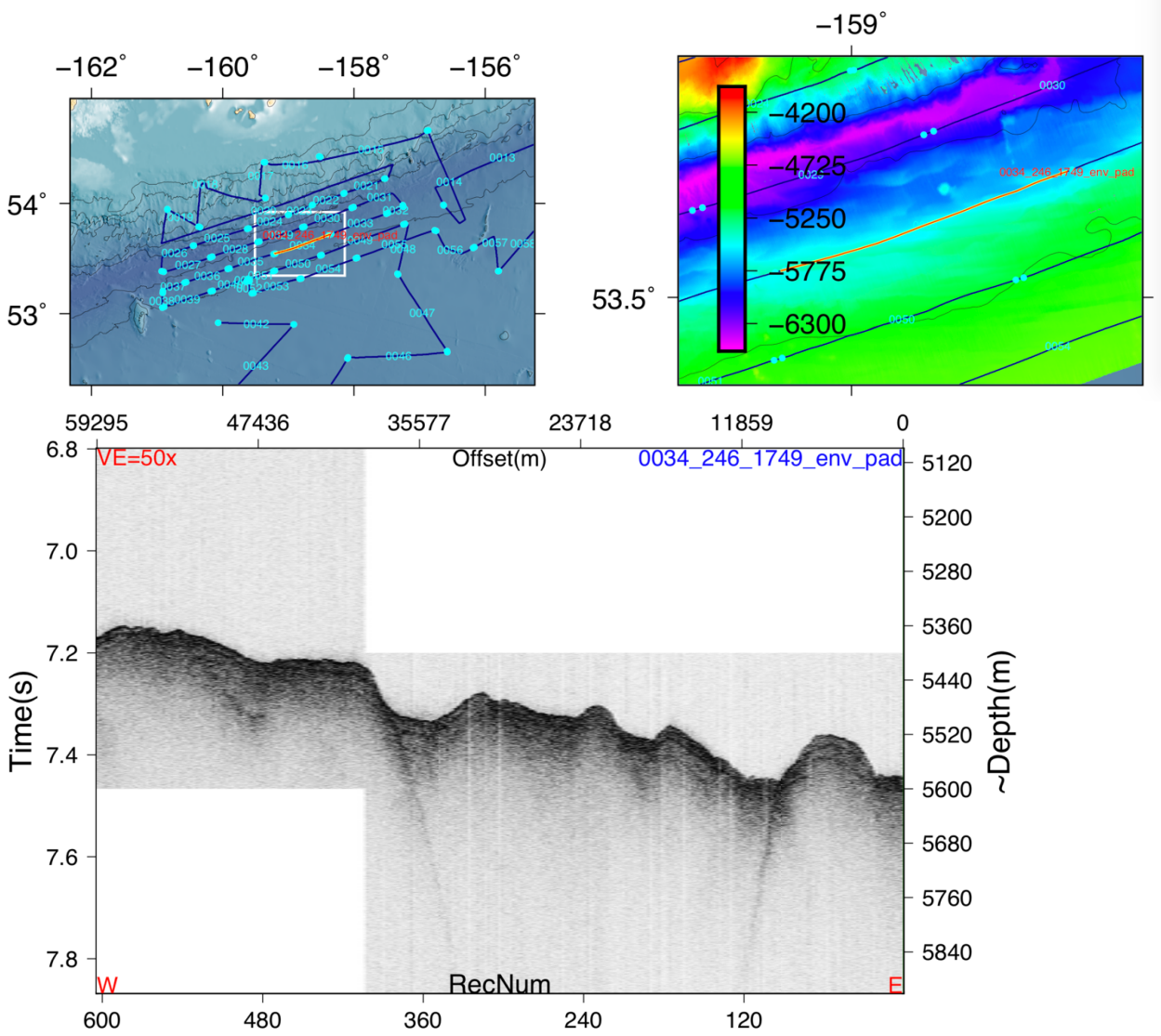


Figure A4.2. *Map showing trackline locations of Chirp profiles for MGL1907 south of the Shumagin Islands. Our profiles were collected oblique to the plate fabric and plate bending faults visible in the multibeam bathymetry. The profile thus shows oblique imaging of down-drop basins and possible fault plane reflections. These "reflections" are also possibly diffractions from sounding oblique to topographic features.*

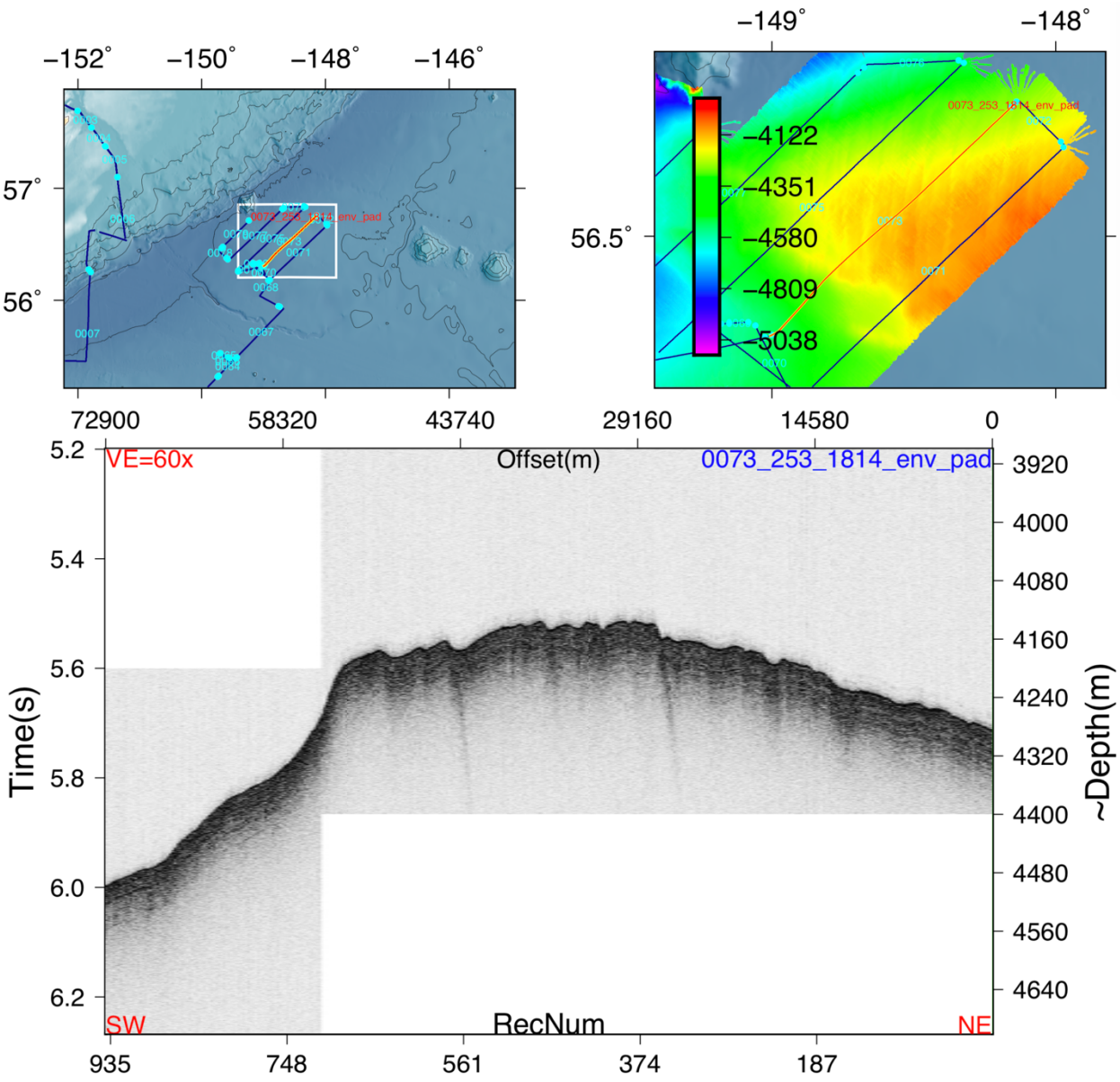


Figure A4.3. *Line 0073_253_1814 was positioned within MGL1907 multibeam Survey C – which was designed to map/fill in gaps of high resolution bathymetry above the January 23, 2018 Mw 7.9 earthquake and aftershock sequence. Finite fault modeling, back-projections, and aftershock relocations indicate that the earthquake was a result of slip on multiple faults, with the hypocenter initiating slip on a north-south oriented fault plane (e.g. Krabbenhoeft et al., 2018, Lay et al., 2018, Ruppert et al., 2018). This profile intersects apparent north-south oriented features within this zone, with offsets in marine sediments collocated with morphologically apparent offsets in the bathymetry.*

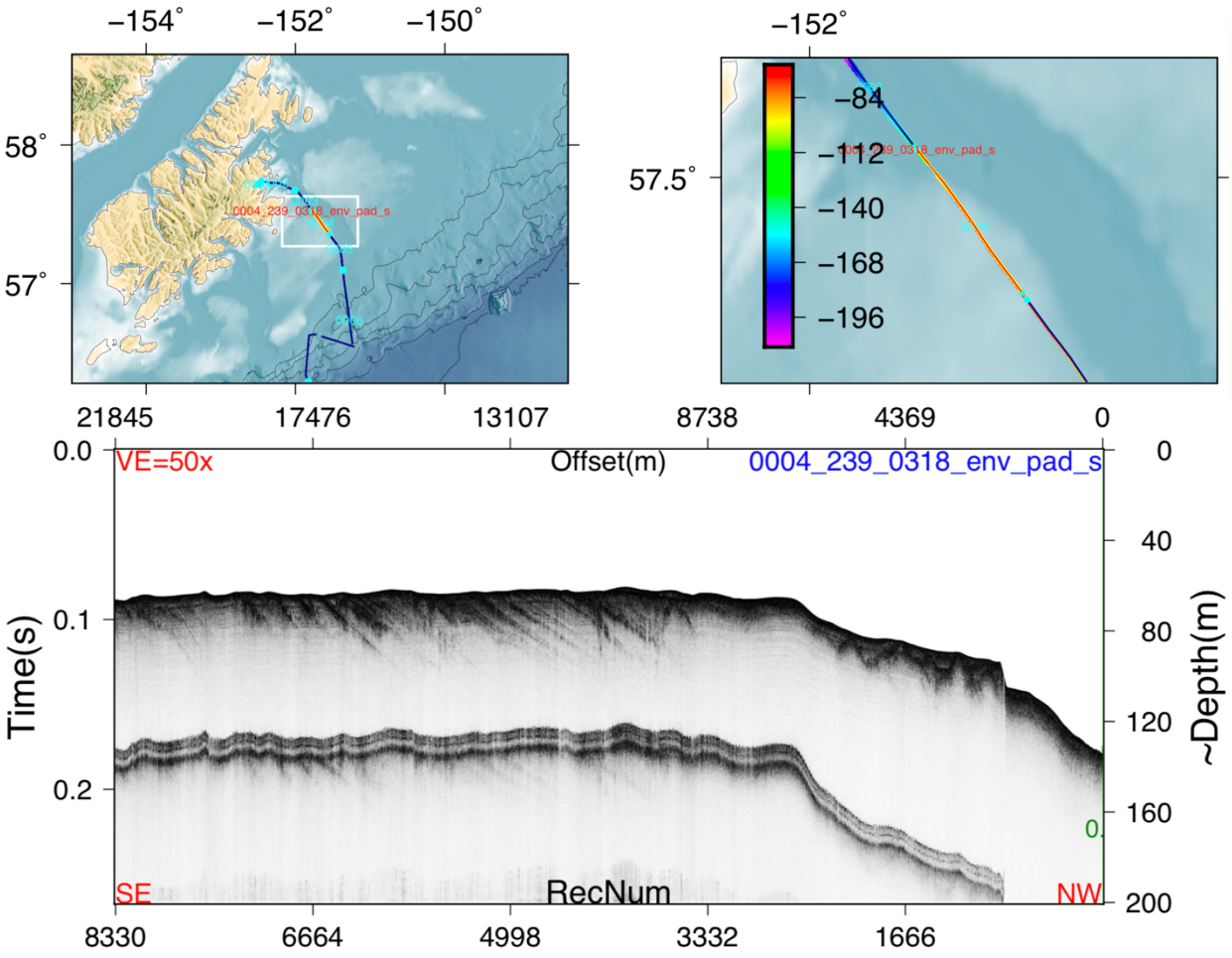


***Figure A4.4**. A profile on the shelf south east of Kodiak island showing inclined bedding planes.*

Recommendations

The Knudsen Chirp system should be able to trigger internally, but we were not able to make that work. Knudsen support should be able to diagnose that problem. It would benefit in using the multiple pings option, which should increase spatial resolution. Triggering internally might help limit some of the noise in the EM122 MBES data, but perhaps add another noise component.

Processing the correlate trace data is something to consider. At least the data is there to look at subsets of the data. Time migration would likely improve the profiles from deeper water and areas of variable seafloor morphology.

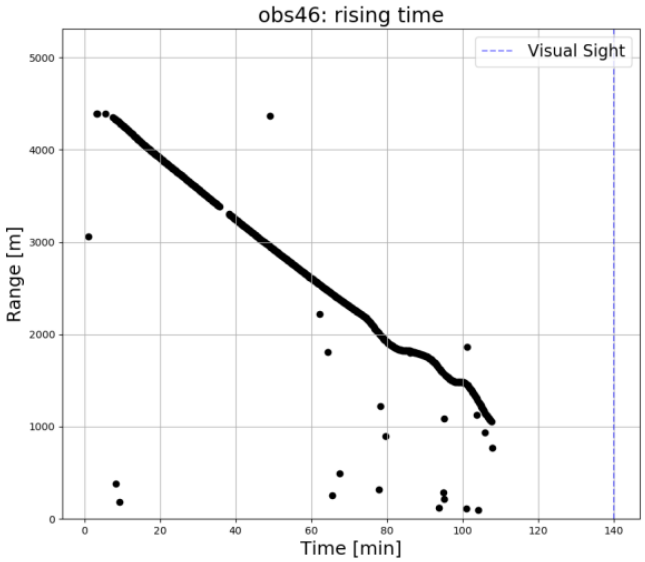
The PNG images provided are intended to be a quick preview for browsing the data. Having the data in Kingdom Suite or some other interpretation or SEG-Y viewer is very helpful for rescaling the data horizontal, vertical and amplitude, so you can better resolve what you are interested in looking at.

Appendix 5. Rise time and rate data for all OBSs

The Edgetech system that communicates acoustically with the OBSs has several functions, including a burnwire anchor release and repeated ranging from ship during ascent, every 10 s. The data monitor OBS ascent to predict when the OBS should be at the surface. I. Eufrasio removed outliers and fit the ranging measurements to a model including a steady ascent rate, and compiled rise time data for all OBSs (time when the OBS left the sea floor and the time observed at the surface), and did model fits to early sites. The table shows these results, and figures show the ranging data. Ranging data were not saved for WD53, WD60, and WS75. In general the Keck (strong-motion) OBSs, WS71-WS75, rose close to 30 m/min while the others varied considerably between 29 and 45 m/min. It is unclear what controls that variation, as all are identically configured.

Table A5.1. *OBS Rise times and rates*

OBS Name	Depth (m)	Recovery Date (UTC)	Release time	Rise time (min)	Visual Sight time	Rising Velocity (m/min)	ETA model	Model Velocity (m/min)
WD46	4349	9-Sep-19	21:05:49	140	23:26:00	31		
WD47	3999	9-Sep-19	12:49:55	129	14:59:00	31		
WD48	1324	27-Aug-19	15:17:45	33	15:51:00	40	16:14:45	23
WD49	4091	7-Sep-19	04:23:41	97	06:01:12	42		
WD50	4987	28-Aug-19	06:08:03	142	08:31:00	35	08:05:03	43
WD51	4361	28-Aug-19	12:04:00	106	13:50:00	41	13:50:00	41
WD52	2564	31-Aug-19	04:42:05	87	06:10:00	29	06:17:05	27
WD53	4646	8-Sep-19	19:09:50	131	21:21:46	35		
WD54	4520	10-Sep-19	09:45:07	107	11:33:00	42		
WD55	1284	28-Aug-19	23:40:00	42	00:22:00	31	00:29:00	26
WD56	4060	28-Aug-19	04:41:00	122	06:43:00	33	06:41:00	34
WD57	5053	29-Aug-19	12:31:00	115	14:26:00	44	14:23:00	45
WD58	4493	8-Sep-19	10:17:27	109	12:07:00	41		
WD59	4550	8-Sep-19	03:22:00	138	05:40:00	33		
WD60	4519	6-Sep-19	08:40:16	108	10:29:00	42		
WD61	2067	30-Aug-19	11:15:02	63	12:19:00	33	12:19:02	32
WD62	4626	6-Sep-19	16:20:03	129	18:30:00	36		
WD63	4656	6-Sep-19	00:28:00	108	02:16:42	43		
WD64	4754	5-Sep-19	17:21:00	147	19:48:00	32		
WD65	4718	4-Sep-19	23:59:00	151	02:30:00	31		
WD66	4941	5-Sep-19	11:24:42	110	13:15:00	45	13:19:42	43
WD67	4652	5-Sep-19	09:46:00	114	11:40:00	41		
WD68	4715	4-Sep-19	17:21:21	110	19:12:00	43		
WD69	3896	31-Aug-19	15:33:00	117	17:30:00	33	17:31:00	33
WD70	3253	27-Aug-19	10:52:00	100	12:32:00	33	12:35:00	32
WS71	1555	28-Aug-19	17:06:00	54	18:00:00	29	18:01:00	28
WS72	4142	27-Aug-19	20:21:00	144	22:45:00	29	22:01:00	30
WS73	2133	30-Aug-19	19:40:00	74	20:54:00	29	20:58:00	27
WS74	903	31-Aug-19	01:02:00	37	01:39:00	24	01:33:00	29
WS75	1109	31-Aug-19	10:48:18	42	11:31:00	26	-	-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Visual Sight
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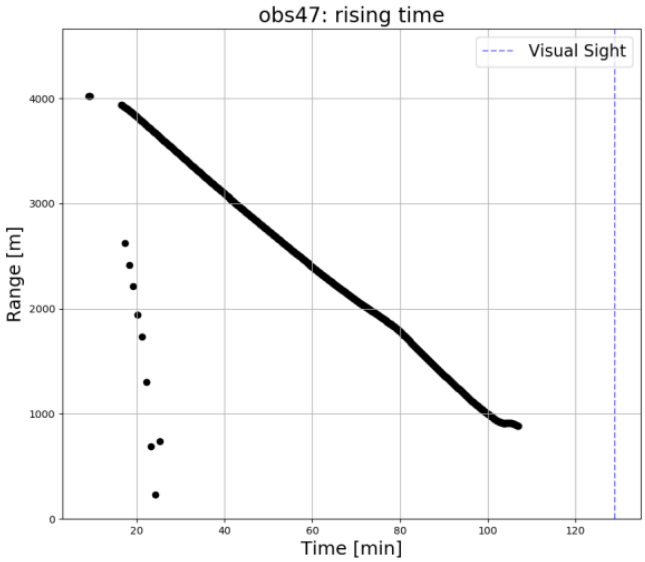
Time [min]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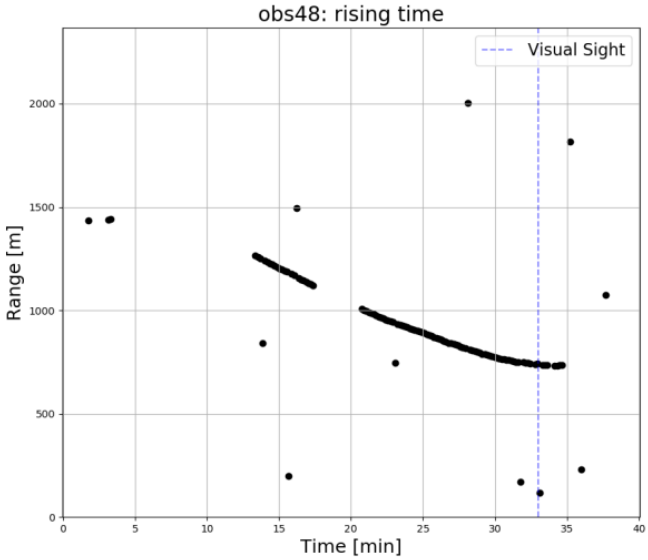
Time [min]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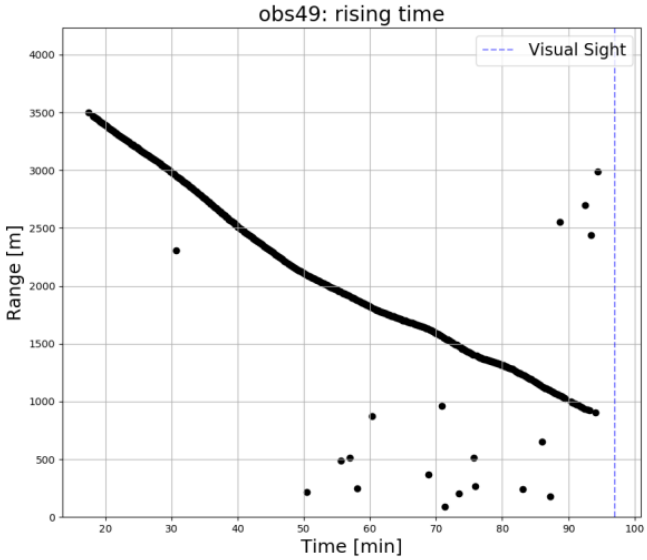
Time [min]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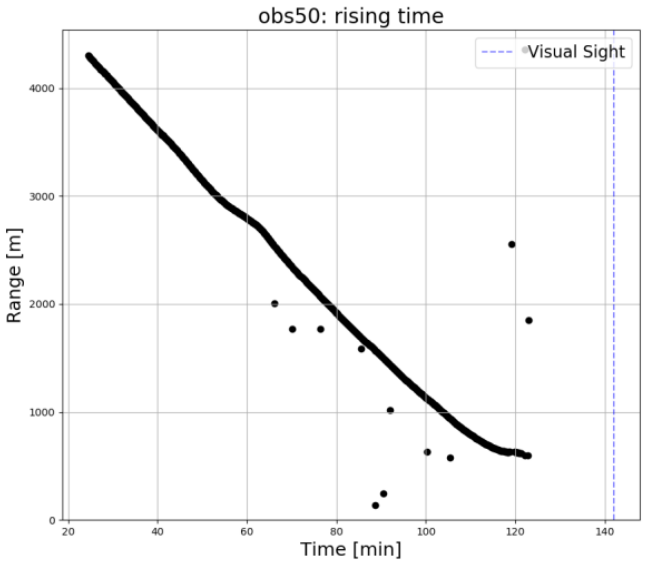
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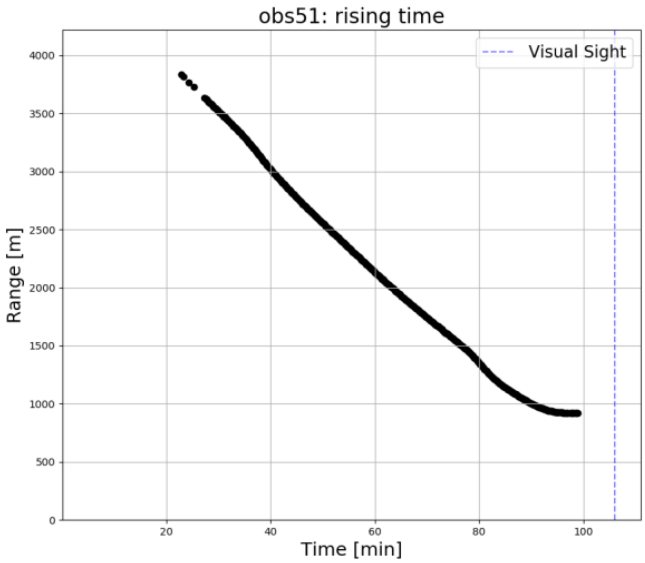
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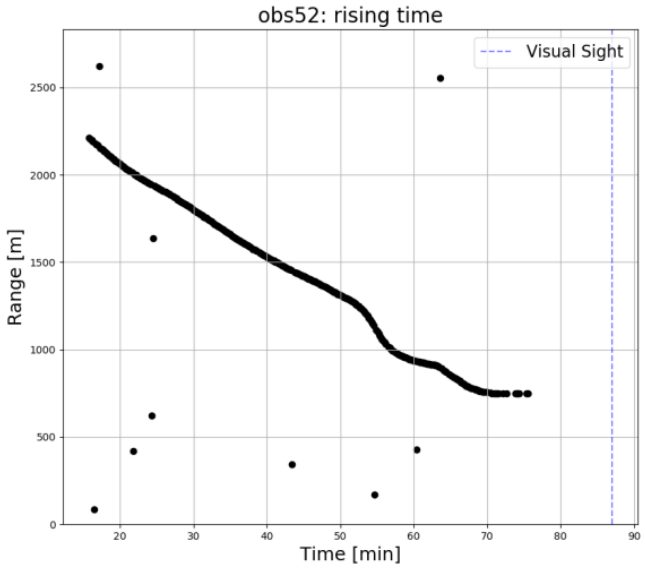
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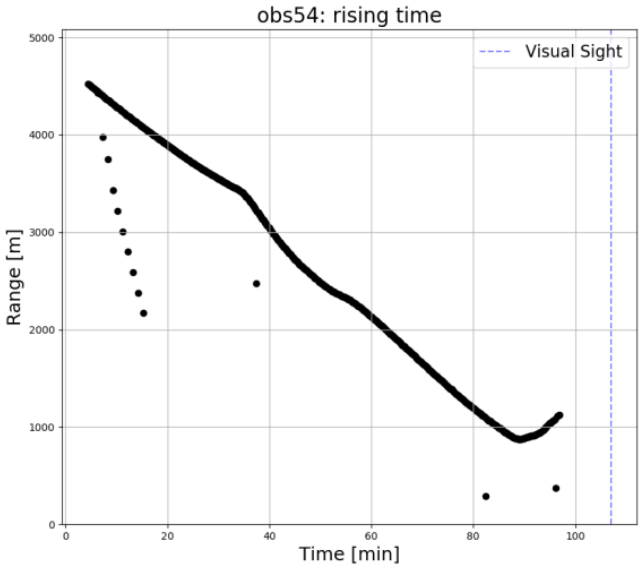
Time [min]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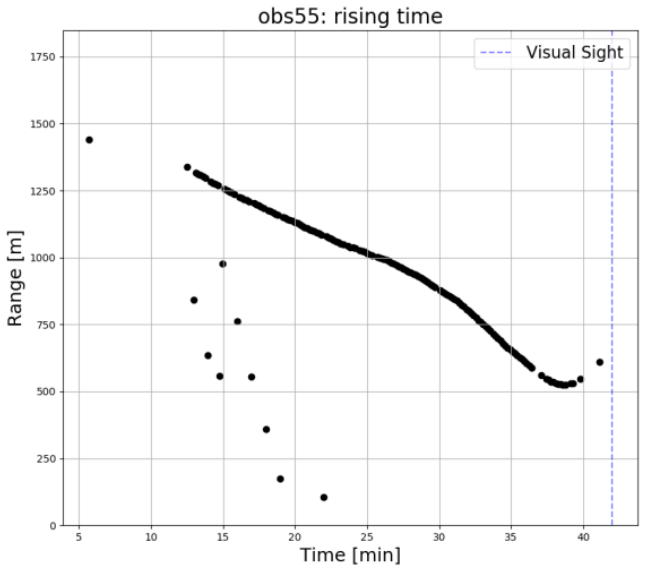
Time [min]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Range [m]
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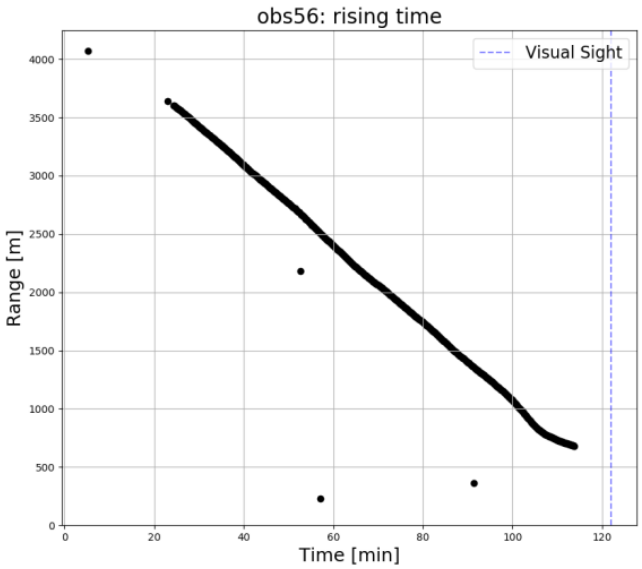
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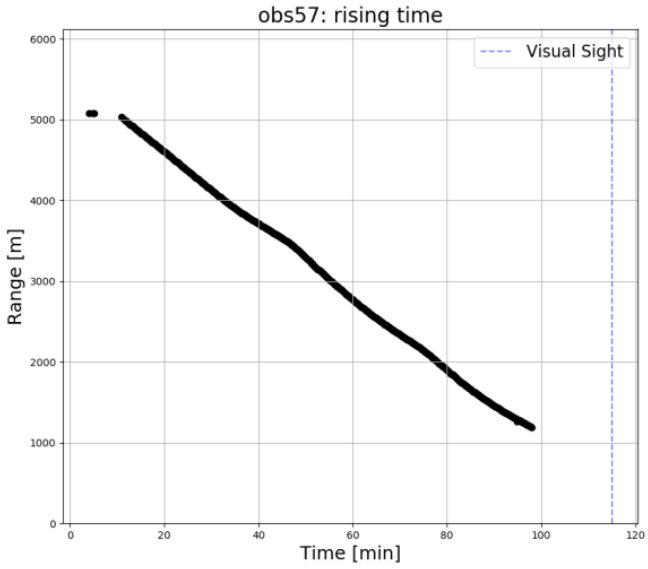
Time [min]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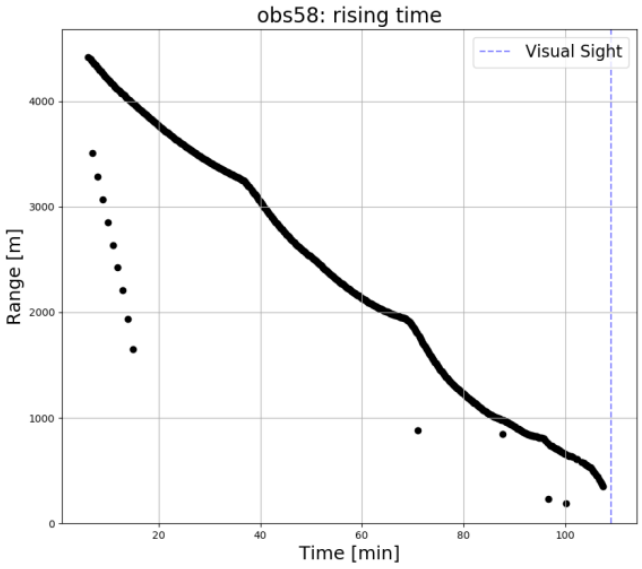
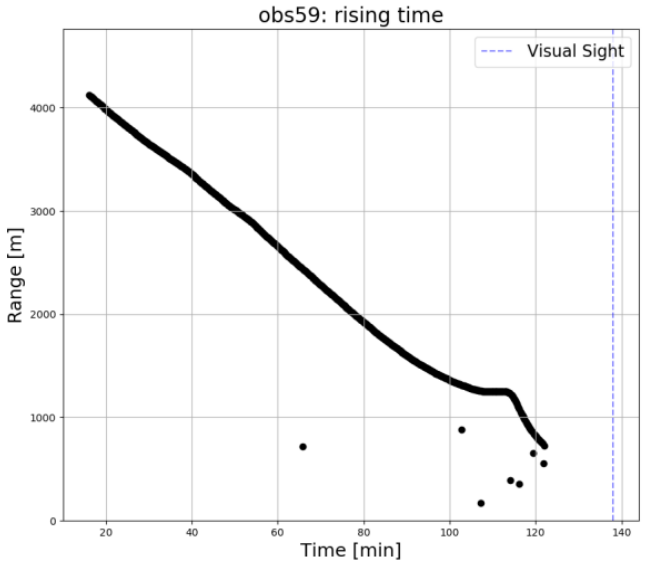
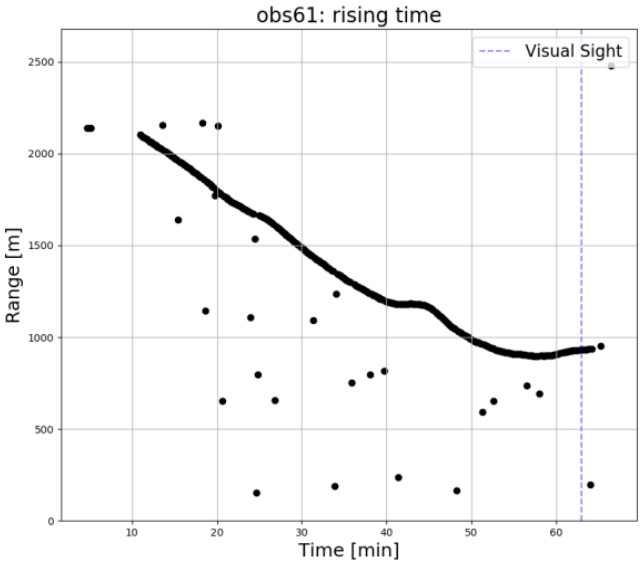
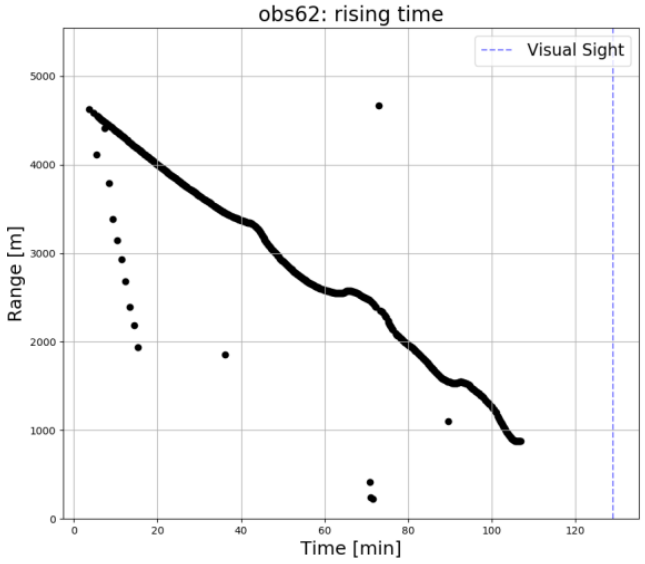
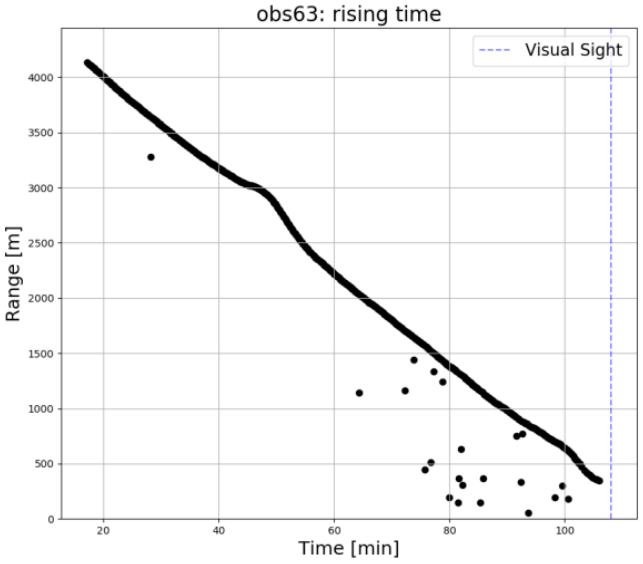
Time [min]

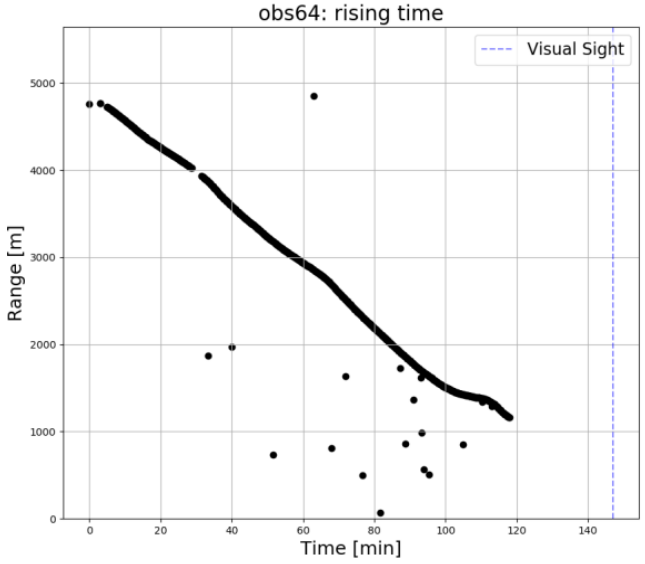

obs58: rising time
Visual Sight
Range [m]
Time [min]

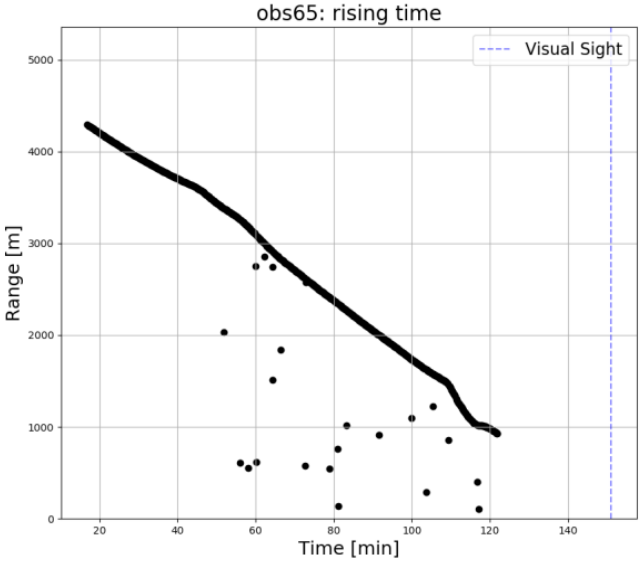

obs59: rising time
Visual Sight
Range [m]
Time [min]

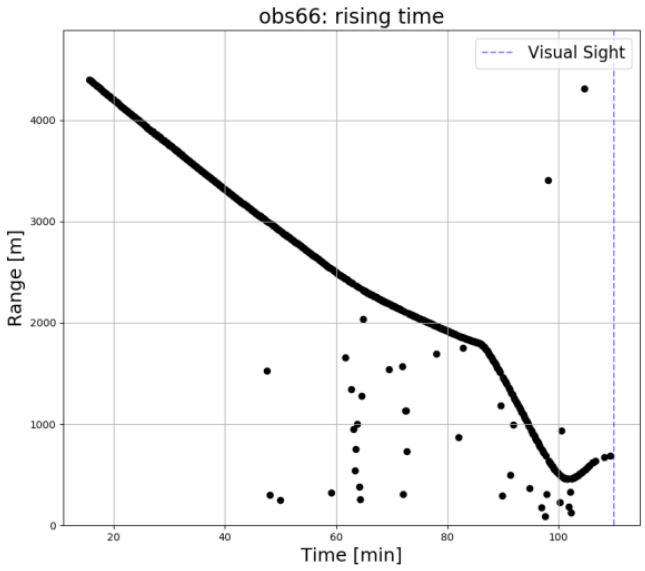

obs61: rising time
Visual Sight
Range [m]
Time [min]

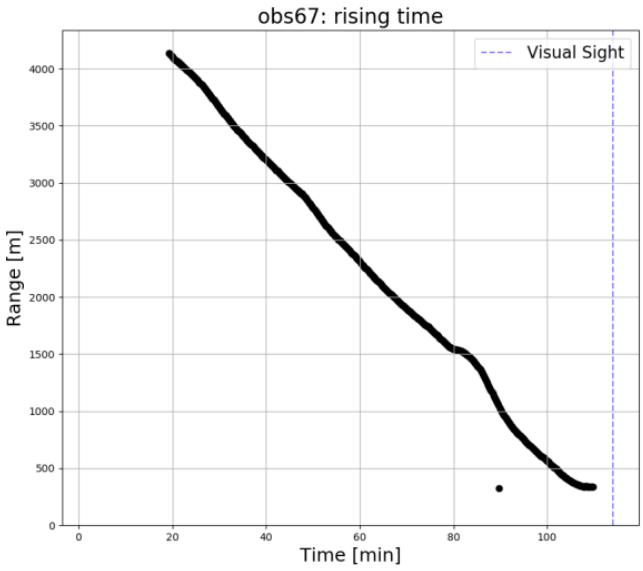

obs62: rising time
Visual Sight
Range [m]
Time [min]

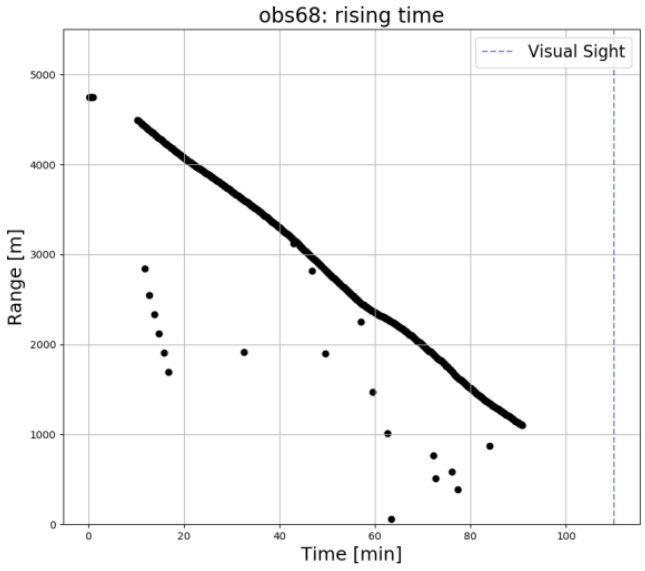

obs63: rising time
Visual Sight
Range [m]
Time [min]

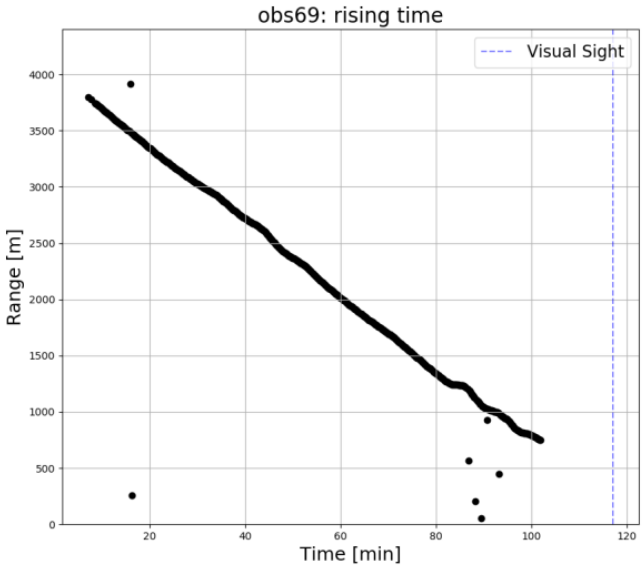

obs64: rising time
Visual Sight
Range [m]
Time [min]

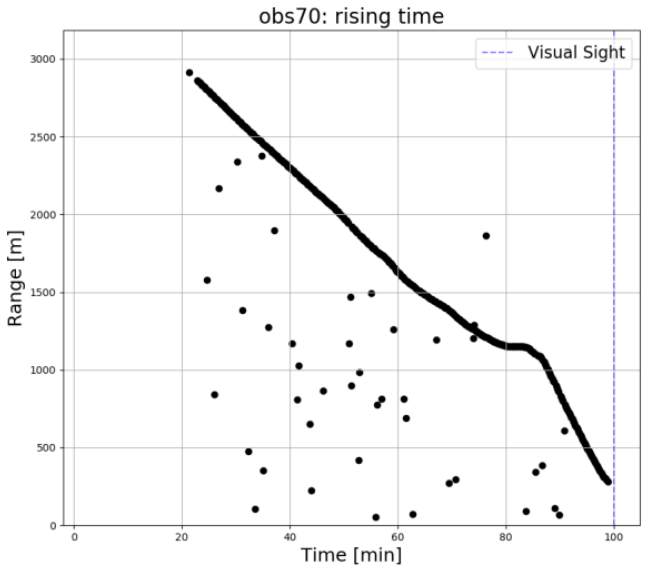

obs65: rising time
Visual Sight
Range [m]
Time [min]

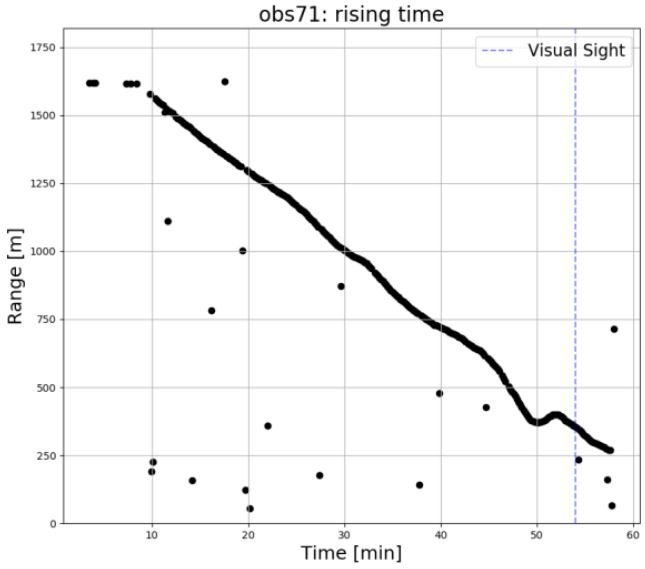

obs66: rising time
Visual Sight
Range [m]
Time [min]

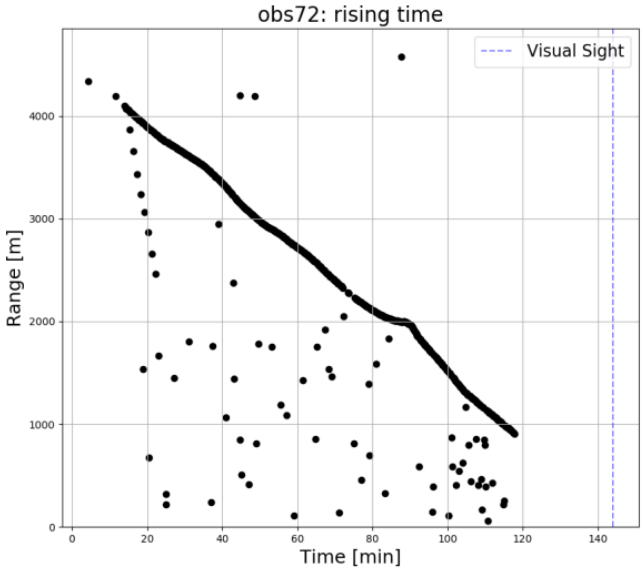

obs67: rising time
Visual Sight
Range [m]
Time [min]

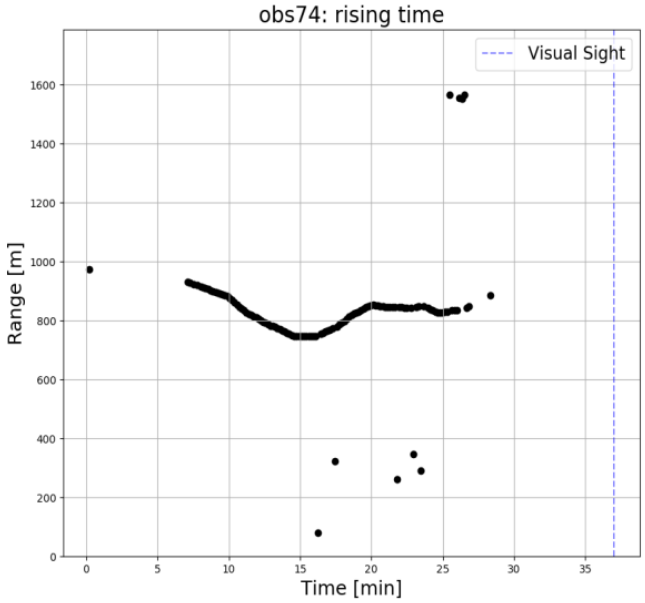

obs68: rising time
Visual Sight
Range [m]
Time [min]

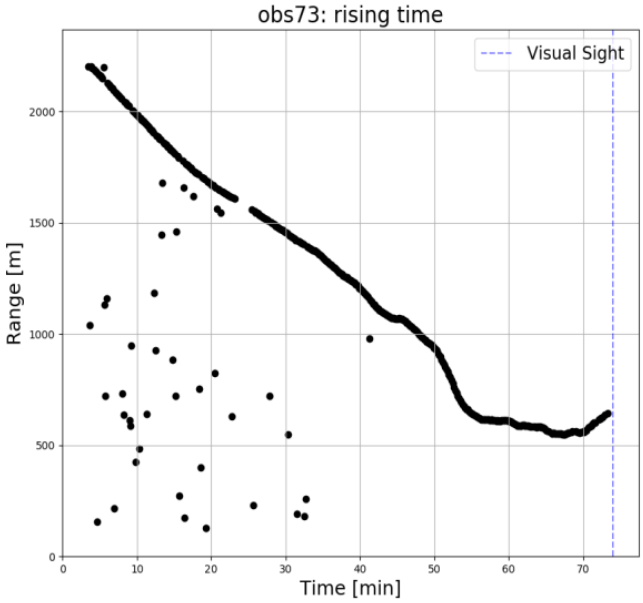

obs69: rising time
Visual Sight
Range [m]
Time [min]


obs70: rising time
Visual Sight
Range [m]
Time [min]


obs71: rising time
Visual Sight
Range [m]
Time [min]


obs72: rising time
Visual Sight
Range [m]
Time [min]


obs74: rising time
Visual Sight
Range [m]
Time [min]


obs73: rising time
Visual Sight
Range [m]
Time [min]

Appendix 6. List of auxiliary and underway data

These are organized by directory on the cruise disk

MGL1907/docs	Cruise documents
MGL1907/docs/elog	Cruise elog
MGL1907/docs/gravity_tie	Gravity Tie information
MGL1907/docs/map	Cruise maps, track map
MGL1907/docs/offsets	Vessel/sensor offsets
MGL1907/docs/operations/	Operations documents
MGL1907/docs/operations/Daily_Reports	Cruise Daily Reports
MGL1907/docs/operations/NavLogs	Spectra Nav logs
MGL1907/docs/operations/ObsLogs	MCS/Source logs
MGL1907/docs/operations/MGL1907_B15-log	Master line log table
MGL1907/docs/operations/Seal_reports	Seal 408 line logs
MGL1907/docs/permits	Associated permitting
MGL1907/docs/waypoints	Waypoint files
MGL1907/docs/personnel	Rosters, org charts etc.
MGL1907/docs/reports	Associated reports
MGL1907/docs/reports/MGL1907_DataReport_v1.0.doc	This file
MGL1907/docs/offsets/MGL1907_Offsets_MCS.xls	Vessel/sensor offsets
MGL1907/docs/screencaps	Screen captures
MGL1907/processed	Processed data
MGL1907/processed/knudsen	Knudsen segy
MGL1907/processed/reflex	Spectra reflex files
MGL1907/processed/obsip	OBS Shot log files
MGL1907/processed/sprint	Sprint UKOOA P190s
MGL1907/processed/svp	Sound velocity profiles
MGL1907/raw	Raw data
MGL1907/raw/adcp	Raw ADCP data
MGL1907/raw/knudsen	Raw Knudsen data
MGL1907/raw/MarkeyWinch	DESH-5 winch data
MGL1907/raw/multibeam	Raw EM122 data
MGL1907/raw/serial	Underway serial data
MGL1907/raw/sonobuoy	Raw sonobuoy data
MGL1907/raw/spectra/P1	Spectra underway p190
MGL1907/raw/spectra/P2	Spectra UKOOA p294
MGL1907/raw/XBT	Raw XBT data

MGL1907/raw/serial/ contains the following datasets:

MGL-bath02 – EM122 center beam depth file (used for displays)
MGL-cnav – Cnav 2000 DGPS data
MGL-cnav3050all – Cnav 3050 DGPS data
MGL-gy01 – raw gyro data
MGL-posmv – Applanix PosMV Inertial GPS data
MGL-seapath – Kongsberg Seapath 330 Inertial GPS data
MGL-slog01 – Furuno DS80 speed log data
MGL-svuss01 – Microsv velocity data
MGL-tsgraw – Thermosalinograph data
MGL-vaisala1 – Vaisala weather station #1 data

MGL-vaisala2 – Vaisala weather station #2 data
MGL-vc01 – BGM raw gravity counts

Appendix 7. XBT Information

Drop #	Date	Time UTC	Probe Type	Lat deg (N)	Lat min	Long deg (W)	Long min
1	7/15/19	11:33:00	T-5	45	41.54443	129	51.07031
2	7/18/19	11:00:00	T-5	45	57.32715	130	3.69434
3	7/18/19	11:06:00	T-5	45	56.86475	130	3.38184
1	8/27/19	7:56:06	T-5	56	53.13623	151	18.86719
2	8/28/19	0:35:33	T-5	56	0.97900	151	49.56934
3	8/28/19	7:28:56	T-5	55	26.85205	152	22.94922
4	8/28/19	7:28:51	T-5	55	26.85205	152	22.94922
5	8/29/19	5:45:30	T-5	55	19.59910	154	3.33594
6	8/29/19	3:29:06	T-5	53	58.86328	156	37.73730
7	8/31/19	5:41:26	T-5	54	2.88770	159	20.26758
8	9/1/19	11:01:36	T-5	54	30.13180	158	49.13574
9	9/1/19	0:20:14	T-5	54	13.24023	157	32.10254
10	9/2/19	8:39:57	T-5	53	50.76758	159	15.26367
11	9/2/19	19:02:36	T-5	53	33.23584	160	45.25391
12	9/3/19	9:00:55	T-5	53	56.13916	158	8.49902
13	9/3/19	23:12:51	T-5	53	28.15576	158	37.29688
14	9/4/19	11:45:57	T-5	53	18.85791	159	36.54395
15	9/6/19	22:42:16	T-5	53	46.92578	157	23.06445
17	9/7/19	13:47:03	T-5	53	22.70020	158	32.19727
18	9/8/19	13:05:18	T-5	53	58.14111	154	52.88379
20	9/9/19	13:08:52	T-5	54	57.13525	150	26.12793
21	9/10/19	10:19:35	T-5	56	20.05615	149	2.88086
22	9/10/19	22:50:28	T-5`	56	17.85840	149	4.02930
24	9/11/19	11:55:07	T-5	56	27.28809	149	42.17090
25	9/12/19	1:40:07	T-5	56	57.25928	150	2.95508

Notes:
Drops 3 and 4 are same raw file; one data set may be overwritten?
Several sequence numbers are skipped (16, 19, 23) due to operator error, but no data or XBTs were lost.

Appendix 8. Electronic event logger (ELOG)

ID	Date	Record Time	Auth.	Type	Subject	Comments
2	2019:239:11:20	2019:239:11:20	dmm	OBS	OBS WD70	ETA to surface 1232 UTC
3	2019:239:12:32	2019:239:12:32	dmm	OBS	OBS WD70 on surface	
4	2019:239:12:44	2019:239:12:44	dmm	OBS	OBS WD70 on board	WD70 on board. EM122 - Knudsen - and ADCP turned back on.
5	2019:239:12:47	2019:239:12:47	dmm	OBS	Begin transit to OBS WD48	
6	2019:239:14:24	2019:239:14:24	HNF	OBS	OBS WD48	15 minutes from station - sonar secured
7	2019:239:15:28	2019:239:15:28	IEUF	OBS	OBS WD48	ETA to surface 1605
8	2019:239:16:13	2019:239:16:12	dmm	OBS	OBS WD48 on board	WD48 on board. EM122 - Knudsen - and ADCP turned on.
9	2019:239:16:24	2019:239:16:24	dmm	OBS	Begin transit to OBS WS72	Transit speed at 8 knots for improved multibeam data.
10	2019:239:19:19	2019:239:19:19	IEUF	OBS	OBS WS72	15 min to reach the OBS.
11	2019:239:19:28	2019:239:19:27	IEUF	OBS	OBS WS72	1 mile away from the OBS. EM122 - Knudsen - and ADCP turned off.
12	2019:239:20:35	2019:239:20:35	IEUF	OBS	OBS WS72	ETA to surface 22:26 UTC
13	2019:239:23:36	2019:239:22:50	TJ	OBS	OBS WS72 onboard	WS72 on board. EM122 - Knudsen - and ADCP turned back on.
14	2019:239:23:39	2019:239:23:03	TJ	EM122 Multibeam	Begin transit to WD50	
15	2019:240:00:12	2019:240:00:00	TJ	Comment/ Event	Midnight location	56 degrees 07.19 North 151 degrees 49.08 West
16	2019:240:00:48	2019:240:00:47	TJ	XBT	Deployed XBT #2	
17	2019:240:05:29	2019:240:05:29	TJ	OBS	15 min to reach the OBS.	
18	2019:240:05:38	2019:240:05:38	TJ	OBS	OBS WD50	1 mile away from the OBS. EM122 - Knudsen - and ADCP turned off.
19	2019:240:06:43	2019:240:06:43	HNF	OBS	OBS WD50 rising	OBS rising - expected surface time 08:00
20	2019:240:08:31	2019:240:08:31	dmm	OBS	OBS WD50	WD50 on board. All sonars in operation.
21	2019:240:08:48	2019:240:08:48	dmm	OBS	Begin transit to WD51	Begin transit to OBS WD51
22	2019:240:11:29	2019:240:11:28	HNF	OBS	OBS WD51	15 minutes from station
23	2019:240:11:40	2019:240:11:39	ZZ	OBS	OBS WD51	1 mile away from the OBS.
24	2019:240:12:44	2019:240:12:44	dmm	OBS	OBS WD51 rising	WD51 eta to surface 0551 local.
25	2019:240:14:20	2019:240:14:19	dmm	OBS	OBS WD51 onboard	OBS WD51 onboard - sonars turned back on.
26	2019:240:16:27	2019:240:16:27	IEUF	OBS	WS71	5min to reach obs
27	2019:240:16:35	2019:240:16:35	HNF	OBS	WS71	1 mile to site WD71

28	2019:240:16:46	2019:240:16:46	HNF	OBS	WS71	sonar secured
29	2019:240:17:19	2019:240:17:19	dmm	OBS	OBS WS71 surface eta 0951 local	
30	2019:240:17:55	2019:240:17:55	dmm	OBS	OBS WS71 on the surface	
31	2019:240:18:11	2019:240:18:38	dmm	OBS	OBS WS71 onboard	Sonars back on
32	2019:240:19:12	2019:240:19:12	GLM	Comment/ Event	Transiting to OBS WD55	Estimated arrival time is 15:45 local
33	2019:240:23:05	2019:240:23:05	TJ	OBS	15 minutes from station WD55	
34	2019:240:23:33	2019:240:23:33	GLM	OBS	WD55	Sonar secured
35	2019:241:00:03	2019:241:00:03	GLM	OBS	WD55	Estimated surface time of OBS is 16:15 local time
36	2019:241:00:23	2019:241:00:23	GA	OBS	OBS WD55 sited on surface	
37	2019:241:00:53	2019:241:00:53	PH	OBS	OBS WD55 lines clipped	
38	2019:241:01:02	2019:241:01:01	PH	OBS	WD55 onboard	Begin transit to OBS WD56
39	2019:241:04:05	2019:241:04:05	PH	Comment/ Event	notified that we are 15 minutes from WD56	
40	2019:241:04:24	2019:241:04:24	PH`	OBS	On sight for WD56 recovery at 04:20	Sonars turned off.
41	2019:241:05:07	2019:241:05:07	PH	OBS	OBS WD56 rising	OBS WD56 rising to the surface. Estimated surface time is 06:37 UTC
42	2019:241:07:06	2019:241:07:06	ZZ	OBS	WD56 onboard	Sonar back online
43	2019:241:11:59	2019:241:11:59	ZZ	OBS	15 minutes from station WD57	
44	2019:241:12:41	2019:241:12:41	PH	OBS	WD57 coming up	Stopped at site - OBS locked - released from bottom - and ETA at surface is 6:54AM local time.
45	2019:241:12:59	2019:241:12:59	HF	OBS	OBS57	revised estimated surface time is 6:24
46	2019:241:14:26	2019:241:14:26	GA	OBS	OBS WD57 sited on surface	Strobe
47	2019:241:14:43	2019:241:14:43	ZZ	OBS	OBS WD57 on board	Sonar system back online.
48	2019:241:20:44	2019:241:14:53	TJ	OBS	Begin transit to OBS LA27	
49	2019:242:01:02	2019:242:01:02	PH	OBS	15 minutes from station LA27	
50	2019:242:01:10	2019:242:01:09	PH	OBS	1 mile from OBS LA27	

51	2019:242:01:22	2019:242:01:21	PH	OBS	on sight at LA27 - sonars secured	
52	2019:242:03:27	2019:242:03:27	PH	OBS	OBS LA27 not recovered	Leaving site.
53	2019:242:10:32	2019:242:10:32	PH	OBS	15 minutes from station WD61	
54	2019:242:10:40	2019:242:10:39	PH	OBS	1 mile from OBS WD61	
55	2019:242:11:06	2019:242:11:06	dmm	OBS	On site WD61 sonars secured	
56	2019:242:11:32	2019:242:11:32	PH	OBS	OBS WD61 rising - estimated surface time 4:19	
57	2019:242:12:17	2019:242:12:17	GA	OBS	OBS WD61	OBS WD61 reached surface
58	2019:242:12:43	2019:242:12:42	GA	OBS	OBS WD61 onboard	
59	2019:242:18:58	2019:242:18:58	IEUF	OBS	15 min to reach the OBS WS73.	
60	2019:242:21:17	2019:242:19:44	GA	OBS	OBS WS73 rising	WS73 rising expected on surface 20:40 local
61	2019:242:21:18	2019:242:21:17	GA	OBS	OBS WS73 onboard	WS73 onboard - 3h15m to WS74
62	2019:242:22:40	2019:242:19:16	IEUF	OBS	Arrived at OBS WD73 site	Multibeam - and sonar sensor were turned off
63	2019:243:00:45	2019:243:00:45	PH	OBS	6 minutes from WS74	Bridge forgot to give 15 minute call
64	2019:243:00:53	2019:243:00:53	PH	OBS	On sight at WS74	
65	2019:243:00:56	2019:243:00:56	PH	OBS	Sonars off at WS74	
66	2019:243:02:03	2019:243:02:03	PH	OBS	OBS WS74 onboard	
67	2019:243:04:17	2019:243:04:17	PH	OBS	15 minutes from station WD52	
68	2019:243:04:26	2019:243:04:25	PH	OBS	1 mile from OBS WD52	
69	2019:243:04:35	2019:243:04:34	PH	OBS	On sigth at WD52 - sonars off	
70	2019:243:05:09	2019:243:05:08	PH	OBS	WD52 estimated surface time 06:00 UTC	10PM ship time
71	2019:243:06:33	2019:243:06:32	ZZ	OBS	OBS WD52 onboard	sonar system back online
72	2019:243:06:34	2019:243:06:34	PH	OBS	OBS WD52 onboard`	

73	2019:243:10:07	2019:243:10:06	HNF	OBS	OBS WS75	15 minutes from location
74	2019:243:10:14	2019:243:10:14	PH	OBS	1 mile from OBS WS75	
75	2019:243:10:26	2019:243:10:26	PH	OBS	WS75 on site	Sonars off
76	2019:243:11:32	2019:243:11:05	PH	OBS	Estimated surface time for WS75	11:29UTC or 3:29 ship time
77	2019:243:11:58	2019:243:11:58	PH	OBS	OBS WS75 on board	
78	2019:243:15:03	2019:243:15:03	IEUF	OBS	15 min to arrive at site	15 mintues to arrive to OBS 69 site
79	2019:243:15:14	2019:243:15:14	GLM	OBS	1 mile from OBS WD69	
80	2019:243:18:00	2019:243:17:52	GA	OBS	OBS WD69 onboard	WD69 on board at 9:52 local time. ETA to LD43 is 12:00 local
81	2019:243:19:53	2019:243:19:52	GLM	OBS	1 mile from LD43	
82	2019:243:21:21	2019:243:21:21	GLM	Comment/ Event	no response from LD43	After 1.5 hours no response from Lamont instrument.
83	2019:246:01:40	2019:245:00:14	TJ	EM122 Multibeam	Midnight position	Lat:54degrees 06.1046N Lon:158 degrees 05.9722W Heading 249 degrees collecting MB data
84	2019:246:01:43	2019:246:00:01	TJ	EM122 Multibeam	Midnight position	Lat: 53 degrees 29.4030 N Lon: 160 degrees 17.7660W Heading 66.9 degrees collecting MB data
85	2019:246:22:35	2019:239:07:56	ES	XBT	Deployed XBT #1	
86	2019:246:22:38	2019:240:07:28	ES	XBT	Deployed XBT #3	Drops 3 and 4 are the same raw files
87	2019:246:22:39	2019:241:05:45	ES	XBT	Deployed XBT #5	
88	2019:246:22:41	2019:242:03:29	ES	XBT	Deployed XBT #6	
89	2019:246:22:43	2019:243:05:41	ES	XBT	Deployed XBT #7	
90	2019:246:22:44	2019:244:11:01	ES	XBT	Deployed XBT #8	
91	2019:246:22:44	2019:244:20:14	ES	XBT	Deployed XBT #9	
92	2019:246:22:45	2019:245:08:39	ES	XBT	Deployed XBT #10	
93	2019:246:22:46	2019:245:19:02	ES	XBT	Deployed XBT #11	
94	2019:246:22:47	2019:246:09:00	ES	XBT	Deployed XBT #12	
95	2019:246:22:57	2019:241:00:00	ES	MIDNIGHT	Midnight Location	55 degrees 40.832 North 153 degrees 37.7340 West
96	2019:246:22:59	2019:242:00:00	ES	MIDNIGHT	Midnight Location	54 degrees 08.9540 North 156 degrees 44.1308 West
97	2019:246:23:07	2019:243:00:00	ES	MIDNIGHT	Midnight Location	54 degrees 20.97 North 159 degrees 07.67 West
98	2019:246:23:09	2019:244:00:00	ES	MIDNIGHT	Midnight Location	53 degrees 42.56 North 160 degrees 54.79 West
99	2019:246:23:14	2019:246:23:13	ES	XBT	Deployed XBT #13	
100	2019:246:23:18	2019:244:00:55	ES	EM122 Multibeam	EM122 Survey A	Turning at waypoint A_01 to begin Survey A line 1

101	2019:246:23:21	2019:244:17:44	ES	EM122 Multibeam	EM122 Survey A	Turning at waypoint A_03 to end Survey A line 1
102	2019:246:23:22	2019:244:18:40	ES	EM122 Multibeam	EM122 Survey A	Turning at waypoint A_04 to begin Survey A line 2
103	2019:246:23:23	2019:245:20:20	ES	EM122 Multibeam	EM122 Survey A	Turning at waypoint A_06 to end Survey A line 2
104	2019:246:23:25	2019:245:21:27	ES	EM122 Multibeam	EM122 Survey A	Turning at waypoint A_07 to begin Survey A line 3
105	2019:246:23:26	2019:246:11:50	ES	EM122 Multibeam	EM122 Survey A	Turning at waypoint A_09 to end Survey A line 3
106	2019:246:23:27	2019:246:12:52	ES	EM122 Multibeam	EM122 Survey A	Turning at waypoint A_10 to begin Survey A line 4
107	2019:246:23:28	2019:244:18:00	ES	Comment/ Event	Slow Down	SOG dropped down to ~3kts because of the storm
108	2019:246:23:29	2019:245:21:30	ES	Comment/ Event	Slow Down	SOG increased to above 9kts again
109	2019:246:23:31	2019:243:13:36	ES	Comment/ Event	Slow Down	4 kts due to ship traffic
110	2019:246:23:31	2019:243:14:30	ES	Comment/ Event	Slow Down	SOG increased back up to 9 kts
111	2019:246:23:33	2019:243:16:00	ES	Comment/ Event	High Wind	Wind speeds above 30 kts - beginning of storm
112	2019:246:23:33	2019:245:10:00	ES	Comment/ Event	High Wind	End of sequence of winds above 30 kts
113	2019:247:06:06	2019:247:00:00	ES	MIDNIGHT	Midnight Location	53 degrees 26.0242 North 159 degrees 47.8369 West
114	2019:247:06:10	2019:247:05:08	ES	EM122 Multibeam	EM122 Survey A	Turning at waypoint A_12 to end Survey A line 4
115	2019:247:06:12	2019:247:06:01	ES	EM122 Multibeam	EM122 Survey A	Turning at waypoint A_13 to begin segment toward OBS station WD66. Estimated arrival to WD66 @9.8 kts is 11:07 UTC.
116	2019:247:10:54	2019:247:10:53	ZZ	OBS	15 mins from WD66	
117	2019:247:11:03	2019:247:11:03	HNF	OBS	OBS WD66	1 mile from site
118	2019:247:11:13	2019:247:11:13	HNF	OBS	OBS WD66	stopped on site - sonar secured
119	2019:247:11:43	2019:247:11:43	PH	OBS	WD66 estimated surface time 13:40 UTC	5:40AM ship time
120	2019:247:11:53	2019:247:11:53	PH	XBT	deployed XBT #14	
121	2019:247:12:19	2019:247:12:19	ZZ	OBS	OBS WD66	surface time update to 5:25 ship time
122	2019:247:13:38	2019:247:13:15	GA	OBS	OBS WD66 visual	WD66 visually spotted on surface
123	2019:247:13:41	2019:247:13:41	GA	OBS	OBS WD66 onboard	WD66 successful recovery. sonar turned back on. Heading to next station. WD68. ETA is 16:40. Ship left EMS122 survey A path and headed SE (COG 216)

124	2019:247:16:59	2019:247:16:59	IEUF	OBS	15 min to reach the OBS.	15 min to reach OBS WD68
125	2019:247:17:14	2019:247:17:14	GA	OBS	WD68 stopped on site	OBS WD68 stopped on site - sonar secured
126	2019:247:17:41	2019:247:17:23	GA	OBS	OBS WD68 released	OBS WD68 released - ETA on surface 1900UTC
127	2019:247:19:31	2019:247:19:30	GA	OBS	OBS WD68 onboard	OBS WD68 onboard - sonar started. ETA to the OBS WD65 is 23:45 UTC. Vessel turned to east after picking up the station (COG 91 degrees) at SOG 10kts
128	2019:247:19:32	2019:247:19:11	GA	OBS	WD68 sited	OBS WD68 visual on surface
129	2019:247:23:31	2019:247:23:31	ES	OBS	15 min to reach the OBS WD65	
130	2019:247:23:50	2019:247:23:49	ES	OBS	On site WD65 - sonars secured	
131	2019:248:00:29	2019:248:00:00	ES	OBS	OBS WD65	OBS released - estimated surface time is 02:42 UTC
132	2019:248:00:31	2019:248:00:00	ES	MIDNIGHT	Midnight Location	52 degrees 53.9569 North 158 degrees 54.6149 West
133	2019:248:02:30	2019:248:02:29	LC	OBS	WD65 is visual on the surfce	
134	2019:248:02:47	2019:248:02:47	PH	OBS	OBS WD65 on deck - sonars on	
135	2019:248:09:21	2019:248:09:21	ZZ	OBS	OBS WD67 15 mins from site	
136	2019:248:09:30	2019:248:09:30	PH	OBS	OBS WD67 1 mile from site	
137	2019:248:09:41	2019:248:09:41	PH	OBS	OBS WD67 on site - sonars off	
138	2019:248:10:10	2019:248:10:10	HF	OBS	WD67	estimated surface time 11:45 UTC
139	2019:248:12:01	2019:248:12:01	GA	OBS	OBS WD67 onboard	WD67 67 onboard - sonars restarted
140	2019:248:17:01	2019:248:17:01	IEUF	Comment/ Event	15 min to reach the OBS.	15 min to reach the OBS WD64
141	2019:248:17:07	2019:248:17:06	IEUF	Comment/ Event	1 mile from OBS WD64	
142	2019:248:17:15	2019:248:17:15	IEUF	Comment/ Event	Arrived at OBS WD64 site	Arrived at Site. Acustistics turned off
143	2019:248:20:08	2019:248:17:22	GA	OBS	WD64 release	WD64 release from sea floor edt 11:37 ship time
144	2019:248:20:08	2019:248:20:08	GA	OBS	OBS WD64 onboard	WD64 onboard - sonar restarted
145	2019:249:00:02	2019:249:00:02	ES	MIDNIGHT	Midnight Location	52 degrees 32.6572 North 158 degrees 8.2831 West

146	2019:249:00:04	2019:249:00:04	ES	OBS	15 minutes from station WD63	
147	2019:249:00:13	2019:249:00:13	PH	OBS	OBS WD63 one mile out	
148	2019:249:00:23	2019:249:00:23	PH	OBS	on sight at WD63	
149	2019:249:00:56	2019:249:00:56	PH	OBS	OBS WD63 estimated surface time	Estimated surface time of 18:13 - ship time. 2:13 UTC.
150	2019:249:02:28	2019:249:02:28	GA	OBS	OBS WD63 onboard	WD63 recovered - sonar restarted
151	2019:249:08:12	2019:249:08:12	PH	OBS	15 minutes from station WD60	
152	2019:249:08:20	2019:249:08:20	PH	OBS	OBS WD60 1 mile away	
153	2019:249:08:33	2019:249:08:33	PH	OBS	on site at WD60	
154	2019:249:08:54	2019:249:08:53	PH	OBS	OBS WD60 estimated surface time	Est. Surface time: 02:36 ship time - 10:36 UTC
155	2019:249:10:57	2019:249:10:57	PH	OBS	OBS WD60 on board	On board - sonars on.
156	2019:249:15:58	2019:249:15:58	IEUF	OBS	15 min to reach the OBS.	15min to obs WD62
157	2019:249:16:06	2019:249:16:06	IEUF	OBS	1 mile from OBS WD60	
158	2019:249:16:13	2019:249:16:13	IEUF	OBS	on site at WD62	sonars off
159	2019:249:18:50	2019:249:18:50	GA	OBS	OBS WD62 onboard	WD62 onboard - sonar on - head for Survey B
160	2019:249:21:52	2019:249:21:52	IEUF	EM122 Multibeam	EM122 Survey B at waypoint B_01	Corse changed to start survey B. Arrived at waypoint B_01
161	2019:249:22:50	2019:249:22:45	ES	XBT	Deployed XBT #15	
162	2019:250:00:01	2019:250:00:00	ES	MIDNIGHT	Midnight Location	53 degrees 43.0158 North 157 degrees 41.0150 West
163	2019:250:09:33	2019:250:08:35	HNF	EM122 Multibeam	Direction change	We ended survey B line 1 - where we were moving toward the SW - and turned South to transit to Survey B line 2
164	2019:250:11:00	2019:250:09:30	HNF	EM122 Multibeam	direction change	Turned to the NE to start Survey B line 2
165	2019:250:13:54	2019:250:13:48	GA	XBT	XBT #17 launched	XBT 17 launched. There is no #16 due to sequencing error
166	2019:250:19:34	2019:250:19:34	IEUF	EM122 Multibeam	EM122 Survey B at waypoint B_06	
167	2019:250:20:40	2019:250:20:40	GLM	EM122 Multibeam	direction change	Waypoint B07

168	2019:251:02:45	2019:251:02:44	PH	OBS	15 minutes from station WD59	
169	2019:251:02:52	2019:251:02:51	PH	OBS	1 mile from OBS WD59	
170	2019:251:02:59	2019:251:02:59	PH	OBS	on site at WD59	sonars off
171	2019:251:03:44	2019:251:03:44	PH	OBS	OBDS WD59 estimated surface time	21:36 ship time 05:36 UTC
172	2019:251:05:51	2019:251:05:51	ZZ	OBS	OBS WD59 on board	Sonar system back online. ETA to next station - WD58 - is 10:30 UTC
173	2019:251:09:53	2019:251:09:53	PH	OBS	15 minutes to OBS site WD58	
174	2019:251:10:00	2019:251:10:00	PH	OBS	1 mile from OBS WD58	
175	2019:251:10:10	2019:251:10:10	PH	OBS	on site at WD58 - sonars off	
176	2019:251:10:28	2019:251:10:28	HNF	OBS	WD58	estimated surface time 12:10 UTC
177	2019:251:11:05	2019:251:00:00	HNF	MIDNIGHT	Midnight Location	53 38.3949 N 156 03.825 W
178	2019:251:12:14	2019:251:12:14	GA	OBS	OBS WD58 onboard	OBS WD58 onboard - sonars on
179	2019:251:13:12	2019:251:13:08	GA	XBT	XBT 18 launch	
180	2019:251:18:52	2019:251:18:46	GA	OBS	OBS WD53 15 minutes	15 minutes away from WD53
181	2019:251:18:55	2019:251:18:55	GLM	OBS	WD53 1 mile warning	
182	2019:251:19:03	2019:251:19:03	GA	OBS	OBS WD53 on site	On site WD53 - sonar secured
183	2019:251:21:22	2019:251:21:22	GA	OBS	OBS WD53 onboard	OBS WD53 onboard - sonars started - head foe WD49
184	2019:252:03:57	2019:252:03:55	ES	OBS	15 minutes from station WD49	
185	2019:252:04:03	2019:252:04:03	PH	OBS	1 mile from OBS WD49	
186	2019:252:04:12	2019:252:04:11	PH	OBS	on site WD49 - sonars off	
187	2019:252:04:50	2019:252:04:50	PH	OBS	Estimated surface time for WD49	22:05 - ship time 06:05 UTC
188	2019:252:06:17	2019:252:06:17	ES	OBS	WD49 onboard	
189	2019:252:06:18	2019:252:06:00	ES	OBS	visual of WD49	
190	2019:252:12:25	2019:252:12:25	ZZ	OBS	OBS WD47 15mins notice	
191	2019:252:12:42	2019:252:12:42	GA	OBS	OBS WD47 on site	OBS WD47 on site - sonars off
192	2019:252:13:04	2019:252:12:45	GA	OBS	OBS WD47 locked	OBS WD47 Burn-2/lock sensor command sent

193	2019:252:13:17	2019:252:13:17	GA	OBS	WD47 estimated surface time	OBS WD47 started release command 1300 - due on surface 0700 ship time (1500 UTC)
194	2019:252:14:02	2019:252:13:13	GA	XBT	XBT #20 launched	XBT sequence #20 launched (note there is no #19 due to operator error)
195	2019:252:14:07	2019:252:00:00	HNF	MIDNIGHT	Midnight Location	midnight location 54 1.5198 N 152 50.4024 W
196	2019:252:15:14	2019:252:15:13	GA	OBS	OBS WD47 onboard	WD47 onboard - sonar started. Est. time to wd46 1237
197	2019:252:20:36	2019:252:20:35	GLM	OBS	15 minutes from station WD46	
198	2019:252:20:53	2019:252:20:53	GA	OBS	OBS WD46 on site	Stopped at WD46 - sonar off
199	2019:252:21:24	2019:252:21:10	GA	OBS	OBS WD46 released	OBS WD46 released - double ping - due on surface 1510 ship time. BB1 acoustics did not respond; sensor not locked. We tried to lock again @ 21:40 but we did not get any reponse
200	2019:252:23:46	2019:252:23:34	GA	OBS	OBS WD46 onboard	WD46 onboard - sonar started. Transit to WD54 with surveying
201	2019:253:00:12	2019:252:23:24	ES	OBS	Visual of station WD46	
202	2019:253:00:13	2019:253:00:00	ES	MIDNIGHT	Midnight Location	55 degrees 29.6835 North 149 degrees 39.7803 West
203	2019:253:09:23	2019:253:09:23	ZZ	OBS	OBS WD54 15 mins notice	
204	2019:253:09:31	2019:253:09:31	HNF	OBS	OBS WD54	1 mile out from WD54
205	2019:253:09:37	2019:253:09:36	PH	OBS	on site WD54	
206	2019:253:11:04	2019:253:11:04	PH	OBS	OBS WD54 estimated surface time	3:40AM ship time 11:40 UTC time
207	2019:253:11:06	2019:253:11:05	PH	XBT	XBT21 launched at 10:19	
208	2019:253:11:59	2019:253:11:58	PH	OBS	OBS WD54 on deck	starting MB survey area
209	2019:253:13:08	2019:253:13:08	ZZ	EM122 Multibeam	at waypoint c_01	make a trun and head to C02 waypoint
210	2019:253:17:40	2019:253:17:39	IEUF	EM122 Multibeam	at waypoint c_02	At C2 turning to C3
211	2019:253:18:27	2019:253:18:26	IEUF	EM122 Multibeam	at waypoint c_03	turning to point C4
212	2019:253:22:41	2019:253:22:30	ES	Multibeam	At waypoint c_04	
213	2019:253:23:10	2019:253:23:10	BD	XBT	XBT 22 launed at 22:50	
214	2019:254:00:02	2019:254:00:00	ES	MIDNIGHT	Midnight Location	56 degrees 15.8037 North 149 degrees degrees 21.8751 West

215	2019:254:00:12	2019:254:00:11	ES	EM122 Multibeam	at waypoint c_05	
216	2019:254:05:31	2019:254:05:31	ZZ	EM122 Multibeam	at waypoint c_06	
217	2019:254:06:45	2019:254:06:45	ZZ	EM122 Multibeam	at waypoint c_07	
218	2019:254:10:59	2019:254:10:58	ZZ	EM122 Multibeam	at waypoint c_08	
219	2019:254:11:50	2019:254:11:50	ZZ	XBT	XBT 23 lauched at 11:50	Stop at 704m - launch a new one
220	2019:254:11:51	2019:254:11:50	ZZ	EM122 Multibeam	at waypoint c_09	
221	2019:254:11:59	2019:254:11:59	ZZ	XBT	XBT 24 lauched at 11:55	
222	2019:254:14:17	2019:254:14:17	GLM	EM122 Multibeam	At waypoint c_10	turning towards c_11
223	2019:254:15:16	2019:254:15:16	IEUF	EM122 Multibeam	At waypoint c_11	Turning to point C_12
224	2019:254:17:15	2019:254:17:10	IEUF	EM122 Multibeam	at waypoint c_12	turning to waypoint C13
225	2019:254:22:06	2019:254:22:00	IEUF	EM122 Multibeam	Arrived at C_95r	
226	2019:255:01:53	2019:255:01:53	PH	XBT	XBT 25 launched at 1:40:07	
227	2019:255:04:13	2019:255:00:00	ES	MIDNIGHT	Midnight Location	57 degrees 08.3569 North 149 degrees 41.5534 West
228	2019:255:04:17	2019:255:00:23	ES	EM122 Multibeam	at waypoint C_96	
229	2019:255:04:22	2019:255:01:30	ES	EM122 Multibeam	at waypoint c_97	Occurred between 1:30 and 2:00.
230	2019:255:07:09	2019:255:07:09	ZZ	EM122 Multibeam	Arrived at C_98	
231	2019:255:07:48	2019:255:07:48	ZZ	EM122 Multibeam	Arrived at C_99	

Appendix 9. Watchstander notes and logs

Apply-to-sail participants took 8 hr shifts standing watch. At the end of each watch and whenever events occurred, they entered information into an on-line document, reproduced here.

Monday, 8/26/19, 238, 239 (UTC time)

The Science Crew started boarding the Langseth at about 9:30 am. It took two trips to get the whole group on board. Those of us in the first trip explored around the ship, the pier, and a beach across the harbor while we waited for the rest of the group to arrive. Watch times were assigned. We also sat through a safety briefing and got a tour of the ship. The ship departed at about 3:00 and began its 10 hour transit to the first OBS, WD70. Geoff, Peter, and the Apply to Sail scientists watched most of the departure from the marine mammals viewing tower.

***14:00 Local** /22:00 UTC: Cong and Em start watch (maybe at 23:30, after leaving port)*

Cong and Em started and maintained the "30-Minute-Log", which logs the date, time, ship position, depth, SOG, COG, wind speed, sea condition, gravity, salinity, and water temperature every 30 minutes. It also logs and changes that are made in the sonar programs during that time.

Tuesday, 8/27/19, 239, 240 (UTC time)

***22:00 local**/06:00 UTC: Heather and Zhengyang start watch, Cong and Em end watch*

WD70 - Communication with OBS complete at **03:20 local**/11:20 UTC. ETA to surface is **04:32 local**/12:32 UTC

WD70 – OBS on surface at 0**4:32 local**/12:32 UTC. Neither the radio nor flasher worked, so OBS was visually spotted with the flood lights on the bridge

WD70 – OBS on board at **04:44 local**/12:44 UTC, sonar turned back on

04:47 local / 12:47 UTC: begin transit between WD70 and WD48

Zhengyang was seasick during our first watch. He helped with tasks as possible, but mostly rested. While things were quiet during the first watch, shortly after this watch began the Langseth began to move off the shelf into deeper water. This resulted in a lot of frequent changes to the Knudsen parameters. We changed the Phase to match the appropriate depths and modified the Range, Gain Values, and power to keep the signal as clear as possible.

We arrived at our first station WD70 at 03:20 local time. This was Heather's first time running the Edgetech. Tim (WHOI OBS crew leader) walked her through it step by step. Since it was the first time through and some of the directions on the log sheet were unclear, it took us a while to get through the whole program and release WD70. The WHOI crew tagged the OBS and secured it on board, then disassembled it. We noticed lots of jellyfish and a squid as we waited to land the OBS. After this recovery we made significant updates to the recovery log sheet to make the directions clearer. The ship began its transit to the next stations

***6:00 local**/14:00 UTC: Ginevra and Igor start watch, Heather and Zhengyang end watch*

WD48 – 15 minutes from station at **6:24 local** /14:24 UTC, sonar secured

Heather trained Igor and Ginevra how to run the OBS release program

The first log file for this station (mgl1907_S69_WD48_20190827_153712.txt) was run with the wrong EdgeNmea python script (E:\PythonTools\EdgeNmea\EdgeNmea_Universal_0.6.py) and with the wrong station enable command. We mistakenly used the S48 command codes instead of the S69 command codes, forgetting that the WHOI IDs are the ones listed on the reference sheet in the communication box. The wrong enable codes (ones for S48) were sent and the OBS did not respond. We discarded this recording sheet and started with a fresh one.

The second log file for this station (MGL1907_S69_WD48_20190827_145942.txt) was created using the correct commands for the station (S69) but we were still using the incorrect python script

(E:\PythonTools\EdgeNmea\EdgeNmea_Universal_0.6.py). The first part of this log file has the correct information, but is missing the ship latitude, longitude, and OBS GPS time. The script was terminated after the repeat-range commands were being returned every 10 seconds.
The third log file for this station (mgl1907_S69_WD48_20190827_153826.txt) was generated using the correct python script (E:\PythonTools\EdgeNmea\EdgeNmea_Universal_0.7.py) but was created after the Edgetech box was already communicating with the rising OBS. So it does not have the commands listed from enabling, locking, and releasing the station from the seafloor, but does have the range values for the station as it approached the water surface.
We arrived to WD48, and sent initial communication to the instrument at 15:01. We were logging on the first draft of the recording sheet so some of the steps and verbiage on the log sheet have notes on them for how to improve future recoveries. We ran the wrong python script initially (EdgeNmea.py version 6 instead of EdgeNmea.py version 7), so there are two log files for this station, one with the logging of the initial commands and the first few ranges, and another with the rest of the ranges. See "the second log file … " and "the third log file … " paragraphs above. Another log file was created but has no information on it because we listed and sent the incorrect command codes to the OBS. See "the first log file … " paragraph above.
During the first burn cycle (the locking command) only two once-per-minute pings were heard, which were followed by 7 once-per-second pings. We interpreted this as the instrument being finished with the process, and we marked the Guralp as "locked". We sent the locking command (burn2) at **07:15:55 local** /15:04:55 UTC.
We sent the burn-wire command (burn1) **07:17:38 local**/15:17:38 UTC, and we heard 7 once-per-second pings. The last ping was heard at 15:17:45. The once-per-minute pings were not tallied, but we heard the first double ping at 15:20:45.
We estimated the lift-off time to be **07:27 local**/15:27 UTC (15 minutes after the first ping), but it likely lifted off at **07:20 local** /15:20 UTC when we heard the first double ping. This "first double ping" assumption is being carried out to instrument recovery moving forward.
The OBS reached the surface ~25 minutes earlier than expected due to the reason listed in the paragraph above. We estimated surface time to be at **08:05 local** /16:05 UTC based on a 37 meters/minute rise time and a range of ~1440 meters away. An additional reason why the rise time might have been faster than expected is due to the shallow depth of the instrument, and the range value thus not being quite as representative of true depth. The instrument surfaced several hundred meters away. The horizontal distance was on the same order of magnitude as the depth listed for the instrument (750 meters horizontal distance, 1324 meters recorded depth of instrument deployment).
07:51:45 local /15:51:45 UTC: visual sight of OBS. There was no signal that radio contact was received at the bridge.
08:12:40 local /16:12:40 UTC: OBS on board. Sunrise. WHOI confirmation that novatech radio and flasher were working. Sonar was turned back on.
Temperature sensors were collected, washed, and recorded. The serial numbers listed on the UW oceanography temperature sensor sheet matched with the serial numbers on the instruments. An Iceland (#S9406) and two Tidbits (#20233080 and #20233093) were on the instrument.
We began transiting to WS72 at **08:24 local** /16:24 UTC, and reduced ship speed to 8 knots to improve the quality of multibeam data. Additional notes from main lab log are listed below.
WD48 – Communication with OBS complete at **07:15:28 local** /15:28 UTC. ETA to surface is **08:16:05 local** /16:05 UTC
WD48 – OBS on board at **08:12 local** /16:12 UTC, sonar turned back on
WS72 – 15 minutes from station at **11:19 local** /19:19 UTC

This was our first instrument with additional strong motion sensors, and almost everyone was still learning how to use the edgetech box, so some components of this recovery were unexpected. This recovery utilized the first revision of the log recording sheet, which has since been revised several more times.
We sent the enable command at **11:48:02 local**/19:48:02. The OBS did not respond initially, because the wrong receiving frequency was being used (12 instead of 11.5). We learned that when the box gets turned off that we need to ensure that all of the correct settings are maintained. We sent another enable command with the correct transmit and receiving frequencies set, but still did not hear a reply from the instrument. We tried one more time, and received a reply from the instrument at **11:48:56 local** /19:56 UTC.
We sent the burn2 command (instrument locking) at 19:59:17 UTC. We got the standard 15 once-per-second confirmation pings , and then 15 once-per-minute processing pings. We did not hear the once-per-second pings that indicate that the process was done as we had for the previous stations. We attributed the longer locking time to the additional instrumentation at this station. We took a range, got a value, and assumed that the guralp was locked. This deviated from the instructions and may have been incorrect.
We carried on and sent the burn1 command (burn wire, seafloor release) at **12:21:08 local** /20:21:08 UTC and heard 15 once-per-second pings confirming that the instrument heard the command. The time of the last ping was **12:22:42 local**/20:22:42 UTC, and we heard 3 more once-per-minute pings. The first double-sounding-ping occurred at **12:26:37 local**/20:26:37 UTC. The range at this time was 4184. We also did not hear any confirmation pings at this step to indicate that the instrument was done burning the connection wire.
We estimated the rise time to be 119 minutes given an ascent speed of 35 meters/minute. An additional estimate was calculated to be 32 meters/minute after some ranges were returned. We did not change the ETA. We estimated the lift-off time to be 20:26 (when we heard the first double ping) and estimated the surface time to be **14:26 local** /22:26 UTC (119 minutes later). Additional notes from the main lab log for this time period are listed below.
WS72 – 1 mile away from site at **11:27 local** /9:27 UTC, sonar secured
WS72 – Communication with OBS complete at **12:35 local** /20:35 UTC, ETA to surface is **12:26 local** /22:26 UTC

***14:00 Local** /22:00 UTC: Cong and Em start watch*
Visual sight of the instrument was acquired at **14:45 local** /22:45 UTC, and it was on board at **15:00 local** /23:00 UTC. WHOI OBS technicians gave verbal indication that the novatech radio was working, but there was not an announcement from the bridge that the radio was heard. It is unclear if the strobe was working or not.
We acquired the temperature sensors from the station, there was an Antares (#1854489) and one Tidbit (#20233118). These records matched the numbers recorded on the UW oceanography station-temperature sensor sheet. The temperature sensors looked normal on the station after recovery. The battery was dead on the instrument.
WS72 – OBS on board at **14:50 local** /22:50 UTC, sonar turned back on
15:03 local /23:03 UTC: begin transit between WS72 and WD50
16:00 local /24:00 UTC: Midnight location (239 -> 240). 56° 07.19’ N, 151° 49.08’ W
Wednesday, 8/28/19, 240, 241 (UTC time)
XBT2 – deployed at **16:47 local** /00:47 UTC
WD50 – 15 minutes from station at **21:29 local**/05:29 UTC

WD50 – 1 mile away from site at **21:38 local** /05:38 UTC, sonar secured

- ➔ Cong & Em's first time using Edgetech.
- ➔ Enable command response was normal, 15 pings @ 1s period
- ➔ Burn 2 command: confirmation reply was 7 pings, then 1 ping a minute later, and one minute after that a 7-ping burn shutdown confirmation. Ranged to confirm.
- ➔ Burn 1 command (**22:08 local** /06:08:00 UTC): confirm reply was 7 pings, then 15 pings @1 min period, then 7-ping burn shutdown confirmation. Heard double ping at **22:13:24 local** /06:13:24 UTC. Ranging afterwards confirmed OBS had already risen 553 m.
- ➔ After setting repeating range we noticed that the ranges (and earlier commands) were not printing to the script, so we stopped the script and restarted it. The script therefore only contains the header and repeating ranges.

22:00 local /06:00 UTC: Heather and Zhengyang start watch, Cong and Em end watch

WD50 – Communication with OBS complete at **22:43 local** /06:43 UTC, ETA to surface i**s 00:00 ocal** / 08:00 UTC

WD50 – OBS on board at **00:31 local** /08:31 UTC, sonar turned back on

00:48 local /08:48 UTC: begin transit between WD50 and WD51

WD51 – 15 minutes from station **03:28 local** /at :11:28 UTC

WD51 – 1 mile away from station at **03:28 local**/ 11:39 UTC

WD51 – Communication with OBS complete at **04:44 local** /12:44 UTC, ETA to surface is **05:51 local** /13:51 UTC

Heather trained Zhengyang how to adjust the Knudsen sounder, keep the "30-minute-log" and run the Edgetech.

At the start of watch Zhengyang and Heathert joined Shawn to launch an XBT. Shawn tried to connect it 3 times, but the computer in the lab never reghistered that it was ready to launch. After some troubleshooting, Shawn found that it was not fully plugged in. Once that was fixed he launched the XBT at about 12:39 local time.

When WD50 reached the surface we had confirmation that the radio was working, but the flasher was not functioning. The instrument was again spotted by the flood light on the bridge. We were a little more involved with the recovery, helping move the tagging poles out of the way, transferring the guide line around the A-frame beam, and disassembling the OBS.

The bridge did receive a radio signal from WD51, but the flasher was not working. The OBS surfaced about 10 minutes earlier than expected, so we started to look into better ways to calculate the estimated surface time. We discovered we can use the range values from the Edgetech fairly well for the deep stations to modify the estimated surface time, but they are not accurate for shallow stations as the lateral distance away from the ship has a larger impact. Heather helped to tag OBS WD51.

***06:00 local** /14:00 UTC: Ginevra and Igor start watch, Heather and Zhengyang end watch*

WD51 – OBS on board at **06:19 local** /14:19 UTC, sonars turned back on

WS71 – 5 minutes from site at **08:27 local** /16:27 UTC

WS71 – 1 mile from site at **08:35 local** /16:35 UTC

WS71 – Reached site at **08:46 local**/16:46 UTC, sonar secured

At this site we began not turning the sonar off until the ship was stopped, rather than stopping all sonar prior to reaching the station. We sent the initial enable command at **08:46:20 local** /16:46:20 UTC, and

we heard 15 confirmation pings. Some of the pings (3s, 7s, and 9s) had a triple ping-sound. This is something that we had not yet observed.
We sent the burn2 (instrument locking) command at 48:58 and heard the 15 once-per-second confirmation pings indicating that the instrument heard us. We then heard 15 once-per-minute pings, followed by 7 once-per-second pings. We took a range and assumed that because we got a range that the guralp was locked, and the process was finished running. This is likely an incorrect assumption, because the seismometer was not locked when we retrieved it at the surface. If the locking pings run longer than 15 minutes then the instrument probably did not finish the process. We have been instructed by Tim to continue on regardless, and not try again to lock the instrument due to ship time.
We sent the burn1 command (burn wire and release from anchor) at **09:06:07 local** /17:06:07 UTC. We heard 7 once-per-second confirmation pings, but these were weird once again, with double pings at 3s and 4s. We heard 4 once-per-minute pings and marked the first time of a double ping occurring at **09:10 local** /17:10:00 UTC. We took several ranges and determined that the instrument was rising.
We estimated a rise rate of 34 meters/minute and gave a lift off estimated time of 17:10, and a surface ETA of 17:50. There was speculation that when calling "range" after the burn 1 command that the value being returned was just a previously stored value because it was the exact same for 3 range calls, and that the instrument was not actually finished with the process.
Visual sight was acquired at **10:00:58 local** / 18:00:58 UTC, and an initial radio contact was not recorded.
The temperature sensors were collected from the instrument, and did not match the values listed in the UW oceanography spreadsheet. There was one Iceland (#S9417) and two Tidbits (#20233113 and #20233085). The Iceland instrument was collected on the next day because it was not recognized during the initial inspection.
There were seastars on this one! And we got to learn how to help hooking and reeling the OBS in alongside the technicians.
WS71 – Communication with OBS complete at **09:19 local** /17:19 UTC, ETA to surface is **09:51 local** /17:51 UTC
WS71 – OBS on surface at **09:55 local** /17:55 UTC
WS71 – OBS on board at **10:38 local**/18:38 UTC, sonars turned back on
11:12 local /19:12 UTC: in transit between WS71 and WD55, ETA to site is **15:45 local**/23:45 UTC
14:00 Local */22:00 UTC: Cong and Em start watch*
WD55 – 15 minutes from station at **15:05 local** /23:05 UTC

- ➔ Em & Cong start script in OBS lab

WD55 – Reached site at **15:33 local**/ 23:33 UTC, sonar secured

- ➔ Enable command response normal, 15 pings
- ➔ Burn 2 command response: 15 confirm reply pings @ 1s period, then 8 pings @ 1 min period, and an 8-ping burn shutdown confirmation @ 1s period. We ranged multiple times to confirm command was received.
- ➔ Burn 1 command (**15:40:56 local** /23:40:56 UTC) response: 7 confirm reply pings, then 5 burning pings @ 1 min period. Heard 3 potential double pings. Confirmed that station was rising by ranging.

16:00 local/ 24:00 UTC: Midnight location (240 -> 241) 55° 40.832' N 153° 37.7340' W
Thursday, 8/29/19, 241, 242 (UTC time)

WD55 – Communication with OBS complete at **16:03 local** /00:03 UTC, ETA to surface is **16:15 local** /00:15 UTC
WD55 – OBS on surface at **16:23 local** /00:23 UTC

- ➔ Em & Cong helped hook and steady the OBS as it neared the ship

WD55 – OBS on board at **16:53 local** /00:53 UTC

- ➔ An octopus and king crab were stowaways on WD55. Shaun released them back to the sea. Ginevra has time-lapse video of the octopus perhaps inking.
- ➔ Flasher did not activate because it was daytime. Tim confirmed that the Novatech radio was working.
- ➔ Cong & Em helped dismantle OBS. Cong took pictures of temp and pressure sensors. There was one Iceland sensor and two Tidbit sensors. All three matched the logsheets from deployment.

17:01 local /01:01 UTC: begin transit between WD55 and WD56
WD56 – 15 minutes from station at **20:05 local** /04:05 UTC
WD56 – Reached site at **20:20 local** /04:20 UTC, sonar secured
WD56 – Communication with OBS complete at **21:05:07 local** /05:07 UTC, ETA to surface is **22:37 local** /06:37 UTC
We started to run OBS script at 04:05 UTC (20:05 local). Around 15 min later, we reached the location of site WD-56. The ship position was then confirmed, and the sonar was shut off. We started to communicate with the OBS at 04:20 UTC. Standard 15 once-per-second confirm pings were received after we sent enable command. We sent range command and got the distance 4074 m.
We sent the lock command (Burn 2) at 04:21 UTC with 15 once-per-second pings. 15 confirmation pings were heard, indicating that Guralp was locked. Release command (Burn 1) was then sent to OBS at 04:41 UTC. We heard the double pings at 04:57 UTC. 14 once-per-second confirmation pings were heard later. We tried the range command and got the distance of 3642 m, indicating OBS had raised up. We informed the bridge that the station WD-56 would rise up to surface at 06:37 UTC (22:37 local), with estimated rate 35m/min.
Cong shot XBT to measure the temperature and salinity with depth at ~21:00/~05:00 UTC during the rise of OBS
22:00 local /06:00 UTC: Heather and Zhengyang start watch, Cong and Em end watch
Heather imported the new XBT profile (T5_00005.edf, T5_00005.rdf) into the SIS multibeam acquisition program
OBS WD56 was in the middle of rising when our shift started with an expected surface time of **22:37 local** /06:37 UTC. We received radio signal and had visual sign of the flasher at **22:43 local** /06:43 UTC. OBS was secured on board at **23:01 local** /07:01 UTC. At **23:06 local** /07:06 UTC the sonar was turned back on. This was the first OBS recovered during our overnight watch that had a working flasher, which made the visual sighting much faster. We helped to tag the instrument again, and Em and Heather helped to dissassemble
We began our transit to OBS WD57 about 15 minutes ahead of schedule, with an estimated arrival time of **03:54 local**/ 11:54 UTC. Ship arrived at WD57 and we began signaling to the instrument at 12:20UTC. Estimated liftoff time **04:32 local** /12:32 UTC. Estimated surface time **06:24 local** /14:24 UTC. This OBS rose very quickly, so we revised the rise rate from 35 m/min to 45 m/min after observing rise rates for about 30 minutes. The new rate was based on the changes in range over periods of 1 or 5 minutes. The new rise rate reduced the rise time duration from 144 minutes to 114 minutes.
Tom taught Heather how to play Cribbage, which is apparently a crucial skill to have while on a ship.

6:00 local*/14:00 UTC: Ginevra and Igor start watch, Heather and Zhengyang end watch*
OBS WD57 surfaced and was sighted visually at **06:26 local** /14:26. WD57 was on board at **06:43 local** /14:43. We began transit to OBS LA27 about an hour ahead of schedule, with an estimated arrival time of **06:35 local** /14:35UTC. The radio and flasher were working upon recovery, and the bridge mentioned that they heard a radio signal but did not record the time.
We retrieved the temperature sensors, two Tidbits (#20233088 and #20233104) which matched the spreadsheet provided by UW oceanography.
We spent most of this shift back-logging previous day's narratives and watching a mostly-flat sonar reader.
We heard our first science talk at the end of our shift today, from chief scientist Geoff Abers, which went over the motivation and logistics of getting the AACSE funded and up and running.
14:00 local /22:00 UTC: Cong and Em start watch, Ginevra and Igor end watch
16:00 local 24:00 UTC: Midnight location (241 -> 242) 54° 8.9540' N 156° 44.1308' W
Friday, 8/30/19, 242, 243 (UTC time)
Sea has ~1 m waves, storm projected to hit at **~22:00 local** /~06:00 UTC
LA27 – 15 minutes from station at **17:02 local** /01:02 UTC
LA27 – 1 mile from station at **17:09 local** /01:09 UTC

- ➔ Em and Cong began script in OBS lab

LA27 – On site, sonars secured at **17:21 local** /01:21 UTC

- ➔ OBS lab radio was off, so OBS team + Em did not hear this news until Geoff came in.
- ➔ The Leg 1 (Sikuliaq, LDEO OBSs) recovery team failed to make contact with LA27 on their cruise, so we are making a second attempt. Reviewing the deployment logs, Geoff noticed LA27 was the only deployed station that was not surveyed for its exact location after sinking.
- ➔ Tim Kane took over efforts to make contact with the station. For two hours he attempted the commands: Release 1, Release 2, and Enable on both acoustic 1 and acoustic 2, while varying the power and sensitivity. He took detailed notes on the commands he sent (stapled to log sheet and scanned). By **18:07 local** /02:07 UTC we had drifted ~700 m from the site, and called to bridge to move directly over the site. By **18:21 local** /02:21 we were directly over site, and more attempts were made. Tim made final attempt at **19:24 local** /03:24.

LA27 – Station not recovered, leaving site at **19:27 local** /03:27 UTC
22:00 local /06:00 UTC: Heather and Zhengyang start watch, Cong and Em end watch
Sea had ~ 1-2m waves at the start of the shift, but calmed slightly during OBS recovery
We received a 15 minute warning for OBS WD61 at **02:32 local** /10:32 UTC and a 1 mile warning at **02:39 local** /10:39 UTC. We did not hear the on site call, so did not start the script running until Brian came in to check the rise time. Sonar was secured and we started communication at **03:07 Local** /11:07 UTC. We discovered that the plug for the base of the radio in the OBS Lab was loose and not charging, so the radio had died. We fixed the issue and it was charging and working by **04:00 local** /12:00 UTC. Using a rise rate of 35 m/min, estimated surface time was **04:19 local** /12:19 UTC. The bridge got the radio signal and we had visual site at **04:19 local** /12:19 UTC. OBS WD61 was more difficult to hook due to roughly 1m waves. Zhengyang and Heather helped to hook and control the OBS WD61 as we brought it on board. It was on board at **04:41 local** /12:41, sonar was turned back on, and we began our transit to the next station WS73. Heather helped to disassemble the OBS once it was on board. Zhengyang removed 3 temperature sensors, Iceland S9419 and two Tidbits (20233103 and 20233102). They matched the spreadsheet provided by UW.

Weather conditions remained fairly steady throughout this shift, but are expected to continue to deteriorate over the next 24 hours.
06:00 local / 14:00 UTC: Ginevra and Igor start watch, Zhengyang and Heather end watch ETA to OBS WS73 is **10:56 local** / 18:56 UTC
10:57 local / 18:57 UTC - 15 min to site.
New ETA is **11:12 local**/ 19:12 UTC.
11:08 local /19:08 UTC - 1 mile to the site
11:16 local /19:16 UTC - All sensors were turned off and secured to start communication with the OBS
11:21 local / 19:21 UTC – Started communication with WS73. The OBS returned only 7 pings (the manual explains that if there are fewer than 8 pings that the instrument is not ready). We sent another enable command. We gave it a second enable command and got the same 7-ping response. We took a successful range value and assumed that the instrument was ready.
11:24 local / 19:24 UTC – We sent the locking command, and the guralp returned 7 confirmation pings, then 3 once-per-minute pings. After this time the instrument started pinging frequently at unknown intervals. We waited 15 minutes, assuming that the instrument would lock after that amount of time. We could not decipher which pings were returned on the minute, but >40 pings were heard. While this was happening, Tim restarted the Edgetech box.
After 15 minutes we tried multiple ranges, half of which returned values that did not make sense. We got a few that were around the depth value and noted that the instrument was still in it's station and responding.
11:40 local / 19:40 UTC – we sent the burn command, and the box was still behaving the same as it was during the locking command. We heard 7 once-per-second pings that indicated that the instrument heard the command. Taking range values, we deduced that the instrument was rising and estimated the surface ETA to be **12:42 local** / 20:42 UTC.
The Edgetech first received "no values in range gates" error at **12:49 local** / 20:49 UTC, visual sight was at **12:54 local** / 20:54 UTC, and the instrument was on board at **13:17 local** / 21:17 UTC.
The OBS technicians mentioned that the OBS was not responding once on board, and later found that the batteries on the instrument died shortly after deployment. No data was acquired from this instrument. The temperature sensors were normal though. The instrument seemed to be draining the batteries and complicating communication.
We learned how to ping-edit the multibeam with Bill before reaching the OBS, and he set up an editing station on a mac in the lab. We took an engine-room tour just before shift change with Em and Cong with the 3rd engineer, Dominique.
14:00 local /22:00 UTC: Cong and Em start watch, Ginevra and Igor end watch

24:00 UTC: Midnight location (242 -> 243) 54° 20.97' N 159° 7.67' W
Saturday, 8/31/19, 243, 244 (UTC time)
00:45 UTC: 6 minutes to WS74, bridge forgot to give 15-minute call
00:53 UTC: On site at WS74
00:56 UTC: Sonars off at WS74
02:03 UTC: OBS WS74 onboard
04:17 UTC: 15 minutes from station WD52
04:25 UTC: 1 mile from station WD52
04:34 UTC: On site at WD52, sonars off
05:08 UTC: WD52 estimated surface time 06:00 UTC, 22:00 ship time

Peter gave the second talk at 6:30 local time on the geology of Alaska. The talk was delayed due to OBS recovery.

22:00 local /06:00 UTC: Heather and Zhengyang start watch, Cong and Em end watch

06:32 UTC: OBS WD52 onboard, sonar system back online
10:06 UTC: OBS WS75 15 minutes from location
10:14 UTC: OBS WS75 1 mile from location
10:26 UTC: OBS WS75 on site. Sonar off.
10:27 UTC: OBS WS75 start running script. Enable code sent out. Range checked.
10:29 UTC: OBS WS75 lock code sent. Couldn't confirm locked status, wait for 15 mins. Range checked reasonable.
10:46 UTC: OBS WS75 release code sent. First time: No double ping, range check indicated not move.
10:51 UTC: OBS WS75 release code sent. Second time: No double ping, range check indicated raise. Estimate surface time 11:29 UTC.
11:31 UTC: OBS WS75 on sight.
11:56 UTC: OBS WS75 on board. Sonar back online. Heading to next station WD69. Estimate arrive time 14:47 UTC.

This was the first time Heather and Zhengyang recovered an OBS with a strong motion sensor during their shift. It behaved very differently that the other instruments we've recovered. This made it harder to predict what the instrument was really doing after each command was sent. After the repeating range commands were sent, the script stopped printing the values on the computer. Once the station had surfaced we restarted the edgetech box. We helped to tag the instrument. Zhengyang removed and recorded the temperature sensors while Heather helped to disassemble OBS WD75.

Wind speed steadily increased during this shift, although wave heights remained relatively stable. The storm in predicted to continue to pick up and be strongest between mid-morning and mid-afternoon on Sunday 9/1.

06:00 local / 14:00 UTC: Ginevra and Igor start watch, Zhengyang and Heather end watch.

After transit speed slowed for ship traffic, the station ETA shifted to 07:15 local / 17:15 UTC.
07:03 local / 17:03 UTC – got 15 minute call from bridge that we are 15 minutes from site WD69
07:24 local / 15:24:02 UTC sent initial enable command to WD69
07:35 local / 15:35 UTC estimated lift off time, surface ETA is 09:12 local/17:12 UTC.

Wind was picking up continuously throughout rising and retrieval. Wind speeds reached 34 knots, and waves were splashing onto the deck.

09:30 local / 17:30 UTC – visual sight of WD69

We approached the OBS with high waves, the attempt to clamp the A-Frame main hook was missed, but the aft hook technician grabbed the main loop with a different rope. The ship got blown over the station, and the station was under the ship for a few minutes. The technicians tied the rope to a cleat on the railing, then tied a bight in the handling rope, then hooked the main A-frame hook to the bight. They extended the A-Frame out to pull the station out from under the ship. When the instrument was visible again we got hooks in the corners of the instrument and brought it aboard. The flag was broken off of the station, but everything else was ok.

09:52 local 17:52 UTC station on board, sonars turned back on, and underway to LD43.

Arrived on site at approximately 12:00 local / 20:00 UTC. Tim and Jenny tried to reach the instrument for 1.8 hours with no response. Moving on at 13:20 local / 21:34 UTC. Wind is blowing at 35 knots, we have been advised to not go outside.

14:00 local /22:00 UTC: Cong and Em start watch, Ginevra and Igor end watch

24:00 UTC: Midnight location (243 -> 244) 53° 42.56' N 160° 54.79 W

Sunday, 9/1/19, 244, 245 (UTC time)

Seas were rough and we spent this shift watching the multibeam. Ginevra gave a talk at 18:00 local time, and we played cribbage and other card games to pass the time.

22:00 local /06:00 UTC: Heather and Zhengyang start watch, Cong and Em end watch

The first half of OBS recovery is done, with 15 stations recovered. The timing worked almost perfectly to allow us to pause OBS recoveries before the storm conditions got too bad. For the next 4 days we will be running multibeam lines to fill in some missing data along the slope and trench at the western side of the recovery area.

Seas are very rough (about 15 feet and increasing) with 30-40 knot winds. Lots of people are hunkered down dealing with varying amounts of seasickness. With no OBS recoveries the night shift is very quiet and slow. We've been entertaining ourselves with card games, cribbage, and watching the waves crash over the starboard side of the ship.

XBT was launched at 11:07 UTC

06:00 local / 14:00 UTC: Ginevra and Igor start watch, Zhengyang and Heather end watch.

We are still on course for collecting multibeam data for the next few days. Besides watching the Knudson sonar data (which has very poor quality, likely because of the slope we are traversing on these transects) and monitoring the multibeam, we are occupied mostly by smoking Tom and Todd at cribbage. They say it is "beginner's luck" but we will have to see.

Seas are still at 15-20 feet high, and winds are still at 30-40 knots. We turned around 11:30, heading back westward over the block of seafloor that we are mapping. We deployed an XBT at 12:07 local time once course was straightened out and we were well on our 24-hour-long transect due west.

Ginevra started processing the Knudson data. Interesting features in preliminary images have motivated us to stay on top of the phase range that the Knudson is recording at. There are a few bugs on some of the lines that Ginevra and Bill are trying to sort out.

We are going slower than initially projected (8-10 knots) due to the weather outside and sea-state (going at 4-6 knots), so the transects are taking longer than expected.

14:00 local /22:00 UTC: Cong and Em start watch, Ginevra and Igor end watch

24:00 UTC: Midnight location (244 -> 245) 54° 6.10' N 158° 5.97' W

Monday, 9/2/19, 245, 246 (UTC time)

Seas are still rough but should be clearing up around 20:00 UTC (12:00 local on Monday). Multibeam is having trouble finding the bottom—we've been forcing depth once in awhile this shift. Echo sounder hasn't seen the bottom for most of our shift. Bill had us start breaking up the Knudsen lines every three hours starting at 22:30 UTC (d244) and ending the first line at 3:30 UTC (d245). We will let the next shift know.

22:00 local /06:00 UTC: Heather and Zhengyang start watch, Cong and Em end watch

Seas are still rough, but slowly starting to improve. Wind speed has been gradually decreasing. Knudsen and multibeam are still having a difficult time finding the bottom. Both have been slowly improving throughout the shift.

Knudsen line was ended at 22:30 local. Forgot to end it at 1:30 local, so ended it at 3:15 local when we remembered. Next end time will be 6:15. We will let the next shift know

06:00 local / 14:00 UTC: Ginevra and Igor start watch, Zhengyang and Heather end watch.

Ginevra is continuing on Knudsen processing, and has made a few images of a few lines. We are still working through a few bugs. Igor has started working on the rising times analysis.

We finished the current survey line at 12:20 which started in our previous shift around 11:30 local time yesterday. We turned south (COG 186 degrees) at 12:20 with SOD ~5kts. We stayed in this direction until 13:30 local time where we finally turned northeast (COG 86 degrees) with the SOD to ~10kts.

The multibeam setting was changed along our shift to increase the resolution. The survey window (maximum multibeam angle) was initially 65/65 degrees and were changed to 45/45 degrees at 11:35. The range stayed shorter until the ship finished turning. At 13:30, the range was set back to 65/65 degrees.
Although the average wind speed of ~25kts, the sea has started to calm down in comparison to yesterday at the time with no waves or fewer waves higher than 1m.
14:00 local /22:00 UTC: Cong and Em start watch, Ginevra and Igor end watch
24:00 UTC: Midnight location (245 -> 246) 53° 29.4030' N 160° 17.7660' W
Tuesday, 9/3/19, 245, 246 (UTC time)
Em and Cong began creating batchfile to build local antelope database for viewing OBS waveforms. Part-way through creating our batchfile we decided to test it with dbbuild, and learned that antelope 5.9 was not fully installed on the iMac we were using. Antelope had been installed but the installation process requires internet connection to install the contrib directory, and the process was apparently halted with ^C. Cong copied the contrib directory over from his laptop, but still we were getting an error. When we tried dbbuild on Cong's laptop, we didn't get this error. So it seems that antelope doesn't know where to look for files in the contrib directory.
Multibeam and Knudsen data are looking very good since we made our last turn. The ship is cruising ~9.7 knots, and the rocking has significantly decreased. We even went out on the deck to watch the sunset!
22:00 local /06:00 UTC: Heather and Zhengyang start watch, Cong and Em end watch
Heather and Tom launched an XBT at about 1:00 local time. Peter loaded the new sound velocity profile into EM122.
We ended and restarted Knudsen lines at 22:30 local, 1:30 local, and 4:45 local.
The ship reached the end of the third multibeam line (point 9) of Survey A at about 3:50 local and began to turn toward the next line. We reached the next waypoint (point 10) at 4:50 local and turned to start the fourth line of Survey A.
During the transit between points 9 and 10 the ship's roll increased noticeably. After the turn we are now heading South-West on our last full length survey line and into the wind, so the ship speed decreased (7-8 knots) and the pitch and roll of the ship increased. This caused the quality of the multibeam and Knudsen to deteriorated. It still looks like better quality than on Monday.
Heather spent the shift ping editing multibeam data from 9/2. Because of the sea state, the data is relatively poor. This made editing a much slower process with a lot more fliers to clean up.
Em and Heather taught Cong and Zhengyang how to play cribbage. The Apply to Sail crew will be ready for a cribbage tournament soon!
06:00 local / 14:00 UTC: Ginevra and Igor start watch, Zhengyang and Heather end watch.
We started and ended our watch on a SW trending multibeam line, maintaining a bearing of ~250 degrees the whole time. Around 10 AM there was a whale sighting from the starboard side. The whales were identified on deck as a mom and a calf.
At lunch there were spray clouds from several surfacing whales off of the port side that could be seen from the galley. There were also a few whales to be seen in front of the ship around 12:30 from the bridge. They were all identified as humpback whales, and their objective was seemingly bubble feeding before heading south for the winter.
The course we were on is somewhat oblique to the plate fabric of the incoming Pacific plate, and several normal faults/horsts/grabens could be seen in the multibeam pings and backscatter. The Knudsen imaging also captured our oblique profile to these structures, and there were suspected fault plane

reflections. After stitching the different phase shifts together, it is hard to tell from our oblique orientation whether the reflections are artifacts/diffractions or physical structures.
The Knudsen processing flow is worked out up until the water bottom correction which removes noise/trace offsets from ship heave.
14:00 local /22:00 UTC: Cong and Em start watch, Ginevra and Igor end watch
24:00 UTC: Midnight location (246 -> 247) 53° 26.0242 N 160° 47.8369' W
Wednesday, 9/4/19, 246, 247 (UTC time)
This is the last watch of the multibeam Survey A before we start recovering OBS stations again. We had an OBS field trip led by Tim—he removed two of the hard hats on a Keck instrument to show us the glass globes that contain the batteries and q330 datalogger. He then brought us in the van to show us the globe that contains the broadband Guralp CMG3T sensor. There are two pivots between the sensor and the globe, which allow the sensor to level itself most of the way using gravity, then the pivots lock, and the sensor begins to level itself internally.
22:00 local /06:00 UTC: Heather and Zhengyang start watch, Cong and Em end watch
6:05 UTC – Started new Knudsen line, changed course to NE transiting to WD66
9:00 UTC – started new Knudsen line
10:55 UTC – 15 minutes from WD66
11:03 UTC – 1 mile from WD66
11:13 UTC – stopped on site WD66, sonar secured
OBS went through entire 15-minute burn 1 cycle without us hearing any double pings. When we ranged it was rising. Based on depth it looked like it had been rising for about 10 minutes.
Estimated surface time for WD66 is 13:40 UTC. Updated to 13:25 UTC/5:25 local after observing the range readings for 45 minutes.
11:53 UTC – XBT launched, new sound speed profile loaded in EM122
13:15 UTC – visual sight of WD66. Flasher working, radio not working
13:41 UTC – WD66 on board, transiting to WD68, sonar back on
Heather worked on ping editing, finishing data from 9/2/19. Most of the data was really rough because it was recorded during the storm in high seas travelling against the wind. The last few segments, after turning South and then turning Northeast were much better quality. After cleaning up the files the updated data saved correctly, but the multibeam image did not redraw smoother. Will need to ask Bill when he gets up to why that is not happening.
Knudsen and multibeam backscatter both showed lots of interesting detail and were very clear now that the seas are calm again.
We finally reach another OBS! OBS surfaced significantly faster than expected. Original surface time was 13:40 based on rise time of 35 m/min. Actual surface time was 13:15, or a rise rate of about 42 m/min. Heather disassembled the instrument while Zhengyang cleaned and logged the temperature sensors.
06:00 local / 14:00 UTC: Ginevra and Igor start watch, Zhengyang and Heather end watch.
We came upon shift after the last crew recovered WD66. After breakfast and a porpoise sighting we recovered WD68 with a timeline listed below.
08:59 local / 16:59 UTC – 15 minutes from OBS WD68
09:14 local / 17:14 UTC – stopped on site at OBS WD68, sonar secured
09:23 local / 17:23 UTC – OBS WD68 released, ETA to surface is 11:00 local / 19:00 UTC
11:11 local / 19:11 UTC – visual sight of WD68 on surface
11:30 local / 19:30 UTC – OBS WD68 on board, sonar secured

The recovery was standard and there was nothing odd to report. A cribbage and ping-pong tournament sign up is on the board! People are excited.
14:00 local /22:00 UTC: Cong and Em start watch, Ginevra and Igor end watch
23:31 UTC – 15 minutes from station WD65
23:49 UTC – on site at WD65, sonars secured
24:00 UTC: Midnight location (247 -> 248) 52° 53.9569 N 158° 54.6149 W
Thursday, 9/5/19, 247, 248 (UTC time)
00:00 UTC – WD65 released, estimated surface time is 2:42 UTC
02:29 UTC – Visual of WD65
02:47 UTC – WD65 on deck, sonars on
While scanning the sea for WD65, we saw whales! This recovery was smooth and uneventful—the water was very calm. Cong took care of temperature and pressure sensors, and Em remained on deck to dismantle OBS.
Cong and Em worked on a batchfile to run dbbuild on Cong's computer. Geoff already put waveforms in the wfdisc on the iMac, so we will copy the dataless database onto the iMac and add the wfdisc. Em ran into some trouble specifying the sensor name for the accelerometer on the Keck instruments—all the sensor files for episensors are named with specific sensitivities. Em asked Tim about it and he said he doesn't know but could find out. For now Em chose episensor_5vpg.pf since we won't be using this DB to remove responses anyway.
Today we also practiced our elevator pitches around the conference table.
22:00 local /06:00 UTC: Heather and Zhengyang start watch, Cong and Em end watch
09:21 UTC – 15 minutes from OBS WD67
09:30 UTC – 1 mile from OBS WD67
09:41 UTC – on site, sonar turned off
10:10 UTC – WD67 rising, estimated surface time 11:45 UTC
11:40 UTC – Visual sight and RDF signal received for WD67
12:00 UTC – WD67 on board, sonars back on, transiting to station WD64
Before OBS recovery Heather finished ping editing the multibeam data from 9/4/19.
Bathymetry on multibeam and Knudsen is mostly flat, aside from a seamount that we passed over just before and after WD67.
WD67 estimated surface time was calculated with a rise rate of 40 m/min. It surfaced and was spotted at 11:40 UTC, so the rise rate was fairly accurate. Heather was in the bridge observing operations when WD67 surfaced. It surfaced on the port side. RDF signal was received and flasher worked. After 1-2 minutes we lost sight as the flasher appeared to stop working. WD67 was relocated by Breck using the port spotlight and the radio signal. Reese turned the ship to approach with WD67 on the starboard and repositioned to account for the wind direction. It was really interesting to see and hear all that goes into moving the ship into position so that it can be tagged and brought on board! Waves were a little larger than during the last few recoveries, which made tagging slightly more challenging. Once on board, the flasher appeared to be working. Zhengyang processed the temperature sensors (one appeared to be broken, as recorded in the Temperature sensor log) while Heather disassembled the OBS. Wind was blowing occasional waves on deck, but Heather managed to stay dry!
Bridge mentioned the possibility of seeing the northern lights, but it became cloudy before anything was visible. We will need to keep an eye out from now on. Benefit to being up all night?
06:00 local / 14:00 UTC: Ginevra and Igor start watch, Zhengyang and Heather end watch.
We woke up to a seamount crossing on the multibeam and sub-bottom profiler. The feature/rapid change in topography was difficult to keep up with the manual phase change.

We recovered WD64 today on almost the exact same timeline as WD68 yesterday.
17:01 UTC – 15 minutes from WD64
17:06 UTC – 1 mile from WD64
17:15 UTC – arrived at site WD64, sonars secured
17:22 UTC – WD64 rising, surface ETA is 11:37 local time
20:08 UTC – WD64 on board, transiting to WD63
The recovery went smoothly. One of the temperature sensors was broken (Tidbit 20233094).
The instrument package bumped into the ship several times during the approach to recover it.
14:00 local /22:00 UTC: Cong and Em start watch, Ginevra and Igor end watch
24:00 UTC: Midnight location (248 -> 249) 52° 32.6572' North 158° 8.2831' West
Friday, 9/6/19, 248, 249 (UTC time)
00:04 UTC – 15 minutes from WD63
00:13 UTC – 1 mile from WD63
00:23 UTC – on site at WD63, sonars secured
00:56 UTC – WD63 rising, estimated surface time of 2:13 UTC
02:28 UTC – WD63 onboard, sonar restored
Today Cong was scheduled to give a talk at 2:00 UTC, but station WD63 seemed to be rising unusually fast (44-46 m/min), so we started his talk at 1:40 UTC instead. After his talk, we recovered the OBS without a hitch. Em stayed on deck to dismantle the OBS, and Cong recovered the temperature and pressure sensors and made sure the log sheet was scanned. Divide and conquer! While Em was outside, the winds started to pick up and waves were breaking over the deck.
Cong and Em stitched together their pieces of the batchfile and ran dbbuild, but encountered many errors with the Keck instruments since they have two sensors on the same datalogger. Em managed to ssh into their school computer to copy over a batchfile they made with a similar station configuration. Eventually they were able to build the database with no errors.
22:00 local /06:00 UTC: Heather and Zhengyang start watch, Cong and Em end watch
08:12 UTC – 15 minutes from OBS WD60
08:20 UTC – 1 mile from OBS WD60
08:33 UTC – on site, sonar turned off
08:42 UTC – WD60 rising, estimated surface time 10:36 UTC
10:29 UTC – Visual sight (flasher working) and RDF signal received for WD60
10:54 UTC – WD60 on board, sonar back on, transiting to station WD62
Heather, Em, Igor, and Cong all practiced getting into the gumby suit (survival suit). We are hoping to get a second suit, plus one tall enough for Peter, so we can do some time trials! Ginevra put together brackets for Ping Pong and Cribbage. Ping Pong was practiced. For some of us, skills are a bit lacking! Bathymetry on multibeam and Knudsen remained flat. No range changes were necessary.
The first few steps of communication with WD60 were normal. Ranges were recorded in the script after enable and lock. After the burn 1/release command, the script stopped recording ranges on the computer. Ranges looked normal on the Edgetech and were observed for the first few minutes to confirm rise time. Surface time was estimated as 10:36 based on a rise rate of 40 m/min. Zhengyang restarted the script but that did not fix the issue, ranges were still not printing. The WHOI crew was not aware that the script was not printing ranges. When they checked and noticed, after about an hour, Brian tried to troubleshoot but still couldn't get the script to work. Heather recorded the ranges by hand for the final 30 minutes until the OBS stopped returning ranges. Flasher and RDF both worked when the OBS surfaced. Waves and wind had increased, but station was brought on board without any issues. Zhengyang recorded the temperature sensors while Heather disassembled the instrument.

Brian, Dan, Zhengyang, Peter, and Heather all made guesses for the instrument surface time before communication started. We determined that the winner would be ***closest time without going over***. Since the instrument was spotted by the bridge at 2:29 local, Zhengyang won with his prediction of 2:20 local, narrowly defeating Dan's prediction of 2:30 local! (Brian guessed 2:15, Heather guessed 2:45, Peter guessed 2:55). The prize? 24 hours of no OBS recovery! Plus bragging rights.

06:00 local / 14:00 UTC: Ginevra and Igor start watch, Zhengyang and Heather end watch.

Our watch started slow, but bumpy, as we approached WD62 a little after breakfast. The timeline was as follows:

15:58 UTC – 15 minutes from WD62
16:06 UTC – 1 mile from WD62
16:13 UTC – arrived at site WD62, sonars secured
17:22 UTC – WD62 rising, surface ETA is 11:37 local time
18:50 UTC – WD62 on board, transiting towards survey B

We had to change our initial surface ETA of WD62 to be 10:30 local time from 10:00 local time, with a slower rise rate than the other WD stations nearby (35 m/min vs 42 m/min). The conditions were windy but apparently not bad enough to wake up the night shift OBS crew. Tim and Jenny told us that when the seas are actually scary that they do all the work on deck.

The recovery was wet and rainy. The instrument was coming in at the wrong orientation (the tag line hanging from the A-Frame is closer to one side, and the instrument is not symmetrical, so it can only be hoisted in when the arm is facing towards the bow). With the waves the OBS team decided that it would be best to spin the instrument in the water rather than when it got overhead. During the spin the flag smashed into the side of the ship for a moment and broke. Besides the flag damage the recovery went fine.

We are currently transiting towards our second multibeam survey stent – with a change in bearing scheduled for 14:24 local time. The next OBS should we within reach tomorrow evening during the night watch.

14:00 local /22:00 UTC: Cong and Em start watch, Ginevra and Igor end watch

24:00 UTC: Midnight location (249 -> 250) 53° 43.0158' North 157° 41.0150' West

Saturday, 9/7/19, 249, 250 (UTC time)

Second storm is picking up as we continue multibeam Survey A. Em is not heavy enough to keep their chair from sliding across the floor.

22:00 local /06:00 UTC: Heather and Zhengyang start watch, Cong and Em end watch

The storm was calming down at the start of our watch. We turned off of Survey B Line 1 8:30 UTC and began Survey B Line 2 at 9:30. Multibeam and Knudsen stayed relatively flat throughout watch. Hoping to get to the next OBS right before or during our watch tomorrow!

06:00 local / 14:00 UTC: Ginevra and Igor start watch, Zhengyang and Heather end watch.

We made a few turns within Survey B during our watch, and the Knudsen had mostly flat information to report. The sun was out for most of the day.

14:00 local /22:00 UTC: Cong and Em start watch, Ginevra and Igor end watch

Cong and Em started to their watch at 22:00 UTC when the ship finished the 9th leg for Survey B. We found a sea mountain (or a ridge) in the last leg of Survey B and the ship headed to station WD59 at 1:00 UTC. We arrived at the location of WD59 around 3:00 UTC. The sonars were disabled, and we started to communicate the station by sending "enable", "Burn 1" and "Burn 2" commands at 3:04:11 UTC. 15 pings were heard for "Burn 1" command at 03:20:00 UTC, and another 15 pings were heard for "Burn 2" command at 03:37:27 UTC. We ranged the OBS and confirmed the OBS had already

raised up. We estimated the rising rate of 35 m/min and notified the bridge the estimated surface time of 05:36 UTC.
At ~5:35 Peter called up to the bridge because he noticed that the ranges were getting larger. Bridge said they had drifted 700m from the site, and began to correct it. In the same conversation the bridge said they had a visual of WD59. The station WD59 was on board at 05:50:11 UTC. We noticed that the flag was chopped out and the Novatech radio did not work. We collected the two temperature sensors and scanned the log.
24:00 UTC: Midnight location (250 -> 251) 53° 38.3949' North 156° 03.825' West
Sunday, 9/8/19, 250, 251 (UTC time)
22:00 local /06:00 UTC: Heather and Zhengyang start watch, Cong and Em end watch
09:53 UTC – 15 minutes from OBS WD58
10:00 UTC – 1 mile from WD58
10:10 UTC – on site at WD58, sonars off
10:28 UTC – WD58 rising, Estimated surface time 12:10 UTC
12:07 UTC – Visual sight, no flasher or radio
12:14 UTC – WD58 on board, sonars on, transiting to WD53
13:08 UTC – XBT 18 launch
Em, Cong, Igor, Heather and Zhengyang played cards and learned how to play Code Names while we approached WD58.
Recovery of WD58 went smoothly, following the timeline above. We suspected the OBS was on the surface due to no range returns about 5 minutes early. We did not see a flasher or receive the RDF signal on deck or in the bridge. Tom noticed something reflecting light off the starboard side. The bridge aimed the spotlight and found the OBS! It had surfaced very close to the ship, so we got it on board quickly. Once on board Zhengyang processed the temperature sensors while heather disassembled the OBS.
Tom and Geoff launched XBT#18 at 13:08 UTC
Tim's boot took over the OBS lab TV channel, which kept us riveted all day. What was it going to do next?
06:00 local / 14:00 UTC: Ginevra and Igor start watch, Zhengyang and Heather end watch.
We recovered WD53 with timeline as follows:
18:46 UTC – 15 minutes from site WD53
18:55 UTC – 1 mile from WD53
19:03 UTC – reached site WD53, sonars turned off
21:22 UTC – OBS WD53 onboard, headed towards site WD49
Igor has become an excel wiz at making best-line fits to the time vs range data that we read in. After about 30 minutes we estimated the average rise-rate to be around 40-43 meters/minute, and gave local surface ETA of 13:10 local time, making for a well-fed-post-lunch recovery.
Everything about the OBS seemed normal, and we finished dismantling it and updating spreadsheets at the end of our shift.
14:00 local /22:00 UTC: Cong and Em start watch, Ginevra and Igor end watch
03:55 UTC – 15 minutes from OBS WD49
04:03 UTC – 1 mile from OBS WD49
04:11 UTC – On site WD49, sonar off
04:50 UTC – WD49 rising, estimated surface time 06:05 UTC/22:05 local
24:00 UTC: Midnight location (251 -> 252) 54° 1.5198' North 152° 50.4024' West
Monday, 9/9/19, 251, 252 (UTC time)

22:00 local /06:00 UTC: Heather and Zhengyang start watch, Cong and Em end watch
06:00 UTC – visual sight of WD49, flasher and RDF working
06:17 UTC – WD49 on board, transiting to WD47
Cong and Em communicated with WD49, but it surfaced on our watch. Retrieval was normal, flasher and RDF worked, so it was spotted quickly once at the surface. If surfaced close to the predicted time, which was estimated using a rise rate of 43 m/min. Heather helped to disassemble to instrument, Zhengyang logged the temperature sensors
12:25 UTC – 15 minute warning WD47
12:34 UTC – 1 mile from WD47
12:42 UTC – on site WD47, sonars off
13:17 UTC – WD47 rising, estimated surface time 1500 UTC/7:00 Local
13:13 UTC – XBT #220 launched
WD47 should surface during the next watch at about 7:00 local/15:00 UTC. The instrument is not locked, it went through the whole 15 minutes locking cycle. It also seemed to be rising more slowly, closer to 35 m/min, so that is what we used to calculate surface time.
Heather ping edited multibeam from 9/8/19 during watch.
During watch Heather and Greg finally played their ping pong tournament game. It was relatively close (pretty sure Greg went easy on me), but Heather lost. Heather also lost her sudden death double elimination cribbage game against Peter, so she is out of all the tournaments. Igor and Zhengyang finished their cribbage games as well, with Igor advancing to the next round. There has been discussion about a backgammon tournament, so there is still hope for a victory somewhere!
06:00 local / 14:00 UTC: Ginevra and Igor start watch, Zhengyang and Heather end watch.
14:59 UTC – visual sight of WD47
15:11 UTC – WD47 on board, transiting to WD46 with a few waypoints on the way
We joined the night crew with the recovery, and Tim taught Ginevra how to grab the main A-frame hook, now that Jenny is a master at being lead-tagger.
We brought the instrument on board as expected, and there were two bundles of octopus eggs that were bundled around the flagpole.
Tim mentioned that the guralp was unlocked, and that there was also about ~50% of the data on the data logger than expected, based on the amount observed at most of the other stations.
We expect to reach WD46 at 12:37 local time / 20:37 UTC, and will likely enable and unlock the station, with the recovery occurring during the next watch.
20:35 UTC – 15 minutes from WD46
20:53 UTC – stopped on site of WD46 – sonars turned off
21:10 UTC – OBS WD46 released, surface ETA is 15:10 ship time, BB1 acoustics did not respond (first acoustic transponder), but we were able to communicate with the station using the BB2 frequencies and commands. The BB2 edgetech was not programmed with a locking command. The instrument was not locked. We tried to send the BB1 locking commands over the BB2 frequencies, which did not work. We also tried to send enable commands using the BB1 frequencies after an hour of rising, potentially reaching the sensor with more ease when it was closer. We did not reach BB1 again.
Cong and Em will retrieve the station in the first few hours of their shift.
14:00 local /22:00 UTC: Cong and Em start watch, Ginevra and Igor end watch
24:00 UTC: Midnight location (252 -> 253) 55° 29.6835’ North 149° 39.7803’ West
Tuesday, 9/10/19, 252, 253 (UTC time)

We collected the second-to-last obs during our watch today: WD46. Ginevra and Igor did the acoustic communication during their watch, and had to use BB2 frequencies with the second edgetech. As a result, the sensor was not locked before it released from the seafloor.
The bridge received radio signal at 23:24 UTC, and then had a visual at 23:26 UTC. We had the station onboard at 23:37 UTC, and noticed the flasher was not working by cupping hands around it.
After WD46 was safely onboard, we returned to the main lab, where Geoff had copied the OBS data collected so far. Cong and I spent the rest of our watch looking for earthquakes recorded by the AACSE network.
22:00 local /06:00 UTC: Heather and Zhengyang start watch, Cong and Em end watch
09:23 UTC – 15 minutes from OBS WD54
09:31 UTC – 1 mile from WD54
09:36 UTC – On site WD54, sonars off
Used rise rate of 40 m/min. WD54 rising, estimated surface time 11:40 UTC/3:40 Local
10:19 UTC – XBT #21 launched
11:33 UTC – visual sight of WD54. Flasher working, no RDF
11:56 UTC – WD54 on deck. Start transiting to waypoint c_01 on survey C
13:08 UTC – reached waypoint c_01, turned to transit to c_02
We started our shift with about 3 hours left in the transit to WD54, our last OBS! During transit we played some Code Names with Em, Igor, and Cong. Em and Cong also showed us some of the earthquake arrivals they had found on the OBSs. Some of the data looks great! Heather worked on more multibeam ping editing.
We reached the site and communicated with the OBS following the timeline above. Everything proceeded normally. The OBS seemed to be rising very quickly. We used 40 m/min rise rate, which gave us an estimated surface time of 3:40 local. We revised that time down to 3:30 local after about an hour because the station was rising at more like 42-45 m/min. Around 3:10 local we noticed that the ship was moving further from the station. We called the bridge and they changed course to get closer. Soon after that we stopped receiving return ranges. The OBS surfaced about 1000 m away but was spotted quickly since the flasher was working.
When we approached the station, the forward hook missed on the attempt to tag the OBS. The rope for A-frame hook was too short, so that also missed. The first hook on was the aft hook, followed by the other hooks once that rope was secured. Once all of the hooks were on, we got the station on board with no problems. Em and Igor joined to witness the final OBS retrieval. Zhengyang recorded the temperature sensors, then Heather and Zhengyang helped to disassemble the OBS.
While the OBS was rising, Dominique gave Heather, Zhengyang, and Dan a tour of the engine room.
06:00 local / 14:00 UTC: Ginevra and Igor start watch, Zhengyang and Heather end watch.
Today we are on multibeam survey C, with the last OBS collected during Heather and Zhengyang's shift this morning!
17:39 UTC – at waypoint c_02, headed towards waypoint c_03
18:26 UTC – at waypoint c_03, headed towards waypoint c_04
There were no major events to report.
14:00 local /22:00 UTC: Cong and Em start watch, Ginevra and Igor end watch
22:30 UTC – at waypoint c_04, headed toward waypoint c_05
22:39 UTC – new Knudsen line
22:50 UTC – XBT #22 launched
24:00 UTC: Midnight location (253 -> 254) 56° 15.8037' North 149° 21.8751' West
Wednesday, 9/11/19, 253, 254 (UTC time)

00:11 UTC – at waypoint c_05, turning toward c_06
00:14 UTC – new Knudsen line
05:31 UTC – at waypoint c_06, turning toward waypoint C_07
Cong and Em worked on making figures of earthquake data collected from the OBSs for the cruise report. They included three earthquakes: the M7.1 in Anchorage, AK on Nov. 30th 2018, and a M5.0 and a M4.2 earthquake that occurred within the network.
22:00 local /06:00 UTC: Heather and Zhengyang start watch, Cong and Em end watch
06:44 UTC – at waypoint c_07, turning toward waypoint c_08
06:48 UTC – new Knudsen line
10:58 UTC – at waypoint c_08, turning toward waypoint c_09
11:06 UTC – new Knudsen line
11:49 UTC – Slowed to 5 knots to launch XBT, XBT #23 launched, broke early/stopped recording at 704m (Tom said there was kelp and jellyfish in the water)
11:49 UTC – at waypoint c_09, turning toward waypoint c_10
11:55 UTC – XBT #24 launched
11:59 UTC – ship increased speed back to 10 knots
12:09 UTC – new Knudsen line
We are continuing with Survey C. Aside from turns, XBT launches, and restarting Knudsen lines, there is nothing to report.
06:00 local / 14:00 UTC: Ginevra and Igor start watch, Zhengyang and Heather end watch.
14:17 UTC – Arrived at waypoint c_10
15:16 UTC – Arrived at waypoint c_11
17:10 UTC – Arrived at waypoint c_12
14:00 local /22:00 UTC: Cong and Em start watch, Ginevra and Igor end watch
22:00 UTC – Arrived at waypoint c_95r
24:00 UTC: Midnight location (254 -> 255) 57° 08.3569' North 149° 41.5534' West
Thursday, 9/12/19, 254, 255 (UTC time)
00:23 UTC – Arrived at waypoint c_96
1:30-2:00 UTC – Arrived at waypoint c_97 (we did not record exact time)
1:40 UTC – XBT 25 launched
Continuing with survey C. This is our last full watch—Heather and Zhengyang will finish out the last two hours after our watch ends. We are watching the multibeam and Knudsen as we make our way back to Kodiak, finalizing our logs, downloading data, finishing snacks that we brought onboard, and playing games.
22:00 local /06:00 UTC: Heather and Zhengyang start watch, Cong and Em end watch
7:09 UTC – turning at waypoint c_98
7:48 UTC – turning at waypoint c_99
We are the last watch! We monitored the multibeam and Knudsen. There was a lot more to change today than yesterday since we are moving up the slope. Heather tried to ping edit multibeam, but it was acting weird and loading very slowly, so it was a slow process. Our shift ended at waypoint c_99. Onward to Kodiak!

Appendix 10: Pre-cruise information packet. Distributed to science party prior to cruise.

Alaska Amphibious Community Science Experiment (AACSE)

NSF-OCE-MGG/GeoPRISMS Award Number 1654568

Cruise Information and Science Overview
Aug. 27 – Sept. 12, 2019
R/V Langseth cruise MGL1907

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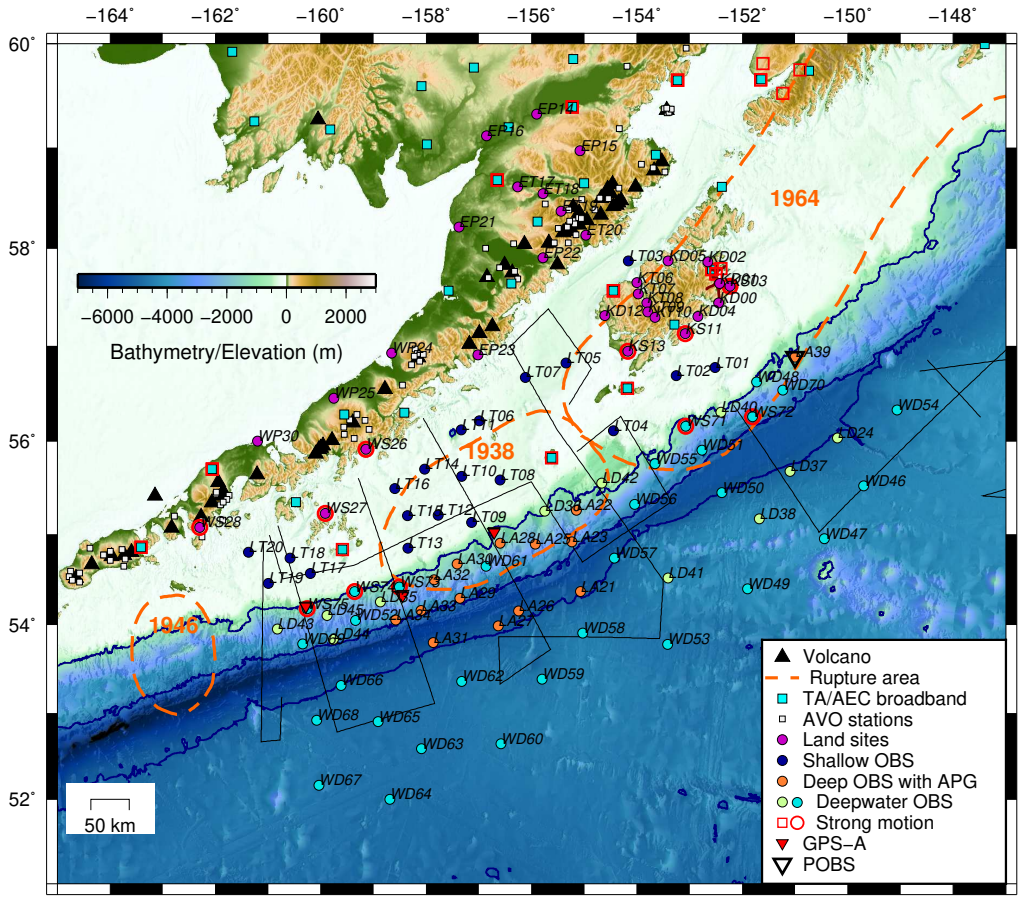
SCIENCE OVERVIEW

In May and July of 2018, the Alaska Amphibious Community Seismic Experiment (AACSE) deployed 75 broad band (BB) ocean bottom seismometers (OBSs) and 30 onshore broadband seismometers offshore the Alaska Peninsula. The **main objective of this cruise is to recover the 30 OBSs that were deployed in July 2018. A second objective is to collect high-resolution bathymetry of the area**. Four engineers and technicians from the WHOI OBS Instrument Center (OBSIC) facility will oversee the OBS recovery. Another cruise August 10-29 is recovering the other 45, on the R/V *Sikuliaq*, staffed by Lamont-Doherty OBS technicians. Data from these instruments provide some of the first sea-floor recordings of earthquakes offshore Alaska, and all will be made openly available once downloaded, processed, time-corrected and reformatted.

This project focuses on the portion of the Alaska subduction zone from Kodiak in the east to the Shumagin Islands in the west. The Kodiak segment last ruptured in 1964, the western half of the great (M9.2) Good Friday earthquake that severely damaged Anchorage. The Shumagin segment appears to be creeping [*Fournier and Freymueller*, 2007; *Li and Freymueller*, 2018]. The middle Semidi segment last ruptured in a M8.2 earthquake in 1938 [*Davies et al.*, 1981], so the array crosses the transition from fully locked to creeping. and the Southwestern Kodiak Asperity (Fig. 1). High levels of seismicity are found throughout the thrust zone. The OBS array covers the entire locked part of the thrust zone, and extends south across the trench over 200 km onto the incoming Pacific plate. These data will allow better understanding of structure, deformation and their variations in the incoming plate, through the thrust zone, into the deeper subducting plate beneath the volcanic arc, and the volcanic arc itself. This is done by integrating data from these OBSs with the many stations deployed on land, as well as active-source data (some collected on these instruments), electromagnetic data, and much else.

We will sail out of Kodiak early on the morning of August 27, reaching our first site in about 15 hours. At each site we will establish acoustic communication with the OBS, and go through a sequence of steps resulting in the OBS releasing its anchor and ascending to the surface. This can take up to two hours depending on water depth; OBSs rise at 30-40 m/min. Once on the surface we will pull the OBS onto the ship, perform some post-recovery tasks, and move on to the next one. We will recover a few OBSs a day, they are a few hours sailing apart – top ship speed is just over 10 knots. The cruise track may be modified in the case of bad weather, etc. All stations have a Guralp CMG-3T seismometer and a pressure sensor (Differential Pressure Gauge or DPG). Some stations will be equipped with an additional strong motion sensor. A map and station list are provided in this document. Ancillary high-sensitivity temperature sensors will also be recovered on each sensor package.

A major secondary activity will be the acquisition of multibeam bathymetry, and we have several additional ship days devoted to this activity. Mapping off the Alaska margin is fairly uneven especially in deep water, and our goals are to much better map both the accretionary wedge and incoming plate fabric as much as possible. Depending on how fast the OBS recoveries go, we plan a day or two mid-cruise for multibeam mapping, and more time toward the end. We will also acquire data from a 3.5 kHz bottom profiler, gravity and magnetic data throughout the survey. A multibeam specialist from the USGS marine office, Bill Danforth, will be aboard and will help guide the data collection and processing.



Map of the AACSE array, showing all seismic stations, bathymetry, rupture areas of great earthquakes, and volcanos. We will be recovering all stations with names starting with "W". The five "WS" are the Keck OBSs with additional strong-motion accelerometers.

Operations

Science operations will run 24/7. We will maintain watches of 12 hours/day. All participants (except OBS engineers/techs and the multibeam expert) will be required to stand watches. Watch stander actions are critical to cruise operations. Watch standers will be responsible for filling out a check sheet for each recovery, writing a summary of operations, equipment deployed, helping communicate with and lock each OBS before recovery, logging and packing temperature sensors, helping with multibeam data processing, updating the project blog, and working on the cruise report. Watch stander actions are critical to cruise operations, with tasks such as record keeping, ensuring the multibeam is operating continuously, that the ship is headed for the correct next site, and keeping the chief scientists and other members of the science party up to date on ongoing operations.

OVERALL TIMELINE AND CHECK LIST

The co-chiefs and other science personnel will arrive in Kodiak by August 25th and move on to the R/V *Langseth* on August 26th. The ship will be docked at the USCG (US Coast Guard) Base in Kodiak. We will leave port early on August 27th in the morning and we will return to port on September 12th. We will stay onboard in Kodiak the night of August 26th to facilitate departure (~16 days at sea). Most of the

science party will leave Kodiak on September 13th. The ship will not unload OBSs and support containers in Kodiak, the stop is just for unloading personnel.

Proposed cruise schedule

Tentative Date	Activity	Port
08/24/2019	Start of mobilization	Kodiak, Alaska
08/27/2019	Sail date from port	Kodiak, Alaska
09/12/2019	Return date to port	Kodiak, Alaska
09/13/2019	End of de-mobilization	Kodiak, Alaska

TRANSPORTATION AND LODGING

All participants should make their flight arrangements via the Cornell University travel agents (as detailed in email communications), and send flight info to the co-chiefs. Prior to sailing, participants will stay in Kodiak the night of August 25th. Upon return to port, we will disembark and spend the night of September 12th. The Apply to Sail participants have rooms booked both the nights of August 25 and September 12 at the Shelilof Inn in Kodiak.

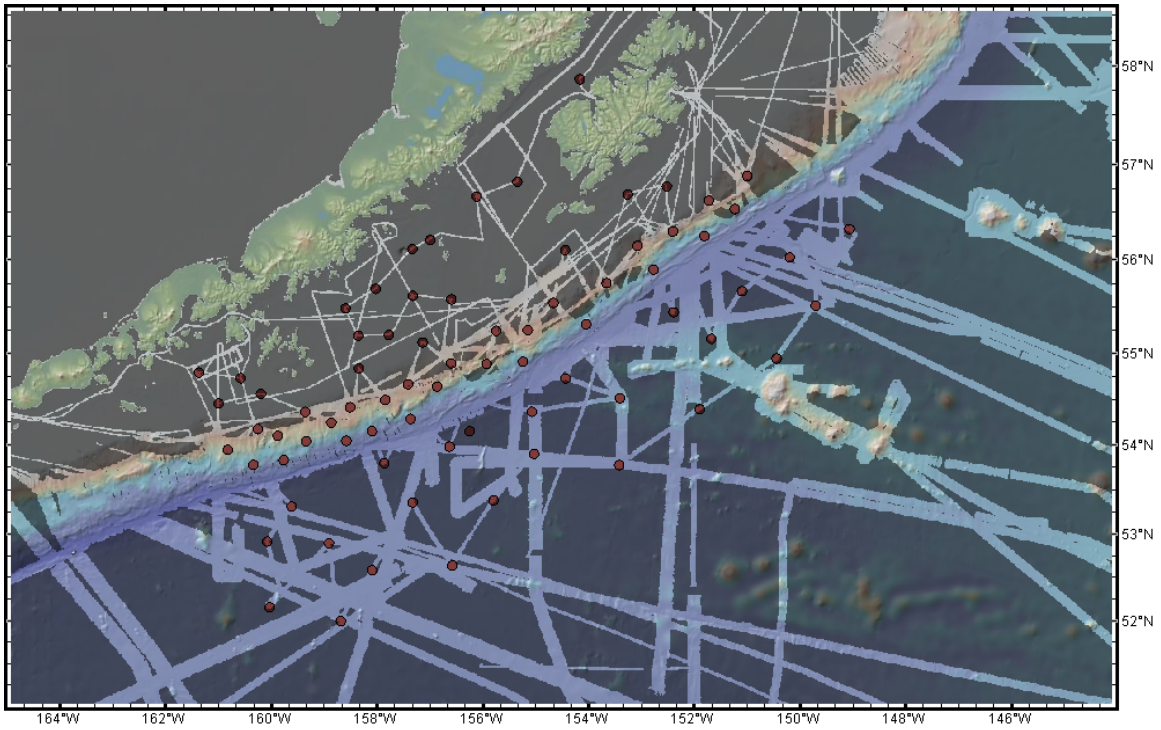
MEDICAL AND EMERGENCY CONTACT FORM

No medical clearance is required, but it is very important to make sure you are healthy before we leave. Please fill out the next of kin form so that we can pass it to the captain. If you have any medical conditions, please email the Captain of the Langseth: captain@ldeo.columbia.edu Medical condition information/discussion should be between Captain and the individual. The captain will then use his discretion as to who needs to also be informed.

GENERAL CRUISE PLAN

The instruments listed below are in the current planned order of recovery. Based on weather or other operational considerations, the deployment order may be changed. Some notes: BBOBS are the standard Broadband OBSs; the Keck instruments include the additional strong-motion sensor and may rise to the surface more slowly. If we stay on schedule, some time near WD66 we plan to do the first several days of multibeam surveying, in the western part of the array. If we are close to schedule, then we will do more multibeam after recovery is complete.

Site Name	WHOI OBS I.D.	OBS Type	Site Latitude (decimal degrees)	Site Longitude (decimal degrees)	Station Depth (m)
Kodiak CG Station			57.73047	-152.51438	
WD54	S30	BBOBS	56.33143	-149.06667	4520
WD46	S73	BBOBS	55.52139	-149.70373	4349
WD47	S71	BBOBS	54.95135	-150.44479	3999
WD49	S38	BBOBS	54.39908	-151.89947	4091
WD53	S59	BBOBS	53.77945	-153.42291	4646
WD58	S01	BBOBS	53.90623	-155.03535	4493
WD59	S23	BBOBS	53.38371	-155.79939	4550
WD60	S37	BBOBS	52.64488	-156.57982	4519
WD62	S27	BBOBS	53.36196	-157.33188	4626
WD63	S45	BBOBS	52.59007	-158.09358	4656
WD64	S42	BBOBS	52.00108	-158.69156	4754
WD67	S68	BBOBS	52.16256	-160.03583	4652
WD65	S67	BBOBS	52.89906	-158.91238	4718
WD68	S46	BBOBS	52.91760	-160.08115	4715
WD66	S72	BBOBS	53.31452	-159.61757	4941
Western Multibeam Transects here					
WD69	S22	BBOBS	53.78207	-160.34289	3896
WS75	S84	Keck	54.17963	-160.25691	1109
WD52	S61	BBOBS	54.04662	-159.34622	2564
WS74	S85	Keck	54.36919	-159.36163	903
WS73	S80	Keck	54.41996	-158.51328	2133
WD61	S66	BBOBS	54.64761	-156.86828	2067
WD57	S19	BBOBS	54.73639	-154.43431	5053
WD56	S48	BBOBS	55.32227	-154.04708	4060
WD55	S65	BBOBS	55.76163	-153.66282	1284
WD50	S05	BBOBS	55.44953	-152.39176	4987
WD51	S70	BBOBS	55.90509	-152.77177	4361
WS71	S87	Keck	56.15695	-153.07892	1555
WS72	S86	Keck	56.25775	-151.81063	4142
WD48	S69	BBOBS	56.62737	-151.73134	1324
WD70	S53	BBOBS	56.54107	-151.23441	3253
Eastern Multibeam Transects here					
Kodiak CG Station			57.73047	-152.51438	



This map shows existing multibeam bathymetry coverage in the region of the array. Dots are AACSE OBSs. The Langseth system will provide efficient coverage of the deep-water portions. Coverage is poor everywhere seaward of the trench, and data west of about 155W are old.

PACKING LIST AND LIFE AT SEA

The following should help give you some preparation for life at sea aboard the R/V Langseth and help guide your packing.

More information can be found on the Langseth website, please take some time to familiarize yourself:
https://www.ldeo.columbia.edu/research/office-of-marine-operations/langseth

Specific information and policies for the science party found here:
https://www.ldeo.columbia.edu/research/office-of-marine-operations/cruise-participants

Safety

Orientation will be conducted for the on-coming science party. This will include a safety briefing and vessel walk-through. You will receive direction on your individual role in the event of an emergency. In most cases the entire crew will participate in a safety drill.
Please communicate often with the chief scientists if you are uncomfortable with certain tasks, with any aspect of your working or living environment or interactions with any individuals onboard, or if you have an illness, injury or other physical or mental health concerns. If anyone onboard finds that unsafe conditions exist, he or she has the authority to stop any related shipboard science until the situation is corrected.

General Clothing Considerations

We will be operating at fairly high latitudes and the weather can and will range from cold and rainy to sunny and mild—wear layers, so you are prepared. Almost all of your work will be indoors in a computer lab. The Main lab will be cold (A/C) so bring a sweater and warm hat to stay warm. Throughout the cruise, we will have opportunity to help recover the OBSs from the back of the ship. For back deck work, you are likely to get wet. Bring a raincoat, it will also be useful for wind protection. Bring rain pants if you have them, the ship has some rain gear on board that you can use if you ask. Close-toed shoes are required in all general areas of the ship (slippers, flip-flops, etc, only allowed in state rooms). You will need sturdy work boots on deck, *with a steel or composite toe* (you will not be able to work with OBS on deck without steel or composite toed shoes). Laundry facilities will be available onboard (including detergent). Bring clothes that can get dirty, be washed together and dried on high heat. The ship will provide bed linens and towels, it is your responsibility to wash them during the cruise. Some Personal Protective Equipment will be provided for you on board as needed (hardhat, working life jacket, working gloves). Survival suits will also be provided on the vessel. Sunglasses and sunscreen are highly recommended protective equipment, but is not absolutely required.

Food

Breakfast, lunch and dinner will be provided at sea; snacks and coffee/tea are available outside of mealtimes. Consider packing personal snacks, chocolate, treats, drinks that you will miss while at sea. If you have any dietary restrictions, please let us know ahead of time so that the galley can be prepared to accommodate you. Note that severe allergies that are affected by proximity alone may not be accommodated in this close environment. Please alert the Captain or Chief Scientist about allergies.

Medication

At least one of the mates will have some training in first aid and the captain has medical supplies, but there is not a doctor aboard the ship. Make sure you bring enough of any prescription medications for the duration of the cruise, plus extra if possible. If you get injured or are sick, please someone know so that a minor problem don't become big ones. You may get seasick. You should bring medication to alleviate seasickness.

Pre-cruise Medical and Dental checkup

Although a medical and dental screening is not required before boarding the vessel, we encourage you to see your doctor and dentist for check-ups to make sure you are in good health before the cruise. The cruise will take place in a remote location without sophisticated medical support onboard, so it is very important to make sure you are in good health before you sail. Be advised that the infirmary is small and medical supplies are limited.

Sea Sickness

You will probably get sea sick, particularly in the first day or two, even if you think you might not. Getting sea sick is normal – be prepared. Bring enough sea sickness medicine for the whole trip. Some people prefer Dramamine II (the non-drowsy type). Regular Dramamine is also fine, sleeping off sea sickness is often a good option. There are prescription sea sickness medicines that are effective. The Scopolamine patch goes behind your ear and works well for many people. Please start taking sea sickness meds about a day before the cruise. Once you are seasick the medicine does not help much, so it is necessary to think ahead.

Internet

Langseth's computer network consists of gigabit networking to all lab spaces, with wireless accessibility throughout the ship. Internet access is on a separate, wired network. Only certain spaces have ports to access the Internet. The ship internet is very slow (bandwidth is less than that of a typical residential DSL service). Download music ahead of time or bring an old iPod with music on it – if you rely on Cloud services you are out of luck. The ship has a large collection of movies on a server and DVDs – if you prefer to watch DVDs of movies on your laptop you should bring a DVD drive if you don't have one built into your computer. There is also a movie room onboard complete with a large LCD TV, surround sound, movies, music, DVD player, and Playstation.

The Langseth's computer network connectivity is variable onboard so *we encourage all the participants to bring adapters to connect Ethernet to their devices*, especially for performing large file transfers as the science wireless network bandwidth can be exhausted quickly on large transfers.

Make sure you download any software, databases, papers to read that you will need ahead of time. Make sure your Matlab or other licenses don't require an internet connection or they won't work.

Updated anti-virus software is required prior to departure. Failing to update on-coming computers' anti-virus software puts the entire vessel network in danger.

Alcohol and Drug Policy

The Office of Marine Operations at Lamont-Doherty Earth Observatory supports a ZERO Tolerance policy for the use, possession, distribution, or any other activity involving illegal drugs or controlled substances aboard the R/V Langseth.

In accord with the UNOLS policy It is forbidden for any person to bring any alcoholic beverages on board; to drink to the point of intoxication; or to come on watch under the influence of any alcohol at sea or in port. Prior authorization is required to purchase souvenir alcohol in port and it will be placed in locked storage under control of the Captain.

Sexual Harassment and Safety

Sexual harassment or harassment of any kind will not be tolerated. The chief scientists are committed to providing a safe, productive research and educational environment. The AACSE project is funded by the National Science Foundation, updated guidelines on sexual harassment can be found here: https://www.nsf.gov/pubs/issuances/in144.jsp

The R/V Langseth is operated by the Lamont Doherty Earth Observatory that is part of Columbia. Please see Columbia University's policy on Sexual Harassment

Social conditions at sea are very different from those on land. Privacy is greatly reduced and as a result certain interactions are frequent and may be for prolonged periods. Under these conditions personal and professional boundaries may become unclear. In general, everyone must be sensitive to the altered social conditions in which they are living and working. The University policy applies to both on and off duty behavior aboard the R/V Langseth. Any person who believes they are being sexually harassed should seek resolution through discussions with the individual directly concerned. If this does not immediately resolve the matter, or if there is reluctance to deal directly with the person involved, the problem should then be brought to the attention of the Chief Scientist and the Captain at the earliest stage possible. The Captain

or Chief Scientist will investigate and take appropriate steps to resolve and remedy the situation. For more information see Columbia University's Office of Equal Opportunity and Affirmative Action .

Consensual, romantic relationships between individuals who work together are generally not considered sexual harassment and are not prohibited by University policies; however, individuals should be aware that these relationships are susceptible to being characterized as non-consensual, and even coercive, if there is an inherent power differential between the parties, and this can lead to complaints of sexual harassment. For further information, employees and students should consult the Romantic Relationship Advisory Statement More information on Columbia University Operating Policies .

Entertainment and Leisure

In addition to the TV room mentioned earlier, there are a workout facility with a treadmill, elliptical machine, rowing machine, some free weights and a library with a variety of books and magazines. Please be considerate of others and don't monopolize these rooms. The rooms are for everyone, including the crew.

Daily Schedule and Duties

Science operations aboard the ship will run 24 hrs. The co-chiefs will set a daily watch schedule—Apply-to-Sail participants will be on watch 8 hours/day. Remember that someone will be sleeping almost any time of the day. Be considerate and clean up after yourself.

Proof of identification

All persons intending to board the vessel must provide positive proof of identification. If you are a foreign Citizen, please bring your passport with you. If you are a US Citizen, although US driver license is accepted as a proof of identification, passport is recommended.

Communications

An opportunity for all on board to make 15 minute personal calls is provided once a week, usually during the weekends. The satellite comm's are available for mission-related and emergency calls at other times. The Langseth has also a cell wave amplifier so we might have access to some networks when we pass close to shore.

In case someone needs to contact you in Emergency while onboard:
Iridium Voice 011 8816 3183 0511 * Only rings on bridge.
Via Inmarsat C (C-Link email) 436980010@inmc.eik.com
Fleet Broadband 870 773 153 692
Ocean Codes: 871 Atlantic East; 872 Pacific; 873 Indian; and 874 Atlantic West
Captain Cell Phone: 914-275-3918

Packing List

Recommendations here:

Essentials

- Waterproof and windproof outer layers for deck operations
- Work gloves or other sturdy gloves
- Socks and underwear

- Shirts and pants for indoor lab duties
- Layers
- Pajamas (you will be sharing a cabin)
- Hat (beanie that can fit under a hardhat)
- Sun hat, sunscreen, sunglasses
- It is recommended to bring your own coffee mug (preferably sealable) and water bottle.
- Sneakers for indoors (all shoes must have enclosed toe and heel outside of cabins)
- Extra sneakers (if your other shoes get wet)
- Workout clothes (there is a gym onboard)
- Personal alarm clock
- Toiletries (bring enough to last the length of the cruise plus ~1 week; shampoo, conditioner, toothpaste, toothbrush, deodorant, lotion)
- Shower shoes
- Over the counter meds (aspirin, cold medicine, etc.), remember that once on board, you will be unable to procure any more
- Personal first aid materials. First aid equipment is available onboard, but you may prefer your own type of bandages, ointments, etc.
- Medication (be sure to pack in your carry-on, not checked luggage in case it gets lost)
- Passport – required for foreign citizens, recommended for others
- Ethernet adapters for drop cable access (if computer is not so equipped)

Nice to have

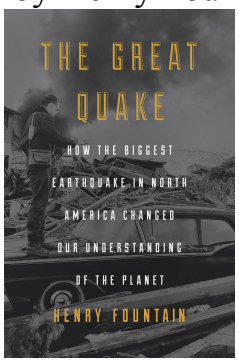
- Extra batteries, chargers
- USB drive, perhaps a larger external disk if you want to save cruise photos, videos, or multibeam data
- Camera
- Watch
- Notebook/Journal (the days go fast and blend together, so having a more personal record of it is a nice way to keep track)
- Ipod/mp3 player with earbuds
- Laptop and charger
- Ethernet adapter if your laptop does not have one built in
- Flashlight, you may share a cabin with others working a different shift
- Eyecovers, earplugs
- DVDs/books/personal hobby materials like knitting, etc. (there will be DVDs and some books on board to borrow, but you should probably bring one or two novels or other leisure reading)
- Seasick medication (lots of options; if you don't know whether you will get sick or not, bring some just in case; do some research and follow instructions); ginger gum, candy or tea may offer relief for mild seasickness.
- Treats, snacks, coffee (nice to have some chocolate or other treats around; and good coffee if you're a coffee snob)
- Cash for ship souvenir R/V Langseth (a small amount of cash seems to be a common thing for people to forget – the tshirts/sweatshirts are the only thing available for purchase on the ship, you won't need $$ for anything else).

Space is limited – so pack efficiently!

Suggested Reading

Here is a list of suggested reading to familiarize you with the region and some of the bigger picture tectonic and seismological questions other folks are pursuing in the area.

The Great Quake
by Henry Fountain



"…narrative about the biggest earthquake in North American recorded history -- the 1964 Alaska earthquake that demolished the city of Valdez and swept away the island village of Chenega -- and the geologist who hunted for clues to explain how and why it took place."

<u>Regional Papers</u>

Fournier, T. J., and J. T. Freymueller (2007), Transition from locked to creeping subduction in the Shumagin region, Alaska, Geophys. Res. Lett., 34, L06303, doi:10.1029/2006GL029073.

Plafker, G. (1965), Tectonic deformation associated with the 1964 Alaska earthquake, *Science*, *148*(3678), 1675-1687.

Shillington, D. J., A. Bécel, M. R. Nedimović, H. Kuehn, S. C. Webb, G. A. Abers, K. M. Keranen, J. Li, M. Delescluse, and G. A. Mattei-Salicrup (2015), Link between plate fabric, hydration and subduction zone seismicity in Alaska, *Nature Geoscience*, *8*(12), 961-964.

von Huene R., J. J. Miller, and W. Weinrebe (2012), Subducting plate geology in three great earthquake ruptures of the western Alaska margin, Kodiak to Unimak. *Geospher*e, 8 (3): 628–644.

Witter, R. C., R. W. Briggs, S. E. Engelhart, G. Gelfenbaum, R. D. Koehler, and W. D. Barnhart (2014), Little late Holocene strain accumulation and release on the Aleutian megathrust below the Shumagin Islands, Alaska, Geophys. Res. Lett., 41, doi:10.1002/2014GL059393.

Appendix 11. OBS deployment sheets & photos (scanned from originals, attached)

The following pages show for each station the photographs taken upon recovery, and the log sheets from the OBS recovery.

WD46 – WHOI S73 09/09/2019

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD46 WHOI OBS ID S 73

Surveyed OBS location 55° 31.2836' 149° 42.2239' Water depth (m) 4349

Novatech radio freq. (MHz) 154.585 Est. Rise Time: 36

Using WHOI ID S## :

Edgetech#1 35793 Tx freq 11 kHz / Rx freq 11.5 kHz

enable 316006 disable 316025

Burn 1 333166 Burn 2 333204 option 316040

Transducer (e.g. Hull) Hull

1 mi out: Start range tracking program ***EdgeNmea_Universal_0.7.py -G19200 -e23 -g24***

On PC, up-arrow or re-type command for vers. 7. Enter data as above. Comment: Your Initials

- file name (e.g. MGL1907_<stn_name>_<obs_id>…) MGL1907_S73_WD46_20190909_204804.txt

Confirm Ship's Position Conforms to Station Location: (__) yes (__) no

- turn on RS232 output in 8011M deck unit

Disable ship acoustics (Multibeam, Knudsen, ADCP, etc) (__) done

Enable acoustics:, check sensor (Guralp) status, Edgetech#1 ***Edgetech 8011M***

- send enable command: *<CMD>-[enable #]-<ENT>*
- UTC date 20190909 9-Sept-2019
- UTC time ~~1~~ 20:53:00 ~~2~~ 54:00 ~~3~~ 55:50

confirm reply: # pings _____, period (s) ___ instrument did not respond after several attempts

(more than 8 pings = Guralp ready, fewer than 8 = not ready)

- if repeats necessary
- UTC time _____
  - record repeated enable commands sent _____
- ranges: *<RNG>-<RNG>* _____
- assessment: Guralp: (__) ready (__) not ready

Lock Guralp (Burn 2 command), Edgetech#1 ***Edgetech 8011M***

- send Burn *2* command *<CMD>-[Burn 2 #]-<<GRD>+<ENT>>*
- UTC time _____

confirm reply, # pings _____, period (s) ___

- time of last reply ping (sec. of the minute) _____

(this can take up to 15 minutes, but may be less. End of locking may have 7 pings – 1 sec apart)

- # burning pings/minutes (count/tally) _____
- # burning pings/minutes _____
- burn shutdown confirmation, # pings _____, period (s) ___

(shutdown after 1 to 3 minutes => Guralp locked; after 15 minutes => Guralp not locked)

If you hear multiple pings over a few seconds, try <RNG>, will allow Range if done. Will not allow Range if not complete.

- assessment: Guralp: (__) locked (__) not locked
- ranges _____

(do multiple ranges to see if OBS is moving or stationary)

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD46 WHOI OBS ID 573

Release/burn (Burn 1 code)# **Edgetech#1** ***Edgetech 8011M***
- send Burn 1 command *<CMD>-[Burn 1 #]-<<GRD>+<ENT>>*
- UTC time _____
confirm reply, # pings_____, period (s) ___
- time of last ping (second of the minute) _____
(~8 or 15 min. cycle, with 1 ping/minute expected)
- # burning pings/minutes _____
Note time of double pings if hear. May be off sea floor.
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ___
Set range to 10 s repeat, if not set via
<MENU> - <Range Setup>-<More Options>-<repetitive rate>
Set repetitive range: <RNG><M/R>
- ranges _____

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings_____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings/minutes _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ____
Set repetitive range: <RNG><M/R>
- ranges _____

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings_____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings _____ # mins _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ____
Set repetitive range: <RNG><M/R>
- ranges _____

Track package during ascent
- estimated rise-time duration (min) _____ , est. rise-rate (m/min) _____
- estimated liftoff time (UTC)_____
- estimated surface time (UTC)_____
- contact bridge and let them know ETA at surface: (__) done (__) not done
→ notify Bridge if there is a change to the ETA

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

BB2

Station Name WD46 WHOI OBS ID 573

If no release with Edgetech#1
Edgetech#2 _____ Interrogate 11 kHz / Reply 13 kHz
enable 511571 disable 511613
Burn 1 531104 Option ~~511630~~ 511630

Enable acoustics, Edgetech#2 ***Edgetech 8011M***
- send enable command, : <*CMD*>-[*enable #*]-<*ENT*>
- UTC date 9-Sept-2019
- UTC time ~~21:06~~ 21:05:49
confirm reply, # pings 15, period (s) 1
- if repeats necessary
- UTC time 21:06:57
- record repeated enable commands sent _____
- ranges: <*RNG*>-<*RNG*> 3062, 4793, 4393
- assessment: Guralp ready _____, not ready _____

* Tried Burn 2 command with BBI frequency - did not work *

Release/burn (Burn 1 command), Edgetech#2 ***Edgetech 8011M***
- send Burn 1 command <*CMD*>-[*Burn 1 #*]-<<*GRD*>+<*ENT*>>
- UTC time 21:09:37
- confirm reply, # pings 15, period (s) 1
- time of last ping (second of the minute) 21:10:09
- # burning pings/minutes || || ||
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ___
Set 10 s repeat: <*MENU*> - <*Range Setup*>-<*More Options*>-<*repetitive rate*>
Repeat range when ready: <*RNG*><*M/R*>
- ranges 4392 / 4353 / 4336

BB2
Tx: 11 Rx 13kHz

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings/minutes _____
- burn shutdown confirmation, # pings _____, period (s) ____
- Set repetitive range <*RNG*><*M/R*> ranges _____

BB1 AGAIN

Change freq to try @ 21:42:30

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings _____, # mins _____
- burn shutdown confirmation, # pings _____, period (s) ____
- Set repetitive range <*RNG*><*M/R*> ranges _____

we will try to lock again when it gets closer

Track package during ascent
- estimated rise time duration (min) 2h, est. rise rate (m/min) 36
- estimated liftoff time (UTC) 21:09
- estimated surface time (UTC) 23:10 or 15:10 local

Back to BB2 @ 21:44:03

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD46 WHOI OBS ID 73

Notes during package ascent

We could not reach the station using the Edgetech #1 frequencies and codes. Tim Kane came and tried also, and then we tried to use the other frequencies for the second edgetech. The second edgetech is not programmed with a burn 2 (locking command) so we could not lock the gimbal. We tried the first frequencies again after an hour of rising with no success again.
Igor & Ginevra communicated w/ OBS, Em & Corg helped recover.

Recover
- Novatech radio received, UTC time 23:24 - visual sight, UTC time 23:26
- on board, UTC time 23:37:16

OBS on deck
- Novatech flasher working(Y/N) N - Novatech radio working(Y/N) Y

OBS condition

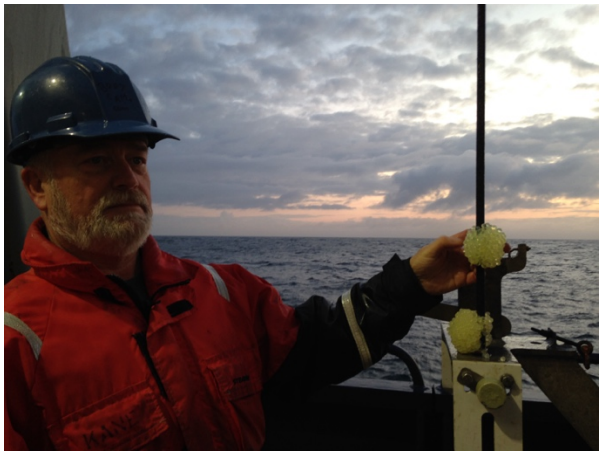
- Gimbal was not locked
- Edgetech #1 did not respond / is likely broken.
- Novatech flasher was not working

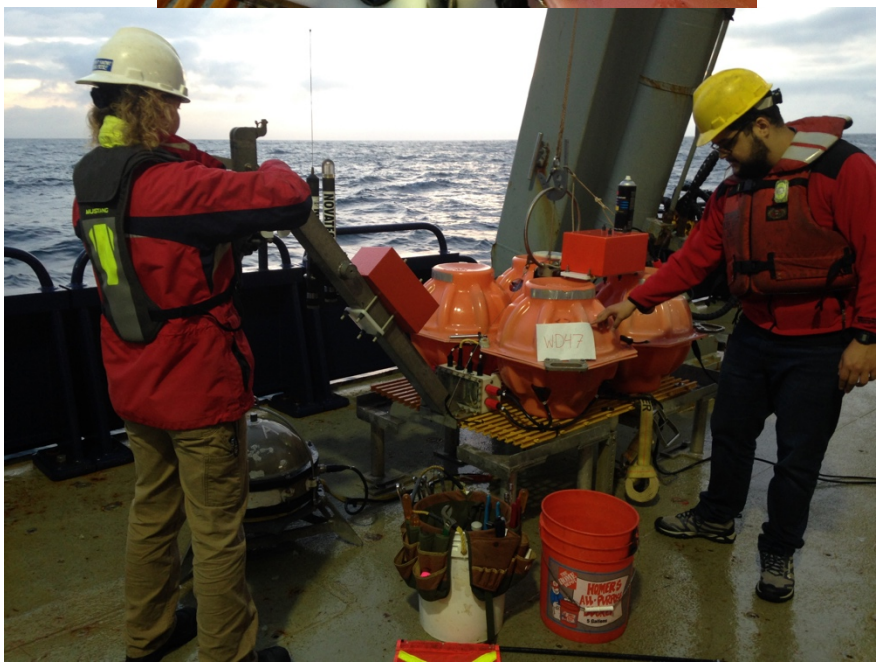
- stop EdgeNmea logging program (^C) ✓
- restart ship acoustics ✓ - confirm next station with bridge ✓

UW Temperature Sensor S/Ns

Antares: 854468 Iceland: _____ Tidbit1: 20233121 Tidbit2: _____

WD47 – WHOI S71 09/09/2019





09-SEP-2019

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD47 WHOI OBS ID S 71

Surveyed OBS location 54° ~~23.4458~~ 57.0811" ~~E~~ 150° 26.6876" Water depth (m) 3999

Novatech radio freq. (MHz) 160.785. Est. Rise Time: 114.

Using WHOI ID S##:
Edgetech#1 35793 Tx freq 11 kHz / Rx freq 11.5 kHz
enable 572644 disable 572667
Burn 1 553055 Burn 2 553107 option 572716
Transducer (e.g. Hull) Hull.

1 mi out: Start range tracking program *EdgeNmea_Universal_0.7.py -G19200 -e23 -g24*
On PC, up-arrow or re-type command for vers. 7. Enter data as above. Comment: Your Initials
- file name (e.g. MGL1907_<stn_name>_<obs_id>…) MGL1907-S71-WD47-20190909-124009.txt

Confirm Ship's Position Conforms to Station Location: (✓) yes ( ) no
- turn on RS232 output in 8011M deck unit
Disable ship acoustics (Multibeam, Knudsen, ADCP, etc) (✓) done

Enable acoustics:, check sensor (Guralp) status, Edgetech#1 ***Edgetech 8011M***
- send enable command: *<CMD>-[enable #]-<ENT>*
- UTC date 20190909.
- UTC time 12:42:01
confirm reply: # pings 15, period (s) 1
(more than 8 pings = Guralp ready, fewer than 8 = not ready)
- if repeats necessary
- UTC time
  - record repeated enable commands sent
- ranges: *<RNG>-<RNG>* 4032
- assessment: Guralp: (✓) ready ( ) not ready

Lock Guralp (Burn 2 command), Edgetech#1 ***Edgetech 8011M***
- send Burn 2 command *<CMD>-[Burn 2 #]-<<GRD>+<ENT>>*
- UTC time 12:43:05
confirm reply, # pings 15, period (s) 1
- time of last reply ping (sec. of the minute) 43:34
  (this can take up to 15 minutes, but may be less. End of locking may have 7 pings – 1 sec apart)
- # burning pings/minutes (count/tally) ~~||||~~ ~~||||~~ ~~||||~~
- # burning pings/minutes
- burn shutdown confirmation, # pings 15, period (s) 1
(shutdown after 1 to 3 minutes => Guralp locked; after 15 minutes => Guralp not locked)
If you hear multiple pings over a few seconds, try <RNG>, will allow Range if done. Will not allow Range if not complete.
- assessment: Guralp: (✓) locked ( ) not locked
- ranges 4022, 4023, 4023
  (do multiple ranges to see if OBS is moving or stationary)

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD47 WHOI OBS ID 571

Release/burn (Burn 1 code)# **Edgetech#1** ***Edgetech 8011M***

- send Burn 1 command *<CMD>-[Burn 1 #]-<<GRD>+<ENT>>*
- UTC time 12:49:55
confirm reply, # pings 15, period (s) 1
- time of last ping (second of the minute) 13:00:13
(~8 or 15 min. cycle, with 1 ping/minute expected)
- # burning pings/minutes 11111
Note time of double pings if hear. May be off sea floor.
Hear double pings? ? UTC Time: _____
- burn shutdown confirmation, # pings /, period (s) ✓
Set range to 10 s repeat, if not set via
<MENU> - <Range Setup>-<More Options>-<repetitive rate>
Set repetitive range: <RNG><M/R>
- ranges 3439, 3936, 3930

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings/minutes _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ____
Set repetitive range: <RNG><M/R>
- ranges _____

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings _____ # mins _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ____
Set repetitive range: <RNG><M/R>
- ranges _____

Track package during ascent

- estimated rise-time duration (min) 114, est. rise-rate (m/min) 35
- estimated liftoff time (UTC) 13:04:00
- estimated surface time (UTC) 15:00:00
- contact bridge and let them know ETA at surface: (✓) done (__) not done
→ notify Bridge if there is a change to the ETA

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name W1747 WHOI OBS ID S77

Notes during package ascent

1st No Return within range @ 14:40 - 745m

Recover

- Novatech radio received, UTC time _____ - visual sight, UTC time 6:59 local / 14:59 UTC
- on board, UTC time 15:11

OBS on deck

- Novatech flasher working(Y/N) — - Novatech radio working(Y/N) —

OBS condition

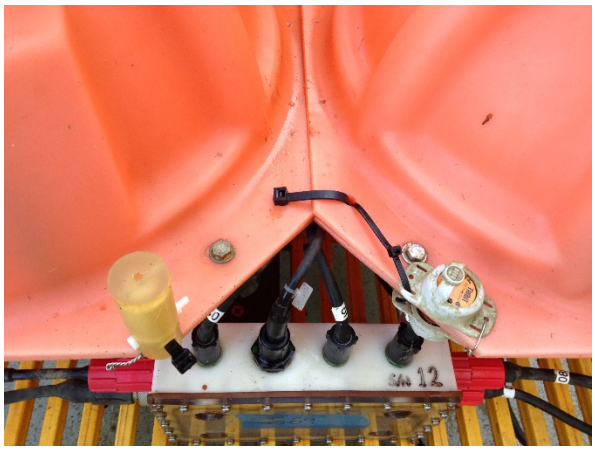
The gasket was not locked.
There were octopus eggs on the flag pole.
There is seemingly ~half of the data expected/recorded on other stations
- Battery was dead.

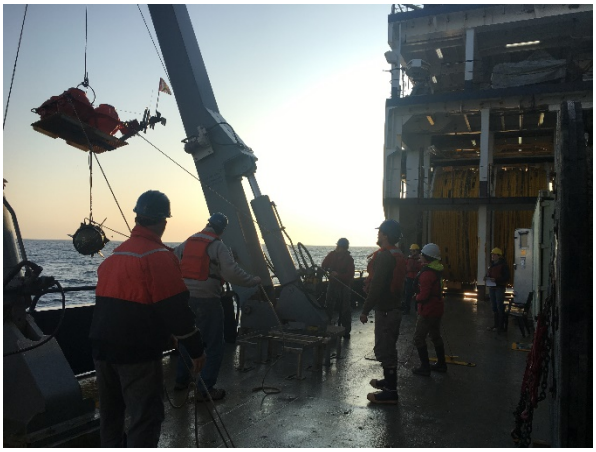
- stop EdgeNmea logging program (^C) ✓
- restart ship acoustics ✓ - confirm next station with bridge ✓

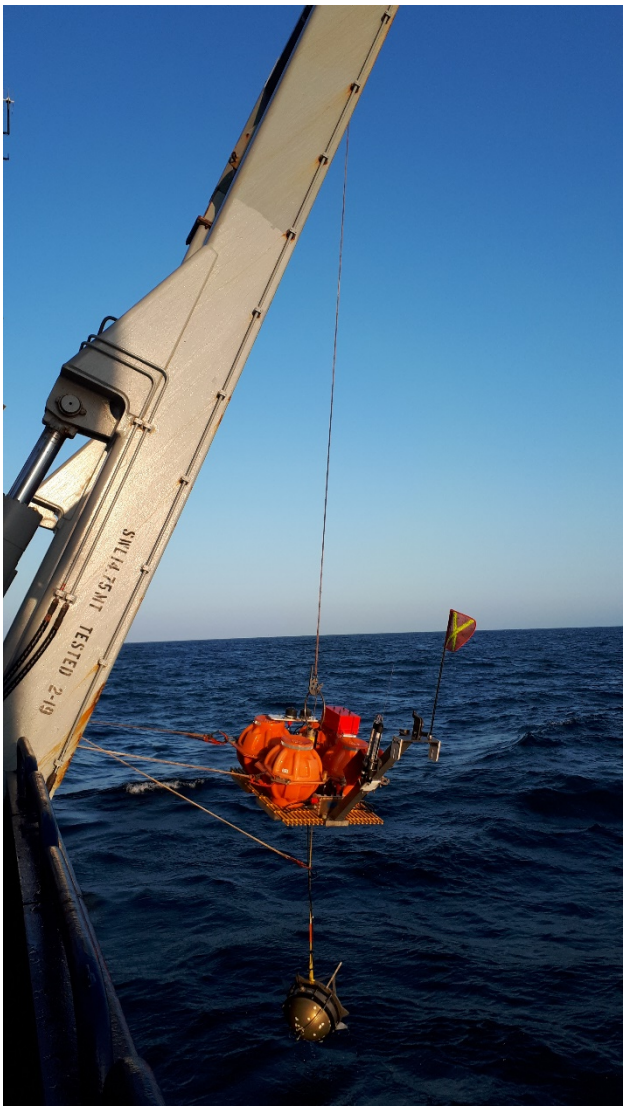
UW Temperature Sensor S/Ns

Antares: 1854415 Iceland: _____ Tidbit1: 2023111 Tidbit2: _____

WD48 – WHOI S69 08/27/2019







AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD48 WHOI OBS ID S69

Surveyed location 54° 37.6419 N 151° 43.8806 W Water depth (m) 1324

Novatech radio freq. (MHz) _____

Edgetech#1 35793 Interrogate (Tx) 11 kHz / Reply (Rx) 11.5 kHz

enable 316154 disable 316177

release 1 333261 release 2 333310 option 592621

Edgetech Deck-Box S/N _____ Transducer Hull

Confirm Ship's Position Conforms to Station Location: Done

Disable ship acoustics (Multibeam, Knudsen, ADCP, etc) Done

Start range tracking program *EdgeNmea.py*

- file name (e.g. <stn_name>_<obs_id>) MGL1907_S69_WD48_20190827_145942.txt
- **turn on RS232 output in 8011M deck unit**

Enable acoustics, check Guralp status, Edgetech#1 *Edgetech 8011M*

- UTC date 08/27/2019
- UTC time 15:01:35
- send enable command, confirm reply, # pings 15, period (s) 1

(more than 8 pings = Guralp ready, fewer than 8 = not ready)

- if repeats necessary
- UTC time
- record repeated enable commands sent

hit twice

- ranges 01408 meters
- assessment: Guralp ready ✓, not ready _____

Lock Guralp (release 2 command), Edgetech#1 *Edgetech 8011M*

- UTC time 15:04:55
- send *release 2* command, confirm reply, # pings 15, period (s) 1
- time of last reply ping (sec. of the minute) 15:05:59
- # burning pings/minutes 7 (per minute (twice)
- # burning pings/minutes 7 pings on minute 3
- burn shutdown confirmation, # pings _____, period (s) ___

(shutdown after 1 to 3 minutes => Guralp locked; after 15 minutes => Guralp not locked)

- assessment: Guralp locked ✓, not locked _____
- ranges 1436 m 1439 m 1440 m

Second range was 1436

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD48 WHOI OBS ID 569

Release/burn (release 1 command), Edgetech#1 *Edgetech 8011M*

- UTC time ~~15:17~~ 15:17:45 - should have been the time when sent.
- send release 1 command, confirm reply, # pings 7, period (s) 1
- time of last ping (second of the minute) 15:17:45
- # burning pings/minutes
- burn shutdown confirmation, # pings , period (s)
- ranges

- if repeat necessary, UTC time
- send release 1 command, confirm reply, # pings , period (s)
- time of last ping (start of 15 minute burn)
- # burning pings/minutes
- burn shutdown confirmation, # pings , period (s)
- ranges

- if repeat necessary, UTC time
- send release 1 command, confirm reply, # pings , period (s)
- time of last ping (start of 15 minute burn)
- # burning pings # mins
- burn shutdown confirmation, # pings , period (s)
- ranges

Track package during ascent

- estimated rise-time duration (min) 33, est. rise-rate (m/min) 37
- estimated liftoff time (UTC) 15:29
- estimated surface time (UTC) 16:05

15:20:45 - First time of double ping - rise may have started at this time instead of 15 minutes after first ping

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD48 WHOI OBS ID S69

Notes during package ascent

- Ran the wrong Python script - had to cancel & re-run version 7 - so log-files are not written for the start of ascent.
- OBS came up earlier than expected - no Novatech radio received - likely due to buoy surface time on when we started seeing range decrease instead of when we heard the first double-ping.

Recover

- Novatech radio received, UTC time ~~[illegible]~~ - visual sight, UTC time 15:51:45
- on board, UTC time 16:12:40

OBS on deck

- Novatech flasher working(Y/N) Y - Novatech radio working(Y/N) Y

OBS condition

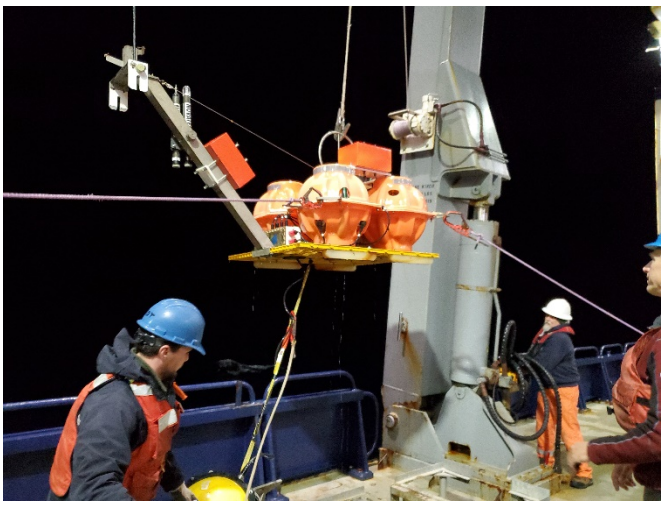
everything Ok

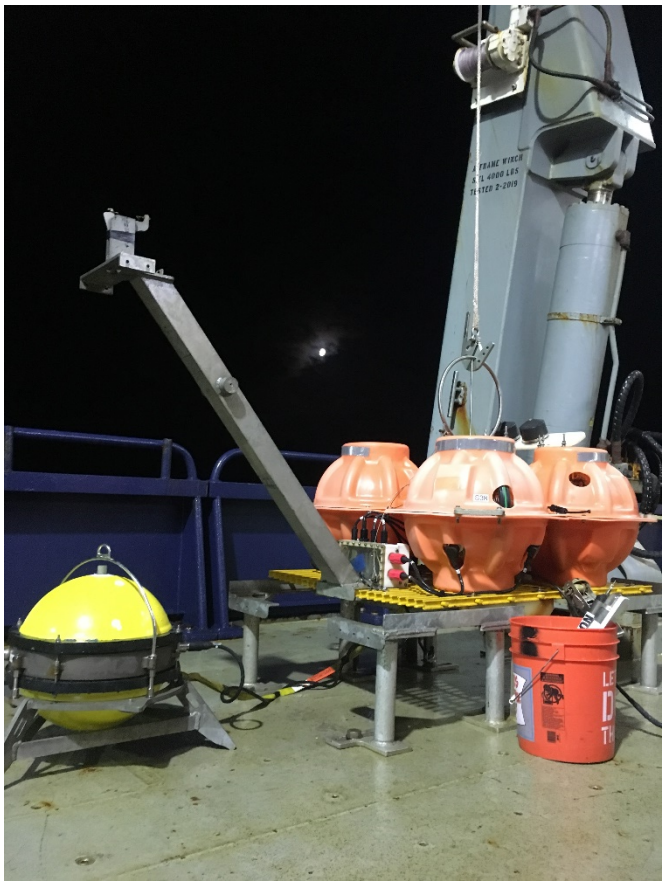
- stop EdgeNmea logging program (^C) ✓ ~~- switch off Deck-Box~~
- restart ship acoustics ✓ - confirm next station with bridge ✓

UW Temperature Sensor S/Ns

Antares: — Iceland: 59406 Tidbit1: 20237080 Tidbit2: 20273093

WD49 – WHOI S38 09/09/2019





AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD49 WHOI OBS ID S 38

Surveyed OBS location 54° 23.9450N 151° 53.9682 Water depth (m) 4091

Novatech radio freq. (MHz) 154.155 Est. Rise Time: 114 mins (35m/min)

Using WHOI ID S##:

Edgetech#1 35733 Tx freq 11 kHz / Rx freq 11.5 kHz

enable 316534 disable 316551

Burn 1 332525 Burn 2 333540 option 3165-72

Transducer (e.g. Hull) hull

1 mi out: Start range tracking program ***EdgeNmea_Universal_0.7.py -G19200 -e23 -g24***

On PC, up-arrow or re-type command for vers. 7. Enter data as above. Comment: Your Initials

- file name (e.g. MGL1907_<stn_name>_<obs_id>…) MGL1907_WD49_S38

Confirm Ship's Position Conforms to Station Location: (✓) yes ( ) no

- turn on RS232 output in 8011M deck unit

Disable ship acoustics (Multibeam, Knudsen, ADCP, etc) (✓) done

Enable acoustics:, check sensor (Guralp) status, Edgetech#1 ***Edgetech 8011M***

- send enable command: *<CMD>-[enable #]-<ENT>*
- UTC date 252
- UTC time 04:17:35

confirm reply: # pings 15, period (s) 1

(more than 8 pings = Guralp ready, fewer than 8 = not ready)

- if repeats necessary
- UTC time
- record repeated enable commands sent
- ranges: *<RNG>-<RNG>* 4112, 4111
- assessment: Guralp: (✓) ready ( ) not ready

Lock Guralp (Burn 2 command), Edgetech#1 ***Edgetech 8011M***

- send Burn 2 command *<CMD>-[Burn 2 #]-<<GRD>+<ENT>>*
- UTC time 4:14:55

confirm reply, # pings 16 (last double), period (s) 1

- time of last reply ping (sec. of the minute) :26

(this can take up to 15 minutes, but may be less. End of locking may have 7 pings – 1 sec apart)

- # burning pings/minutes (count/tally) 11
- # burning pings/minutes
- burn shutdown confirmation, # pings 7, period (s) 1

(shutdown after 1 to 3 minutes => Guralp locked; after 15 minutes => Guralp not locked)

If you hear multiple pings over a few seconds, try <RNG>, will allow Range if done. Will not allow Range if not complete.

- assessment: Guralp: (✓) locked ( ) not locked
- ranges 4107, 4108 → ranges not printing to script, restarting script

(do multiple ranges to see if OBS is moving or stationary)

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD47 WHOI OBS ID S38

Release/burn (Burn 1 code)# **Edgetech#1** ***Edgetech 8011M***

- send Burn 1 command *<CMD>-[Burn 1 #]-<<GRD>+<ENT>>*
- UTC time 04:23:41
confirm reply, # pings 7, period (s) 1
- time of last ping (second of the minute) 04:24:07
(~8 or 15 min. cycle, with 1 ping/minute expected)
- # burning pings/minutes ~~HH HH HH~~
Note time of double pings if hear. May be off sea floor.
Hear double pings? ✓ UTC Time: 04:39:00
- burn shutdown confirmation, # pings 7, period (s) 1
Set range to 10 s repeat, if not set via
<MENU> - <Range Setup>-<More Options>-<repetitive rate>
Set repetitive range: <RNG><M/R>
- ranges 3498m

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings/minutes _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ____
Set repetitive range: <RNG><M/R>
- ranges _____

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings _____ # mins _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ____
Set repetitive range: <RNG><M/R>
- ranges _____

Track package during ascent

- estimated rise-time duration (min) 75, est. rise-rate (m/min) 40
- estimated liftoff time (UTC) 04:48:00
- estimated surface time (UTC) 06:05:00
- contact bridge and let them know ETA at surface: (✓) done (__) not done
→ notify Bridge if there is a change to the ETA

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD49 WHOI OBS ID 538

Notes during package ascent

Nothing Happened

Recover

- Novatech radio received, UTC time 16:01:12 - visual sight, UTC time 16:01:12
- on board, UTC time 16:17:00

OBS on deck

- Novatech flasher working(Y/N) ✓ - Novatech radio working(Y/N) ✓

OBS condition

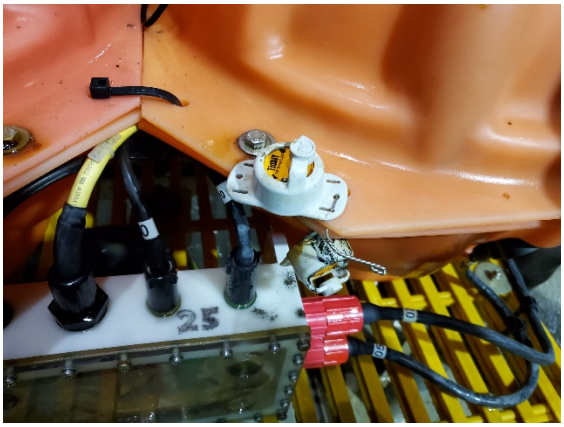
looks good.

- stop EdgeNmea logging program (^C) _____
- restart ship acoustics _____ - confirm next station with bridge _____

UW Temperature Sensor S/Ns

Antares: 1954482 Iceland: ✓ Tidbit1: 20233078 Tidbit2: ✓

WD50 – WHOI S05 08/28/2019



Cong + Em

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD-50 WHOI OBS ID S 05

Surveyed OBS location Lat: 55°26.9716N, Lon: 132°23.5058W Water depth (m) 4987

Novatech radio freq. (MHz) 14.85 Est. Rise Time: ~~20~~ 144 min.

Using WHOI ID S## :

Edgetech#1 3793 Tx freq 11 kHz / Rx freq 11.5 kHz

enable 43274 disable 43305

Burn 1 43274 Burn 2 43260 option 43326

Transducer (e.g. Hull) Hull

Disable ship acoustics (Multibeam, Knudsen, ADCP, etc) ✓

Confirm Ship's Position Conforms to Station Location: Lat 55 26.9344 N Lon: 132 22.9329 W

Start range tracking program ***EdgeNmea_Universal_0.7.py -G19200 -e23 -g24***

On PC, up-arrow or re-type command for vers. 7. Enter data as above. Comment: Your Initials

- file name (e.g. MGL1907_<stn_name>_<obs_id>…) MGL1907_WD50_S05

- turn on RS232 output in 8011M deck unit

Enable acoustics:, check sensor (Guralp) status, Edgetech#1 ***Edgetech 8011M***

- UTC date 2019-08-28
- UTC time ~~05:48:09~~ 05:48:06
- send enable command: *<CMD>-[enable #]-<ENT>*

confirm reply: # pings 15, period (s) 1

(more than 8 pings = Guralp ready, fewer than 8 = not ready)

- if repeats necessary
- UTC time
- record repeated enable commands sent
- ranges: *<RNG>-<RNG>* 4986m
- assessment: Guralp ready ✓, not ready

Lock Guralp (release 2 command), Edgetech#1 ***Edgetech 8011M***

- UTC time ~~05:48:09~~ 06:02:03
- send Burn *2* command *<CMD>-[Burn 2 #]-<<GRD>+<ENT>>*

confirm reply, # pings ~~15~~ 7, period (s) 1

- time of last reply ping (sec. of the minute) ~~05:48:09~~ → 06:04:09
- # burning pings/minutes (count/tally) ~~1111~~ 1, at 2 minutes 7 pings
- # burning pings/minutes
- burn shutdown confirmation, # pings 7, period (s) 1

(shutdown after 1 to 3 minutes => Guralp locked; after 15 minutes => Guralp not locked)

If you hear multiple pings over a few seconds, try <RNG>, will allow Range if done.

- assessment: Guralp locked ✓, not locked
- ranges 4984

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name _____ WHOI OBS ID _____

Release/burn (Burn 1 code)# **Edgetech#1** ***Edgetech 8011M***

Double ping: 06:13:24, 06:16:24

- UTC time 06:08:00
- send Burn 1 command *<CMD>-[Burn 1 #]-<<GRD>+<ENT>>*
confirm reply, # pings 7, period (s) 1 (~15 min. cycle)
- time of last ping (second of the minute) 06:09:24
- # burning pings/minutes ~~||||| ||||~~
- burn shutdown confirmation, # pings 7, period (s) 1
Repeat range when ready: <RNG><M/R>
- ranges 1423 m
Set range to 10 s repeat, if not set via
<MENU> - <Range Setup>-<More Options>-<repetitive rate>

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings/minutes _____
- burn shutdown confirmation, # pings _____, period (s) ____
- ranges _____

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings _____ # mins _____
- burn shutdown confirmation, # pings _____, period (s) ____
- ranges _____
Note time of double pings if hear. May be off sea floor.

Track package during ascent
- estimated rise-time duration (min) ~~144 min~~ 90 min, est. rise-rate (m/min) ~~35 m/min~~ 45 m/min
- estimated liftoff time (UTC) ~~06:16:24~~ 06:16:24 (double-ping)
- estimated surface time (UTC) ~~07:46~~ 08:00

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name _____ WHOI OBS ID _____

Notes during package ascent

Somehow the terminal does not show the records when OBS comes up; WC ~~re-log~~ re-input the command script

Recover

- Novatech radio received, UTC time 8:06 - visual sight, UTC time 8:16
- on board, UTC time 8:31

OBS on deck

- Novatech flasher working(Y/N) N - Novatech radio working(Y/N) Y

OBS condition

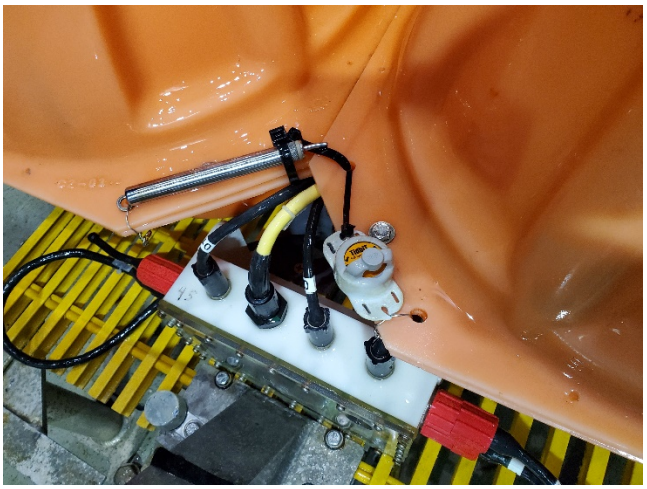
Everything Ok

- stop EdgeNmea logging program (^C) ✓
- restart ship acoustics ✓ - confirm next station with bridge ✓

UW Temperature Sensor S/Ns

Antares:_____ Iceland:_____ Tidbit1: 20233132 Tidbit2: 20233120

WD51 – WHOI S70 08/28/2019



AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WDS1 WHOI OBS ID S 70

Surveyed OBS location 55° 54.3052 N 152° 46.3061 W Water depth (m) 4361

Novatech radio freq. (MHz) 154.585 Est. Rise Time: 126 min

Using WHOI ID S##:

Edgetech#1 35793 Tx freq 11 kHz / Rx freq 11.5 kHz

enable 572560 disable 572602

Burn 1 552766 Burn 2 553013 option 572621

Transducer (e.g. Hull) Hull

Disable ship acoustics (Multibeam, Knudsen, ADCP, etc) ✓

Confirm Ship's Position Conforms to Station Location: ✓

Start range tracking program ***EdgeNmea_Universal_0.7.py -G19200 -e23 -g24***

On PC, up-arrow or re-type command for vers. 7. Enter data as above. Comment: Your Initials

- file name (e.g. MGL1907_<stn_name>_<obs_id>…) MGL1907_S70_WDS1_20190828_115325.txt

- turn on RS232 output in 8011M deck unit

Enable acoustics:, check sensor (Guralp) status, Edgetech#1 ***Edgetech 8011M***

- UTC date 8/28/19
- UTC time 11:54
- send enable command: *<CMD>-[enable #]-<ENT>*

confirm reply: # pings 15, period (s) 1

(more than 8 pings = Guralp ready, fewer than 8 = not ready)

- if repeats necessary
- UTC time
- record repeated enable commands sent
- ranges: *<RNG>-<RNG>* 4388
- assessment: Guralp ready ✓, not ready

Lock Guralp (release 2 command), Edgetech#1 ***Edgetech 8011M***

- UTC time 11:58 (Burn)
- send Burn *2* command *<CMD>-[Burn 2 #]-<<GRD>+<ENT>>*

confirm reply, # pings 15, period (s) 1

- time of last reply ping (sec. of the minute) 21 18
- # burning pings/minutes (count/tally) 11 once/min for 2 pings
- # burning pings/minutes 7 pings on min 3
- burn shutdown confirmation, # pings , period (s)

(shutdown after 1 to 3 minutes => Guralp locked; after 15 minutes => Guralp not locked)

If you hear multiple pings over a few seconds, try <RNG>, will allow Range if done.

- assessment: Guralp locked ✓, not locked
- ranges 4394, 4394, 4395

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD 51 WHOI OBS ID S70

Release/burn (Burn 1 code)# **Edgetech#1** ***Edgetech 8011M***

- UTC time 12:04
- send Burn 1 command *<CMD>-[Burn 1 #]-<<GRD>+<ENT>>*
confirm reply, # pings 7, period (s) 1 (~15 min. cycle)
- time of last ping (second of the minute) 35
- # burning pings/minutes ~~LHT~~ ~~LHT~~ ~~LHT~~ 1
- burn shutdown confirmation, # pings 15, period (s) 60 sec

Repeat range when ready: <RNG><M/R>
- ranges 3837, 3816, 3726

Set range to 10 s repeat, if not set via
<MENU> - <Range Setup>-<More Options>-<repetitive rate>

- if repeat necessary, UTC time
- send Burn 1 command, confirm reply, # pings, period (s)
- time of last ping (start of 15 minute burn)
- # burning pings/minutes
- burn shutdown confirmation, # pings, period (s)
- ranges

- if repeat necessary, UTC time
- send Burn 1 command, confirm reply, # pings, period (s)
- time of last ping (start of 15 minute burn)
- # burning pings # mins
- burn shutdown confirmation, # pings, period (s)
- ranges

Note time of double pings if hear. May be off sea floor.

Track package during ascent
- estimated rise-time duration (min) 82 min, est. rise-rate (m/min) 7/10 sec = 42 m/min
- estimated liftoff time (UTC)
- estimated surface time (UTC) 13:51 UTC 5:51 ship

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD51 WHOI OBS ID S70

Notes during package ascent

None

Recover

- Novatech radio received, UTC time 13:44 - visual sight, UTC time no exact record ~13:50
- on board, UTC time 14:19

OBS on deck

- Novatech flasher working(Y/N) N - Novatech radio working(Y/N) Y

OBS condition

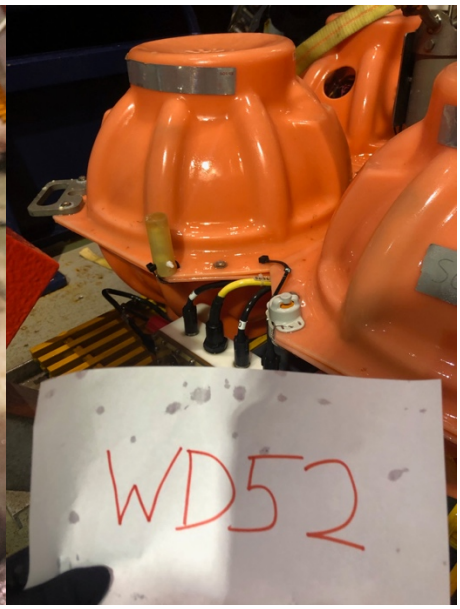
External looks good

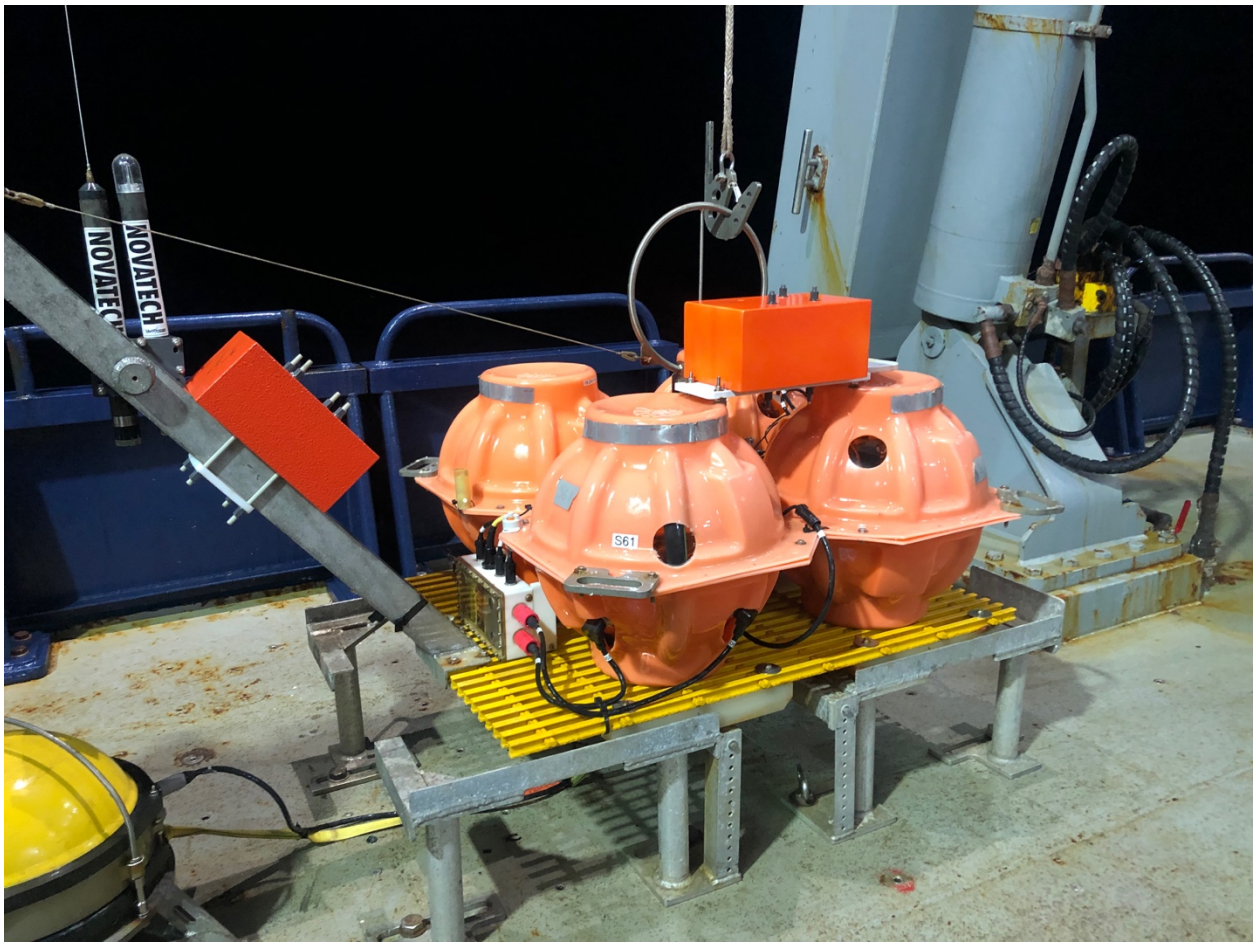
- stop EdgeNmea logging program (^C) ✓
- restart ship acoustics ✓ - confirm next station with bridge ✓

UW Temperature Sensor S/Ns

Antares: 185429 Iceland: Tidbit1: 2023101 Tidbit2:

WD52 – WHOI S61 08/31/2019





Org & Zn

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD52 WHOI OBS ID S 61

Surveyed OBS location 54° 02.7973' N 159° 20.7729' W Water depth (m) 2564

Novatech radio freq. (MHz) 154.585 Est. Rise Time: 72mn

Using WHOI ID S## :

Edgetech#1 37793 Tx freq 11 kHz / Rx freq 11.5 kHz

enable 31741 disable 317432

Burn 1 33465 Burn 2 33207 option 31745

Transducer (e.g. Hull) hull

1 mi out: Start range tracking program ***EdgeNmea_Universal_0.7.py -G19200 -e23 -g24***

On PC, up-arrow or re-type command for vers. 7. Enter data as above. Comment: Your Initials

- file name (e.g. MGL1907_<stn_name>_<obs_id>…) MGL1907_WD52_561

Confirm Ship's Position Conforms to Station Location: (✓) yes ( ) no

- turn on RS232 output in 8011M deck unit

Disable ship acoustics (Multibeam, Knudsen, ADCP, etc) (✓) done

Enable acoustics:, check sensor (Guralp) status, Edgetech#1 ***Edgetech 8011M***

- send enable command: *<CMD>-[enable #]-<ENT>*
- UTC date 243
- UTC time 04:38:34

confirm reply: # pings 15, period (s) 1

(more than 8 pings = Guralp ready, fewer than 8 = not ready)

- if repeats necessary
- UTC time
  - record repeated enable commands sent
- ranges: *<RNG>-<RNG>* 2609m
- assessment: Guralp: (✓) ready ( ) not ready

Lock Guralp (Burn 2 command), Edgetech#1 ***Edgetech 8011M***

- send Burn 2 command *<CMD>-[Burn 2 #]-<<GRD>+<ENT>>*
- UTC time 04:38:05

confirm reply, # pings 15, period (s) 1

- time of last reply ping (sec. of the minute) 04:38:22

(this can take up to 15 minutes, but may be less. End of locking may have 7 pings – 1 sec apart)

- # burning pings/minutes (count/tally) ++++ ||
- # burning pings/minutes
- burn shutdown confirmation, # pings 7, period (s) 1

(shutdown after 1 to 3 minutes => Guralp locked; after 15 minutes => Guralp not locked)

If you hear multiple pings over a few seconds, try <RNG>, will allow Range if done. Will not allow Range if not complete.

- assessment: Guralp: (✓) locked ( ) not locked
- ranges 2603m

(do multiple ranges to see if OBS is moving or stationary)

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD52 WHOI OBS ID S61

Release/burn (Burn 1 code)# **Edgetech#1** ***Edgetech 8011M***
- send Burn 1 command *<CMD>-[Burn 1 #]-<<GRD>+<ENT>>*
- UTC time 04:42:43
confirm reply, # pings 7, period (s) 1
- time of last ping (second of the minute) 04:42:50
(~8 or 15 min. cycle, with 1 ping/minute expected)
- # burning pings/minutes ++++ ++++ ++++ ++++ ++++ +++
Note time of double pings if hear. May be off sea floor.
Hear double pings? ✓ UTC Time: 04:45; 04:42, 04:47 ✓.
- burn shutdown confirmation, # pings 7, period (s) 1
Set range to 10 s repeat, if not set via
<MENU> - <Range Setup>-<More Options>-<repetitive rate>
Set repetitive range: <RNG><M/R>
- ranges 2216m

- if repeat necessary, UTC time
- send Burn 1 command, confirm reply, # pings, period (s)
- time of last ping (start of 15 minute burn)
- # burning pings/minutes
Hear double pings? UTC Time:
- burn shutdown confirmation, # pings, period (s)
Set repetitive range: <RNG><M/R>
- ranges

- if repeat necessary, UTC time
- send Burn 1 command, confirm reply, # pings, period (s)
- time of last ping (start of 15 minute burn)
- # burning pings # mins
Hear double pings? UTC Time:
- burn shutdown confirmation, # pings, period (s)
Set repetitive range: <RNG><M/R>
- ranges

Track package during ascent
- estimated rise-time duration (min) 72 min, est. rise-rate (m/min) 2.5m/min
- estimated liftoff time (UTC) 04:47:00
- estimated surface time (UTC) 05:00:00
- contact bridge and let them know ETA at surface: (✓) done (__) not done
→ notify Bridge if there is a change to the ETA

20:47
21:47

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WP52 WHOI OBS ID S61

Notes during package ascent

Ranging stopped working at 05:57:36 @ 747m

Recover

- Novatech radio received, UTC time ~~[illegible]~~ 06:03 - visual sight, UTC time 06:10
- on board, UTC time 06:32

OBS on deck

- Novatech flasher working(Y/N) N - Novatech radio working(Y/N) Y

OBS condition

- stop EdgeNmea logging program (^C) ✓
- restart ship acoustics ✓ - confirm next station with bridge ✓

UW Temperature Sensor S/Ns

Antares: Iceland: 59422 Tidbit3: 20233083 Tidbit1: 20233124

WD53 – WHOI S59 09/09/2019

Igor & Ginevra

08-Sep-2019

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD53 WHOI OBS ID S [redacted]59

Surveyed OBS location 53° 46.7669 153° 25.3745 Water depth (m) 4646

Novatech radio freq. (MHz) 154.585 Est. Rise Time: _____

Using WHOI ID S## :

Edgetech#1 35793 Tx freq 11 kHz / Rx freq 11.5 kHz

enable 315507 disable 315605

Burn 1 333034 Burn 2 333051 option 315626

Transducer (e.g. Hull) Hull

1 mi out: Start range tracking program ***EdgeNmea_Universal_0.7.py -G19200 -e23 -g24***

On PC, up-arrow or re-type command for vers. 7. Enter data as above. Comment: Your Initials

- file name (e.g. MGL1907_<stn_name>_<obs_id>…) MGL1907_S59_WD53_20190908-185236.txt

Confirm Ship's Position Conforms to Station Location: (✓) yes (✗) no

- turn on RS232 output in 8011M deck unit

Disable ship acoustics (Multibeam, Knudsen, ADCP, etc) (✓) done

Enable acoustics:, check sensor (Guralp) status, Edgetech#1 ***Edgetech 8011M***

- send enable command: *<CMD>-[enable #]-<ENT>*
- UTC date 9-9-2019 Sept-9-2019
- UTC time 19:03:30
confirm reply: # pings 15, period (s) 1
(more than 8 pings = Guralp ready, fewer than 8 = not ready)
- if repeats necessary
- UTC time _____
  - record repeated enable commands sent _____
- ranges: *<RNG>-<RNG>* 4662, 4662
- assessment: Guralp: (✓) ready (__) not ready

Lock Guralp (Burn 2 command), Edgetech#1 ***Edgetech 8011M***

- send Burn 2 command *<CMD>-[Burn 2 #]-<<GRD>+<ENT>>*
- UTC time 19:05:05
confirm reply, # pings 15, period (s) 1
- time of last reply ping (sec. of the minute) 19:05:36
(this can take up to 15 minutes, but may be less. End of locking may have 7 pings – 1 sec apart)
- # burning pings/minutes (count/tally) 1 1 1
- # burning pings/minutes 3
- burn shutdown confirmation, # pings 7, period (s) 1
(shutdown after 1 to 3 minutes => Guralp locked; after 15 minutes => Guralp not locked)
If you hear multiple pings over a few seconds, try <RNG>, will allow Range if done. Will not allow Range if not complete.
- assessment: Guralp: (__) locked (__) not locked
- ranges 4666, 4667
(do multiple ranges to see if OBS is moving or stationary)

18:47 - 95 min to the site

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD53 WHOI OBS ID 59

Release/burn (Burn 1 code)# **Edgetech#1** ***Edgetech 8011M***

- send Burn 1 command *<CMD>-[Burn 1 #]-<<GRD>+<ENT>>*
- UTC time 19:09:50
confirm reply, # pings 7, period (s) 1
- time of last ping (second of the minute) 19:10:12
(~8 or 15 min. cycle, with 1 ping/minute expected)
- # burning pings/minutes 11 11
Note time of double pings if hear. May be off sea floor.
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ___
Set range to 10 s repeat, if not set via
<MENU> - <Range Setup>-<More Options>-<repetitive rate>
Set repetitive range: <RNG><M/R>
- ranges 4669, 4644, 4603

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings/minutes _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ____
Set repetitive range: <RNG><M/R>
- ranges _____

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings _____ # mins _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ____
Set repetitive range: <RNG><M/R>
- ranges _____

Track package during ascent

- estimated rise-time duration (min) ~~120~~ 116, est. rise-rate (m/min) 40
- estimated liftoff time (UTC) ~~19:10~~ 19:14
- estimated surface time (UTC) ~~21:00~~ 21:10
- contact bridge and let them know ETA at surface: (✓) done (__) not done
→ notify Bridge if there is a change to the ETA

103 = 1hr 53 min
130 = 2hr 10 min

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD53 WHOI OBS ID SS9

Notes during package ascent

First no-return w/in range gates @ 21:02

Recover

- Novatech radio received, UTC time —- visual sight, UTC time 21:12:46
- on board, UTC time 21:21:25

OBS on deck

- Novatech flasher working(Y/N) ~ - Novatech radio working(Y/N) Y

OBS condition

Everything OK

- stop EdgeNmea logging program (^C) ✓
- restart ship acoustics ✓ - confirm next station with bridge ✓

UW Temperature Sensor S/Ns

Antares: 1854471 Iceland: —— Tidbit1: 20233199 Tidbit2: ——

WD54 – WHOI S30 09/10/2019

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD54 WHOI OBS ID S30

Surveyed OBS location 56° 19.8860' 149° 03.9999' Water depth (m) 4520

Novatech radio freq. (MHz) 154.585 Est. Rise Time: 132.

Using WHOI ID, S##:
Edgetech#1 35793 Tx freq 11 kHz / Rx freq 11.5 kHz
enable 317330 disable 317355
Burn 1 354123 Burn 2 354146 option 317376
Transducer (e.g. Hull) Hull.

1 mi out: Start range tracking program ***EdgeNmea_Universal_0.7.py -G19200 -e23 -g24***
On PC, up-arrow or re-type command for vers. 7. Enter data as above. Comment: Your Initials
- file name (e.g. MGL1907_<stn_name>_<obs_id>…) MGL1907-S30_WD54_20190910_093528

Confirm Ship's Position Conforms to Station Location: (✓) yes (__) no
- turn on RS232 output in 8011M deck unit
Disable ship acoustics (Multibeam, Knudsen, ADCP, etc) (✓) done

Enable acoustics:, check sensor (Guralp) status, Edgetech#1 ***Edgetech 8011M***
- send enable command: *<CMD>-[enable #]-<ENT>*
- UTC date 20190910
- UTC time 9:37:44
confirm reply: # pings 7, period (s) 1
(more than 8 pings = Guralp ready, fewer than 8 = not ready)
- if repeats necessary
- UTC time 09:39:53.
- record repeated enable commands sent 7 1 sec
- ranges: *<RNG>-<RNG>* 4557, 4557
- assessment: Guralp: (✓) ready (__) not ready

Lock Guralp (Burn 2 command), Edgetech#1 ***Edgetech 8011M***
- send Burn *2* command *<CMD>-[Burn 2 #]-<<GRD>+<ENT>>*
- UTC time 9:41:40
confirm reply, # pings 7 + 1, period (s) 1
- time of last reply ping (sec. of the minute) 9:42:01
(this can take up to 15 minutes, but may be less. End of locking may have 7 pings – 1 sec apart)
- # burning pings/minutes (count/tally) ++
- # burning pings/minutes
- burn shutdown confirmation, # pings 7, period (s) 1
(shutdown after 1 to 3 minutes => Guralp locked; after 15 minutes => Guralp not locked)
If you hear multiple pings over a few seconds, try <RNG>, will allow Range if done. Will not allow Range if not complete.
- assessment: Guralp: (✓) locked (__) not locked
- ranges 4555, 4555, 4555.
(do multiple ranges to see if OBS is moving or stationary)

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD54 WHOI OBS ID S30

Release/burn (Burn 1 code)# **Edgetech#1** ***Edgetech 8011M***

- send Burn 1 command *<CMD>-[Burn 1 #]-<<GRD>+<ENT>>*
- UTC time 9:45:07
confirm reply, # pings 7, period (s) 1
- time of last ping (second of the minute) 9:45:28
(~8 or 15 min. cycle, with 1 ping/minute expected)
- # burning pings/minutes 1111
Note time of double pings if hear. May be off sea floor.
Hear double pings? ✓ UTC Time: —
- burn shutdown confirmation, # pings —, period (s) —
Set range to 10 s repeat, if not set via
<MENU> - <Range Setup>-<More Options>-<repetitive rate>
Set repetitive range: <RNG><M/R>
- ranges 4522, 4513, 4507.

- if repeat necessary, UTC time
- send Burn 1 command, confirm reply, # pings, period (s)
- time of last ping (start of 15 minute burn)
- # burning pings/minutes
Hear double pings? UTC Time:
- burn shutdown confirmation, # pings, period (s)
Set repetitive range: <RNG><M/R>
- ranges

- if repeat necessary, UTC time
- send Burn 1 command, confirm reply, # pings, period (s)
- time of last ping (start of 15 minute burn)
- # burning pings # mins
Hear double pings? UTC Time:
- burn shutdown confirmation, # pings, period (s)
Set repetitive range: <RNG><M/R>
- ranges

Track package during ascent

- estimated rise-time duration (min) 113, est. rise-rate (m/min) 40
- estimated liftoff time (UTC) 9:49:00
- estimated surface time (UTC) 11:40:00
- contact bridge and let them know ETA at surface: (✓) done ( ) not done
→ notify Bridge if there is a change to the ETA

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD54 WHOI OBS ID S310

Notes during package ascent

Restart the 8011M Box during sending enable code.

Recover

- Novatech radio received, UTC time _____ - visual sight, UTC time 11:33:00
- on board, UTC time 11:56:00

OBS on deck

- Novatech flasher working(Y/N) Y - Novatech radio working(Y/N)_____

OBS condition

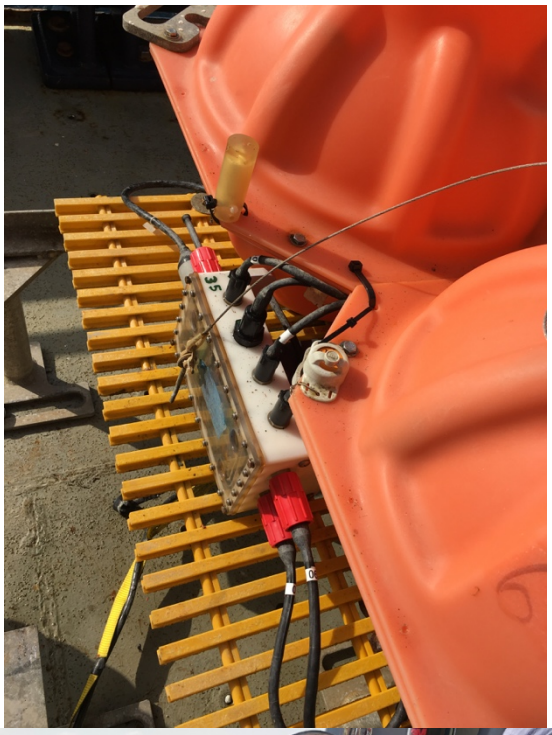
Looks good.

- stop EdgeNmea logging program (^C) ✓
- restart ship acoustics ✓ - confirm next station with bridge ✓

UW Temperature Sensor S/Ns

Antares: 185408 Iceland: ✓ Tidbit1: 20233/00 Tidbit2: ✓

WD55 – WHOI S65 08/28/2019



Cong + Em

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD-55 WHOI OBS ID S 65

Surveyed OBS location ~~44.6975~~ Lat: 44°45.69' Lon: 152°29.79' Water depth (m) 1284

Novatech radio freq. (MHz) 154.585 Est. Rise Time: 36 min (on 35 m/min)

Using WHOI ID S##:

Edgetech#1 35793 Tx freq 11 kHz / Rx freq 11.5 kHz

enable 316364 disable 316403

Burn 1 333431 Burn 2 333454 option 316420

Transducer (e.g. Hull) Hull

1 mi out: Start range tracking program ***EdgeNmea_Universal_0.7.py -G19200 -e23 -g24***

On PC, up-arrow or re-type command for vers. 7. Enter data as above. Comment: Your Initials

- file name (e.g. MGL1907_<stn_name>_<obs_id>…) MGL1907_WD55_565

Confirm Ship's Position Conforms to Station Location: (✓) yes (__) no

- turn on RS232 output in 8011M deck unit

Disable ship acoustics (Multibeam, Knudsen, ADCP, etc) (✓) done

Enable acoustics:, check sensor (Guralp) status, Edgetech#1 ***Edgetech 8011M***

- send enable command: *<CMD>-[enable #]-<ENT>*
- UTC date 2019 Aug 28
- UTC time 23:32:~~54~~.07

confirm reply: # pings ~~15~~ 16, period (s) 1

(more than 8 pings = Guralp ready, fewer than 8 = not ready)

- if repeats necessary
- UTC time
- record repeated enable commands sent
- ranges: *<RNG>-<RNG>* 1463 m
- assessment: Guralp: (✓) ready (__) not ready

Lock Guralp (Burn 2 command), Edgetech#1 ***Edgetech 8011M***

- send Burn *2* command *<CMD>-[Burn 2 #]-<<GRD>+<ENT>>*
- UTC time 23:34:26

confirm reply, # pings 15, period (s) 1

- time of last reply ping (sec. of the minute) 35:10

(this can take up to 15 minutes, but may be less. End of locking may have 7 pings – 1 sec apart)

- # burning pings/minutes (count/tally) ~~++++~~ 11
- # burning pings/minutes
- burn shutdown confirmation, # pings 8, period (s) 1

(shutdown after 1 to 3 minutes => Guralp locked; after 15 minutes => Guralp not locked)

If you hear multiple pings over a few seconds, try <RNG>, will allow Range if done. Will not allow Range if not complete.

- assessment: Guralp: (✓) locked (__) not locked
- ranges 1440m

(do multiple ranges to see if OBS is moving or stationary)

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name _____ WHOI OBS ID _____

Water Dep: 1284 m
Rise Time @ 35 m/min: 36 m

Release/burn (Burn 1 code)# **Edgetech#1** ***Edgetech 8011M***

- send Burn 1 command *<CMD>-[Burn 1 #]-<<GRD>+<ENT>>*
- UTC time 23:40:56
confirm reply, # pings 7, period (s) 1
- time of last ping (second of the minute) :14
(~8 or 15 min. cycle, with 1 ping/minute expected)
- # burning pings/minutes IIII
Note time of double pings if hear. May be off sea floor.
Hear double pings? Y UTC Time: 23:43:17 23:44:17 45:17
- burn shutdown confirmation, # pings _____, period (s) ___
Set range to 10 s repeat, if not set via 1338
<MENU> - <Range Setup>-<More Options>-<repetitive rate>
Set repetitive range: <RNG><M/R>
- ranges 1317 m

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings/minutes _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ____
Set repetitive range: <RNG><M/R>
- ranges _____

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings _____ # mins _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ____
Set repetitive range: <RNG><M/R>
- ranges _____

Track package during ascent
- estimated rise-time duration (min) 36, est. rise-rate (m/min) 35
- estimated liftoff time (UTC) 23:43:17
- estimated surface time (UTC) 00:19:17
- contact bridge and let them know ETA at surface: (✓) done (__) not done
→ notify Bridge if there is a change to the ETA

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WP-4 WHOI OBS ID S65

Notes during package ascent

N/A

Recover

- Novatech radio received, UTC time _____ - visual sight, UTC time 00:22
- on board, UTC time 00:53

OBS on deck

- Novatech flasher working(Y/N) Dayline - Novatech radio working(Y/N) Y

OBS condition

- stop EdgeNmea logging program (^C) _____
- restart ship acoustics ✓ - confirm next station with bridge ✓

UW Temperature Sensor S/Ns

Antares: _____ Iceland: S9426 Tidbit1: 20233109 Tidbit2: 20233126

WD56 – WHOI S48 08/29/2019

Em + Cong

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD56 WHOI OBS ID S 48

Surveyed OBS location 55° 19.3360' N 154° 02.8247 W Water depth (m) 4060

Novatech radio freq. (MHz) 154.585 Est. Rise Time: 114 min

Using WHOI ID S## :

Edgetech#1 35793 Tx freq 11 kHz / Rx freq 11.5 kHz

enable 317037 disable 317052

Burn 1 333736 Burn 2 333753 option 317071

Transducer (e.g. Hull) Hull

1 mi out: Start range tracking program ***EdgeNmea_Universal_0.7.py -G19200 -e23 -g24***

On PC, up-arrow or re-type command for vers. 7. Enter data as above. Comment: Your Initials

- file name (e.g. MGL1907_<stn_name>_<obs_id>…) MGL1907_WD56_S48

Confirm Ship's Position Conforms to Station Location: (✓) yes ( ) no

- turn on RS232 output in 8011M deck unit

Disable ship acoustics (Multibeam, Knudsen, ADCP, etc) (✓) done

Enable acoustics:, check sensor (Guralp) status, Edgetech#1 ***Edgetech 8011M***

- send enable command: *<CMD>-[enable #]-<ENT>*
- UTC date Aug. 28th.
- UTC time 04:20:23

confirm reply: # pings 15, period (s) 1

(more than 8 pings = Guralp ready, fewer than 8 = not ready)

- if repeats necessary
- UTC time
  - record repeated enable commands sent
- ranges: *<RNG>-<RNG>* 4074m.
- assessment: Guralp: (✓) ready ( ) not ready

Lock Guralp (Burn 2 command), Edgetech#1 ***Edgetech 8011M***

- send Burn *2* command *<CMD>-[Burn 2 #]-<<GRD>+<ENT>>*
- UTC time 4:21:40

confirm reply, # pings 15, period (s) 1

- time of last reply ping (sec. of the minute) 4:22:00

(this can take up to 15 minutes, but may be less. End of locking may have 7 pings – 1 sec apart)

- # burning pings/minutes (count/tally) ~~||||~~ ~~||||~~ ~~||||~~ ||||
- # burning pings/minutes
- burn shutdown confirmation, # pings 15, period (s) 1

(shutdown after 1 to 3 minutes => Guralp locked; after 15 minutes => Guralp not locked)

If you hear multiple pings over a few seconds, try <RNG>, will allow Range if done. Will not allow Range if not complete.

- assessment: Guralp: (✓) locked ( ) not locked
- ranges 4071m

(do multiple ranges to see if OBS is moving or stationary)

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD-56 WHOI OBS ID 548 3.5m/min

Release/burn (Burn 1 code)# **Edgetech#1** ***Edgetech 8011M***

- send Burn 1 command <*CMD*>-*[Burn 1 #]*-<<*GRD*>+<*ENT*>>
- UTC time 04:41:56
confirm reply, # pings 15, period (s) 1
- time of last ping (second of the minute) :20
(~8 or 15 min. cycle, with 1 ping/minute expected)
- # burning pings/minutes ||||-||||-||||
Note time of double pings if hear. May be off sea floor.
Hear double pings? ✓ UTC Time: ~~05~~ 57:20
- burn shutdown confirmation, # pings 14, period (s) 1
Set range to 10 s repeat, if not set via
<*MENU*> - <*Range Setup*>-<*More Options*>-<*repetitive rate*>
Set repetitive range: <*RNG*><*M/R*>
- ranges 3642m

- if repeat necessary, UTC time 58:25
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings/minutes _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ____
Set repetitive range: <*RNG*><*M/R*>
- ranges _____

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings _____ # mins _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ____
Set repetitive range: <*RNG*><*M/R*>
- ranges _____

Track package during ascent

- estimated rise-time duration (min) 116 min, est. rise-rate (m/min) 35. revised to 43 m/min
- estimated liftoff time (UTC) 04:41:56
- estimated surface time (UTC) 06:37:56 revised to 06:31 local
- contact bridge and let them know ETA at surface: (✓) done (__) not done
→ notify Bridge if there is a change to the ETA

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD-56 WHOI OBS ID S48

Notes during package ascent

Power cycled Edgetech box after recieving confirmation of Burn 2 command. Set Tx, ~~et~~ Rx & repetetive rate afterwards

Recover

- Novatech radio received, UTC time 06:43 - visual sight, UTC time 06:43
- on board, UTC time 07:01

OBS on deck

- Novatech flasher working(Y/N) ✓ - Novatech radio working(Y/N) ✓

OBS condition

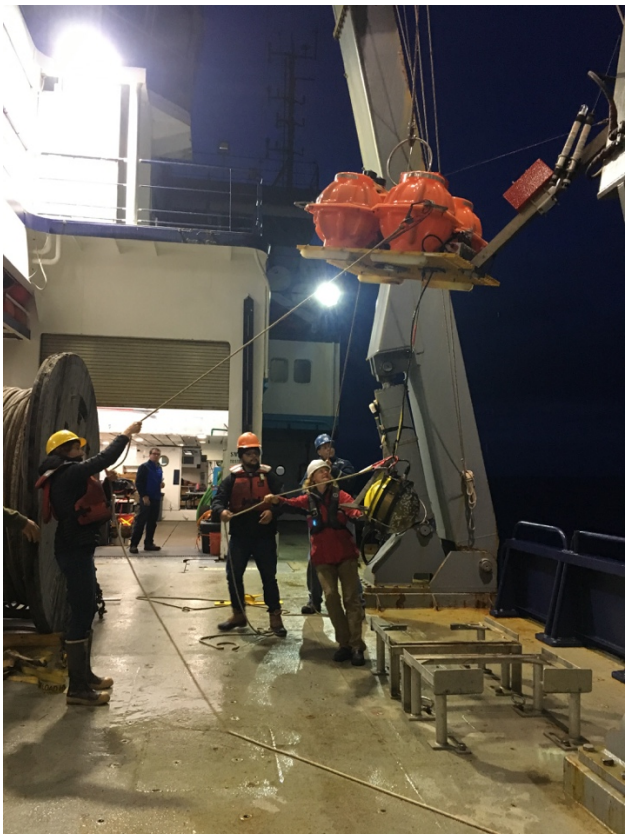
Good

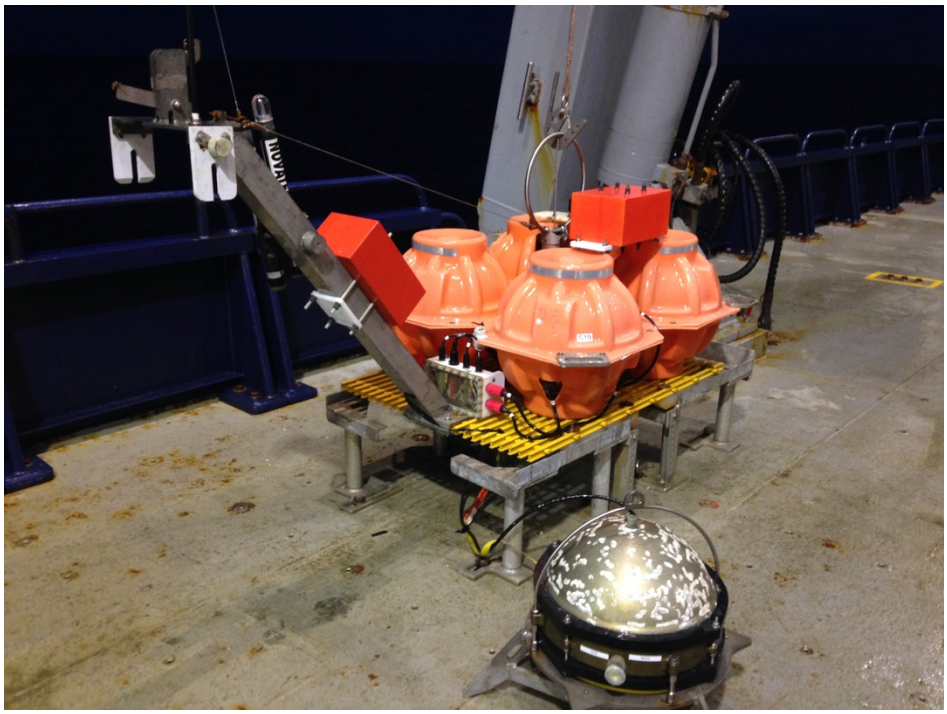
- stop EdgeNmea logging program (^C) ✓
- restart ship acoustics ✓ - confirm next station with bridge ✓

UW Temperature Sensor S/Ns

Antares: 1854114 Iceland: Tidbit1: 20233131 Tidbit2:

WD57 – WHOI S19 08/29/2019





AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD57 WHOI OBS ID S19

Surveyed OBS location 71°54.47.1832' W154 26.0583 Water depth (m) 5053

Novatech radio freq. (MHz) 154.585 Est. Rise Time: 144 min

Using WHOI ID S##: S19

Edgetech#1 35793 Tx freq 11 kHz / Rx freq 11.5 kHz

enable 317241 disable 317262

Burn 1 334071 Burn 2 334100 option 317313

Transducer (e.g. Hull) Hull.

1 mi out: Start range tracking program ***EdgeNmea_Universal_0.7.py -G19200 -e23 -g24***

On PC, up-arrow or re-type command for vers. 7. Enter data as above. Comment: Your Initials

- file name (e.g. MGL1907_<stn_name>_<obs_id>…) MGL1907-S19-WD57-20190829121827.txt

Confirm Ship's Position Conforms to Station Location: (✓) yes ( ) no

- turn on RS232 output in 8011M deck unit

Disable ship acoustics (Multibeam, Knudsen, ADCP, etc) (✓) done

Enable acoustics:, check sensor (Guralp) status, Edgetech#1 ***Edgetech 8011M***

- send enable command: *<CMD>-[enable #]-<ENT>*
- UTC date 29 08 2019
- UTC time 12:20:23
- confirm reply: # pings 15., period (s) 0.5.

(more than 8 pings = Guralp ready, fewer than 8 = not ready)

- if repeats necessary
- UTC time
  - record repeated enable commands sent
- ranges: *<RNG>-<RNG>* 5063.
- assessment: Guralp: (✓) ready ( ) not ready

Lock Guralp (Burn 2 command), Edgetech#1 ***Edgetech 8011M***

- send Burn 2 command *<CMD>-[Burn 2 #]-<<GRD>+<ENT>>*
- UTC time 12:22:17

confirm reply, # pings 15., period (s) 0.5

- time of last reply ping (sec. of the minute) 12:22:46

(this can take up to 15 minutes, but may be less. End of locking may have 7 pings – 1 sec apart)

- # burning pings/minutes (count/tally) 111
- # burning pings/minutes
- burn shutdown confirmation, # pings , period (s)

(shutdown after 1 to 3 minutes => Guralp locked; after 15 minutes => Guralp not locked)

If you hear multiple pings over a few seconds, try <RNG>, will allow Range if done. Will not allow Range if not complete.

- assessment: Guralp: (✓) locked ( ) not locked
- ranges 5076 5074 5074

(do multiple ranges to see if OBS is moving or stationary)

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD57 WHOI OBS ID S19

Release/burn (Burn 1 code)# **Edgetech#1** ***Edgetech 8011M***
- send Burn 1 command *<CMD>-[Burn 1 #]-<<GRD>+<ENT>>*
- UTC time 12:31:32
confirm reply, # pings 7, period (s) 1
- time of last ping (second of the minute) 12:31:54
(~8 or 15 min. cycle, with 1 ping/minute expected)
- # burning pings/minutes _____
Note time of double pings if hear. May be off sea floor.
Hear double pings? ✓ UTC Time: 12:32:54
- burn shutdown confirmation, # pings 3, period (s) 1
Set range to 10 s repeat, if not set via
<MENU> - <Range Setup>-<More Options>-<repetitive rate>
Set repetitive range: <RNG><M/R>
- ranges 5031, 5010

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings/minutes _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ____
Set repetitive range: <RNG><M/R>
- ranges _____

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings _____ # mins _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ____
Set repetitive range: <RNG><M/R>
- ranges _____

Track package during ascent
- estimated rise-time duration (min) ~~12:56:54~~ 144, est. rise-rate (m/min) 35m/min revised to 45m/min
- estimated liftoff time (UTC) 12:32:54
- estimated surface time (UTC) 14:56:54 revised to 14:37
- contact bridge and let them know ETA at surface: (__) done (__) not done
→ notify Bridge if there is a change to the ETA

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD57 WHOI OBS ID S74

Notes during package ascent

Came up much faster than expected estimated 35 m/min. Revised to 45 m/min after observing about 30 min of rise time

Recover

- Novatech radio received, UTC time yes but didn't catch time - visual sight, UTC time 14:26
- on board, UTC time ~~14:43~~

OBS on deck

- Novatech flasher working(Y/N) Y - Novatech radio working(Y/N) Y

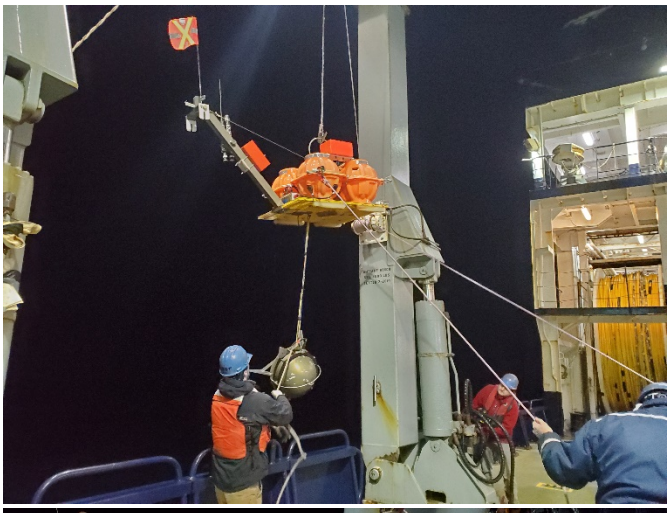
OBS condition

- stop EdgeNmea logging program (^C) ✓
- restart ship acoustics ✓ - confirm next station with bridge ✓

UW Temperature Sensor S/Ns

Antares:_____ Iceland:_____ Tidbit1: 20237088 Tidbit2: 20233104

WD58 – WHOI S01 09/08/2019



AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD 58 WHOI OBS ID S S01

Surveyed OBS location 53° 54.3736 N 155° 02.1207 W Water depth (m) 4493

Novatech radio freq. (MHz) 154.585 Est. Rise Time: 112 min

Using WHOI ID S## :

Edgetech#1 35793 Tx freq 11 kHz / Rx freq 11.5 kHz

enable 315502 disable 315521

Burn 1 332762 Burn 2 333017 option 315544

Transducer (e.g. Hull) Hull

1 mi out: Start range tracking program ***EdgeNmea_Universal_0.7.py -G19200 -e23 -g24***

On PC, up-arrow or re-type command for vers. 7. Enter data as above. Comment: Your Initials

- file name (e.g. MGL1907_<stn_name>_<obs_id>…) MGL1907_S01_WD58_20190908_100444.txt

Confirm Ship's Position Conforms to Station Location: (✓) yes (__) no

- turn on RS232 output in 8011M deck unit

Disable ship acoustics (Multibeam, Knudsen, ADCP, etc) (✓) done

Enable acoustics:, check sensor (Guralp) status, Edgetech#1 ***Edgetech 8011M***

- send enable command: *<CMD>-[enable #]-<ENT>*
- UTC date 2019 0908
- UTC time 10:11:10. 10:11:50

confirm reply: # pings 15, period (s) 1

(more than 8 pings = Guralp ready, fewer than 8 = not ready)

- if repeats necessary
- UTC time
- record repeated enable commands sent
- ranges: *<RNG>-<RNG>* 45 13
- assessment: Guralp: (✓) ready (__) not ready

Lock Guralp (Burn 2 command), Edgetech#1 ***Edgetech 8011M***

- send Burn *2* command *<CMD>-[Burn 2 #]-<<GRD>+<ENT>>*
- UTC time 10:12:22.

confirm reply, # pings 15 ~~52~~, period (s) 1

- time of last reply ping (sec. of the minute) 12:52.

(this can take up to 15 minutes, but may be less. End of locking may have 7 pings – 1 sec apart)

- # burning pings/minutes (count/tally) 11 1 *
- # burning pings/minutes
- burn shutdown confirmation, # pings 7, period (s) 1

(shutdown after 1 to 3 minutes => Guralp locked; after 15 minutes => Guralp not locked)

If you hear multiple pings over a few seconds, try <RNG>, will allow Range if done. Will not allow Range if not complete.

- assessment: Guralp: (✓) locked (__) not locked
- ranges 4528, 4529, 4530

(do multiple ranges to see if OBS is moving or stationary)

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD58 WHOI OBS ID S01

Release/burn (Burn 1 code)# **Edgetech#1** ***Edgetech 8011M***

- send Burn 1 command *<CMD>-[Burn 1 #]-<<GRD>+<ENT>>*
- UTC time 10:17:06
confirm reply, # pings 7, period (s) 1
- time of last ping (second of the minute) 10:17:27.
(~8 or 15 min. cycle, with 1 ping/minute expected)
- # burning pings/minutes 1 1 1 1 1
Note time of double pings if hear. May be off sea floor.
Hear double pings? 5 UTC Time:
- burn shutdown confirmation, # pings /, period (s) 1
Set range to 10 s repeat, if not set via
<MENU> - <Range Setup>-<More Options>-<repetitive rate>
Set repetitive range: <RNG><M/R>
- ranges 4418. 4401. 4392.

- if repeat necessary, UTC time
- send Burn 1 command, confirm reply, # pings, period (s)
- time of last ping (start of 15 minute burn)
- # burning pings/minutes
Hear double pings? UTC Time:
- burn shutdown confirmation, # pings, period (s)
Set repetitive range: <RNG><M/R>
- ranges

- if repeat necessary, UTC time
- send Burn 1 command, confirm reply, # pings, period (s)
- time of last ping (start of 15 minute burn)
- # burning pings # mins
Hear double pings? UTC Time:
- burn shutdown confirmation, # pings, period (s)
Set repetitive range: <RNG><M/R>
- ranges

Track package during ascent

- estimated rise-time duration (min) 112 min, est. rise-rate (m/min) 40m/min
- estimated liftoff time (UTC) 10:21:00.
- estimated surface time (UTC) 12:10:00
- contact bridge and let them know ETA at surface: (✓) done (__) not done
→ notify Bridge if there is a change to the ETA

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD58 WHOI OBS ID S01

Notes during package ascent

None.

Recover

- Novatech radio received, UTC time ✓ - visual sight, UTC time 12:07
- on board, UTC time 12:14

OBS on deck

- Novatech flasher working(Y/N) N - Novatech radio working(Y/N) N

OBS condition

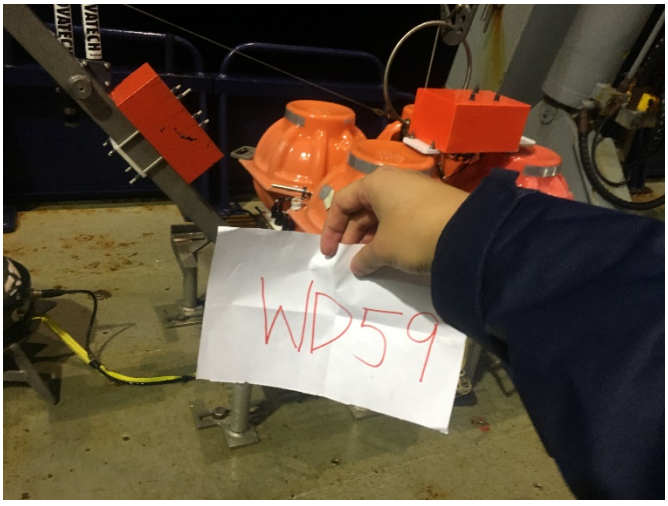
Looks good.

- stop EdgeNmea logging program (^C) ✓
- restart ship acoustics ✓ - confirm next station with bridge _____

UW Temperature Sensor S/Ns

Antares: 1854410 Iceland: ✓ Tidbit1: 20233125 Tidbit2: ✓

WD59 – WHOI S23 09/08/2019



Copy RB

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD09 WHOI OBS ID S 23

Surveyed OBS location Lat: 43°22.0228 Lon: 165°4.9632 Water depth (m) 4570m

Novatech radio freq. (MHz) 154.585 Est. Rise Time: 132 min @ 35 m/min

Using WHOI ID S##:

Edgetech#1 35793 Tx freq 11 kHz / Rx freq 11.5 kHz

enable 315643 disable 315660

Burn 1 333072 Burn 2 333103 option 315711

Transducer (e.g. Hull) hull

1 mi out: Start range tracking program ***EdgeNmea_Universal_0.7.py -G19200 -e23 -g24***

On PC, up-arrow or re-type command for vers. 7. Enter data as above. Comment: Your Initials

- file name (e.g. MGL1907_<stn_name>_<obs_id>…) _____

Confirm Ship's Position Conforms to Station Location: (✓) yes (__) no

- turn on RS232 output in 8011M deck unit

Disable ship acoustics (Multibeam, Knudsen, ADCP, etc) (✓) done

Enable acoustics:, check sensor (Guralp) status, Edgetech#1 ***Edgetech 8011M***

- send enable command: *<CMD>-[enable #]-<ENT>*
- UTC date 281
- UTC time 03:04:11

confirm reply: # pings 15, period (s) 1

(more than 8 pings = Guralp ready, fewer than 8 = not ready)

- if repeats necessary
- UTC time _____
  - record repeated enable commands sent _____
- ranges: *<RNG>-<RNG>* @ 4574
- assessment: Guralp: (✓) ready (__) not ready

Lock Guralp (Burn 2 command), Edgetech#1 ***Edgetech 8011M***

- send Burn 2 command *<CMD>-[Burn 2 #]-<<GRD>+<ENT>>*
- UTC time 03:05:23

confirm reply, # pings 15, period (s) 1

- time of last reply ping (sec. of the minute) 03:05:50

(this can take up to 15 minutes, but may be less. End of locking may have 7 pings – 1 sec apart)

- # burning pings/minutes (count/tally) 𝍸 𝍸 𝍸 |||| |||| |||| ||||
- # burning pings/minutes _____
- burn shutdown confirmation, # pings 14, period (s) 1

(shutdown after 1 to 3 minutes => Guralp locked; after 15 minutes => Guralp not locked)

If you hear multiple pings over a few seconds, try <RNG>, will allow Range if done. Will not allow Range if not complete.

- assessment: Guralp: (✓) locked (__) not locked
- ranges 4602M

(do multiple ranges to see if OBS is moving or stationary)

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD59 WHOI OBS ID 523

Release/burn (Burn 1 code)# **Edgetech#1** ***Edgetech 8011M***
- send Burn 1 command *<CMD>-[Burn 1 #]-<<GRD>+<ENT>>*
- UTC time 03:22:00
confirm reply, # pings 15, period (s) 1
- time of last ping (second of the minute) 03:22:30
(~8 or 15 min. cycle, with 1 ping/minute expected)
- # burning pings/minutes ++++ ++++ ++++
Note time of double pings if hear. May be off sea floor.
Hear double pings? ✓ UTC Time: 03:37:27
- burn shutdown confirmation, # pings 15, period (s) 1
Set range to 10 s repeat, if not set via
<MENU> - <Range Setup>-<More Options>-<repetitive rate>
Set repetitive range: <RNG><M/R>
- ranges 4422m 03:28:30 (25m/min)

- if repeat necessary, UTC time
- send Burn 1 command, confirm reply, # pings, period (s)
- time of last ping (start of 15 minute burn)
- # burning pings/minutes
Hear double pings? UTC Time:
- burn shutdown confirmation, # pings, period (s)
Set repetitive range: <RNG><M/R>
- ranges

- if repeat necessary, UTC time
- send Burn 1 command, confirm reply, # pings, period (s)
- time of last ping (start of 15 minute burn)
- # burning pings # mins
Hear double pings? UTC Time:
- burn shutdown confirmation, # pings, period (s)
Set repetitive range: <RNG><M/R>
- ranges

Track package during ascent
- estimated rise-time duration (min) 146m, est. rise-rate (m/min) 35
- estimated liftoff time (UTC) 03:40:45
- estimated surface time (UTC) 05:30:00
- contact bridge and let them know ETA at surface: (✓) done (__) not done
→ notify Bridge if there is a change to the ETA

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD+9 WHOI OBS ID S23

Notes during package ascent

boat drove 200 m away!

Recover

- Novatech radio received, UTC time never received - visual sight, UTC time 05:40:00 UTC ~~05:50:00 UTC~~
- on board, UTC time 05:50:11 UTC

OBS on deck

- Novatech flasher working(Y/N) Y - Novatech radio working(Y/N) N

OBS condition

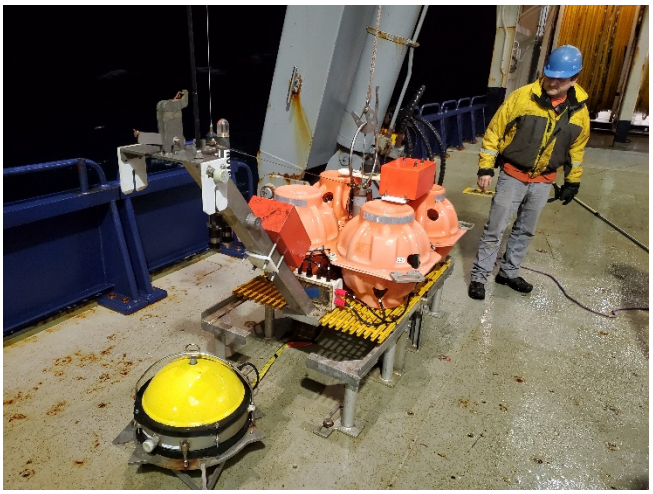
Flag was ~~to~~ chopped out.
radio doesn't work

- stop EdgeNmea logging program (^C) ✓
- restart ship acoustics ✓ - confirm next station with bridge ✓

UW Temperature Sensor S/Ns

Antares: 85411 Iceland: _____ Tidbit1: ~~22~~ 20253107 Tidbit2: _____

WD60 – WHOI S37 09/06/2019



Looks like obs id is placed in file name before station name, when the file name is auto-generated from user input. This is on all files

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD60 WHOI OBS ID S37

Surveyed OBS location 52 38.6928 ~~57~~ 156 34.7894 Water depth (m) 4519

Novatech radio freq. (MHz) 154.585 Est. Rise Time: ~~15~~ 132

Using WHOI ID S##:

Edgetech#1 35793 Tx freq 11 kHz / Rx freq 11-5 kHz

enable 317165 disable 317207

Burn 1 334037 Burn 2 334052 option 317224

Transducer (e.g. Hull) Hull

1 mi out: Start range tracking program ***EdgeNmea_Universal_0.7.py -G19200 -e23 -g24***

On PC, up-arrow or re-type command for vers. 7. Enter data as above. Comment: Your Initials

- file name (e.g. MGL1907_<stn_name>_<obs_id>…) MGL1907-S37-WD60-20190906_082413.txt

Confirm Ship's Position Conforms to Station Location: (✓) yes (__) no

- turn on RS232 output in 8011M deck unit

Disable ship acoustics (Multibeam, Knudsen, ADCP, etc) (__) done

Enable acoustics:, check sensor (Guralp) status, Edgetech#1 ***Edgetech 8011M***

- send enable command: *<CMD>-[enable #]-<ENT>*
- UTC date 20190906
- UTC time 8:32:10

confirm reply: # pings 15, period (s) 1

(more than 8 pings = Guralp ready, fewer than 8 = not ready)

- if repeats necessary
- UTC time
- record repeated enable commands sent
- ranges: *<RNG>-<RNG>* 4536
- assessment: Guralp: (✓) ready (__) not ready

Lock Guralp (Burn 2 command), Edgetech#1 ***Edgetech 8011M***

- send Burn *2* command *<CMD>-[Burn 2 #]-<<GRD>+<ENT>>*
- UTC time 8:35:41

confirm reply, # pings 15, period (s) 1

- time of last reply ping (sec. of the minute) 8:36:00

(this can take up to 15 minutes, but may be less. End of locking may have 7 pings – 1 sec apart)

- # burning pings/minutes (count/tally) 111
- # burning pings/minutes
- burn shutdown confirmation, # pings 7, period (s) 1

(shutdown after 1 to 3 minutes => Guralp locked; after 15 minutes => Guralp not locked)

If you hear multiple pings over a few seconds, try <RNG>, will allow Range if done. Will not allow Range if not complete.

- assessment: Guralp: (✓) locked (__) not locked
- ranges 4548, 4547, 4546

(do multiple ranges to see if OBS is moving or stationary)

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WH02 WHOI OBS ID 537

Release/burn (Burn 1 code)# **Edgetech#1** ***Edgetech 8011M***

- send Burn 1 command *<CMD>-[Burn 1 #]-<<GRD>+<ENT>>*
- UTC time 8:40:16.
confirm reply, # pings 7, period (s) 1 (46) (8)
- time of last ping (second of the minute) 8:40:36
(~8 or 15 min. cycle, with 1 ping/minute expected)
- # burning pings/minutes 1 1 1 1 1 1 1 1
Note time of double pings if hear. May be off sea floor.
Hear double pings? ? UTC Time: —
- burn shutdown confirmation, # pings _____, period (s) ___
Set range to 10 s repeat, if not set via
<MENU> - <Range Setup>-<More Options>-<repetitive rate>
Set repetitive range: <RNG><M/R>
- ranges 4308, 4296, 4281, ~~4264~~ 44.52 4264.

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings/minutes _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ____
Set repetitive range: <RNG><M/R>
- ranges _____

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings _____ # mins _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ____
Set repetitive range: <RNG><M/R>
- ranges _____

Track package during ascent
- estimated rise-time duration (min) ~~60~~ 116., est. rise-rate (m/min) 45
- estimated liftoff time (UTC) ~~8:42~~ 8:42.
- estimated surface time (UTC) 10:36
- contact bridge and let them know ETA at surface: (✓) done (__) not done
→ notify Bridge if there is a change to the ETA

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name W160 WHOI OBS ID 537

Notes during package ascent

script was not writing. failed to clearly communicate that to OBS crew eventually was noticed and Brian asked us to log by hand. No log for about 1 hour.

1228	9:58:58	1176	10:00:24	1141	10:01:55
1221	9:59:08	1167	10:00:45	1138	
1215		1161	10:00:55	1136	
1204		1158	10:01:05	1134	
1198		1153	10:01:15	1132	10:02:45
1191	9:59:54	1152	10:01:25	1128	10:00:55
1187	10:00:04	1147	10:01:35	1128	10:03:06
	10:00:14	1143	10:01:45	1125	
				1125	10:03:26
				1125	
				1125	10:03:46
				188	
				1127	
				1126	10:04:16
				1123	
				1122	
				1122	
				1116	10:04:56
				1113	
				1109	
				1105	
				1100	
				1095	10:05:46
				1089	
				1083	
				1074	
				1068	
				1061	
				1054	10:06:47
				1048	
				1040	
				1031	
				1021	
				1012	
				1002	10:07:47

Recover

- Novatech radio received, UTC time 10:29 - visual sight, UTC time 10:29
- on board, UTC time 10:54

OBS on deck

- Novatech flasher working(Y/N) Y - Novatech radio working(Y/N) Y

OBS condition Good

10:30:31 10:21:42 10:22:42 10:33:32 No return

335 321 319 319 317 318 318 318 319 320 320 327 332 336 343 348 352 357 365

10:14:39 10:15:39 10:16:10 10:17:30 10:19:01 10:20:01

285 612 603 592 583 574 564 554 544 534 524 514 505 498 488 480 471 462 453 444 436 421 412 406 399 392 384 378 372 365 360 354 348 341 336 332 328

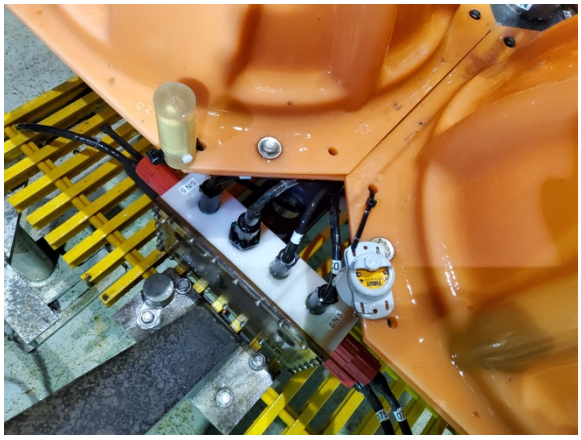
- stop EdgeNmea logging program (^C) ✓
- restart ship acoustics _____ - confirm next station with bridge _____

UW Temperature Sensor S/Ns

Antares: 185488 Iceland: ✓ Tidbit1: 20233096 Tidbit2: ✓

10:08:37 10:09:56 10:10:38 10:11:59 10:12:36 10:13:49

WD61 – WHOI S66 08/30/2019



AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD61 38.8568 WHOI OBS ID S566

Surveyed OBS location 54° ~~41.1837~~ N 156 52.0969 W Water depth (m) 2067

Novatech radio freq. (MHz) 154.585 Est. Rise Time: 1 hr

Using WHOI ID S##: 566

Edgetech#1 35793

enable 513044 Tx freq 11 kHz / Rx freq 11.5 kHz

Burn 1 532026 Burn 2 532043 disable 513067

Transducer (e.g. Hull) Hull. option 513116

1 mi out: Start range tracking program ***EdgeNmea_Universal_0.7.py -G19200 -e23 -g24***

On PC, up-arrow or re-type command for vers. 7. Enter data as above. Comment: Your Initials

- file name (e.g. MGL1907_<stn_name>_<obs_id>…) MGL1907-566_WD61_20190830_105042.txt.

Confirm Ship's Position Conforms to Station Location: (✓) yes ( ) no

- turn on RS232 output in 8011M deck unit

Disable ship acoustics (Multibeam, Knudsen, ADCP, etc) (✓) done

Enable acoustics:, check sensor (Guralp) status, Edgetech#1 ***Edgetech 8011M***

- send enable command: *<CMD>-[enable #]-<ENT>*
- UTC date 30.08.2019
- UTC time 11:07:16.

confirm reply: # pings 15, period (s) 1

(more than 8 pings = Guralp ready, fewer than 8 = not ready)

- if repeats necessary
- UTC time
- record repeated enable commands sent
- ranges: *<RNG>-<RNG>* 2147, 2148
- assessment: Guralp: (✓) ready ( ) not ready

Lock Guralp (Burn 2 command), Edgetech#1 ***Edgetech 8011M***

- send Burn *2* command *<CMD>-[Burn 2 #]-<<GRD>+<ENT>>*
- UTC time 11:09:02.

confirm reply, # pings 15, period (s) 0.5

- time of last reply ping (sec. of the minute) 11:09:27

(this can take up to 15 minutes, but may be less. End of locking may have 7 pings – 1 sec apart)

- # burning pings/minutes (count/tally) 1 1 11 1 11 1 1 1111 111 1111 1
- # burning pings/minutes
- burn shutdown confirmation, # pings , period (s)

(shutdown after 1 to 3 minutes => Guralp locked; after 15 minutes => Guralp not locked)

If you hear multiple pings over a few seconds, try <RNG>, will allow Range if done. Will not allow Range if not complete.

- assessment: Guralp: (✓) locked ( ) not locked
- ranges 2140, 2139, 2139

(do multiple ranges to see if OBS is moving or stationary)

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name W1261 WHOI OBS ID S66

Release/burn (Burn 1 code)# **Edgetech#1** ***Edgetech 8011M***

- send Burn 1 command *<CMD>-[Burn 1 #]-<<GRD>+<ENT>>*
- UTC time 11:45:50 06.
confirm reply, # pings 7, period (s) 1
- time of last ping (second of the minute) _____
(~8 or 15 min. cycle, with 1 ping/minute expected)
- # burning pings/minutes _____
Note time of double pings if hear. May be off sea floor.
Hear double pings? ✓ UTC Time: 11:19:10
- burn shutdown confirmation, # pings _____, period (s) ___
Set range to 10 s repeat, if not set via
<MENU> - <Range Setup>-<More Options>-<repetitive rate>
Set repetitive range: <RNG><M/R>
- ranges 2102, 2098.

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings/minutes _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ____
Set repetitive range: <RNG><M/R>
- ranges _____

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings _____ # mins _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ____
Set repetitive range: <RNG><M/R>
- ranges _____

Track package during ascent
- estimated rise-time duration (min) 60, est. rise-rate (m/min) 35
- estimated liftoff time (UTC) 11:19:00
- estimated surface time (UTC) 12:19:00
- contact bridge and let them know ETA at surface: (✓) done (__) not done
→ notify Bridge if there is a change to the ETA

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD61 WHOI OBS ID S66

Notes during package ascent

locking signal was a different pattern than I have heard on other OBSs

Recover

- Novatech radio received, UTC time 12:19 - visual sight, UTC time 12:19
- on board, UTC time 12:41

OBS on deck

- Novatech flasher working(Y/N) ✓ - Novatech radio working(Y/N) ✓

OBS condition

looks good.

instrument confirmed to be locked even though locking process took longer than 15 min

- stop EdgeNmea logging program (^C) ✓
- restart ship acoustics ✓ - confirm next station with bridge _____

UW Temperature Sensor S/Ns

Antares: ✓ Iceland: S9419 Tidbit1: 20233103 Tidbit2: 20233102

WD62 – WHOI S27 09/06/2019

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD62 WHOI OBS ID S 27

Surveyed OBS location 53° 21.7177 N 157° 19.9129 W Water depth (m) 4626

Novatech radio freq. (MHz) 154.585 Est. Rise Time: 110 minutes 1hr 40 min

Using WHOI ID S## :

Edgetech#1 35793 Tx freq 11 kHz / Rx freq 11.5 kHz

enable 511250 disable 511273

Burn 1 530700 Burn 2 530723 option 511302

Transducer (e.g. Hull) Hull

1 mi out: Start range tracking program ***EdgeNmea_Universal_0.7.py -G19200 -e23 -g24***

On PC, up-arrow or re-type command for vers. 7. Enter data as above. Comment: Your Initials

- file name (e.g. MGL1907_<stn_name>_<obs_id>…) MGL1907_S27_WD62_20190906_160720.txt

Confirm Ship's Position Conforms to Station Location: (✓) yes (__) no

- turn on RS232 output in 8011M deck unit

Disable ship acoustics (Multibeam, Knudsen, ADCP, etc) (✓) done

Enable acoustics:, check sensor (Guralp) status, Edgetech#1 ***Edgetech 8011M***

- send enable command: *<CMD>-[enable #]-<ENT>*
- UTC date 6-Sept-2019
- UTC time 16:17:38

confirm reply: # pings 15, period (s) 1

(more than 8 pings = Guralp ready, fewer than 8 = not ready)

- if repeats necessary
- UTC time _____
  - record repeated enable commands sent _____
- ranges: *<RNG>-<RNG>* 4635, 4635
- assessment: Guralp: (__) ready (__) not ready

Lock Guralp (Burn 2 command), Edgetech#1 ***Edgetech 8011M***

- send Burn *2* command *<CMD>-[Burn 2 #]-<<GRD>+<ENT>>*
- UTC time 16:15:12

confirm reply, # pings 15, period (s) 1

- time of last reply ping (sec. of the minute) 16:15:41

(this can take up to 15 minutes, but may be less. End of locking may have 7 pings – 1 sec apart)

- # burning pings/minutes (count/tally) 111
- # burning pings/minutes 7 3
- burn shutdown confirmation, # pings 7, period (s) 1

(shutdown after 1 to 3 minutes => Guralp locked; after 15 minutes => Guralp not locked)

If you hear multiple pings over a few seconds, try <RNG>, will allow Range if done. Will not allow Range if not complete.

- assessment: Guralp: (✓) locked (__) not locked
- ranges 4640, 4641

(do multiple ranges to see if OBS is moving or stationary)

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD62 WHOI OBS ID 527

Release/burn (Burn 1 code)# **Edgetech#1** ***Edgetech 8011M***

- send Burn 1 command *<CMD>-[Burn 1 #]-<<GRD>+<ENT>>*
- UTC time 16:20:03
confirm reply, # pings 7, period (s) 1
- time of last ping (second of the minute) 16:20:25
(~8 or 15 min. cycle, with 1 ping/minute expected)
- # burning pings/minutes 11
Note time of double pings if hear. May be off sea floor.
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ___
Set range to 10 s repeat, if not set via
<MENU> - <Range Setup>-<More Options>-<repetitive rate>
Set repetitive range: <RNG><M/R>
- ranges 4624, NRWRG, 4585, ~~4573~~, 4552

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings/minutes _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ____
Set repetitive range: <RNG><M/R>
- ranges _____

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings _____ # mins _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ____
Set repetitive range: <RNG><M/R>
- ranges _____

Track package during ascent

- estimated rise-time duration (min) 110 (1hr 50 min), est. rise-rate (m/min) 42
- estimated liftoff time (UTC) 16:20
- estimated surface time (UTC) 18:00
- contact bridge and let them know ETA at surface: (✓) done (__) not done
→ notify Bridge if there is a change to the ETA

↳ new rise rate is 35 m/min
↳ 130 minutes
↳ new surface ETA is 18:30

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD62 WHOI OBS ID 527

Notes during package ascent

First no return w/in range gates @ 16:18
→ Ship was ~1000 km

Recover

- Novatech radio received, UTC time _____ - visual sight, UTC time 18:30 UTC
- on board, UTC time 18:46

OBS on deck

- Novatech flasher working(Y/N) ✓ y - Novatech radio working(Y/N) ✓ y

OBS condition

Everything OK.

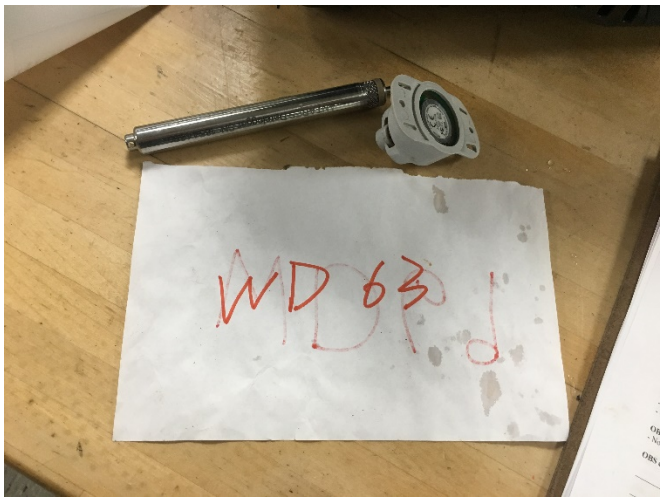
- stop EdgeNmea logging program (^C) ✓
- restart ship acoustics ✓ - confirm next station with bridge ✓

4 multibeam tracks / waypoints

UW Temperature Sensor S/Ns

Antares: 1854414 Iceland: _____ Tidbit1: 20233092 Tidbit2: _____

WD63 – WHOI S45 09/06/2019



Conf & Tm

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD63 WHOI OBS ID S 45

Surveyed OBS location 52° 35.4043' N 158° 5.6145' W Water depth (m) 4656

Novatech radio freq. (MHz) 154.585 Est. Rise Time: 132 m.n @ 35 m/m.n

Using WHOI ID S## :
Edgetech#1 35793 Tx freq 11 kHz / Rx freq 11.5 kHz
enable 511655 disable 511676
Burn 1 531142 Burn 2 531161 option 511707
Transducer (e.g. Hull) Hull

1 mi out: Start range tracking program ***EdgeNmea_Universal_0.7.py -G19200 -e23 -g24***
On PC, up-arrow or re-type command for vers. 7. Enter data as above. Comment: Your Initials
- file name (e.g. MGL1907_<stn_name>_<obs_id>…) MGL1907_WD63_S45

Confirm Ship's Position Conforms to Station Location: (✓) yes (__) no
- turn on RS232 output in 8011M deck unit
Disable ship acoustics (Multibeam, Knudsen, ADCP, etc) (✓) done

Enable acoustics:, check sensor (Guralp) status, Edgetech#1 ***Edgetech 8011M***
- send enable command: *<CMD>-[enable #]-<ENT>*
- UTC date 269
- UTC time ~~00:27:40~~ 00:23:49
confirm reply: # pings 7, period (s) 1
(more than 8 pings = Guralp ready, fewer than 8 = not ready)
- if repeats necessary
- UTC time
- record repeated enable commands sent
- ranges: *<RNG>-<RNG>* 4679 m
- assessment: Guralp: (✓) ready (__) not ready

Lock Guralp (Burn 2 command), Edgetech#1 ***Edgetech 8011M***
- send Burn 2 command *<CMD>-[Burn 2 #]-<<GRD>+<ENT>>*
- UTC time 00:24:50
confirm reply, # pings 7, period (s) 1
- time of last reply ping (sec. of the minute) ~~43~~ :09
(this can take up to 15 minutes, but may be less. End of locking may have 7 pings – 1 sec apart)
- # burning pings/minutes (count/tally) 1
- # burning pings/minutes
- burn shutdown confirmation, # pings HH11 7, period (s) 1
(shutdown after 1 to 3 minutes => Guralp locked; after 15 minutes => Guralp not locked)
If you hear multiple pings over a few seconds, try <RNG>, will allow Range if done. Will not allow Range if not complete.
- assessment: Guralp: (✓) locked (__) not locked
- ranges 4671, 4670
(do multiple ranges to see if OBS is moving or stationary)

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD63 WHOI OBS ID 545

Release/burn (Burn 1 code)# **Edgetech#1** ***Edgetech 8011M***

- send Burn 1 command *<CMD>-[Burn 1 #]-<<GRD>+<ENT>>*
- UTC time 00:28:42
confirm reply, # pings 7, period (s) 1
- time of last ping (second of the minute) :06
(~8 or 15 min. cycle, with 1 ping/minute expected)
- # burning pings/minutes ~~IIII IIII IIII~~
Note time of double pings if hear. May be off sea floor.
Hear double pings? Y UTC Time: 00:34, :35, :36
- burn shutdown confirmation, # pings _____, period (s) ___
Set range to 10 s repeat, if not set via
<MENU> - <Range Setup>-<More Options>-<repetitive rate>
Set repetitive range: <RNG><M/R>
- ranges 4133 @ 00:45

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings/minutes _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ____
Set repetitive range: <RNG><M/R>
- ranges _____

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings _____ # mins _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ____
Set repetitive range: <RNG><M/R>
- ranges _____

Track package during ascent

- estimated rise-time duration (min) 89 min from 00:45 → 4133m, est. rise-rate (m/min) 46.6
- estimated liftoff time (UTC) 00:34
- estimated surface time (UTC) 02:18
- contact bridge and let them know ETA at surface: (✓) done (__) not done
→ notify Bridge if there is a change to the ETA

15 min-average rise rate: 44 m/min (taken at 01:00) → ETA 02:18

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD63 WHOI OBS ID 545

Notes during package ascent

Unusually fast rise rate: 44 m/min
Suspected on surface at 2:16
↳ range plateau

18:22
Revised cshmuk

Recover
- Novatech radio received, UTC time 2:16:42 - visual sight, UTC time 2:16:42
- on board, UTC time 02:28:52

OBS on deck
- Novatech flasher working(Y/N) ✓ - Novatech radio working(Y/N) ✓

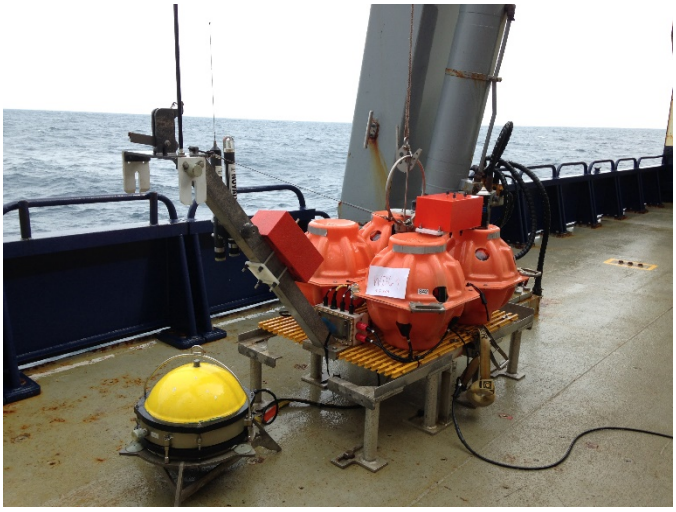
OBS condition

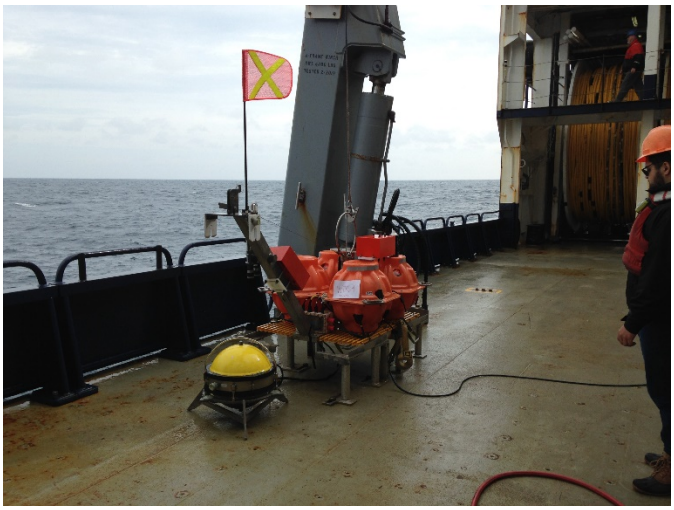
- stop EdgeNmea logging program (Y/C) ✓
- restart ship acoustics ~~✗~~ ✓ - confirm next station with bridge _____

UW Temperature Sensor S/Ns

Antares: 185469 Iceland: _____ Tidbit1: 2022168 Tidbit2: _____

WD64 – WHOI S22 09/05/2019





AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD64 WHOI OBS ID S42

Surveyed OBS location 52 00.0646 158 41.4937 Water depth (m) 4754

Novatech radio freq. (MHz) 160.772 Est. Rise Time: _____

Using WHOI ID S## :

Edgetech#1 35793 Tx freq 11 kHz / Rx freq 11.5 kHz

enable 514533 disable 514556

Burn 1 533103 Burn 2 533120 option 514575

Transducer (e.g. Hull) Hull

1 mi out: Start range tracking program ***EdgeNmea_Universal_0.7.py -G19200 -e23 -g24***

On PC, up-arrow or re-type command for vers. 7. Enter data as above. Comment: Your Initials

- file name (e.g. MGL1907_<stn_name>_<obs_id>…) mgL1907-S42-WD64-20190905_165731.txt

Confirm Ship's Position Conforms to Station Location: (__) yes (__) no ~

- turn on RS232 output in 8011M deck unit

Disable ship acoustics (Multibeam, Knudsen, ADCP, etc) (✓) done

Enable acoustics:, check sensor (Guralp) status, Edgetech#1 ***Edgetech 8011M***

- send enable command: *<CMD>-[enable #]-<ENT>*
- UTC date 9/5/2019 9/5/2019 05-Sept-2019
- UTC time 17:16::21

confirm reply: # pings 15, period (s) 1

(more than 8 pings = Guralp ready, fewer than 8 = not ready)

- if repeats necessary
- UTC time NA
  - record repeated enable commands sent NA
- ranges: *<RNG>-<RNG>* 4761, 4761
- assessment: Guralp: (✓) ready (__) not ready

Lock Guralp (Burn 2 command), Edgetech#1 ***Edgetech 8011M***

- send Burn *2* command *<CMD>-[Burn 2 #]-<<GRD>+<ENT>>*
- UTC time 17:17:48

confirm reply, # pings 15, period (s) 1

- time of last reply ping (sec. of the minute) 17:19:25

(this can take up to 15 minutes, but may be less. End of locking may have 7 pings – 1 sec apart)

- # burning pings/minutes (count/tally) 1
- # burning pings/minutes 2
- burn shutdown confirmation, # pings 7, period (s) 1

(shutdown after 1 to 3 minutes => Guralp locked; after 15 minutes => Guralp not locked)

If you hear multiple pings over a few seconds, try <RNG>, will allow Range if done. Will not allow Range if not complete.

- assessment: Guralp: (✓) locked (__) not locked
- ranges 4762, 4762, 4762

(do multiple ranges to see if OBS is moving or stationary)

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD64 WHOI OBS ID S42

Release/burn (Burn 1 code)# **Edgetech#1** ***Edgetech 8011M***

- send Burn 1 command <*CMD*>-[*Burn 1 #*]-<<*GRD*>+<*ENT*>>
- UTC time 17:21:33
confirm reply, # pings 7, period (s) 1
- time of last ping (second of the minute) 17:22:03
(~8 or 15 min. cycle, with 1 ping/minute expected)
- # burning pings/minutes 111
Note time of double pings if hear. May be off sea floor.
Hear double pings? _____ UTC Time: 17:25
- burn shutdown confirmation, # pings _____, period (s) ___
Set range to 10 s repeat, if not set via
<*MENU*> - <*Range Setup*>-<*More Options*>-<*repetitive rate*>
Set repetitive range: <*RNG*><*M/R*>
- ranges 4767, 4767 / 4729, 4721, 4715

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings/minutes _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ____
Set repetitive range: <*RNG*><*M/R*>
- ranges _____

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings _____ # mins _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ____
Set repetitive range: <*RNG*><*M/R*>
- ranges _____

Track package during ascent

- estimated rise-time duration (min) 116, est. rise-rate (m/min) 40
- estimated liftoff time (UTC) 17:25
- estimated surface time (UTC) 19:25
- contact bridge and let them know ETA at surface: (✓) done (__) not done
→ notify Bridge if there is a change to the ETA

new estimated rise rate = 32 m/min
149 minute rise time
surface ETA = noon Local time
(19:55)

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD64 WHOI OBS ID 542

Notes during package ascent

modified surface FOTA trice
- First no return w/in range @ 11:36 local / 19:36 UTC
- instrument bumped against the side of the ship upon pickup / approaching for pickup after whale sight.

Recover
- Novatech radio received, UTC time no radio - visual sight, UTC time 19:48
- on board, UTC time 20:06

OBS on deck
- Novatech flasher working(Y/N) daytime - Novatech radio working(Y/N) N

OBS condition

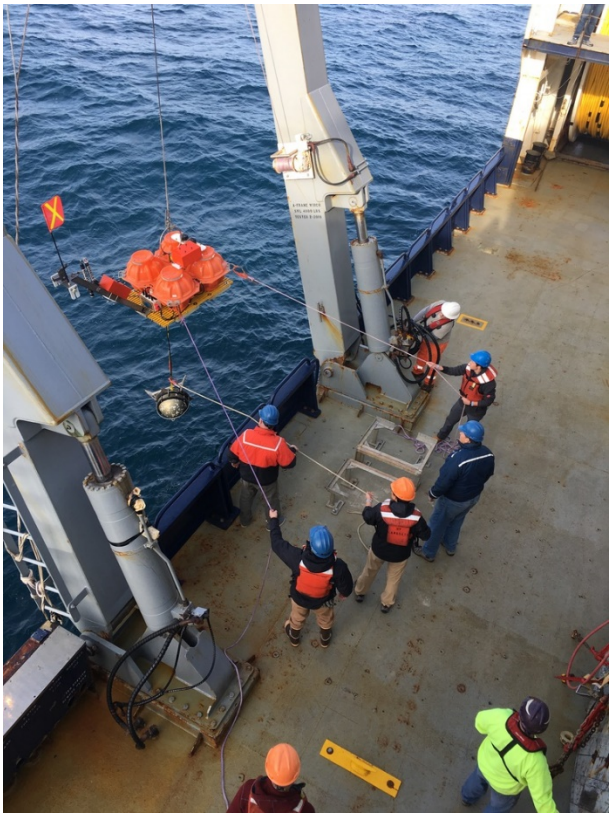
Station looks good but one of the Tidbit was severely damaged (Tidbit 2)

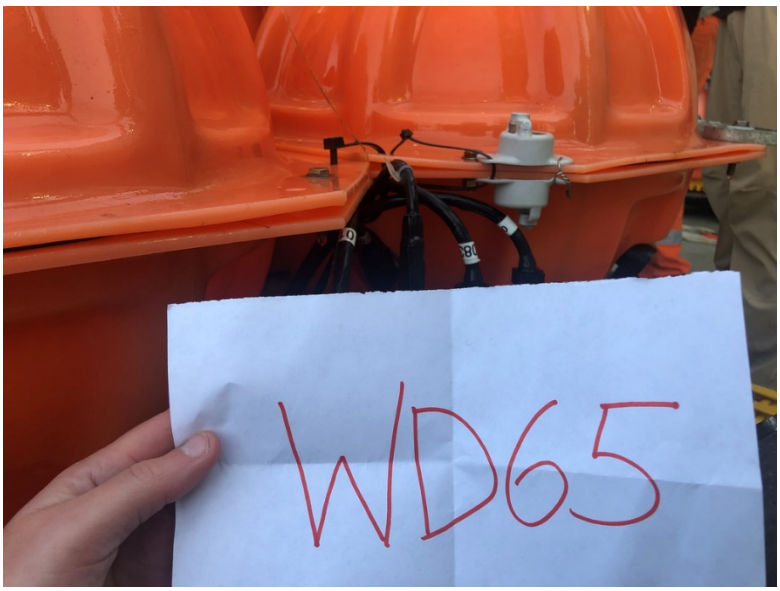
- stop EdgeNmea logging program (^C) ✓
- restart ship acoustics _____ - confirm next station with bridge _____

UW Temperature Sensor S/Ns

Antares: _____ Iceland: _____ Tidbit1: 20233079 Tidbit2: 20233094

WD65 – WHOI S67 09/04/2019





Comp R En

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD 65 WHOI OBS ID S 67

Surveyed OBS location Lat: 52° 53.934 Lon: 168° 54.7428 Water depth (m) 478

Novatech radio freq. (MHz) 154.585 Est. Rise Time: 132 m/min @ 35 m/min

Using WHOI ID S## :

Edgetech#1 35793 Tx freq 11 kHz / Rx freq 13 kHz

enable 511101 disable 511132

Burn 1 530614 Burn 2 530637 option 51157

Transducer (e.g. Hull) hull

1 mi out: Start range tracking program ***EdgeNmea_Universal_0.7.py -G19200 -e23 -g24***

On PC, up-arrow or re-type command for vers. 7. Enter data as above. Comment: Your Initials

- file name (e.g. MGL1907_<stn_name>_<obs_id>…) MGL1907_WD65_S67

Confirm Ship's Position Conforms to Station Location: (✓) yes (__) no

- turn on RS232 output in 8011M deck unit

Disable ship acoustics (Multibeam, Knudsen, ADCP, etc) (✓) done

Enable acoustics:, check sensor (Guralp) status, Edgetech#1 ***Edgetech 8011M***

- send enable command: *<CMD>-[enable #]-<ENT>*
- UTC date 247 23:50:34
- UTC time 23:50:38
confirm reply: # pings 15, period (s) 1
(more than 8 pings = Guralp ready, fewer than 8 = not ready)
- if repeats necessary
- UTC time _____
- record repeated enable commands sent _____
- ranges: *<RNG>-<RNG>* 04722 m @ 2353
- assessment: Guralp: (✓) ready (__) not ready

Lock Guralp (Burn 2 command), Edgetech#1 ***Edgetech 8011M***

- send Burn *2* command *<CMD>-[Burn 2 #]-<<GRD>+<ENT>>*
- UTC time 23:54:40
confirm reply, # pings 15, period (s) 1
- time of last reply ping (sec. of the minute) 55:07
(this can take up to 15 minutes, but may be less. End of locking may have 7 pings – 1 sec apart)
- # burning pings/minutes (count/tally) ////
- # burning pings/minutes _____
- burn shutdown confirmation, # pings 7, period (s) 1
(shutdown after 1 to 3 minutes => Guralp locked; after 15 minutes => Guralp not locked)
If you hear multiple pings over a few seconds, try <RNG>, will allow Range if done. Will not allow Range if not complete.
- assessment: Guralp: (✓) locked (__) not locked
- ranges 4723
(do multiple ranges to see if OBS is moving or stationary)

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD65 WHOI OBS ID 567

Release/burn (Burn 1 code)# **Edgetech#1** ***Edgetech 8011M***

- send Burn 1 command *<CMD>-[Burn 1 #]-<<GRD>+<ENT>>*
- UTC time 23:59:08
confirm reply, # pings ~~HHH~~ 11, period (s) 1
- time of last ping (second of the minute) :35
(~8 or 15 min. cycle, with 1 ping/minute expected)
- # burning pings/minutes ~~HH~~ HH HH HH
Note time of double pings if hear. May be off sea floor.
Hear double pings? _____ UTC Time: ~~00:00:00~~
- burn shutdown confirmation, # pings 7 (1st double), period (s) 1
Set range to 10 s repeat, if not set via
<MENU> - <Range Setup>-<More Options>-<repetitive rate>
Set repetitive range: <RNG><M/R>
- ranges 4293, @00:15
- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings/minutes _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ____
Set repetitive range: <RNG><M/R>
- ranges _____

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings _____ # mins _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ____
Set repetitive range: <RNG><M/R>
- ranges _____

Track package during ascent
- estimated rise-time duration (min) ~~143~~ 143 min, est. rise-rate (m/min) 30 m/min
- estimated liftoff time (UTC) @ 00:00
- estimated surface time (UTC) @ 2:38
- contact bridge and let them know ETA at surface: (✓) done (__) not done
→ notify Bridge if there is a change to the ETA

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD65 WHOI OBS ID S67

Notes during package ascent

~~N/A~~ & slower rise rate than we expected, but on surface ealier than we calculated

Recover

- Novatech radio received, UTC time _____ - visual sight, UTC time 2:30
- on board, UTC time 2:43

OBS on deck

- Novatech flasher working(Y/N) ~~Dark~~ Y - Novatech radio working(Y/N) Y

OBS condition

N/A.

- stop EdgeNmea logging program (^C) ✓
- restart ship acoustics ✓ 2:46 - confirm next station with bridge _____

UW Temperature Sensor S/Ns

Antares:_____ Iceland:_____ Tidbit1: 20223098 Tidbit2: 20216908

WD66 – WHOI S72 09/04/2019

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD66 WHOI OBS ID S72

Surveyed OBS location 53 18.8712 154 32.0539 Water depth (m) 4941

Novatech radio freq. (MHz) 160.725 Est. Rise Time: 14 4m/s

Using WHOI ID S##:

Edgetech#1 35793 Tx freq 11 kHz / Rx freq 11.5 kHz

enable 511026 disable 511043

Burn 1 530555 Burn 2 530576 option 514060

Transducer (e.g. Hull) Hull

1 mi out: Start range tracking program ***EdgeNmea_Universal_0.7.py -G19200 -e23 -g24***

On PC, up-arrow or re-type command for vers. 7. Enter data as above. Comment: Your Initials

- file name (e.g. MGL1907_<stn_name>_<obs_id>…) MGL1907_S72-WD66_20190901_110543.txt

Confirm Ship's Position Conforms to Station Location: (✓) yes ( ) no

- turn on RS232 output in 8011M deck unit

Disable ship acoustics (Multibeam, Knudsen, ADCP, etc) (✓) done

Enable acoustics:, check sensor (Guralp) status, Edgetech#1 ***Edgetech 8011M***

- send enable command: *<CMD>-[enable #]-<ENT>*
- UTC date 09 04 2019
- UTC time 17 15 20

confirm reply: # pings 15, period (s) 1

(more than 8 pings = Guralp ready, fewer than 8 = not ready)

- if repeats necessary
- UTC time
- record repeated enable commands sent
- ranges: *<RNG>-<RNG>* 4437, 4436
- assessment: Guralp: (✓) ready ( ) not ready

Lock Guralp (Burn 2 command), Edgetech#1 ***Edgetech 8011M***

- send Burn *2* command *<CMD>-[Burn 2 #]-<<GRD>+<ENT>>*
- UTC time 17:17:23

confirm reply, # pings 15 ~~17 8~~, period (s) 1

- time of last reply ping (sec. of the minute) 17:17:52.

(this can take up to 15 minutes, but may be less. End of locking may have 7 pings – 1 sec apart)

- # burning pings/minutes (count/tally) 1-1-1-1 ~~error 5~~
- # burning pings/minutes
- burn shutdown confirmation, # pings 5, 11:22:52, period (s) 1

(shutdown after 1 to 3 minutes => Guralp locked; after 15 minutes => Guralp not locked)

If you hear multiple pings over a few seconds, try <RNG>, will allow Range if done. Will not allow Range if not complete.

- assessment: Guralp: (✓) locked ( ) not locked
- ranges 4435, 4436, 4436

(do multiple ranges to see if OBS is moving or stationary)

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name W1766 WHOI OBS ID 572.

Release/burn (Burn 1 code)# **Edgetech#1** ***Edgetech 8011M***

- send Burn 1 command *<CMD>-[Burn 1 #]-<<GRD>+<ENT>>*
- UTC time 11:24:42.
confirm reply, # pings 7, period (s) 11
- time of last ping (second of the minute) 11:25:07
(~8 or 15 min. cycle, with 1 ping/minute expected)
- # burning pings/minutes 1-1-1-1-1-1-1-1-1-1-1-1-1-1-1

Note time of double pings if hear. May be off sea floor.

Hear double pings? ✓ UTC Time: _____
- burn shutdown confirmation, # pings 7, period (s) 0.5

Set range to 10 s repeat, if not set via
<MENU> - <Range Setup>-<More Options>-<repetitive rate>
Set repetitive range: <RNG><M/R>
- ranges 4400. 4344. 4383.

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) _____
- time of last ping (start of 15 minute burn) _____
- # burning pings/minutes _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) _____
Set repetitive range: <RNG><M/R>
- ranges _____

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) _____
- time of last ping (start of 15 minute burn) _____
- # burning pings _____ # mins _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) _____
Set repetitive range: <RNG><M/R>
- ranges _____

Track package during ascent
- estimated rise-time duration (min) ~~41~~ 125, est. rise-rate (m/min) 350
- estimated liftoff time (UTC) 11:29:04
- estimated surface time (UTC) 13:40
- contact bridge and let them know ETA at surface: (✓) done (__) not done
→ notify Bridge if there is a change to the ETA

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name ~~AA~~ W1 66 WHOI OBS ID S72

Notes during package ascent

None

Recover

- Novatech radio received, UTC time —- visual sight, UTC time ~~5:15~~ 13:15
- on board, UTC time 13:41:00

OBS on deck

- Novatech flasher working(Y/N) Y - Novatech radio working(Y/N) N

OBS condition

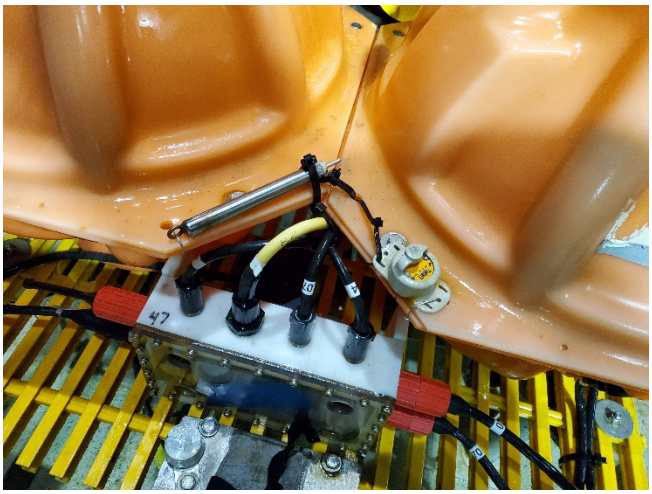
looks good.

- stop EdgeNmea logging program (^C) V
- restart ship acoustics ✓ - confirm next station with bridge ✓

UW Temperature Sensor S/Ns

Antares: ✓ Iceland: ✓ Tidbit1: 20233081 Tidbit2: 20233087.

WD67 – WHOI S68 09/05/2019



AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD 67 WHOI OBS ID S 68

Surveyed OBS location 52 09.7538 160 02.1499 Water depth (m) 4652

Novatech radio freq. (MHz) 160.785 Est. Rise Time: 132 min

Using WHOI ID S##: S 68

Edgetech#1 35743 Tx freq 11 kHz / Rx freq 11.5 kHz

enable 315732 disable 315757

Burn 1 333120 Burn 2 333145 option 315774

Transducer (e.g. Hull) Hull

1 mi out: Start range tracking program ***EdgeNmea_Universal_0.7.py -G19200 -e23 -g24***

On PC, up-arrow or re-type command for vers. 7. Enter data as above. Comment: Your Initials

- file name (e.g. MGL1907_<stn_name>_<obs_id>…) MGL1907-S68-WD67_20190905_043824.txt

Confirm Ship's Position Conforms to Station Location: (✓) yes (__) no

- turn on RS232 output in 8011M deck unit

Disable ship acoustics (Multibeam, Knudsen, ADCP, etc) (✓) done

Enable acoustics:, check sensor (Guralp) status, Edgetech#1 ***Edgetech 8011M***

- send enable command: *<CMD>-[enable #]-<ENT>*
- UTC date 09052019
- UTC time 9:41:50

confirm reply: # pings 15, period (s) 1

(more than 8 pings = Guralp ready, fewer than 8 = not ready)

- if repeats necessary
- UTC time
  - record repeated enable commands sent
- ranges: *<RNG>-<RNG>* 4677, 4677
- assessment: Guralp: (✓) ready (__) not ready

Lock Guralp (Burn 2 command), Edgetech#1 ***Edgetech 8011M***

- send Burn 2 command *<CMD>-[Burn 2 #]-<<GRD>+<ENT>>*
- UTC time 9:43:24

confirm reply, # pings 15, period (s) 1

- time of last reply ping (sec. of the minute) 9:43:53

(this can take up to 15 minutes, but may be less. End of locking may have 7 pings – 1 sec apart)

- # burning pings/minutes (count/tally) 1-4457
- # burning pings/minutes
- burn shutdown confirmation, # pings 7, period (s) 1

(shutdown after 1 to 3 minutes => Guralp locked; after 15 minutes => Guralp not locked)

If you hear multiple pings over a few seconds, try <RNG>, will allow Range if done. Will not allow Range if not complete.

- assessment: Guralp: (✓) locked (__) not locked
- ranges 4668, 4668, 4668

(do multiple ranges to see if OBS is moving or stationary)

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name M067 WHOI OBS ID S68

Release/burn (Burn 1 code)# **Edgetech#1** ***Edgetech 8011M***
- send Burn 1 command *<CMD>-[Burn 1 #]-<<GRD>+<ENT>>*
- UTC time 9:46:39
confirm reply, # pings 7, period (s) 1
- time of last ping (second of the minute) 9:50:00
(~8 or 15 min. cycle, with 1 ping/minute expected) 15
- # burning pings/minutes 1-51.01 1-52.02 1-53.02 1-54:03 1-55:02, 1-56.02 1-57:02 1-58:02.11
Note time of double pings if hear. May be off sea floor.
Hear double pings? ____ UTC Time: _____
- burn shutdown confirmation, # pings 7, period (s) 1
Set range to 10 s repeat, if not set via
<MENU> - <Range Setup>-<More Options>-<repetitive rate>
Set repetitive range: <RNG><M/R>
- ranges 4136, 4129

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings/minutes _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ____
Set repetitive range: <RNG><M/R>
- ranges _____

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings _____ # mins _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ____
Set repetitive range: <RNG><M/R>
- ranges _____

Track package during ascent
- estimated rise-time duration (min) 103, est. rise-rate (m/min) 40
- estimated liftoff time (UTC) 9:43:00
- estimated surface time (UTC) 11:45:00
- contact bridge and let them know ETA at surface: (✓) done (__) not done
→ notify Bridge if there is a change to the ETA

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WP67 WHOI OBS ID S68

Notes during package ascent

None. Surfaced ~300m away came up port side

Recover

- Novatech radio received, UTC time 11:40 - visual sight, UTC time 11:40
- on board, UTC time 12:00:00

OBS on deck

- Novatech flasher working(Y/N) Y - Novatech radio working(Y/N) Y.

OBS condition

look good. One UW temp sensor looks dead. Tidbit.

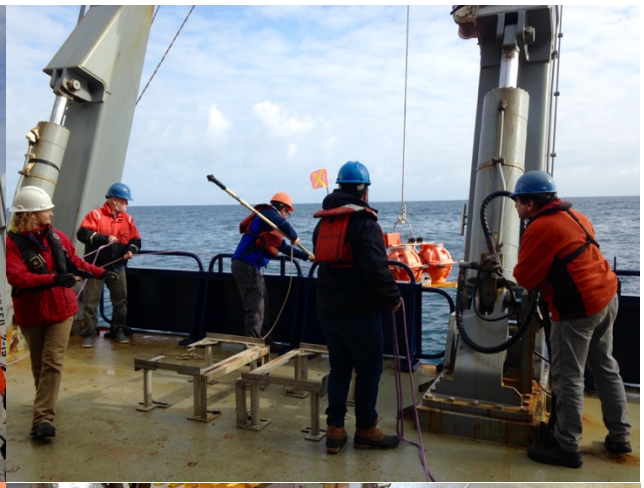
Flasher worked initially, then appeared to stop (not visible from bridge). appeared to work once on deck

- stop EdgeNmea logging program (^C) ✓
- restart ship acoustics ✓ - confirm next station with bridge V

UW Temperature Sensor S/Ns

Antares: 185430 Iceland: Tidbit1: 20233091 Tidbit2:

WD68 – WHOI S46 09/04/2019



AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD68 WHOI OBS ID S46

Surveyed OBS location S55.0562 160 04.8687 Water depth (m) 4715

Novatech radio freq. (MHz) 154.585 Est. Rise Time: 110 ~100

Using WHOI ID S## :

Edgetech#1 35793 Tx freq 11.5 kHz / Rx freq 11.5 kHz

enable 316610 disable 316633

Burn 1 333563 Burn 2 333609 option 316656

Transducer (e.g. Hull) Hull

1 mi out: Start range tracking program ***EdgeNmea_Universal_0.7.py -G19200 -e23 -g24***

On PC, up-arrow or re-type command for vers. 7. Enter data as above. Comment: Your Initials

- file name (e.g. MGL1907_<stn_name>_<obs_id>…) MGL1907_S46_WD68_20190904_110803 +LT

Confirm Ship's Position Conforms to Station Location: (✓) yes ( ) no

- turn on RS232 output in 8011M deck unit

Disable ship acoustics (Multibeam, Knudsen, ADCP, etc) (✓) done

Enable acoustics:, check sensor (Guralp) status, Edgetech#1 ***Edgetech 8011M***

- send enable command: *<CMD>-[enable #]-<ENT>*
- UTC date 2019-09-04
- UTC time 17:15:46

confirm reply: # pings 15, period (s) 1

(more than 8 pings = Guralp ready, fewer than 8 = not ready)

- if repeats necessary
- UTC time ~~15:46~~
  - record repeated enable commands sent
- ranges: *<RNG>-<RNG>* 4749
- assessment: Guralp: (✓) ready ( ) not ready

Lock Guralp (Burn 2 command), Edgetech#1 ***Edgetech 8011M***

- send Burn *2* command *<CMD>-[Burn 2 #]-<<GRD>+<ENT>>*
- UTC time 17:17:29

confirm reply, # pings 15, period (s) 1

- time of last reply ping (sec. of the minute) 19:19:07

(this can take up to 15 minutes, but may be less. End of locking may have 7 pings – 1 sec apart)

- # burning pings/minutes (count/tally) 111
- # burning pings/minutes
- burn shutdown confirmation, # pings 7, period (s) 1

(shutdown after 1 to 3 minutes => Guralp locked; after 15 minutes => Guralp not locked)

If you hear multiple pings over a few seconds, try <RNG>, will allow Range if done. Will not allow Range if not complete.

- assessment: Guralp: (✓) locked ( ) not locked
- ranges 4732, 4751, 4751

(do multiple ranges to see if OBS is moving or stationary)

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD69 WHOI OBS ID S46

Release/burn (Burn 1 code)# **Edgetech#1** ***Edgetech 8011M***

- send Burn 1 command *<CMD>-[Burn 1 #]-<<GRD>+<ENT>>*
- UTC time 17:22:21
confirm reply, # pings 7, period (s) 1
- time of last ping (second of the minute) 17:23:15
(~8 or 15 min. cycle, with 1 ping/minute expected)
- # burning pings/minutes 1111 111
Note time of double pings if hear. May be off sea floor.
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ___
Set range to 10 s repeat, if not set via
<MENU> - <Range Setup>-<More Options>-<repetitive rate>
Set repetitive range: <RNG><M/R>
- ranges 4494 , 4492

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings/minutes _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ____
Set repetitive range: <RNG><M/R>
- ranges _____

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings _____ # mins _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ____
Set repetitive range: <RNG><M/R>
- ranges _____

Track package during ascent
- estimated rise-time duration (min) 105, est. rise-rate (m/min) 45
- estimated liftoff time (UTC) 17:23:15
- estimated surface time (UTC) ~~XXXXXX~~ 19:05
- contact bridge and let them know ETA at surface: (✓) done (__) not done
→ notify Bridge if there is a change to the ETA

↑ Based on station this morning

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD68 WHOI OBS ID S46

Notes during package ascent

First ru return w/in range at ~~19:06:06~~ 19:06:16

Recover

- Novatech radio received, UTC time _____ - visual sight, UTC time 19:12
- on board, UTC time 19:29 off the port bow

OBS on deck

- Novatech flasher working(Y/N) _____ - Novatech radio working(Y/N) Y

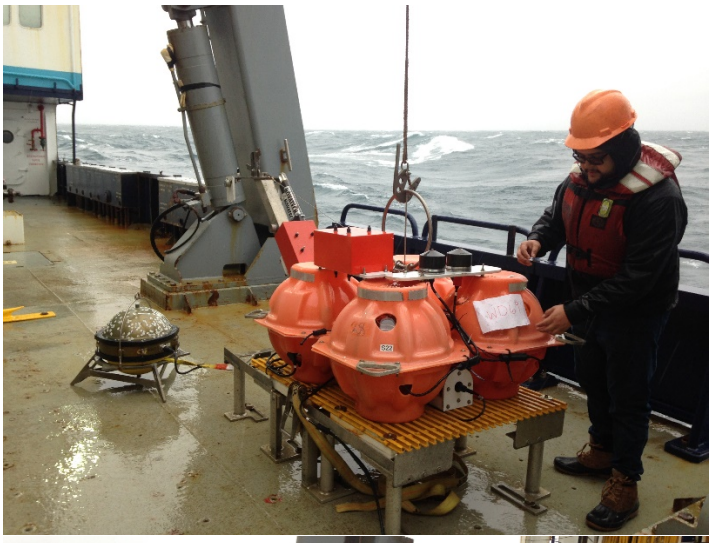
OBS condition

- stop EdgeNmea logging program (^C) ✓
- restart ship acoustics ✓ - confirm next station with bridge ✓

UW Temperature Sensor S/Ns

Antares: ✓ Iceland: ✓ Tidbit1: 20273090 Tidbit2: 20273097

WD69 – WHOI S22 08/31/2019



G + I

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD69 20. WHOI OBS ID S22

Surveyed OBS location 53°46.9239 160°5734 Water depth (m) 3896

Novatech radio freq. (MHz) 154.585 Est. Rise Time: 114 min

Using WHOI ID S##:

Edgetech#1 35793 Tx freq 11 kHz / Rx freq 11.5 kHz

enable 316675 disable 316704

Burn 1 333622 Burn 2 333647 option 316727

Transducer (e.g. Hull) Hull

1 mi out: Start range tracking program ***EdgeNmea_Universal_0.7.py -G19200 -e23 -g24***

On PC, up-arrow or re-type command for vers. 7. Enter data as above. Comment: Your Initials

- file name (e.g. MGL1907_<stn_name>_<obs_id>…) mgL1907_S22_WD69_20190831-15H72

Arrived at 15:21 UTC

Confirm Ship's Position Conforms to Station Location: (✓) yes ( ) no 53°47.0642 160° 20.7967 W TxT

- turn on RS232 output in 8011M deck unit

Disable ship acoustics (Multibeam, Knudsen, ADCP, etc) (✓) done

Changed received Freq from 12kHz to 11.5kHz

Enable acoustics:, check sensor (Guralp) status, Edgetech#1 ***Edgetech 8011M***

- send enable command: *<CMD>-[enable #]-<ENT>*
- UTC date 31 Aug 2019
- UTC time 15:21:02

confirm reply: # pings 15, period (s) 1

(more than 8 pings = Guralp ready, fewer than 8 = not ready)

- if repeats necessary
- UTC time ~~15~~:
  - record repeated enable commands sent
- ranges: *<RNG>-<RNG>* 3930
- assessment: Guralp: (✓) ready ( ) not ready

Lock Guralp (Burn 2 command), Edgetech#1 ***Edgetech 8011M***

- send Burn *2* command *<CMD>-[Burn 2 #]-<<GRD>+<ENT>>*
- UTC time ~~#1~~ 15:26:29 / ~~#2~~ 15:28:23

we had to repeat the command bc we didn't get any answer back

confirm reply, # pings 15, period (s) 1

- time of last reply ping (sec. of the minute) 15:28:56

(this can take up to 15 minutes, but may be less. End of locking may have 7 pings – 1 sec apart)

- # burning pings/minutes (count/tally) 111
- # burning pings/minutes 3
- burn shutdown confirmation, # pings 7, period (s) 1

(shutdown after 1 to 3 minutes => Guralp locked; after 15 minutes => Guralp not locked)

If you hear multiple pings over a few seconds, try <RNG>, will allow Range if done. Will not allow Range if not complete.

- assessment: Guralp: (✓) locked ( ) not locked
- ranges 3926 / 3925 / 3924

(do multiple ranges to see if OBS is moving or stationary)

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD69 WHOI OBS ID S22

Release/burn (Burn 1 code)# **Edgetech#1** ***Edgetech 8011M***

- send Burn 1 command *<CMD>-[Burn 1 #]-<<GRD>+<ENT>>*
- UTC time 15:33:56
confirm reply, # pings 7, period (s) 1
- time of last ping (second of the minute) 15 34:25
(~8 or 15 min. cycle, with 1 ping/minute expected)
- # burning pings/minutes ~~HH~~
Note time of double pings if hear. May be off sea floor.
Hear double pings? ____ UTC Time: 15:35
- burn shutdown confirmation, # pings _____, period (s) ___
Set range to 10 s repeat, if not set via
<MENU> - <Range Setup>-<More Options>-<repetitive rate>
Set repetitive range: <RNG><M/R>
- ranges 3795

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings/minutes _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ____
Set repetitive range: <RNG><M/R>
- ranges _____

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings _____ # mins _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ____
Set repetitive range: <RNG><M/R>
- ranges _____

Track package during ascent

- estimated rise-time duration (min) 108 min, est. rise-rate (m/min) 36
- estimated liftoff time (UTC) 15:34
- estimated surface time (UTC) 17:12
- contact bridge and let them know ETA at surface: (✓) done (__) not done
→ notify Bridge if there is a change to the ETA

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD69 WHOI OBS ID 522

Notes during package ascent

17 11:10 - First no return w/in range error
17 19:44 - no return w/in range error
~~17 20:17 - final range reading @ 2937m~~
Seas are rough, wind ~ 30.0 knots
- Seen rising in water column @ 19:30
- Station got blown undership during recovery (ship was getting blown over the station)

Recover

- Novatech radio received, UTC time _____ - visual sight, UTC time 17:30 utc
- on board, UTC time ~~17:45~~ 17:52

OBS on deck

- Novatech flasher working(Y/N) Daytime - Novatech radio working(Y/N) unknown

OBS condition

Everything ok - except flag broken off

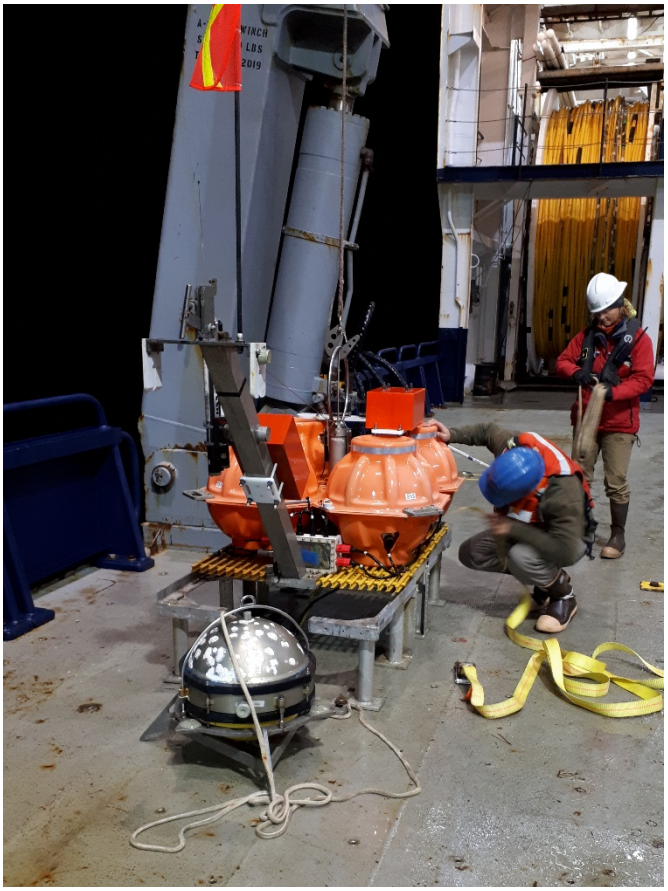
- stop EdgeNmea logging program (^C) ✓
- restart ship acoustics ✓ - confirm next station with bridge ✓

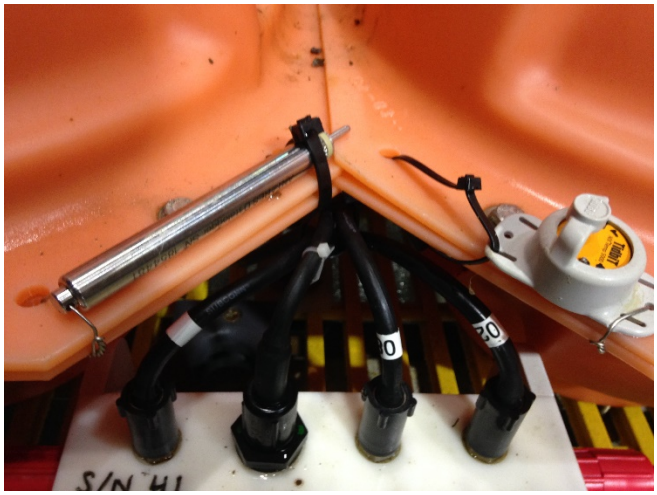
UW Temperature Sensor S/Ns

Antares: 18544472 Iceland: _____ Tidbit1: 20216909 Tidbit2: _____

← match spreadsheet →

WD 70 – WHOI S53 08/27/2019





AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD 70 WHOI OBS ID S S53

Surveyed location 56° 32.64'N 151° 13.6542'W Water depth (m) 3273.8

Novatech radio freq. (MHz) 154.585

Edgetech#1 35793 Interrogate 11 kHz / Reply 11.5 kHz

enable 512372 disable 512415

release 1 531501 release 2 531522 option 512436

Edgetech Deck-Box S/N _____ Transducer Hull

Confirm Ship's Position Conforms to Station Location: 56° 32.2418' 151° 13.5958'

Disable ship acoustics (Multibeam, Knudsen, ADCP, etc) Done

Start range tracking program *EdgeNmea.py*

- file name (e.g. <stn_name>_<obs_id>) MGL1907_S53_WD70_20190827_102656.txt
- **turn on RS232 output in 8011M deck unit**

Enable acoustics, check Guralp status, Edgetech#1 *Edgetech 8011M*

- UTC date 8/27/19
- UTC time 10:25
- send enable command, confirm reply, # pings 15, period (s) 1s

(more than 8 pings = Guralp ready, fewer than 8 = not ready)

- if repeats necessary
- UTC time _____
  - record repeated enable commands sent _____
- ranges 3330
- assessment: Guralp ready ✓, not ready _____

Lock Guralp (release 2 command), Edgetech#1 *Edgetech 8011M*

- UTC time ~~10:33~~ 10:43
- send *release 2* command, confirm reply, # pings 15, period (s) 1s
- time of last reply ping (sec. of the minute) ~~10:36:45~~ 10:43
- # burning pings/minutes 1 per min 2 times
- # burning pings/minutes 3 pings in minute 3, then stopped
- burn shutdown confirmation, # pings _____, period (s) ___

(shutdown after 1 to 3 minutes => Guralp locked; after 15 minutes => Guralp not locked)

- assessment: Guralp locked _____, not locked _____ Don't know
- ranges 3332, 3330, 3330

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD70 WHOI OBS ID S53

Release/burn (release 1 command), Edgetech#1 *Edgetech 8011M*

- UTC time 10:52:32
- send release 1 command, confirm reply, # pings 7, period (s) 15
- time of last ping (second of the minute) 10:52:54
- # burning pings/minutes ~~10:52:54~~
- burn shutdown confirmation, # pings _____, period (s) ___
- ranges 2915

Double pings @10:57

- if repeat necessary, UTC time _____
- send release 1 command, confirm reply, # pings _____, period (s) ___
- time of last ping (start of 15 minute burn) _____
- # burning pings/minutes _____
- burn shutdown confirmation, # pings _____, period (s) ___
- ranges _____

- if repeat necessary, UTC time _____
- send release 1 command, confirm reply, # pings _____, period (s) ___
- time of last ping (start of 15 minute burn) _____
- # burning pings _____ # mins _____
- burn shutdown confirmation, # pings _____, period (s) ___
- ranges _____

Track package during ascent

- estimated rise-time duration (min) 83.3, est. rise-rate (m/min) 40
- estimated liftoff time (UTC) _____
- estimated surface time (UTC) 12:32

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WD 70 WHOI OBS ID S53

Notes during package ascent

None

Recover

- Novatech radio received, UTC time _____ - visual sight, UTC time 12:32
- on board, UTC time 12:44

OBS on deck

- Novatech flasher working(Y/N) No - Novatech radio working(Y/N) NO

OBS condition

Frame looks fine.

- stop EdgeNmea logging program (^C) ✓ ~~- switch off Deck-Box~~ ✓
- restart ship acoustics ✓ - confirm next station with bridge ✓

UW Temperature Sensor S/Ns

Antares: 185448 Iceland: _____ Tidbit1: 20233105 Tidbit2: _____

WS71 – WHOI S87 08/28/2019

Scanned

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WS71 WHOI OBS ID S 87

Surveyed OBS location 56 09.4170 153 04.7353 Water depth (m) 1555

Novatech radio freq. (MHz) 154.585 Est. Rise Time: 54

Using WHOI ID S## :

Edgetech#1 35793 Tx freq 11 kHz / Rx freq 11.5 kHz

enable 512522 disable 512547

Burn 1 531604 Burn 2 531625 option 512564

Transducer (e.g. Hull) Hull

1 mi out: Start range tracking program *EdgeNmea_Universal_0.7.py -G19200 -e23 -g24* (164125.txt

On PC, up-arrow or re-type command for vers. 7. Enter data as above. Comment: Your Initials

- file name (e.g. MGL1907_<stn_name>_<obs_id>…) MGL1907-S87-WS71-20190828_164125.txt

Confirm Ship's Position Conforms to Station Location: (✓) yes ( ) no

- turn on RS232 output in 8011M deck unit

Disable ship acoustics (Multibeam, Knudsen, ADCP, etc) ( ) done

Ship location: 5609.4134 153 05.1418

Enable acoustics:, check sensor (Guralp) status, Edgetech#1 ***Edgetech 8011M***

- send enable command: *<CMD>-[enable #]-<ENT>*
- UTC date 08/28/2019
- UTC time 16:46:20

confirm reply: # pings 15, period (s) 1 - Triple at 3s, 7s, 9s

(more than 8 pings = Guralp ready, fewer than 8 = not ready)

- if repeats necessary
- UTC time 16:47:55
  - record repeated enable commands sent
- ranges: *<RNG>-<RNG>* 1641
- assessment: Guralp: (✓) ready ( ) not ready

Lock Guralp (Burn 2 command), Edgetech#1 ***Edgetech 8011M***

- send Burn *2* command *<CMD>-[Burn 2 #]-<<GRD>+<ENT>>*
- UTC time 48:58

confirm reply, # pings 15, period (s) 1

- time of last reply ping (sec. of the minute) 49: 40 (25)

(this can take up to 15 minutes, but may be less. End of locking may have 7 pings – 1 sec apart)

- # burning pings/minutes (count/tally) ~~||||~~ ~~||||~~ ~~||||~~ ||||
- # burning pings/minutes 15
- burn shutdown confirmation, # pings 7, period (s) 1

(shutdown after 1 to 3 minutes => Guralp locked; after 15 minutes => Guralp not locked)

If you hear multiple pings over a few seconds, try <RNG>, will allow Range if done. Will not allow Range if not complete.

- assessment: Guralp: (✓) locked ( ) not locked
- ranges 1619 / 1618 / 1618

(do multiple ranges to see if OBS is moving or stationary)

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WS71 WHOI OBS ID 587

Release/burn (Burn 1 code)# **Edgetech#1** ***Edgetech 8011M***

- send Burn 1 command *<CMD>-[Burn 1 #]-<<GRD>+<ENT>>*
- UTC time 17:06:07
confirm reply, # pings 7, period (s) 1 - 3s 2x, 4 2x
- time of last ping (second of the minute) 17:06:23
(~8 or 15 min. cycle, with 1 ping/minute expected)
- # burning pings/minutes 1111
Note time of double pings if hear. May be off sea floor.
Hear double pings? ✓ UTC Time: 17:10:00
- burn shutdown confirmation, # pings 7, period (s) 1
Set range to 10 s repeat, if not set via
<MENU> - <Range Setup>-<More Options>-<repetitive rate>
Set repetitive range: <RNG><M/R>
- ranges 1579 / 790 / 227 / 562

- if repeat necessary, UTC time
- send Burn 1 command, confirm reply, # pings, period (s)
- time of last ping (start of 15 minute burn)
- # burning pings/minutes
Hear double pings? UTC Time:
- burn shutdown confirmation, # pings, period (s)
Set repetitive range: <RNG><M/R>
- ranges

- if repeat necessary, UTC time
- send Burn 1 command, confirm reply, # pings, period (s)
- time of last ping (start of 15 minute burn)
- # burning pings # mins
Hear double pings? UTC Time:
- burn shutdown confirmation, # pings, period (s)
Set repetitive range: <RNG><M/R>
- ranges

Track package during ascent

- estimated rise-time duration (min) 40 min, est. rise-rate (m/min) 34/min
- estimated liftoff time (UTC) 17:10
- estimated surface time (UTC) 17:50
- contact bridge and let them know ETA at surface: (✓) done (__) not done
→ notify Bridge if there is a change to the ETA

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WS71 WHOI OBS ID S87

Notes during package ascent

Range command was working during Burn 1 but we think it was the storage value

estimated Time at surface based on range at 17:56 - but we might have been drifting away from OBS. We were moving @ 3 kts. instead! Numbers started decreasing again after.

Recover

- Novatech radio received, UTC time _____ - visual sight, UTC time 18:00:58 ~~18:00:58~~
- on board, UTC time 18:39

OBS on deck

- Novatech flasher working(Y/N) — - Novatech radio working(Y/N) —

OBS condition

- Some sea stars on board

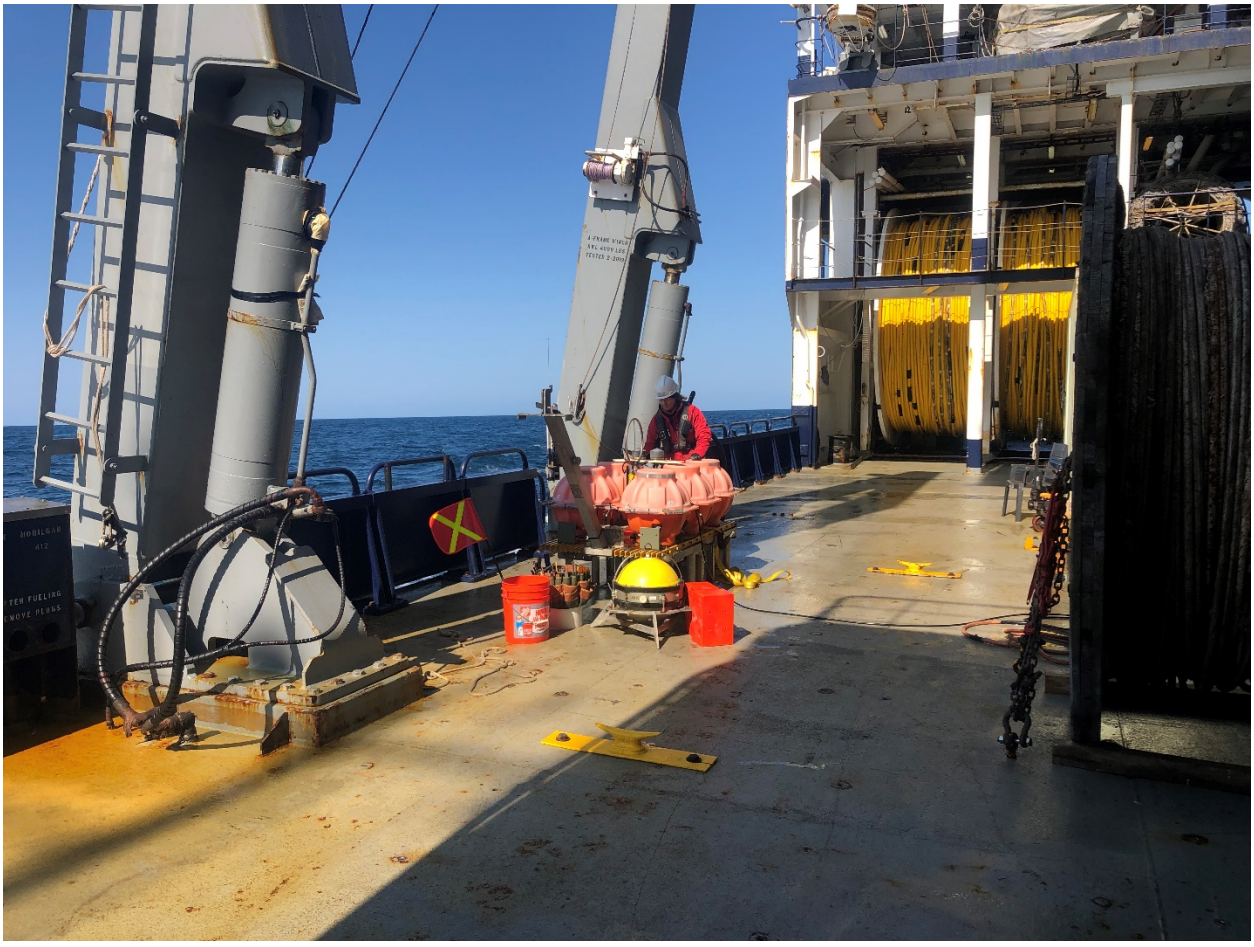
crew said the seismometer wasn't locked

- stop EdgeNmea logging program (^C) ✓
- restart ship acoustics _____ - confirm next station with bridge ✓

UW Temperature Sensor S/Ns

Antares:_____ Iceland: ✓ 59417 Tidbit1: ✓ 20233113 Tidbit2: ✓ 20233085

WS72 – WHOI S86 08/27/2019



Scanned

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WS72 WHOI OBS ID S 86

Surveyed OBS location 56° 37.6419 151° 43.8806 Water depth (m) 4142

Novatech radio freq. (MHz) 154.585 Est. Rise Time: 2.3h / 138Min

Using WHOI ID S##:

Edgetech#1 35793 Tx freq 11 kHz / Rx freq 11.5 kHz

enable 513424 disable 513441

Burn 1 532273 Burn 2 532302 option 513462

Transducer (e.g. Hull) Hull

Disable ship acoustics (Multibeam, Knudsen, ADCP, etc) ✓

Confirm Ship's Position Conforms to Station Location: 56 15.6210 151 48.3552

Start range tracking program ***EdgeNmea.py***

On PC, up-arrow or re-type command for vers. 7. Enter data as above. Comment: Your Initials

- file name (e.g. MGL1907_<stn_name>_<obs_id>…) mgL1907_S86_WS72_20190827_194940.txt

- turn on RS232 output in 8011M deck unit

Enable acoustics:, check Guralp status, Edgetech#1 ***Edgetech 8011M***

- UTC date 27 Aug 2019
- UTC time 19:48:02
- send enable command: *<CMD>-[enable #]-<ENT>*

confirm reply: # pings 15, period (s) 1

(more than 8 pings = Guralp ready, fewer than 8 = not ready)

- if repeats necessary
- UTC time 19:56:
  - record repeated enable commands sent Y
- ranges: *<RNG>-<RNG>* 4179
- assessment: Guralp ready ✓, not ready

Lock Guralp (release 2 command), Edgetech#1 ***Edgetech 8011M***

- UTC time 19:59:17
- send Burn 2 command *<CMD>-[Burn 2 #]-<<GRD>+<ENT>>*

confirm reply, # pings 15, period (s) 1

- time of last reply ping (sec. of the minute) 20:00:53 (47)
- # burning pings/minutes (count/tally) ~~||||~~ ~~||||~~ ~~||||~~
- # burning pings/minutes 15
- burn shutdown confirmation, # pings —, period (s) —

(shutdown after 1 to 3 minutes => Guralp locked; after 15 minutes => Guralp not locked)

If you hear multiple pings over a few seconds, try <RNG>, will allow Range if done.

- assessment: Guralp locked ✓, not locked
- ranges 4334

Dist to sta: to convert to mints

= 1 / ~~942~~ 800 248

1/1.86 + 8/1.60 1000

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WS 72 WHOI OBS ID S86

Release/burn (Burn 1 code)# **Edgetech#1** ***Edgetech 8011M***

- UTC time 20:21:08
- send Burn 1 command <*CMD*>-[*Burn 1 #*]-<<*GRD*>+<*ENT*>> ✓
confirm reply, # pings 15, period (s) 1 (~15 min. cycle)
- time of last ping (second of the minute) 20:22:42
- # burning pings/minutes 111 20:26:37
- burn shutdown confirmation, # pings 3, period (s) 1
- ranges 4189

Set range to 10 s repeat if not set via <MENU> - <Range Setup> on Edgetech ? more option opt 1

- if repeat necessary, UTC time
- send Burn 1 command, confirm reply, # pings, period (s)
- time of last ping (start of 15 minute burn)
- # burning pings/minutes
- burn shutdown confirmation, # pings, period (s)
- ranges

- if repeat necessary, UTC time
- send Burn 1 command, confirm reply, # pings, period (s)
- time of last ping (start of 15 minute burn)
- # burning pings # mins
- burn shutdown confirmation, # pings, period (s)
- ranges

Note time of double pings if hear. May be off sea floor.

Track package during ascent

- estimated rise-time duration (min) 119, est. rise-rate (m/min) 35/min
- estimated liftoff time (UTC) 20:26
- estimated surface time (UTC) 22:26

Average ascent speed: 32 m/min

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WS72 WHOI OBS ID S86

Notes during package ascent

No confirmation beeps when done locking or when done burning. Used range command to determine OBS was finished w/ step.

Recover

- Novatech radio received, UTC time _____ - visual sight, UTC time 22:45:45 ↑ Approximate
- on board, UTC time 23:00:05

OBS on deck

- Novatech flasher working(Y/N) daytime off - Novatech radio working(Y/N) Y

OBS condition

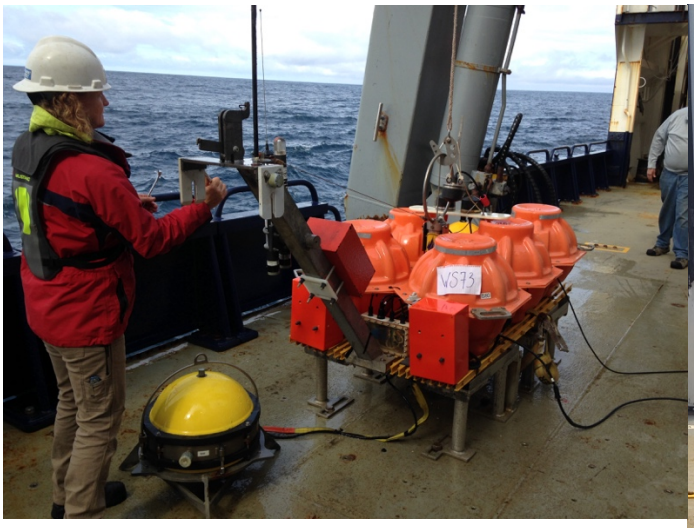
The batteries were dead

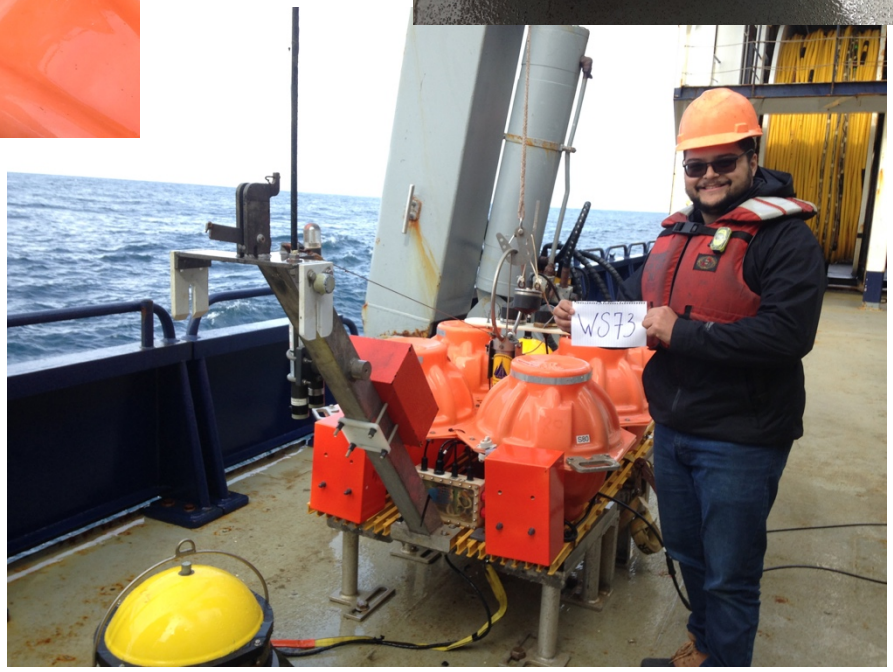
- stop EdgeNmea logging program (^C) ✓
- restart ship acoustics _____ - confirm next station with bridge _____

UW Temperature Sensor S/Ns - No picture, but sensor attachment looked normal

Antares: 185489 Iceland: _____ Tidbit1: 20233118 Tidbit2: _____

WS73 – WHOI S80 08/30/2019





Ginevra & Igor

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WS73 WHOI OBS ID S 80

Surveyed OBS location 54° 25.1975 N 158° 30.7966 W Water depth (m) 2133

Novatech radio freq. (MHz) 154.585 Est. Rise Time: 61 minutes

Using WHOI ID S##:

Edgetech#1 35793 Tx freq 11 kHz / Rx freq 11.5 kHz

enable 513343 disable 513360

Burn 1 532235 Burn 2 532250 option 513407

Transducer (e.g. Hull) Hull

1 mi out: Start range tracking program ***EdgeNmea_Universal_0.7.py -G19200 -e23 -g24***

On PC, up-arrow or re-type command for vers. 7. Enter data as above. Comment: Your Initials

- file name (e.g. MGL1907_<stn_name>_<obs_id>…) MGL1907_S80_WS73_20190830_190517.txt

54 24.9887 158 30.9457

Confirm Ship's Position Conforms to Station Location: (✓) yes ( ) no

- turn on RS232 output in 8011M deck unit

Disable ship acoustics (Multibeam, Knudsen, ADCP, etc) (✓) done

Enable acoustics:, check sensor (Guralp) status, Edgetech#1 ***Edgetech 8011M***

- send enable command: <*CMD*>-*[enable #]*-<*ENT*>
- UTC date 8/30/2019
- UTC time 19:21:15

confirm reply: # pings 7, period (s) 1

(more than 8 pings = Guralp ready, fewer than 8 = not ready)

- if repeats necessary
- UTC time 19:22:11
  - record repeated enable commands sent 513343
- ranges: <*RNG*>-<*RNG*> 2186
- assessment: Guralp: (✓) ready ( ) not ready

Not sure - got 7 confirmation pings (<8)
Assumed ready b/c returned range

Lock Guralp (Burn 2 command), Edgetech#1 ***Edgetech 8011M***

- send Burn *2* command <*CMD*>-*[Burn 2 #]*-<<*GRD*>+<*ENT*>>
- UTC time 19:24:02

confirm reply, # pings 7, period (s) 1

- time of last reply ping (sec. of the minute) ~~[illegible]~~ 19:24:21

(this can take up to 15 minutes, but may be less. End of locking may have 7 pings – 1 sec apart)

- # burning pings/minutes (count/tally) | | | early | early | | | | | | | | | | | | | | | | |
- # burning pings/minutes
- burn shutdown confirmation, # pings ___, period (s) ___

(shutdown after 1 to 3 minutes => Guralp locked; after 15 minutes => Guralp not locked)

If you hear multiple pings over a few seconds, try <RNG>, will allow Range if done. Will not allow Range if not complete.

- assessment: Guralp: ( ) locked ( ) not locked
- ranges 2199 2199 2200

(do multiple ranges to see if OBS is moving or stationary)

Chirping a lot at unknown intervals → First 3 were 1/min

Tim shut down and turned back on → ||||||||| |||||||| ||||||

Trying range often but >½ returns seem wrong. Only taking ranges that are returned @ around 2.8 s. Based on water depth & velocity

Quit after 15 min

Keck instruments have an extra item on the that interfere w/ ours - might also interfere w/ these instruments communication

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WS73 WHOI OBS ID S80

Release/burn (Burn 1 code)# **Edgetech#1** ***Edgetech 8011M***

- send Burn 1 command *<CMD>-[Burn 1 #]-<<GRD>+<ENT>>*
- UTC time 19:40:35
confirm reply, # pings 7, period (s) 1
- time of last ping (second of the minute) ~~19:40:29~~ 19:41:29
(~8 or 15 min. cycle, with 1 ping/minute expected)
- # burning pings/minutes 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Note time of double pings if hear. May be off sea floor.
Hear double pings? ✓ UTC Time: 19:42:54
- burn shutdown confirmation, # pings _____, period (s) ___
Set range to 10 s repeat, if not set via
<MENU> - <Range Setup>-<More Options>-<repetitive rate>
Set repetitive range: <RNG><M/R>
- ranges 2202, 2201, 2196, 2187

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings/minutes _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ____
Set repetitive range: <RNG><M/R>
- ranges _____

- if repeat necessary, UTC time _____
- send Burn 1 command, confirm reply, # pings _____, period (s) ____
- time of last ping (start of 15 minute burn) _____
- # burning pings _____ # mins _____
Hear double pings? _____ UTC Time: _____
- burn shutdown confirmation, # pings _____, period (s) ____
Set repetitive range: <RNG><M/R>
- ranges _____

Track package during ascent
- estimated rise-time duration (min) 60, est. rise-rate (m/min) 35
- estimated liftoff time (UTC) 19:42:54
- estimated surface time (UTC) 20:42:54
- contact bridge and let them know ETA at surface: (✓) done (__) not done
→ notify Bridge if there is a change to the ETA

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WS73 WHOI OBS ID S80

Notes during package ascent

The instrument was sending many pings @ unknown intervals / random intervals for the Burn 2 & Burn 1 commands. We waited 15 minutes after Burn 2 command to find Burn 1 command - because could not decifer which chirps were @ 1minute. Tim turned the box off / on then we ran burn 2. The repeated - random interval chirping happened again after 7 confirmation-sent chirps- Range T/OS returns values that indicate instrument is rising

→ changed repetetive rate to 10s intervals @ 1760m range distance

* File closed during repeat range, another file created

no fix in range gates returned @ 20:44

Recover
- Novatech radio received, UTC time _____ - visual sight, UTC time 20:54 UTC
- on board, UTC time 21:17:22

OBS on deck
- Novatech flasher working(Y/N) Day Time - Novatech radio working(Y/N)_____

OBS condition

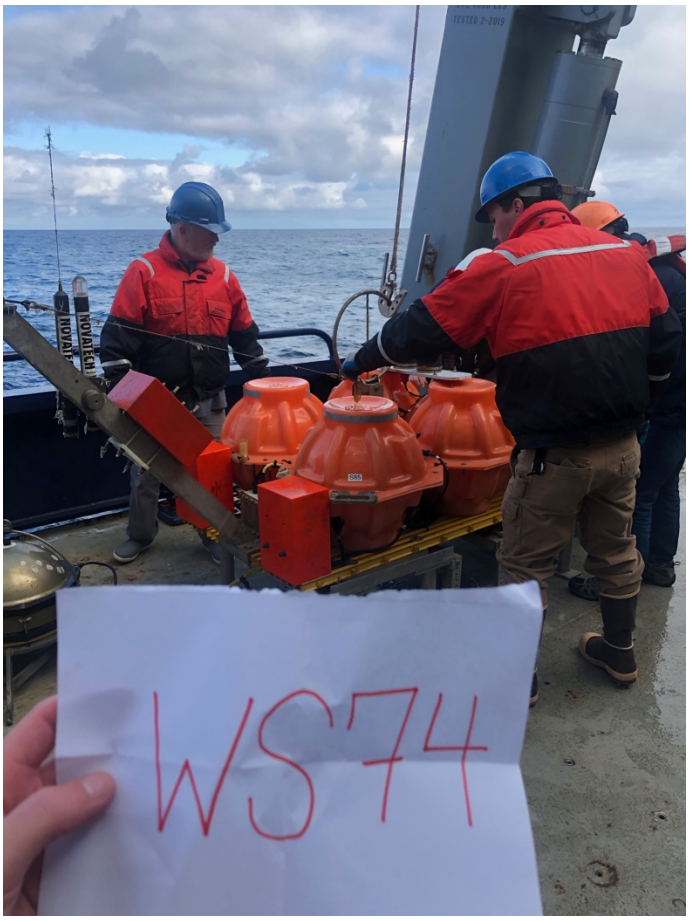
- station not locked likely b/c no battery left
- Dead batteries
- NO DATA

- stop EdgeNmea logging program (^C) ✓
- restart ship acoustics ✓ - confirm next station with bridge ✓

UW Temperature Sensor S/Ns

Antares:_____ Iceland: 59431 Tidbit1: 20337825 Tidbit2: 20296990

WS74 – WHOI S85 08/31/2019



Comp & Bm

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WS-74 WHOI OBS ID S85

Surveyed OBS location Lat: 14° 21.6 N Lon: 118° 18.45 W Water depth (m) 903

Novatech radio freq. (MHz) 154.585 Est. Rise Time: 30 min

Using WHOI ID S## :

Edgetech#1 35793 Tx freq 11 kHz / Rx freq 11.5 kHz

enable 512712 disable 512731

Burn 1 531731 Burn 2 531754 option 512754

Transducer (e/g. Hull) hull

1 mi out: Start range tracking program ***EdgeNmea_Universal_0.7.py -G19200 -e23 -g24***

On PC, up-arrow or re-type command for vers. 7. Enter data as above. Comment: Your Initials

- file name (e.g. MGL1907_<stn_name>_<obs_id>…) MGL1907_WS74_S85

Confirm Ship's Position Conforms to Station Location: (✓) yes ( ) no

- turn on RS232 output in 8011M deck unit

Disable ship acoustics (Multibeam, Knudsen, ADCP, etc) (✓) done 00:55

Enable acoustics:, check sensor (Guralp) status, Edgetech#1 ***Edgetech 8011M***

- send enable command: *<CMD>-[enable #]-<ENT>*
- UTC date 243
- UTC time ~~00:56:14~~ 00:57:24

confirm reply: # pings 8, period (s) 1 → From #2-#7 double pings

(more than 8 pings = Guralp ready, fewer than 8 = not ready)

- if repeats necessary
- UTC time
  - record repeated enable commands sent
- ranges: *<RNG>-<RNG>* 975
- assessment: Guralp: (✓) ready ( ) not ready

Lock Guralp (Burn 2 command), Edgetech#1 ***Edgetech 8011M***

- send Burn 2 command *<CMD>-[Burn 2 #]-<<GRD>+<ENT>>*
- UTC time 00:59:27

confirm reply, # pings 8, period (s) 1 #2-#7 double

- time of last reply ping (sec. of the minute) :40

(this can take up to 15 minutes, but may be less. End of locking may have 7 pings – 1 sec apart)

- # burning pings/minutes (count/tally) 111
- # burning pings/minutes
- burn shutdown confirmation, # pings 8, period (s) 1 doubles #2-#7

(shutdown after 1 to 3 minutes => Guralp locked; after 15 minutes => Guralp not locked)

If you hear multiple pings over a few seconds, try <RNG>, will allow Range if done. Will not allow Range if not complete.

- assessment: Guralp: (✓) locked ( ) not locked
- ranges 975

(do multiple ranges to see if OBS is moving or stationary)

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WS74 WHOI OBS ID 585

Release/burn (Burn 1 code)# Edgetech#1 ***Edgetech 8011M***

- send Burn 1 command *<CMD>-[Burn 1 #]-<<GRD>+<ENT>>*
- UTC time 01:02:56

confirm reply, # pings 8, period (s) 1 #1-#7 double

- time of last ping (second of the minute) ____

(~8 or 15 min. cycle, with 1 ping/minute expected)

- # burning pings/minutes (tally marks)

Note time of double pings if hear. May be off sea floor.

Hear double pings? all UTC Time: ____

- burn shutdown confirmation, # pings ____, period (s) ____

Set range to 10 s repeat, if not set via

<MENU> - <Range Setup>-<More Options>-<repetitive rate>

Set repetitive range: <RNG><M/R>

- ranges 932 m

- if repeat necessary, UTC time ____
- send Burn 1 command, confirm reply, # pings ____, period (s) ____
- time of last ping (start of 15 minute burn) ____
- # burning pings/minutes ____

Hear double pings? ____ UTC Time: ____

- burn shutdown confirmation, # pings ____, period (s) ____

Set repetitive range: <RNG><M/R>

- ranges ____

- if repeat necessary, UTC time ____
- send Burn 1 command, confirm reply, # pings ____, period (s) ____
- time of last ping (start of 15 minute burn) ____
- # burning pings ____ # mins ____

Hear double pings? ____ UTC Time: ____

- burn shutdown confirmation, # pings ____, period (s) ____

Set repetitive range: <RNG><M/R>

- ranges ____

Track package during ascent

- estimated rise-time duration (min) 30, est. rise-rate (m/min) ____
- estimated liftoff time (UTC) 01:02
- estimated surface time (UTC) 01:32
- contact bridge and let them know ETA at surface: (✓) done ( ) not done

→ notify Bridge if there is a change to the ETA

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WS74 WHOI OBS ID 585

Notes during package ascent

Every ping was a double ping, and there was no consistent period. At ~01:20 the ranges got deeper and plateaued around 850 m, so we began looking

Recover

- Novatech radio received, UTC time 01:38:00 (approximate) - visual sight, UTC time 01:39:10
- on board, UTC time 02:03

OBS on deck

- Novatech flasher working(Y/N) N/A - Novatech radio working(Y/N) Y

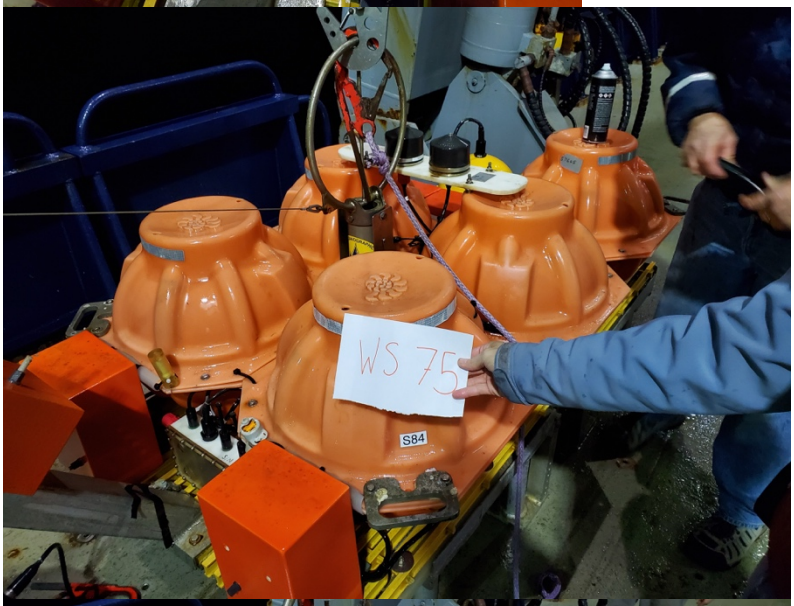
OBS condition

- stop EdgeNmea logging program (^C) ✓
- restart ship acoustics ✓ - confirm next station with bridge _____

UW Temperature Sensor S/Ns

Antares: — Iceland: 59413 Tidbit1: 20233123 Tidbit2: 20233084

WS75 – WHOI S84 08/31/2019



AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name WS75 WHOI OBS ID S84

Surveyed OBS location 54. ~~02.2993~~ 10.7778 160 55.4145 Water depth (m) 1109

Novatech radio freq. (MHz) 154.585. Est. Rise Time: 06.

Using WHOI ID S## :

Edgetech#1 35793. Tx freq 11 kHz / Rx freq 11.5 kHz

enable 513652 disable 513671

Burn 1 532423 Burn 2 532446 option 513700

Transducer (e.g. Hull) _____

1 mi out: Start range tracking program ***EdgeNmea_Universal_0.7.py -G19200 -e23 -g24***

On PC, up-arrow or re-type command for vers. 7. Enter data as above. Comment: Your Initials

- file name (e.g. MGL1907_<stn_name>_<obs_id>…) MGL1907-S84-WS75-20190831-102155.txt

Confirm Ship's Position Conforms to Station Location: (✓) yes (__) no

- turn on RS232 output in 8011M deck unit

Disable ship acoustics (Multibeam, Knudsen, ADCP, etc) (✓) done

Enable acoustics:, check sensor (Guralp) status, Edgetech#1 ***Edgetech 8011M***

- send enable command: *<CMD>-[enable #]-<ENT>*
- UTC date 08.31.2019
- UTC time 10:27:46
confirm reply: # pings 14, period (s) 0.5
(more than 8 pings = Guralp ready, fewer than 8 = not ready)
- if repeats necessary
- UTC time _____
  - record repeated enable commands sent _____
- ranges: *<RNG>-<RNG>* 1147, 1143
- assessment: Guralp: (✓) ready (__) not ready

Lock Guralp (Burn 2 command), Edgetech#1 ***Edgetech 8011M***

- send Burn 2 command *<CMD>-[Burn 2 #]-<<GRD>+<ENT>>*
- UTC time 10:29:34
confirm reply, # pings 111, period (s) ___
- time of last reply ping (sec. of the minute) 34.00 (roughly)
(this can take up to 15 minutes, but may be less. End of locking may have 7 pings – 1 sec apart)
- # burning pings/minutes (count/tally)_____
- # burning pings/minutes _____
- burn shutdown confirmation, # pings _____, period (s) ___
(shutdown after 1 to 3 minutes => Guralp locked; after 15 minutes => Guralp not locked)
If you hear multiple pings over a few seconds, try <RNG>, will allow Range if done. Will not allow Range if not complete.
- assessment: Guralp: (__) locked (__) not locked
- ranges 1122, 1122, 1120
(do multiple ranges to see if OBS is moving or stationary)

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name W575 WHOI OBS ID 584

Release/burn (Burn 1 code)# **Edgetech#1** ***Edgetech 8011M***
- send Burn 1 command *<CMD>-[Burn 1 #]-<<GRD>+<ENT>>*
- UTC time 10:46:18 32.
confirm reply, # pings 15 ~~1 1 1~~ 14+4, period (s) ___
- time of last ping (second of the minute) ___
(~8 or 15 min. cycle, with 1 ping/minute expected)
- # burning pings/minutes ___
Note time of double pings if hear. May be off sea floor.
Hear double pings? ? UTC Time: ?
- burn shutdown confirmation, # pings ___, period (s) ___
Set range to 10 s repeat, if not set via
<MENU> - <Range Setup>-<More Options>-<repetitive rate>
Set repetitive range: <RNG><M/R>
- ranges 2264, 1098, 1202, 1206

- if repeat necessary, UTC time 10:51:51
- send Burn 1 command, confirm reply, # pings 52:10, period (s) ___
- time of last ping (start of 15 minute burn) ___
- # burning pings/minutes ___
Hear double pings? ? UTC Time: ___
- burn shutdown confirmation, # pings ___, period (s) ___
Set repetitive range: <RNG><M/R>
- ranges 1108.

- if repeat necessary, UTC time ___
- send Burn 1 command, confirm reply, # pings ___, period (s) ___
- time of last ping (start of 15 minute burn) ___
- # burning pings ___ # mins ___
Hear double pings? ___ UTC Time: ___
- burn shutdown confirmation, # pings ___, period (s) ___
Set repetitive range: <RNG><M/R>
- ranges ___

Track package during ascent
- estimated rise-time duration (min) 37, est. rise-rate (m/min) 30 m/min
- estimated liftoff time (UTC) 0552:10
- estimated surface time (UTC) 1129:10
- contact bridge and let them know ETA at surface: (✓) done (__) not done
→ notify Bridge if there is a change to the ETA

AACSE OBS Recovery Cruise (MGL1907) Aug. 27/Sept. 12 2019

Station Name _____ WHOI OBS ID _____

Notes during package ascent

Burn 2 send out. get 40~50/min ping
Unable to confirm lock or not.
First Burn 1 send. Range result simply not moving. Try
second time.
Python script doesn't work after second try.
Reset Box after recovery.

Recover

- Novatech radio received, UTC time 11:31 - visual sight, UTC time 11:31
- on board, UTC time 11:50

OBS on deck

- Novatech flasher working(Y/N) Y - Novatech radio working(Y/N) Y

OBS condition

Looks good.

- stop EdgeNmea logging program (^C) ✓
- restart ship acoustics ✓ - confirm next station with bridge ✓

UW Temperature Sensor S/Ns

Antares: _____ Iceland: 59435 Tidbit1: 20237086 Tidbit2: 20233133