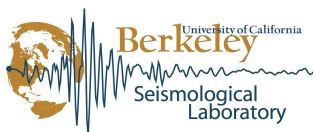


**Cruise Report
R/V Thomas G. Thompson
TN-312**



**Cascadia Initiative Year 4 Leg 3
June 22 - July 6, 2014
Newport, OR - Seattle, WA**

**Richard Allen and Maya Tolstoy
Co-Chief Scientists**



Lamont-Doherty Earth Observatory
COLUMBIA UNIVERSITY | EARTH INSTITUTE



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Executive Summary

The goals of TN-312 were to recover a total of 32 ocean bottom seismometers (OBSs) that were all deployed in 2013 as part of NSF's Cascadia Initiative (CI). This is the 3rd cruise of 6 associated with CI in 2014. Ten of the instruments were LDEO deep water OBSs, twenty were LDEO Trawl Resistant Mounts (LDEO-TRM), and two were WHOI OBSs. The 10 LDEO-OBSs were all recovered successfully by sending an acoustic release command on arrival causing them to release their anchor and float to the surface where they were recovered with the ship's crane. Of the 20 LDEO-TRMs, 14 had pop-up buoys with acoustic releases designed to bring a line to the surface so the TRM could be winched on board. The pop-up worked for 12 of the instruments. There was no acoustic response from one and the other responded but did not appear at the surface and responded with a 'tilted' code (meaning the instrument was at angle of $> 45^\circ$). The non-communicating TRM (J49C) was recovered with an ROV Jason dive. At the site of the other (FN15C), Jason discovered an uncharted shipwreck and we concluded the TRM was in the middle of the wreck and therefore unrecoverable. Of the 6 TRMs without a pop-up, all were recovered with Jason as intended. Finally, the 2 WHOI-OBSs (J29C, J45C) had lost acoustic communication during deployment and therefore needed to be "rescued" with a Jason dive. In both cases a sea-floor search found the instruments and they were recovered successfully. In summary, 31 of the target 32 instruments were recovered, 1 was lost to a shipwreck.

The shallow water LDEO-TRMs are a relatively new type of instrument, this being only their third deployment. Recovery of these large, heavy instruments is challenging, requiring an ROV (Jason in this case) for some, and a heave-compensated winch for all. The recovery this year went relatively smoothly thanks to a fully functional heave-compensated winch and the use of a line-spool elevator that was attached to the deeper TRMs by Jason and then released to the surface.

An initial assessment of the LDEO deep-water instrument data shows that 8 of the 10 OBSs have good data and 2 flatlined. Of the 20 TRMs, 16 have good data for the majority of the duration, 3 had one component of data only, 1 was lost.

While underway we also collected EM302 Multibeam, 3.5 kHz sub-bottom profiler and ADCP data at all times except when holding station. Additionally we were able to collect several carbonate samples from the sea floor.

All data, including the seismic data, underway data, and video and stills from ROV Jason, are immediately openly available.

The cruise participants included 7 undergraduate and 3 graduate students who participated as watch standers and assisted the OBS team as needed. All gained at-sea experience in marine geophysics. Their experience is cataloged in a daily video blog that has had approaching 1000 views:

<http://www.youtube.com/playlist?list=PLaLpP50ifUEiz1cLei4aNZNfS4wtGihey>

Captain & Crew R/V Thompson:

Captain: Russell DeVaney
Chief Engineer: Paul Morrissey
Chief Mate: Christine Klimkowski
2nd Mate: Bruce Barnaby
3rd Mate: Damien Casken
1st Engineer: James T. Swanton
2nd Engineer: Michael Koch
3rd Engineer: David Bartel
Steward: Sarah Wicker
2nd Cook: India M. Grammatica
Mess Terence Singerline
AB Paul Benecki
AB Pamela Blusk
AB Brian Clampitt
AB Michael Hansen
AB Thomas Wicker
OS Michele Barutha
Oiler Kimberly Gardner
Oiler William Kinnear
Oiler Scott Myers
Oiler Mario Yordan
Crew Intern Talalelei Tulafono
Crew Intern: Matthew Carlsen

Science Party:

Co-Chief Scientists:

Richard Allen (UC Berkley)
Maya Tolstoy (LDEO)

Marine Tech

Jim Postel (UW)
Steve Jalickee (UW)

OBS Team:

Andrew Barclay (LDEO)
Carlos Bercerril (LDEO)
Ted Koczynski (LDEO)
Walt Masterson (LDEO)
Harvey Tan (LDEO)
Yen Joe Tan (LDEO)

ROV Jason Team:

Tito Collasius (WHOI)
Korey Verhein (WHOI)
Akel Kevis (WHOI)
Joshua Erick (WHOI)
James Pelowski (WHOI)
Robert Elder (WHOI)
Casey Agee (WHOI)
Frederick Denton (WHOI)
Scott Hansen (WHOI)
Scott McCue (WHOI)

Graduate Students:

William Hawley (UC Berkley)
Tarini Bhatnagar (LDEO)

Undergraduate Students

Una Miller (U. Washington)
Danny Hertel (UC Berkeley)
Chris Jaeger (UC Berkeley)
Voon Hui Lai (UC Berkeley)
Brenda Luna (UC Berkeley)
Weihan Liu (UC Berkeley)
Robert Martin-Short (Imperial)

Navy Representative

Kurt Caviggia (SAIC)

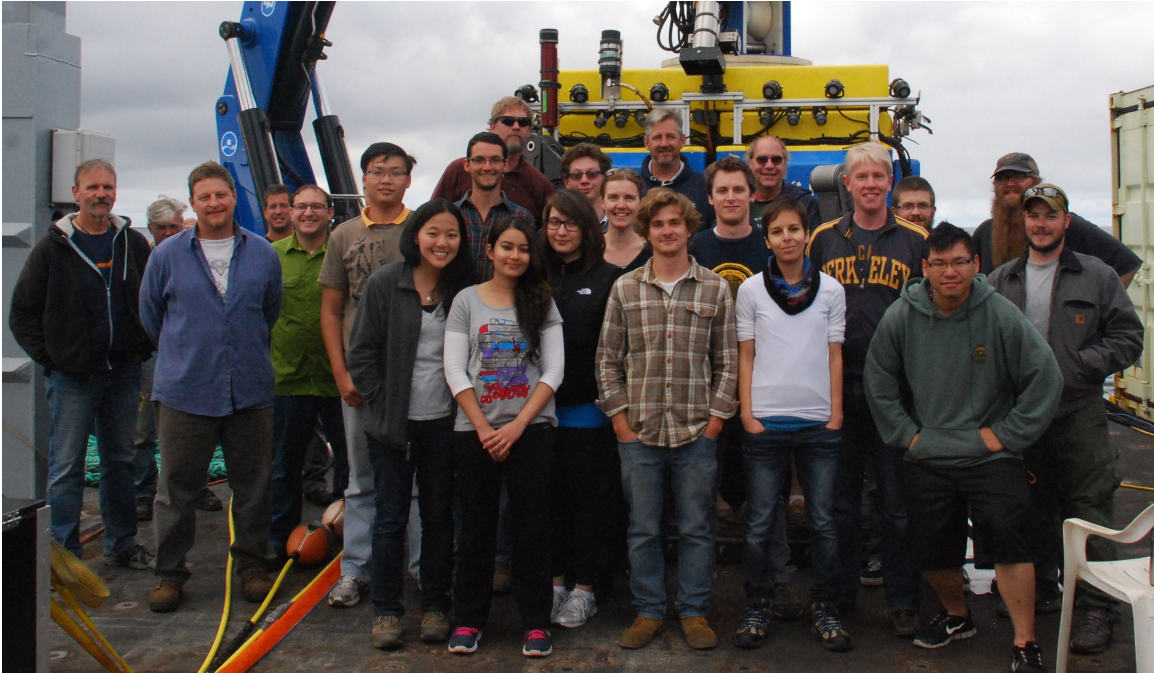


Figure 1. Science party for TN-312 on the R/V Thomas G Thompson

1) Introduction

Leg TN-312 aboard the R/V Thomas G. Thompson was the third 2014 leg of the Cascadia Initiative (CI), a community experiment funded by the National Science Foundation. This cruise focused on recovery of instruments deployed for the 3rd year of the CI deployment. The same instruments will be deployed again later in 2014 to record data for the final year of the experiment. For more information on the CI see <http://cascadia.uoregon.edu/CIET/>.

Objectives for the cruise were to recover 32 ocean bottom seismometers (OBSs) (Fig. 2, Table 1.). Ten were “regular” LDEO-OBS (deep water) instruments, 20 were shallow water Trawl Resistant Mount (LDEO-TRMs) instruments, and 2 were deep water WHOI-OBS instruments. All were deployed during 2013 and had been on the sea floor for approximately one year. The TRMs are of two kinds. The shallower sites (14 total) have pop-up buoys that are designed to bring a line from the TRM to the surface so that the instrument can be winched on board with a heave-compensated winch. Six of the TRMs were in deeper water meaning that the pop-up buoy approach was not possible. ROV Jason was on board to assist with these recoveries. The approach was to use Jason to first locate the TRM, and then drop an elevator to the sea bed with a line spool attached. The end of line spool was attached to the TRM by ROV Jason and then the elevator was released to return to the surface with the line. ROV Jason and Medea were recovered and the TRM could then be winched on board as with the pop-ups.

The two WHOI-OBS instruments lost acoustic communication during deployment in 2013 meaning that their condition or exact location on the sea floor were unknown. Having ROV Jason on board made it possible to attempt to “rescue” these instruments. In this case, a search had to be mounted for the instrument as its sea-floor location was not known, only the sea-surface drop location. A description of the search plan is included in the daily log for site J29C below. Once found, a float pack was dropped to the OBS on weights. The floats were attached to the OBS by Jason, and the weights released returning the OBS to the surface beneath the float pack.

Underway data. We collected 12 kHz EM302 multibeam, 3.5 kHz Knudsen sub-bottom profiler, and adcp data while we were underway. These data are not featured in this cruise report, but are available through R2R. As all data collected are part of a community experiment all these data are considered open immediately. See Fig. 3 for track information.

At-sea experience for students. A total of 10 students were on board the R/V Thompson for this cruise. Six were undergraduates participating in a research experience class at UC Berkeley. The class consisted of several meetings during the previous semester to inform the students about the science objectives of the Cascadia Initiative and the cruise, and then participation in the cruise. One undergraduate, from the University of Washington, was part of the “Apply to sail” program run by the CI. A total of three graduate students also participated, one from UC Berkeley and two from Columbia. However, one of the Columbia graduate students was on board specifically as a member of the LDEO OBS team. All the other students participated as watch standers and assisted with various other activities during the cruise. They also prepared a popular daily video blog detailing various aspects of cruise life as well as the science objectives of the CI. The blog can be seen at <https://www.youtube.com/playlist?list=PLaLpP50ifUEiz1cLei4aNZNfS4wtGihey>.

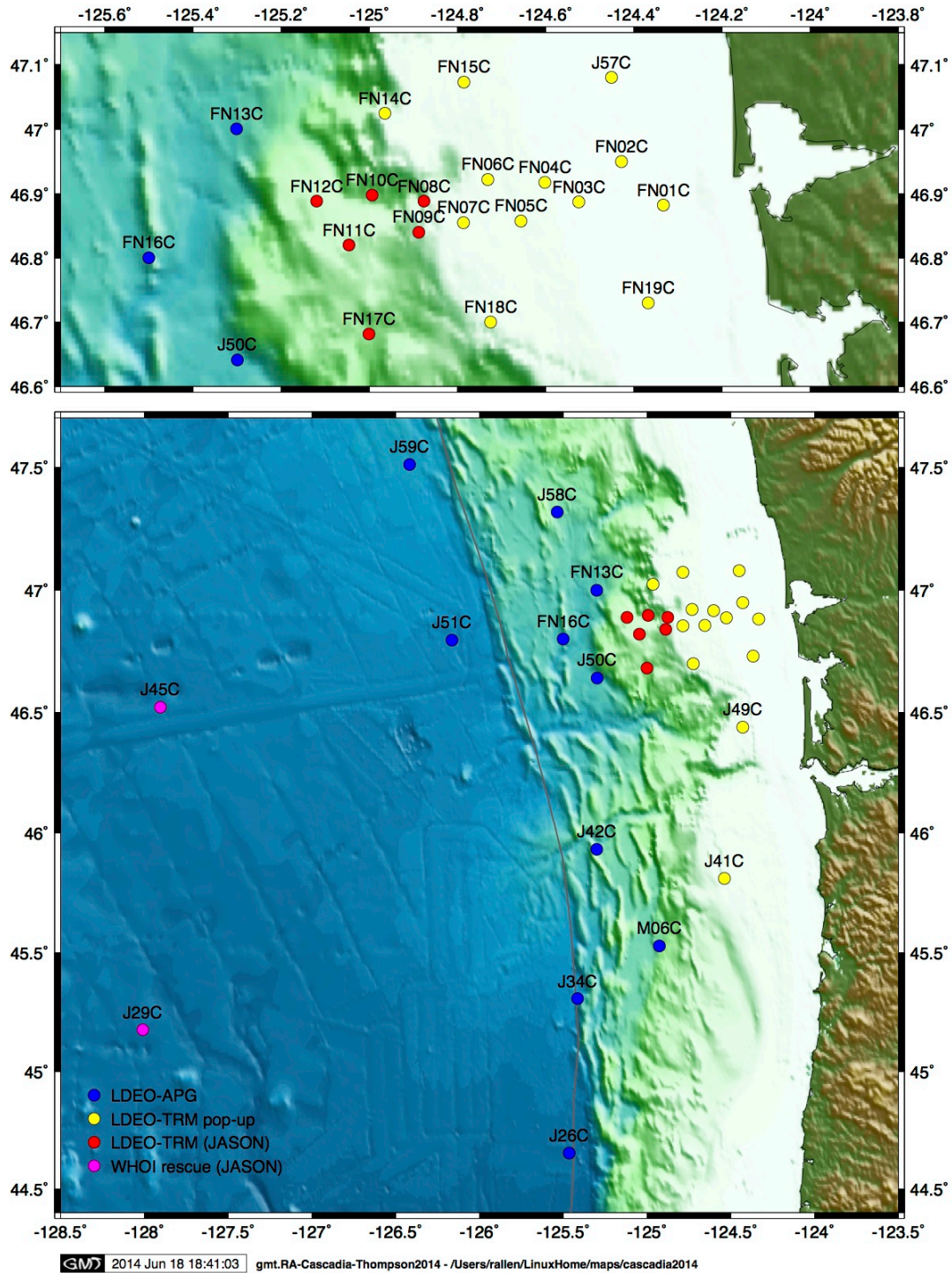


Figure 2. Map of the cruise region showing all OBS instrument sites visited. Sites are color-coded by instrument and recovery type.

Table 1. Locations of all instrument sites visited and intended activity. For LDEO instruments (blue, yellow, red) all locations are the survey location determined at deployment. For the 2 WHOI instruments (purple) the locations are those determined when they were located on the sea-floor during this cruise.

Station	Latitude	Longitude	Water depth (m)	Activity
FN01C	46.88225	-124.33334	53	recover LDEO-TRMp
FN02C	46.94970	-124.42795	67	recover LDEO-TRMp
FN03C	46.88717	-124.52514	93	recover LDEO-TRMp
FN04C	46.91749	-124.60133	104	recover LDEO-TRMp
FN05C	46.85749	-124.65557	123	recover LDEO-TRMp
FN06C	46.92205	-124.73127	137	recover LDEO-TRMp
FN07C	46.85537	-124.78604	158	recover LDEO-TRMp
FN08C	46.88874	-124.87605	176	recover LDEO-TRM
FN09C	46.84022	-124.88717	198	recover LDEO-TRM
FN10C	46.89809	-124.99346	811	recover LDEO-TRM
FN11C	46.82048	-125.04544	619	recover LDEO-TRM
FN12C	46.88868	-125.11897	656	recover LDEO-TRM
FN13C	47.00045	-125.30105	1764	recover LDEO-APG
FN14C	47.02489	-124.96416	173	recover LDEO-TRMp
FN15C	47.07337	-124.78504	124	recover LDEO-TRMp
FN16C	46.80049	-125.50013	1728	recover LDEO-APG
FN17C	46.68162	-125.00046	1015	recover LDEO-TRM
FN18C	46.70012	-124.72481	166	recover LDEO-TRMp
FN19C	46.73011	-124.36684	72	recover LDEO-TRMp
J26C	44.65341	-125.46531	2880	recover LDEO-APG
J29C	45.17307	-128.00574	2852	rescue/recover WHOI OBS
J34C	45.30695	-125.41523	2591	recover LDEO-APG
J41C	45.81165	-124.53758	171	recover LDEO-TRMp
J42C	45.93229	-125.29909	1550	recover LDEO-APG
J45C	46.52107	-127.90473	2775	rescue/recover WHOI OBS
J49C	46.43796	-124.42783	113	recover LDEO-TRMp
J50C	46.64114	-125.29875	1931	recover LDEO-APG
J51C	46.79572	-126.16311	2626	recover LDEO-APG
J57C	47.08042	-124.45063	60	recover LDEO-TRMp
J58C	47.31778	-125.53456	1527	recover LDEO-APG
J59C	47.51109	-126.41679	2389	recover LDEO-APG
M06C	45.52872	-124.92607	1460	recover LDEO-APG

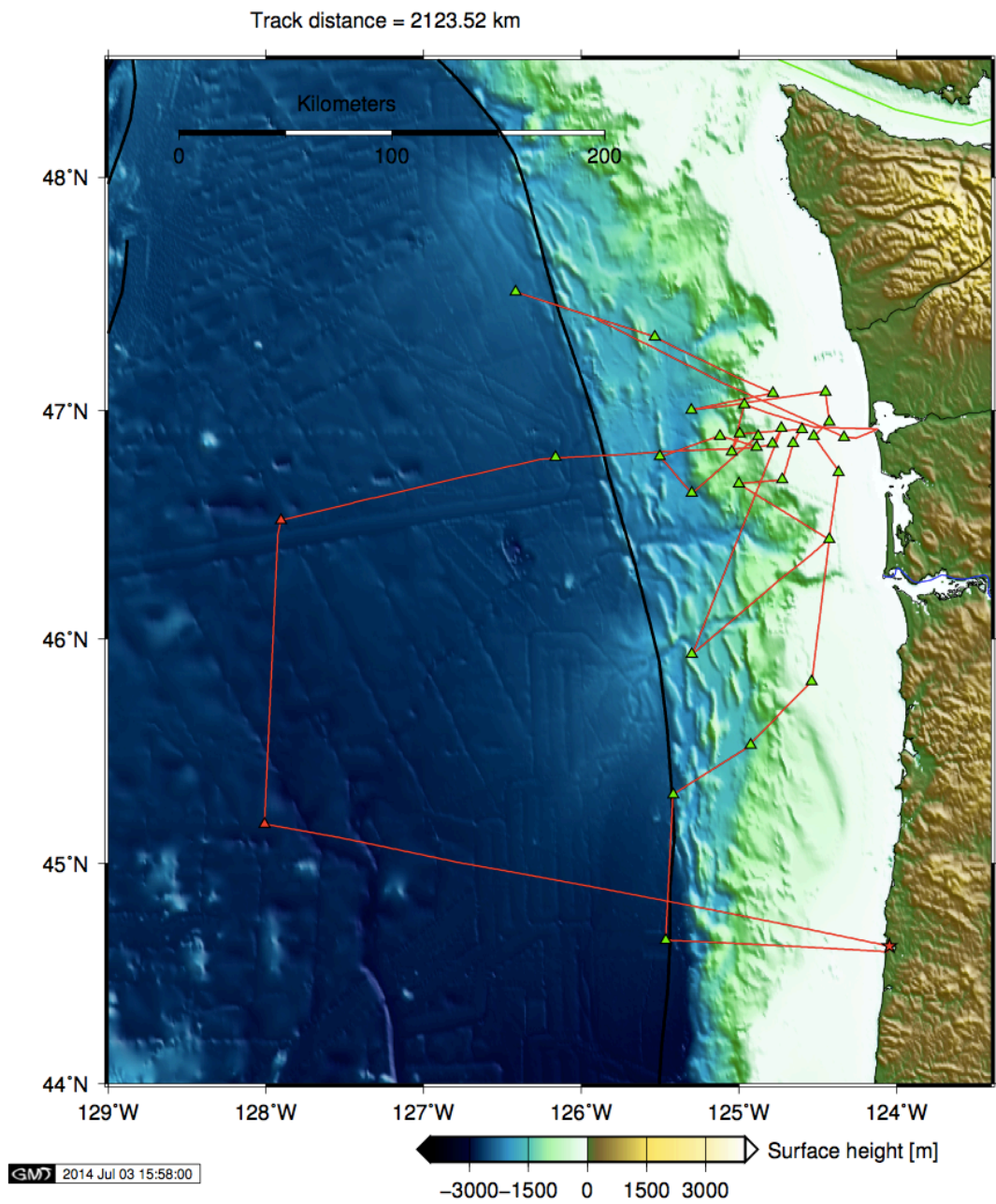


Figure 3. Ship track for TN-312. The cruise started in Newport OR, and returned to Newport OR to offload OBS instruments. The Thompson then continued on to Seattle (not shown).

2) Daily Logs

Time: Local time for the cruise was Pacific Standard Time (PST), which is 7 hours behind UTC (Z, Zulu) time.

OBS locations: The locations of all LDEO OBS and TRM instruments were determined by survey or line position (shallow water) on deployment. No new survey locations were determined and the locations given below are the locations reported on deployment. By and large the locations seemed to be confirmed as extremely accurate by Jason dives. For the two WHOI-OBSs, only drop locations were available from the deployment. The sea-floor locations of these instruments were determined once found by Jason and are reported below.

Monday June 23rd, 2014 PST

Left dock 6/24/14 00:00 Z (6/23/14 17:00 PST) heading west for J26C. The departure was delayed for 32 hours due to ongoing repairs and inspections of engines 1 and 3. Engine 2 is out of commission.

J26C: LDEO OBS recovery

Arrived on station	6/24/14 05:37 Z (6/23/14 10:37 PST)
OBS location	44.65341 -125.46531
Water depth	2880 m
Left sea floor	05:41 Z
Surfaced	06:49 Z
Rise rate	55 m/min
On deck	07:08 Z
Underway to next site	07:34 Z
Time on site	1 hr 57 min
Any issues	None
Data status	Good

Tuesday June 24th, 2014 PST

J34C: LDEO OBS recovery

Arrived on station	6/24/14 11:11 Z (6/24/14 04:11 PST)
OBS location	45.30695 -125.41523
Water depth	2591 m
Left sea floor	11:21 Z
Surfaced	12:16 Z
Rise rate	47 m/min
On deck	12:32 Z
Underway to next site	12:57 Z
Time on site	1 hr 46 min

Any issues	None
Data status	Good

M06C: LDEO OBS recovery

Arrived on station	6/24/14 15:23 Z (6/24/14 08:23 PST)
OBS location	45.52872 -124.92607
Water depth	1460 m
Left sea floor	15:23 Z
Surfaced	16:01 Z
Rise rate	38 m/min
On deck	16:17 Z
Underway to next site	16:48 Z
Time on site	1 hr 25 min
Any issues	None
Data status	Good. Approximately two minutes of drift on clock.

J41C: LDEO TRM pop-up recovery

Arrived on station	6/24/14 18:53 Z (6/24/14 11:53 PST)
TRM location	45.81165 -124.53758
Water depth	171 m
Buoy released	19:13 Z
Surfaced	19:15 Z
Buoy retrieved	19:46 Z
TRM on deck	20:57 Z
Underway to next site	21:20 Z
Time on site	2 hr 27 min
Any issues	Heave compensated winch not as smooth as last year.
Data status	Good

We next transited to **J49C** for another TRM pop-up recovery. Arriving on site at 6/25/14 00:51 Z (6/24/14 17:51 PST) an attempt was made to communicate with the TRM with no response. A second transponder was used directly over the site, again no response. We moved 200 m off station and sent a release command, no response and no buoy at the surface. The release was opened and closed several times to “wiggle” it and left in the closed position. We remained on station for another 5 minutes, no buoy. Departed the site and 02:07 Z heading for FN17C. We will return to this site for a JASON recovery later in the cruise if time allows.

FN17C: recovery of LDEO TRM (JASON Dive TN-312-J2-775)

TRM location	46.68162 -125.00046 (based on deployment survey)
TRM location (JASON)	46.68176 -125.00051 (based on JASON navigation)
Water depth	1015 m

Arrived on station	6/25/14 04:48 Z (6/24/14 21:48 PST) (TRM location)
Elevator deployed	05:41 Z (ship transits to JASON deployment site)
JASON deployed	06:37 Z (at 46.59999 -125.20003)
Medea deployed	06:42 Z
JASON on bottom	07:30 Z
-- Carbonate transit with JASON --	
JASON picks up elevator	10:45 Z
Elevator attached to TRM	11:45 Z (JASON starts up to the surface)
Burn command to elevator	12:15 Z (with JASON at 100m)
Elevator leaves sea floor	12:31 Z
Medea on deck	12:41 Z
JASON on deck	12:50 Z
Elevator on surface	13:02 Z
Elevator on deck	13:28 Z
Winch taking in slack	13:36 Z
TRM off bottom	14:02 Z
TRM at surface	15:14 Z
TRM on deck	15:18 Z
Underway to next site	16:01 Z
Time on site	11 hr 13 min (6 hr 9 min excluding carbonate search)
Any issues	Seismometer did not drop from TRM on deployment
Data status	HX2 only until 2014:022

JASON dive 775 at FN17C was extended in order to give the OBS team some time to sleep after being up for 24 hrs. Several bright spots had been observed on the side scan sonar 0.5 nm (46.67858 -124.99226) and 1.5 nm (46.67155 -125.97454) from the TRM. We therefore deployed the TRM elevator near the TRM, transited 1.5 nm to the distant bright spot, deployed JASON, and then transited back towards the TRM, passing over the second bright spot on the way.

Several rocks were observed during the transit. One was collected at 09:03 Z (46.67547 -124.98460). A second sample fragmented when picked up. A third sample was collected at 09:48 Z (46.67793 -124.99100). On inspection back at the University of Washington it was found that they were indeed carbonates.

A niskin water sample was collected at the end of the transit close to the elevator and TRM at 10:48 Z (46.68149 125.00105). These samples were collected at the request of UW scientists and delivered upon return to shore. Request for access to the samples should be directed to Paul H. Johnson (University of Washington).

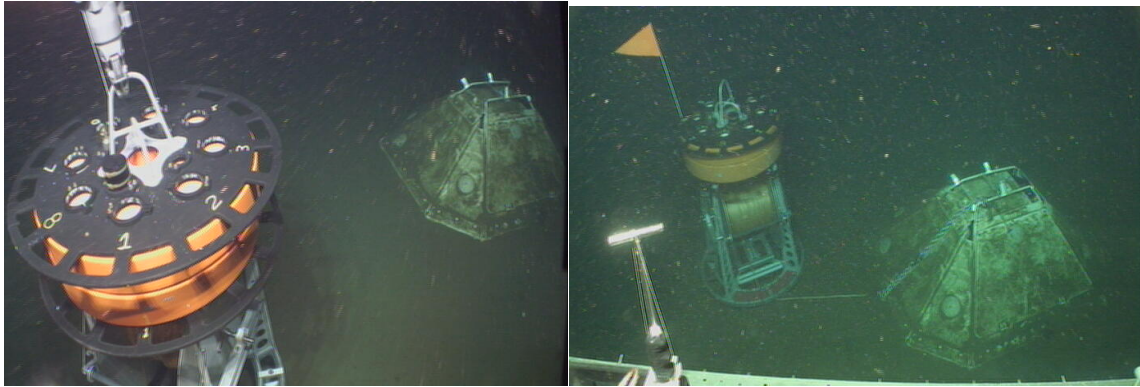


Figure 4. Left: approaching FN17C TRM with the elevator. Right: Elevator attached to TRM ready to release.

TRM recovery process with JASON. This procedure was developed during the previous year's recoveries and worked well. The elevator was deployed near the TRM. Jason then dives to bottom, locates the elevator and carries it over to TRM (Fig. 4). Jason connects the line on the spool on the elevator to the TRM (Fig. 4) and returns to the surface. A burn command is sent to the elevator, which drops its weights and returns to surface under its own buoyancy, spooling out line as it rises. Jason is recovered once the elevator has released. The elevator is then recovered and the line connected to the heave compensated winch, at which point the TRM is winched on board. We did have some issues with the burn wire not working on the elevator. For this reason, Jason would wait on the bottom to ensure that the elevator lifted off, before Jason returned to the surface.

Wednesday June 25th, 2014 PST

FN18C: LDEO TRM pop-up recovery

Arrived on station	6/25/14 17:16 Z (6/25/14 10:16 PST)
TRM location	46.70012 -124.72481
Water depth	166 m
Left sea floor	17:43 Z
Surfaced	17:44 Z
Buoy retrieved	17:55 Z
On deck	18:46 Z
Underway to next site	18:56 Z
Time on site	1 hr 40 mins
Any issues	None
Data status	HX2 only until 2014:044

FN05C: LDEO TRM pop-up recovery

Arrived on station	6/25/14 20:19 Z (6/25/14 13:19 PST)
TRM location	46.85749 -124.65557
Water depth	123 m
Release signal sent	20:47 Z
Surfaced	20:49 Z
Buoy retrieved	21:08 Z
TRM left bottom	21:20 Z
On deck	22:05 Z
Underway to next site	22:13 Z
Time on site	1 hr 26 mins
Any issues	None
Data status	good until 2014:033

Heave-compensated winch: Software update. The winch had not been performing as well as it had the previous year in that it did not appear to be paying-out line when the ship lifted on a swell. Instead it would simply slow. After communication with the UNOLS equipment pool staff it was determined that the wrong control software had been uploaded to the winch control. The correct software was obtained and installed on the winch control by the OBS team prior to recovering FN04C. The update worked and winch operation was much improved after this point.

FN04C: LDEO TRM pop-up recovery

Arrived on station	6/25/14 23:10 Z (6/25/14 16:10 PST)
TRM location	46.91749 -124.60133
Water depth	104 m
Release signal sent	23:46 Z
Surfaced	23:47 Z
Buoy retrieved	00:11 Z 6/26/14
On deck	00:54 Z
Underway to next site	01:43 Z
Time on site	2 hr 33 mins
Any issues	None
Data status	Good

During transit from FN04C to FN10C a **highly reflective area was observed on the sidescan sonar** around 6/26/14 02:00 Z (6/25/14 19:00 PSF). Approximate location 46.91705 124.61313

FN10C: Recovery of LDEO TRM (JASON Dive TN-312-J2-776)

TRM location	46.89809 -124.99346 (based on deployment survey)
Water depth	811 m

Arrived on station	6/26/14 03:26 Z (6/25/14 20:26 PST)
Elevator deployed	03:44 Z
JASON deployed	03:58 Z
Medea deployed	04:01 Z
JASON on bottom	04:39 Z
JASON picks up elevator	04:51 Z
Elevator attached to TRM	05:12 Z
JASON off bottom	05:15 Z
Burn command to elevator	05:42 Z (with JASON at 100m)
JASON going down	06:06 Z (elevator burn failed)
JASON on bottom	06:34 Z
Elevator leaves sea floor	06:42 Z
JASON off bottom	06:47 Z
Elevator on surface	07:07 Z
Medea on deck	07:27 Z
JASON on deck	07:33 Z
Elevator on deck	08:17 Z
Winching	08:27 Z
TRM on deck	10:46 Z
Underway to next site	10:58 Z
Time on site	7 hr 32 min
Any issues	None
Data status	Good until 2013:346

Thursday June 26th, 2014 PST

FN11C: Recovery of LDEO TRM (JASON Dive J2-777)

TRM location	46.82048 -125.04544 (based on deployment survey)
Water depth	619 m

Arrived on station	6/26/14 11:40 Z (6/25/14 04:40 PST)
Elevator deployed	12:09 Z
JASON deployed	12:22 Z
Medea deployed	12:26 Z
JASON on bottom	12:53 Z
JASON picks up elevator	12:57 Z
Elevator attached to TRM	13:13 Z
Burn command to elevator	13:17 Z (with JASON observing from a few meters)
Elevator leaves sea floor	13:23 Z
JASON off bottom	13:24 Z
Medea on deck	13:59 Z
JASON on deck	14:05 Z
Elevator on deck	15:06 Z
Winching	15:35 Z

TRM on deck	17:33 Z
Underway to next site	17:50 Z
Time on site	6 hr 10 min
Any issues	None
Data status	Good

FN14C: LDEO TRM pop-up recovery

TRM location	47.02489	-124.96416
Water depth	173 m	
Arrived on station	6/26/14 19:34 Z (6/26/14 12:34 PST)	
Buoy left sea floor	19:43 Z	
Surfaced	19:46 Z	
Buoy on deck	19:58 Z	
TRM on deck	21:00 Z	
Underway to next site	21:38 Z	
Time on site	2 hrs 4 mins	
Any issues	None	
Data status	Good until 2014:103	

Following this station it was decided to transit to Greys Harbor in order to drop off a student suffering from chronic sea sickness. The R/V Thompson arrived in Greys Harbor at 00:59 Z (6/27/14). The student, Weihan Liu, was transported on the R/V Thompson's rescue boat into Westport where he was met by an ambulance and a friend who lives in Washington.

FN01C: LDEO TRM pop-up recovery

TRM location	46.88225	-124.33334
Water depth	53 m	
Arrived on station	6/27/14 03:26 Z (6/26/14 20:26 PST)	
Buoy left sea floor	03:28 Z	
Surfaced	03:31 Z	
Started winching	03:47 Z	
TRM on deck	04:01 Z	
Underway to next site	04:42 Z	
Time on site	1 hr 16 min	
Any issues	None	
Data status	Good	

Friday June 27th, 2014 PST

J59C: LDEO OBS recovery

OBS location	47.51109	-126.41679
Water depth	2389 m	
Arrived on station	6/27/14 13:35 Z (6/27/14 06:35 PST)	
Burn release sent	13:41 Z	
Burn released re-sent	16:02 Z	
Left sea floor	Immediately	
Surfaced	16:52 Z	
Rise rate	53 m/min	
On deck	17:04 Z	
Underway to next site	17:20 Z	
Time on site	3 hrs 45 mins	
Any issues	Problems with release (see below)	
Data status	Good	

Problems with release: On arrival we were able to communicate with the OBS. A release command was sent and acknowledged, but the OBS did not leave the seafloor. As Jason was on board we started to prep for a Jason dive. Just prior to the Jason dive, 2 hr 21 min after the first release command was sent, a second command was sent. The OBS was then observed to lift off the sea floor immediately and recovered at the surface as usual.

J58C: LDEO OBS recovery

OBS location	47.31778	-125.53456
Water depth	1527 m	
Arrived on station	6/27/14 20:31 Z (6/27/14 13:31 PST)	
Release command sent	20:42 Z	
Surfaced	21:16 Z	
On deck	21:34 Z	
Underway to next site	21:45 Z	
Time on site	1 hr 14 mins	
Any issues	None	
Data status	Good	

FN15C: LDEO TRM pop-up: Attempted recovery (Jason dive J2-778)

Summary: FN15C not recovered: On arrival we were able to communicate with the TRM and send a release command. No buoy reached the surface. Jason dove on the site and discovered an uncharted shipwreck. Given the extensive debris field,

fishing line and low visibility presenting a real hazard to Jason, we decided to abandon the search.

TRM location	47.07337	-124.78504
Water depth	124 m	
Arrived on station	6/28/14 00:59 Z (6/27/14 18:00 PST)	
Communicating with TRM	01:08 Z	
Release command sent	01:30 Z	
Planning JASON dive	02:14 Z	
JASON in the water	03:09 Z	
Medea in the water	03:11 Z	
JASON on the bottom	03:26 Z	
JASON off the bottom	03:56 Z	
Medea out of the water	04:08 Z	
JASON out of the water	04:17 Z	
Underway to next site	04:35 Z	
Time on site	3 hrs 34 mins	
Any issues	Unable to recover TRM at FN15C	
Data status	No data due to loss of instrument	

On arrival at the site we first had difficulty communicating with the TRM. The communication codes listed on the deployment report did not match those on the manufacturer guide sheet. We were then able to communicate with the TRM using the codes on the deployment report. Once communicating, the communication was intermittent, but we did get a response indicating that the release was tilted more than 45 deg. The release command was sent and acknowledged, but the buoy did not appear on the surface. The release command was re-sent several times but still no buoy.

We then asked Jason to dive to see if we could recover the TRM. Jason was in the water in less than an hour. On the way down to the bottom (only 124 m of water) we encountered what appeared to be a line covered in biology. We proceeded carefully to the bottom finding several large objects covered in white sea anemones and many fish (Fig. 5, <http://youtu.be/KvbUEFQIkw>). As we first approached the location of the TRM from the south we came across what appeared to be a shipwreck (uncharted). Jason's navigation system suggested that the TRM was on the other side of the wreck. We then proceeded around to the east and approached the TRM location from the north. Again we found ourselves facing the wreck with large debris scattered across the seafloor (Fig. 6) and the TRM location on the other side of the debris. There was one sonar return that looked like it might be the TRM. We approached cautiously to find what looked like a toilet covered in sea anemones (Fig. 7). At this point the Jason Expedition Leader decided to end the dive on account of the hazardous environment. The Co-Chief scientists were in complete agreement with this decision. Jason and Medea returned to the surface without incident.

Our conclusion is that the TRM was likely deployed on top of the shipwreck. This was the first time that a TRM was deployed at this location. The cruise report from the deployment (Cruise OC1308B *R/V Oceanus*) states that the TRM “position was established based on [sic] community plan and to adhere to advice from fisheries.” We suspect that this location was recommended by the fisheries as it is a know hang meaning that the instrument is unlikely to get trawled. Unfortunately, the TRM appears to have been deployed on the hang/wreck.

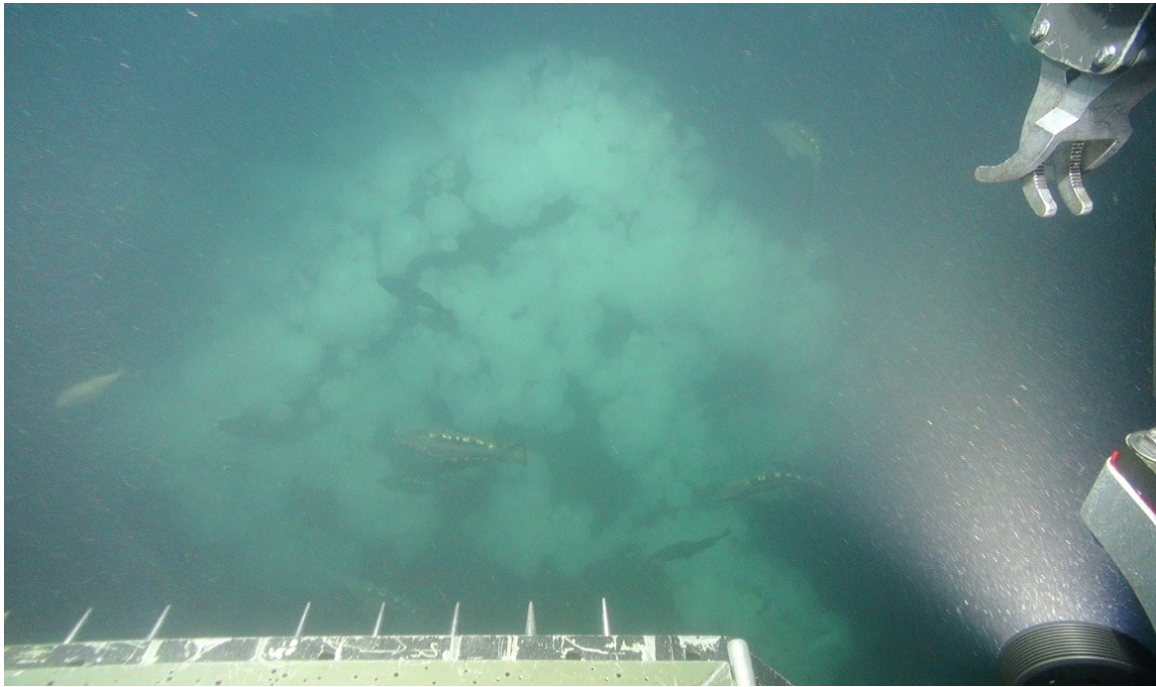


Figure 5. Debris covered in sea anemones at FN15C. We believe this to be the hull of a ship.

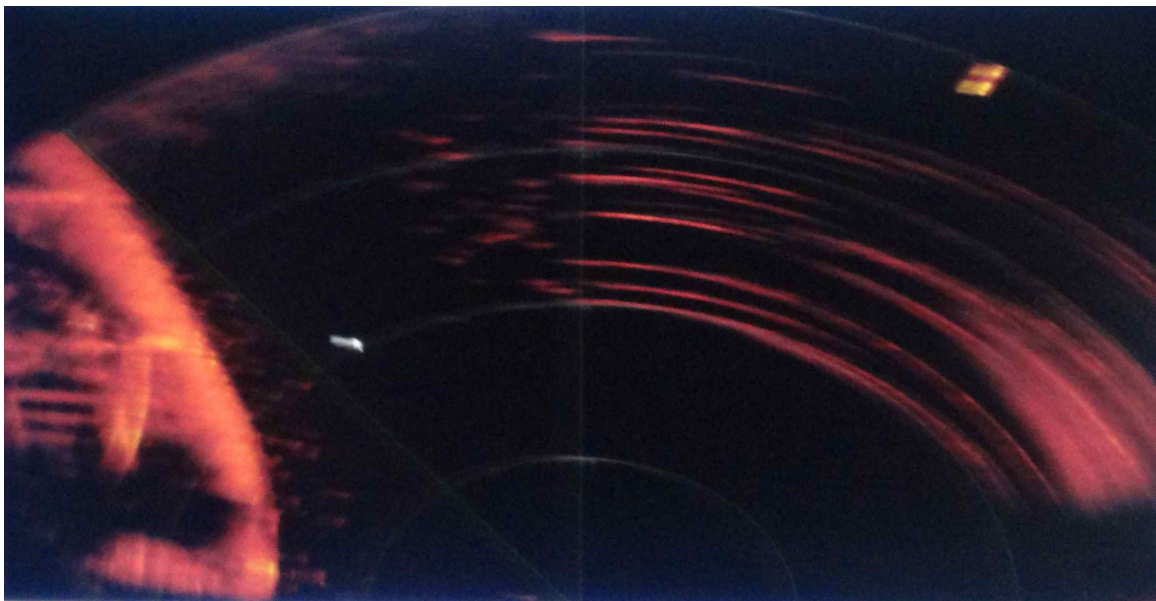


Figure 6. Screen capture of sonar at **FN15C** showing the outline of what we concluded was a shipwreck. Semi-circular rings mark 7.5 m distance lines.



Figure 7. Possible TRM target for **FN15C** identified on sonar. After investigation we concluded it was in fact a toilet. Note the toilet seat in the foreground.

FN13C: LDEO OBS recovery

OBS location	47.00045	-125.30105
Water depth	1764 m	
Arrived on station	6/28/14 06:38 Z (6/27/14 23:38 PST)	
Release command sent	06:42 Z	
Left sea floor	06:48 Z	
Surfaced	07:26 Z	
Rise rate	46 m/min	
On deck	07:40 Z	
Underway to next site	08:39 Z	
Time on site	2 hrs 1 min	

Any issues	None
Data status	Good

J57C: LDEO TRM pop-up recovery

TRM location	47.08042	-124.45063
Water depth	60 m	
Arrived on station	6/28/14 12:49 Z (6/28/14 05:49 PST)	
Pop-up released	12:59 Z	
Buoy on surface	13:01 Z	
Buoy on board	06:10 Z	
TRM on deck	14:05 Z	
Underway to next site	14:19 Z	
Time on site	1 hr 30 mins	
Any issues	None	
Data status	Good	

FN02C: LDEO TRM pop-up recovery

TRM location	46.94970	-124.42795
Water depth	67 m	
Arrived on station	6/28/2014 15:31 Z (6/28/2014 08:31 PST)	
Pop-up released	15:48 Z	
Buoy on surface	15:50 Z	
Buoy on board	16:18 Z	
TRM on deck	16:46 Z	
Underway to next site	17:15 Z	
Time on site	1 hr 44 mins	
Any issues	None	
Data status	Good	

FN03C: LDEO TRM pop-up recovery

TRM location	46.88717	-124.52514
Water depth	93 m	
Arrived on station	6/28/2014 18:04 Z (6/28/2014 11:04 PST)	
Pop-up released	18:36 Z	
Buoy on surface	18:38 Z	
Buoy on board	18:59 Z	
TRM on deck	19:24 Z	
Underway to next site	20:08 Z	

Time on site	2 hrs 4 mins
Any issues	Evidence of trawl marks on TRM (Fig. 8)
Data status	Good

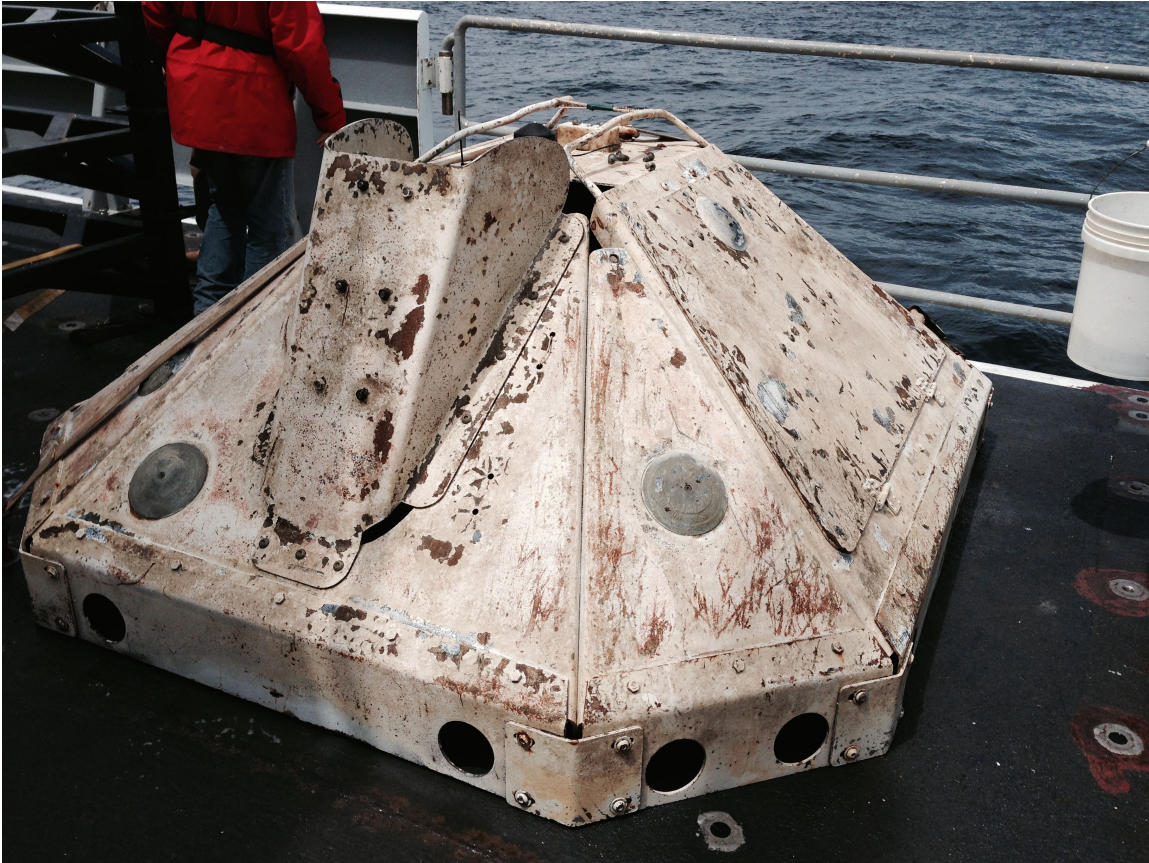


Figure 8. What are presumed to be **trawl marks** were clearly visible on one corner of the TRM recovered at **FN03C**. There was no evidence that the instrument had moved or was in any way damaged.

FN19C: LDEO TRM pop-up recovery

TRM location	46.73011	-124.36684
Water depth	72 m	
Arrived on station	6/28/2014 21:41 Z (6/28/2014 14:41 Z)	
Pop-up released	21:48 Z	
Buoy on surface	21:49 Z	
TRM on deck	22:33 Z	
Underway to next site	22:55 Z	
Time on site	1 hr 14 mins	
Any issues	Trawl marks on TRM (again) (Fig. 9)	
Data status	Good until 2014:083	



Figure 9. For the second TRM in a row, what are presumed to be **trawl marks** were clearly visible on the TRM recovered from **FN19C**. In this case the marks included deep evenly spaced gouges. Again, no evidence that the TRM had moved or of damage to the instrument itself, beyond the frame gouges.

J49C: LDEO TRM pop-up: Recovery with Jason (Dive J2-779)

Summary: This station was previously visited at 6/25/14 00:51 Z (6/24/14 17:51 PST) but we were unable to communicate with it. On our return we still could not communicate with it and had Jason dive on the site. The TRM looked like it was in good condition so the Jason manipulator was used to break the float free. Jason was then recovered. The TRM pop-up buoy was then recovered and the TRM winched from the sea floor as usual.

Note: During the process of breaking the buoy free, some of the line from the TRM also came out presenting a potential hazard in the water. In future, ***we recommend that in a situation where the pop-up buoy/line remain in the TRM, that the elevator is used to recover the TRM as at the non-pop-up TRM sites*** rather than trying to free the pop-up.

TRM location	46.43796	-124.42783
Water depth	113 m	

Arrived on station	6/29/2014 00:54 Z (6/28/2014 17:54 PST)
Jason in the water	01:37 Z
Medea in the water	01:38 Z
TRM spotted	02:25 Z
Pop-up released	02:56 Z
Jason leaves bottom	02:57 Z
Buoy spotted on surface	03:03 Z
Medea recovered	03:19 Z
Jason recovered	03:28 Z
Buoy on board	04:08 Z
TRM on deck	04:42 Z
Underway to next site	05:09 Z
Time on site	4 hrs 17 mins
Any issues	No communication with TRM – damaged transponder
Data status	Good

This station was previously visited at 6/25/14 00:51 Z (6/24/14 17:51 PST) but we were unable to communicate with it. On our return we again tried to communicate with it without success. Jason was launched with the intent of freeing the pop-up buoy so that the TRM could be recovered as normal.

Jason dove on this site previously (R/V Thompson TN-283 J2-645 7/13/2012 09:29 Z) and found what appeared to be several large rock outcrops on the sea floor to the SE of the current TRM location. On this dive we therefore approached the TRM location from the west. There was a significant swell, strong current and moderate winds making the dive challenging. Jason was in the water quickly and proceeded to the bottom. The ship then needed to reposition to be appropriately located if/when the buoy popped.

Jason approached the estimated TRM location and found the instrument immediately. Many large fish were observed on the way to the TRM. The TRM appeared to be in good condition with limited bio-fouling and no obvious reason for the loss of communication (Fig. 10). The Jason manipulators were used to try and break the release mechanism to release the buoy. This proved to be difficult to do as the entire release mechanism would get pulled up out of the TRM. Some of the line also spilled out of the TRM during this process and was pulled away from the TRM/Jason by the current (Fig. 11a).

At this point concerns were raised about the hazard that the line posed both to Jason and also to the ship. This meant that “Plan B” to drop the line elevator and use it to bring up the TRM was no longer an option unless the TRM line was cut and the current was strong enough to carry the line away so as to no longer be a hazard.

A second attempt was made to break the release mechanism. The target break point was the PVC pipe that ran through the center of the float. One Jason manipulator was used to hold the metal release while the other was used to twist and break the

PVC pipe (Fig. 11b). This approach worked and the buoy was released and spotted on the surface moments later. Medea was then recovered followed by Jason. During the Jason recovery it appears that the TRM line got caught on Jason momentarily breaking an antenna. Once Medea and Jason were on board, the pop-up buoy was recovered and the TRM was winched up as usual without incident.

An initial inspection of the TRM suggests that the transponder on top of the TRM may have flooded and this is the likely cause for loss of communication.

Recommendation for future recoveries: *The potential of a loose line in the water from the TRM presents a real hazard to recoveries. In future, we recommend using the line elevator—the same process being used for the TRMs without pop-ups—rather than trying to free the buoy.*



Figure 10. On arrival the TRM (including the release mechanism) at J49C appears to be in good condition with no obvious reason for the failure in communication.

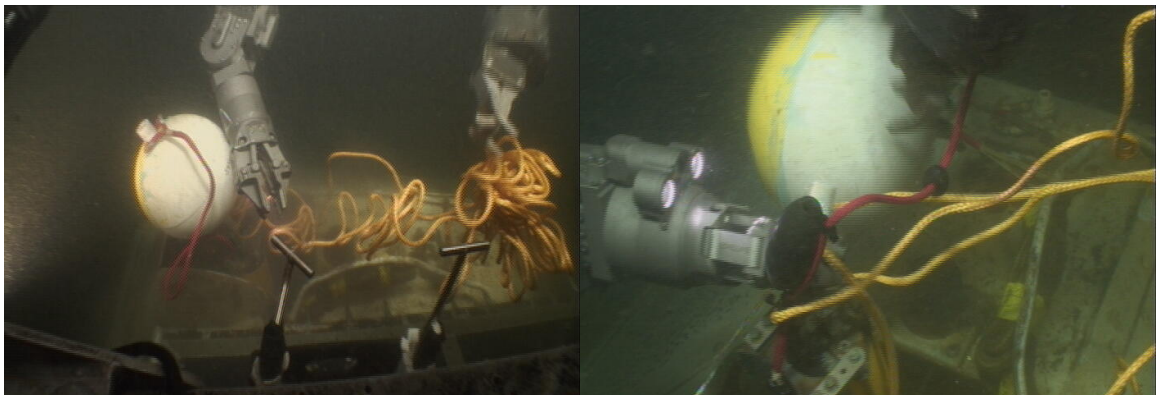


Figure 11. (a) As Jason worked to break the release at J49C some of the line spilled out of the TRM. (b) The buoy did eventually break free once the PVC pipe through the float was broken by the Jason manipulators.

Sunday June 29th, 2014 PST

J42C: LDEO OBS recovery

OBS location	45.93229	-125.29909
Water depth	1550 m	
Arrived on station	6/29/2014 09:10 Z (6/29/2014 02:10 PST)	
Release acknowledged	09:15 Z	
Left sea floor	09:21 Z	
Surfaced	09:56 Z	
Rise rate	44 m/min	
On deck	10:13 Z	
Underway to next site	10:35 Z	
Time on site	1 hr 25 min	
Any issues	None	
Data status	Good	

FN06C: LDEO TRM pop-up recovery

TRM location	46.92205	-124.73127
Water depth	137 m	
Arrived on station	6/29/2014 15:49 Z (6/29/2014 08:49)	
Pop-up released	16:01 Z	
Buoy on surface	16:03 Z	
TRM on deck	16:48 Z	
Underway to next site	17:25 Z	
Time on site	1hr 36 min	
Any issues	None	
Data status	Good, HXZ only	

FN07C: LDEO TRM pop-up recovery

TRM location	46.85537	-124.78604
Water depth	158 m	
Arrived on station	6/29/2014 17:47 Z (6/29/2014 10:47 PST)	
Pop-up released	17:55 Z	
Buoy on surface	17:57 Z	
Buoy on board	18:20 Z	
TRM on deck	19:02 Z	

Underway to next site	19:36 Z
Time on site	1 hr 11 mins
Any issues	None
Data status	Good

FN09C: LDEO TRM recovery: Jason dive J2-780 (1st attempt)

Summary: The elevator was attached to the TRM with Jason. Jason and the elevator were recovered and the winching began. Part way through the winching process the line snapped leaving ~323 m line attached to the TRM on the bottom. The line snapped where two lines had been joined with a knot to make a longer line. **Recommendation: NEVER put a knot in the spectra (orange) line as this is a point of weakness. Instead, lines should be joined with a proper splice.** We will return to this site to recover the TRM with Jason tomorrow.

TRM location	46.84022	-124.88717
Water depth	198 m	

Arrived on station	6/29/2014 20:17 Z (6/29/2014 13:17 PST)
Elevator in the water	20:30 Z
Jason in the water	20:39 Z
Medea in the water	20:41 Z
Jason on bottom	21:03 Z
Elevator in sight	21:07 Z
Jason picks up elevator	21:10 Z
TRM in sight	21:20 Z
TRM attached to elevator	21:36 Z
Burn command to elevator	21:52 Z
Going back to elevator	22:17 Z
TRM in sight	22:56 Z
Nudged elevator	23:02 Z (to see if stuck in mud; but no lift off)
Pulled release manually	23:04 Z (elevator lifts off)
Jason off the bottom	23:05 Z
Elevator at the surface	23:10 Z
Medea out of the water	23:27 Z
Jason out of the water	23:35 Z
Elevator on deck	6/30/2014 00:17 Z
Line to TRM snapped	00:48 Z
Underway to next site	01:26 Z
Time on site	5 hrs 9 mins

In this case the TRM was in a fine condition and the Jason dive went well to attach the line on the elevator to the TRM. Jason, Medea and the elevator were then recovered and the line from the elevator (attached to the TRM) was attached to the heave compensated winch.

The winching process then began. This site is at ~200 m depth. In order to have a line on the elevator long enough (need ~2 times the depth to allow for the current drag) two lines were tied together with a knot. As the line was being winched in, when it was just starting to take a load, the line snapped at the knot. This happened previously with the same spectra (orange) line during TRM recovery in 2012. For previous recoveries the lines were coupled with a proper splice. **In future, lines should only be coupled with a splice.**

The length of the line that remained in the water attached to the TRM was 250m, greater than the water depth. Therefore it was unlikely that the TRM had lifted off the seabed and likely remained in good condition. (This was later confirmed by comparing Jason dive positions for both recovery attempts).

The plan developed was to return to the site tomorrow, and approach the TRM with Jason cautiously from up current. When we are confident that the current will carry the line away from Jason and the ship, then the line will be cut, given 15 minutes to drift away, and then we will proceed with a TRM elevator recovery as usual.

FN08C: LDEO TRM recovery: Jason dive J2-781

TRM location	46.88874	-124.87605
Water depth	176 m	
Arrived on station	6/30/14 01:47 Z (6/29/14 18:26 PST)	
Elevator in the water	02:04 Z	
Jason in the water	02:13 Z	
Medea in the water	02:16 Z	
Jason on bottom	02:28 Z	
Elevator in sight	02:30 Z	
Elevator picked up	02:33 Z	
Elevator next to TRM	02:39 Z	
Niskin water sample	02:39 Z (46.84204 -124.8880 depth 168 m)	
Elevator attached to TRM	02:45 Z	
Elevator released	02:48 Z	
Jason off bottom	02:50 Z	
Medea out of water	03:13 Z	
Jason out of water	03:19 Z	
Elevator on deck	03:49 Z	
TRM on deck	04:42 Z	
Underway to next site	04:58 Z	
Time on site	3 hrs 1 min	
Any issues	None	
Data status	Good	

This recovery was extremely smooth and rapidly executed with no problems.

Monday June 30th, 2014 PST

J50C: LDEO OBS recovery

OBS location	46.64114	-125.29875
Water depth	1931 m	
Arrived on station	6/30/14 07:13 Z (6/30/14 00:13 PST)	
Release sent	07:16 Z	
Left sea floor	07:21 Z	
Surfaced	08:03 Z	
Rise rate	46 m/min	
On deck	08:16 Z	
Underway to next site	08:57 Z	
Time on site	1 hr 44 min	
Any issues	None	
Data status	Good	

FN16C: LDEO OBS recovery

OBS location	46.80049	-125.50013
Water depth	1728 m	
Arrived on station	6/30/2014 09:50 Z (6/30/2014 02:50 PST)	
Release sent	10:00 Z	
Left sea floor	10:06 Z	
Surfaced	10:44 Z	
Rise rate	45 m/min	
On deck	11:02 Z	
Underway to next site	11:31 Z	
Time on site	1 hr 41 mins	
Any issues	None	
Data status	Flatlined – no data	

FN12C: LDEO TRM recovery: Jason dive J2-782

TRM location	46.88868	-125.11897
Water depth	656 m	
Arrived on station	6/30/14 13:59 Z (6/30/14 06:59 PST)	
Jason in the water	15:11 Z	
Medea in the water	15:13 Z	

Jason on bottom	15:43 Z
Niskin water sample	15:48 Z (46.88874 -125.11911 depth 641 m)
Elevator in sight	15:50 Z
Elevator in transit	15:52 Z
Elevator at TRM	15:59 Z
Elevator attached to TRM	16:28 Z
Elevator off bottom	16:31 Z
Jason off bottom	16:37 Z
Elevator on surface	16:55 Z
Medea out of water	17:20 Z
Jason out of water	17:29 Z
Elevator on deck	18:20 Z
TRM on deck	20:25 Z
Underway to next site	20:57 Z
Time on site	6 hrs 58 mins
Any issues	None
Data status	Good

The Jason dive for this recovery went very smoothly without any problems, lasting a total of 2 hrs 18 mins. It then took 51 mins to get the elevator on board, and 2 hrs 5 mins to winch up the TRM (from 656 m depth).

FN09C: LDEO TRM recovery: Jason dive J2-783 (2nd attempt to recover)

Summary: We returned to this site after the line snapped during the winch process on our first attempt. The line was cut free of the TRM by Jason. The TRM was then recovered as usual.

TRM location	46.84022	-124.88717
Water depth	198 m	
Arrived on station	6/30/14 21:54 Z (6/30/14 14:54 PST)	
Jason in the water	22:32 Z	
Medea in the water	22:39 Z	
Jason on bottom	22:56 Z	
TRM spotted	23:27 Z (with line stretched out to north)	
Line cut	23:29 Z	
Elevator deployed	23:39 Z	
Elevator found	23:45 Z	
Elevator at TRM	23:51 Z	
Elevator attached to TRM	00:06 Z (7/1/14)	
Pause for dinner	00:06 Z	
Elevator released	00:26 Z	
Medea out of water	00:55 Z	
Jason out of water	01:05 Z	

Elevator on board	02:21 Z
TRM on deck	03:02 Z
Underway to next site	03:24 Z
Time on site	5 hrs 30 mins
Any issues	None, on 2 nd attempt
Data status	Not yet transcribed

We returned to FN09C to recover the TRM with Jason. During our 1st attempt (yesterday) the line snapped while attempting to winch up the TRM. On this dive we approached the TRM from the northeast in order to approach the TRM from up current. Jason traversed ~200 m to the TRM to find the line stretched out to the north and low in the water. The line was cut and was pulled away from JASON and the ship by the current (which was strong in the lower 50 m of the water column).

The line elevator was then deployed from the ship, located and carried to the TRM by Jason, attached to the TRM and the pin pulled to release the weights and return the elevator to the surface. Medea and Jason were then recovered followed by the elevator and the TRM without incident.

This was our last TRM recovery. Hallelujah. AMEN

Tuesday July 1st, 2014 PST

J51C: LDEO OBS recovery

OBS location	46.79572	-126.16311
Water depth	2626 m	
Arrived on station	7/1/2014 07:47 Z (7/1/2014 00:47 PST)	
Release command sent	07:55 Z	
Left sea floor	08:02 Z	
Surfaced	09:06 Z	
Rise rate	41 m/min	
OBS on deck	09:26 Z	
Underway to next site	09:58 Z	
Time on site	2 hrs 11 mins	
Any issues	Sensor did not drop	
Data status	Flatlined – no data	

J45C: WHOI OBS rescue: Jason Dive (J2-784)

Summary: Communication was lost with this OBS during deployment (8/3/2013 01:34 Z, Cruise OC1307C R/V Oceanus) meaning that it could not be recovered by sending an anchor release command. Jason dove on the drop location and,

remarkably, the OBS was found several meters from the drop location. A float pack was dropped from the ship, attached to the OBS by Jason, and released to return the OBS to the surface.

OBS drop location	46.52092	-127.90483
OBS sea-floor location	46.521066	-127.904731, 18 m at 24 deg from drop
Water depth	2775 m	

Arrived on station	7/1/2014 16:07 Z (7/1/2014 09:07 PST)
Jason in the water	16:37 Z
Medea in the water	16:39 Z
Jason on bottom	18:16 Z
OBS found	18:28 Z (yes, we are that good)
Float pack on bottom	19:50 Z
Float pack next to OBS	19:58 Z
Float pack attached	20:07 Z
Left sea floor	20:23 Z
Jason off bottom	20:43 Z
OBS on surface	21:03 Z
Rise rate	69 m/min
OBS on deck	21:24 Z
Medea out of water	22:15 Z
Jason out of water	22:23 Z
Underway to next site	22:32 Z
Time on site	6 hrs 25 mins
Any issues	Transponder not working
Data status	Unknown

Prior to the arrival at the site we attempted to assess the likely drift of the two WHOI OBS instruments based on the known drifts of the other WHOI OBSs deployed at the same time. Most of the instruments drifted less than 100m. One drifted a little more than 300 m. There was no discernable pattern to the direction of the drift.

OBS recovery search plan: Our search plan (for both WHO-OBS sites) was as follows (Fig. 12). Dive on the drop location. Rotate Jason 360 deg once on the bottom. Then traverse a square 100 m on either side centered on the drop location. At the four corners, and at the mid-point of the 4 sides, scan 360 deg. Given that Jason's sonar can see at least 50 m ahead, and ~40 m on either side, this initial search would have found most of the WHOI-OBSs. If this search did not locate the instrument, then Jason would traverse to the corner of a 640 m by 640 m centered on the drop location. Jason would then traverse lines, separated by 80 m, to cover the area within the 640x640m box.

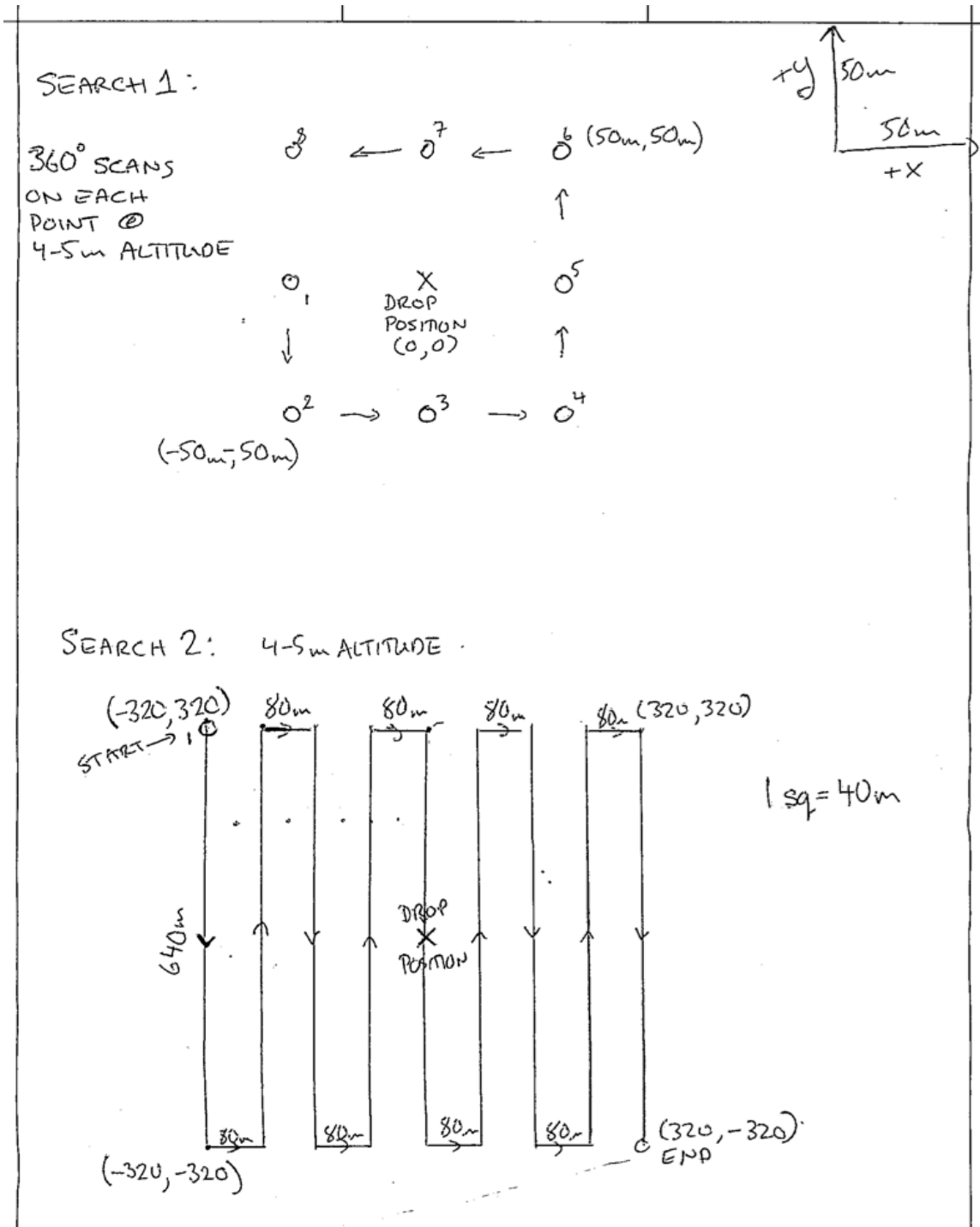


Figure 12. Two-stage Jason search plan for the two WHOI-OBSs.

In the case of **J45C**, the WHOI-OBS was located immediately, just 18 m from the drop site at a bearing of 24 deg. The sea-floor location of **J45C** was 46.521066 - 127.904731.

The instrument and seismometer appeared to be in good condition with the seismometer well buried in the sediment (Fig. 13). We aligned Jason with the long axis of the sensor that had been dropped into the mud (Fig. 14). When aligned, the heading of Jason was 192 deg.

We also found the anchor plate from the 2011/2012 WHOI-OBS deployed at this site (J45A). It was located at 46.520856 -127.904889 which was 8 m from the 2013 drop location at 212 deg also indicating very little drift for this instrument. The location of the 2011/2012 OBS anchor plate (J45A) was 26 m at a bearing of 207 deg from the 2013/2014 OBS location (J45C).

A float pack was dropped from the surface and attached to the OBS by Jason. The weights were cut from the float pack and the floats brought the OBS to the surface where it was recovered by the ships crane without incident.

Finally, the OBS team continued to try communicating with the OBS as it was rising to the surface. Once the instrument was at less than ~1000m depth, communication was possible.

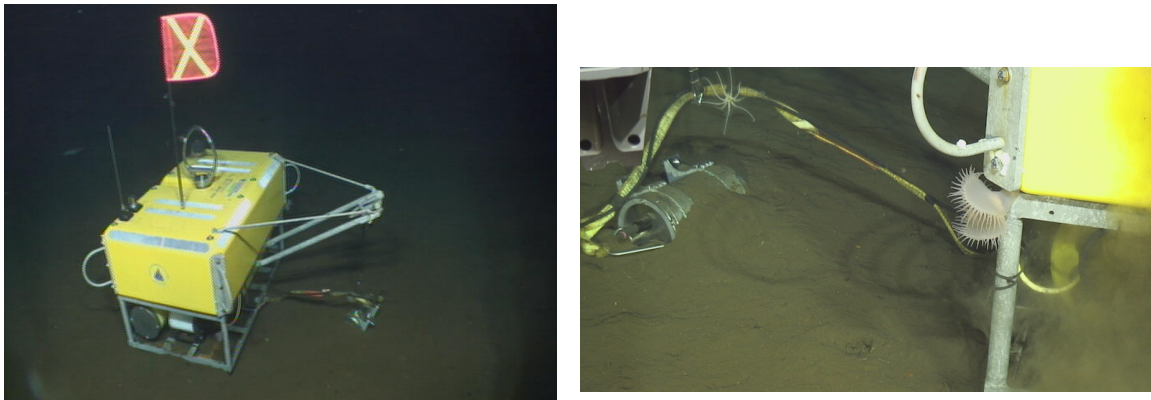


Figure 13. WHOI-OBS at J45C. Visual inspection suggested the instrument was fine and the seismometer had dropped on deployment. The sensor was well buried in the sediment.



Figure 14. Photo with Jason heading aligned with J45C.

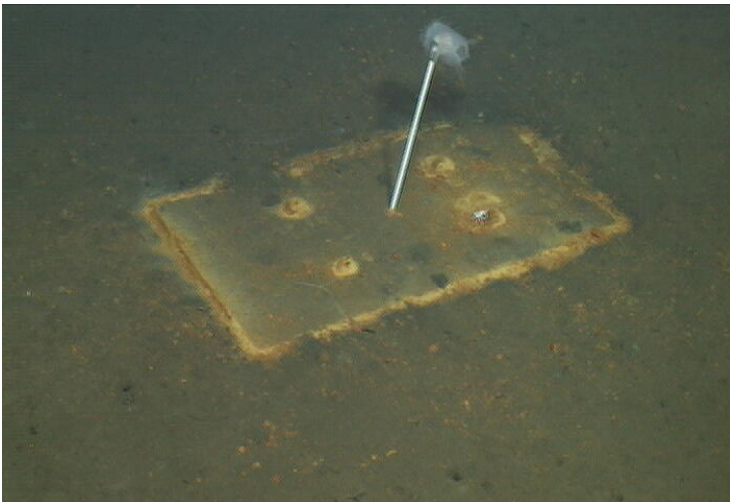


Figure 15. Anchor plate on the sea floor from J45A located just 26 m from the sea-floor location of J45C.

J29C: WHOI OBS rescue: Jason Dive (J2-785)

Summary: Successful search and rescue without incident.

OBS drop location	45.17592	-128.00848
OBS sea-floor location	45.173073	-128.005745, 382 m at 146 deg from drop
Water depth	2852 m	
Arrived on station	7/2/2014 05:20 Z (7/1/2014 22:20 PST)	
Jason in the water	05:43 Z	
Medea in the water	05:45 Z	
Jason on bottom	07:10 Z	

OBS found	18:47 Z (yes, we are that dedicated)
Float pack in water	19:06 Z
Float pack on bottom	19:41 Z
Float packed picked up	19:48 Z
Floats net to OBS	20:05 Z
Floats attached to OBS	20:10 Z
Left sea floor	20:14 Z
Jason off bottom	20:33 Z
OBS on surface	20:50 Z
Rise rate	79 m/min
OBS on deck	21:12 Z
Medea out of water	21:47 Z
Jason out of water	21:54 Z
Underway to next site	22:03 Z
Time on site	16 hrs 43 mins
Any issues	Transponder not working
Data status	Unknown

The search procedure/plan for this site was the same as described for J45C above. Unlike J45C, at J29C we had almost completed our planned search of the 640x640m box when we found the WHOI-OBS in the southeast corner of our search box (Fig. 16).

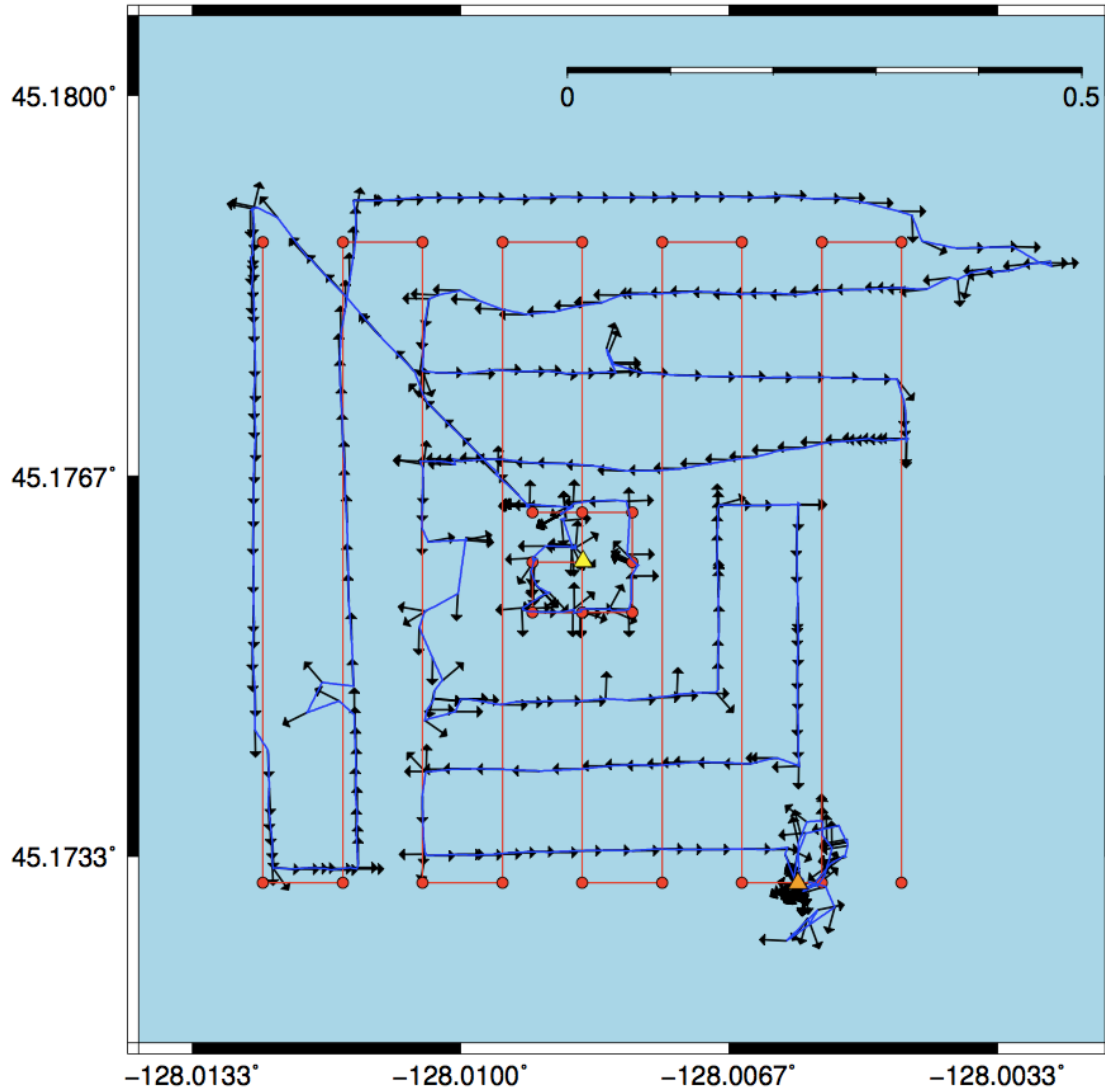


Figure 16. Planned (red) and actual (blue) search pattern for **J29C**. The yellow triangle is the OBS drop location, the orange triangle is where the OBS was found, 382m southeast of the drop location. The black arrows indicate the heading of Jason, sampled periodically. While the direction of the search paths was changed during the search (for various operational reasons, ie currents and wind), we continued to use a linear search path pattern with lines separated by 80.

After searching for 11 hrs and 37 mins the OBS was located. **J29C's location was 45.173073 -128.005745, 382 m at a bearing of 146 deg from the drop location.** The instrument appeared to be in good condition with the seismometer dropped and buried in the mud (Fig. 17). Jason's heading was again aligned with the seismometer. The long axis of the cylinder is aligned with a heading of 326°.

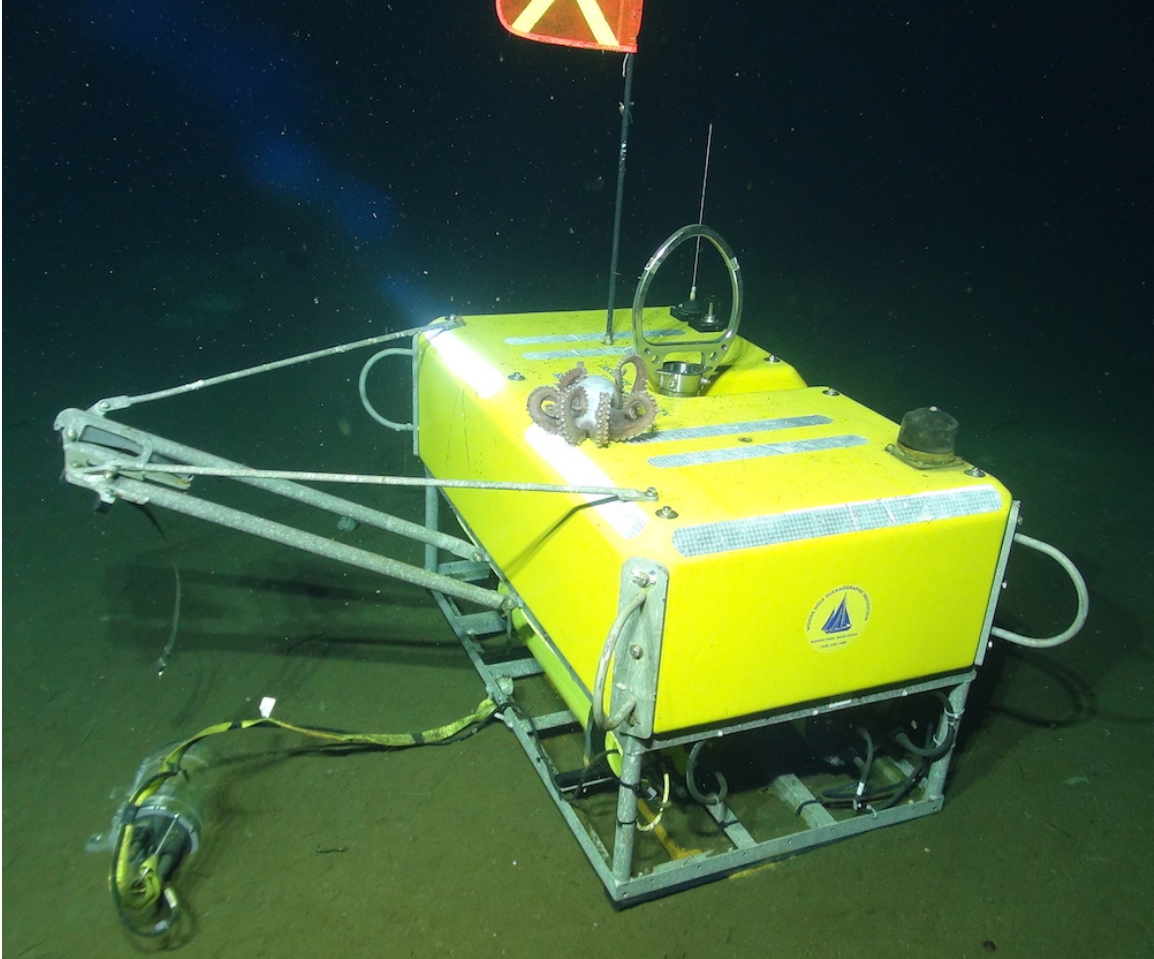


Figure 17. WHOI-OBS at J29C.

The same procedure as the previous WHOI-OBS was used to recover this instrument. A float pack was dropped from the surface, recovered, and attached to the OBS by Jason. The weights were cut from the float pack, allowing it to rise back to the surface with the OBS suspended below. Unlike J45C, we were not able to communicate with it at any stage.

Medea, Jason and the OBS were then recovered without incident.

Return to Newport, OR

Following recovery of J29C, the R/V Thompson returned to Newport OR to offload the OBS instruments. All of the recovered instruments will be redeployed later in the summer on cruises departing from Newport. By returning the instruments to Newport, it provides additional time for the OBS teams to prepare the instruments for re-deployment.

The R/V Thompson docked at the OSU dock in Newport around 6am 7/3/14. In Newport all the OBSs were offloaded and most of the Science Party disembarked. The R/V Thompson then departed later in the day returning to Seattle and the end-point of the cruise.

3. Preliminary data assessment

Table 2. Preliminary instrument performance summary. Number of days of data for each channel are shown: red=bad, green=no obvious problems, yellow=some issues, grey=non-instrumental data loss.

Site	Number of days of data				Notes
	HHZ	HH1	HH2	APG	
FN01C	301	301	301	301	
FN02C	302	302	302	302	
FN03C	302	302	302	302	Possible trawl damage
FN04C	299	299	299	299	
FN05C	154	154	154	299	Seismometer went to pieces around day 2014030
FN06C	302	0	0	302	HH1, HH2 flatlined
FN07C	302	302	302	302	
FN08C	302	302	302	0	APG didn't work
FN09C	303	303	303	303	High-drift clock (time corrections not applied)
FN10C	101	101	101	298	Seismometer stopped early
FN11C	296	296	296	296	
FN12C	301	301	301	301	
FN13C	297	297	297	297	
FN14C	189	189	189	297	Seismometer went to pieces around day 2014070
FN15C					Not recovered: on shipwreck
FN16C	0	0	0	300	All three seismometers flatlined
FN17C	0	0	148	295	Sensor didn't drop; no clock sync: HX2 OK to 2014013
FN18C	0	0	161	298	HX2 OK to 2014040; no APG time headers
FN19C	209	209	209	303	Seismometer stopped early; came back: possible trawl damage
J26C	291	291	291	291	
J34C	292	292	292	292	
J41C	299	299	299	299	
J42C	297	297	297	297	
J49C	303	303	303		No APG file header
J50C	300	300	300	300	
J51C	0	0	0	no APG	Sensor didn't drop; all three seismometers flatlined
J57C	131	131	131	no file header	Seismometer stopped 2014011
J58C	296	296	296	296	
J59C	296	296	296	296	
M06C	292	292	292	292	

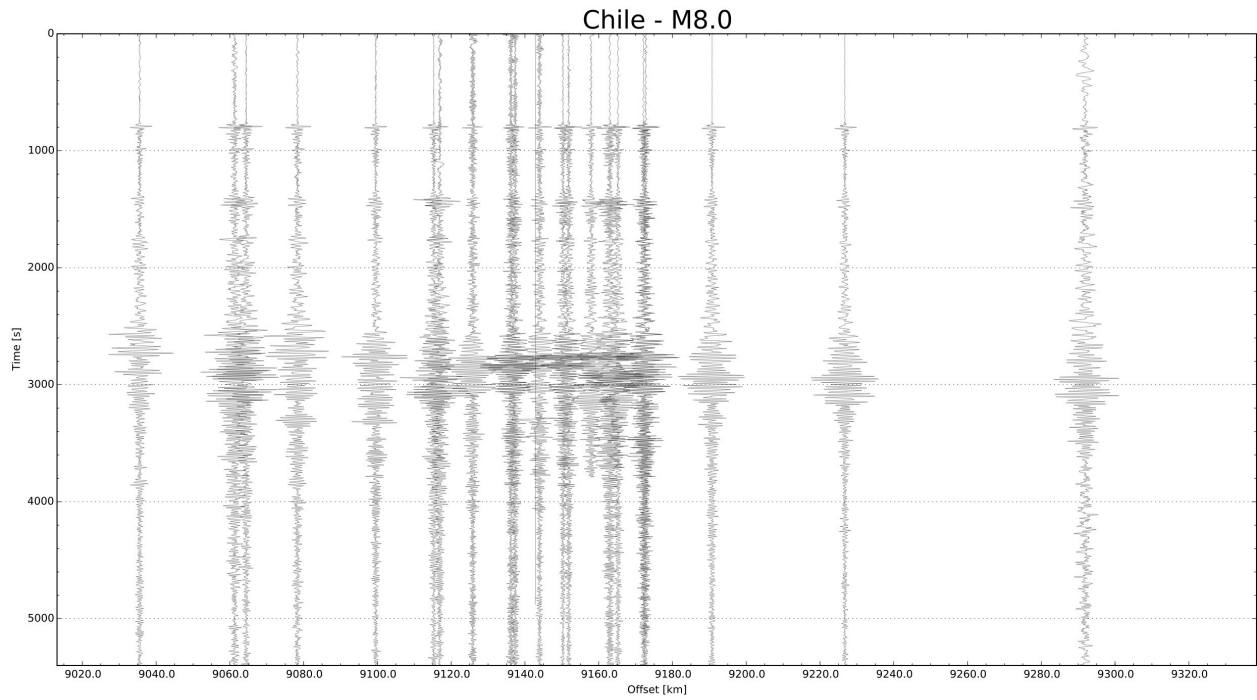
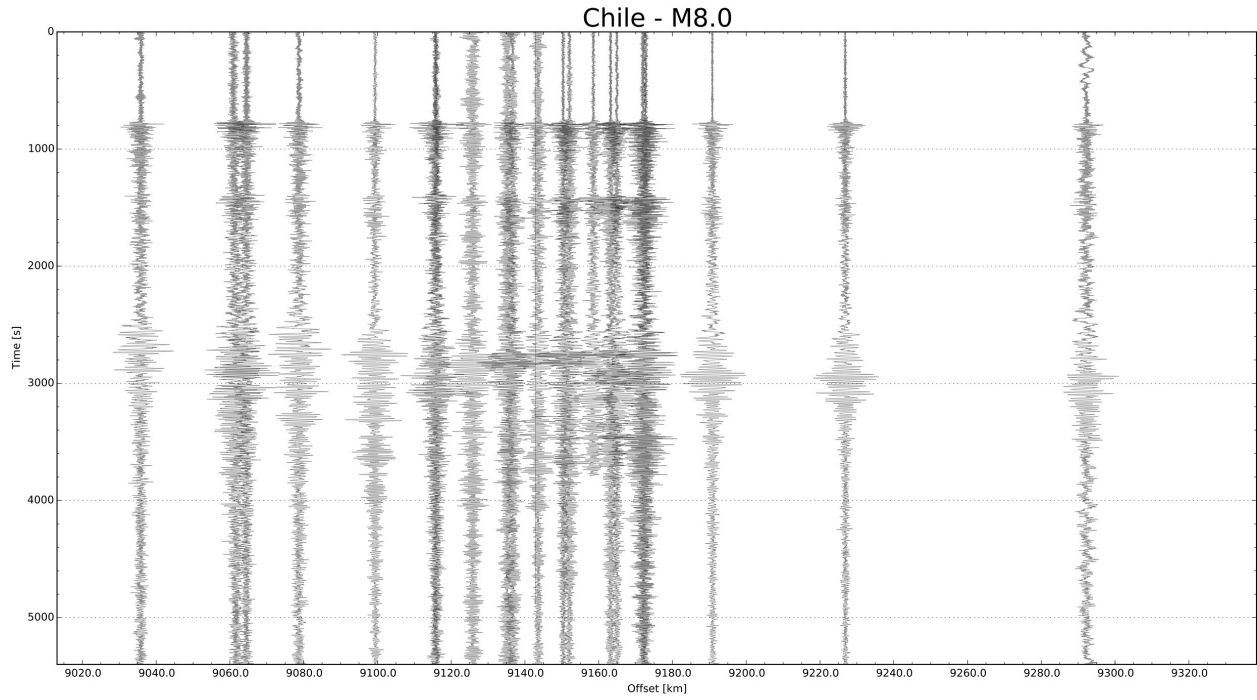


Figure 18. Record sections of data recorded by recovered instruments for the M8.0 Chile earthquake. Top: unfiltered data. Bottom: data filtered at 100-20 sec. Earthquake origin time 2014-04-01T23:46:45, location -19.63 -70.86, depth 10.0 km.

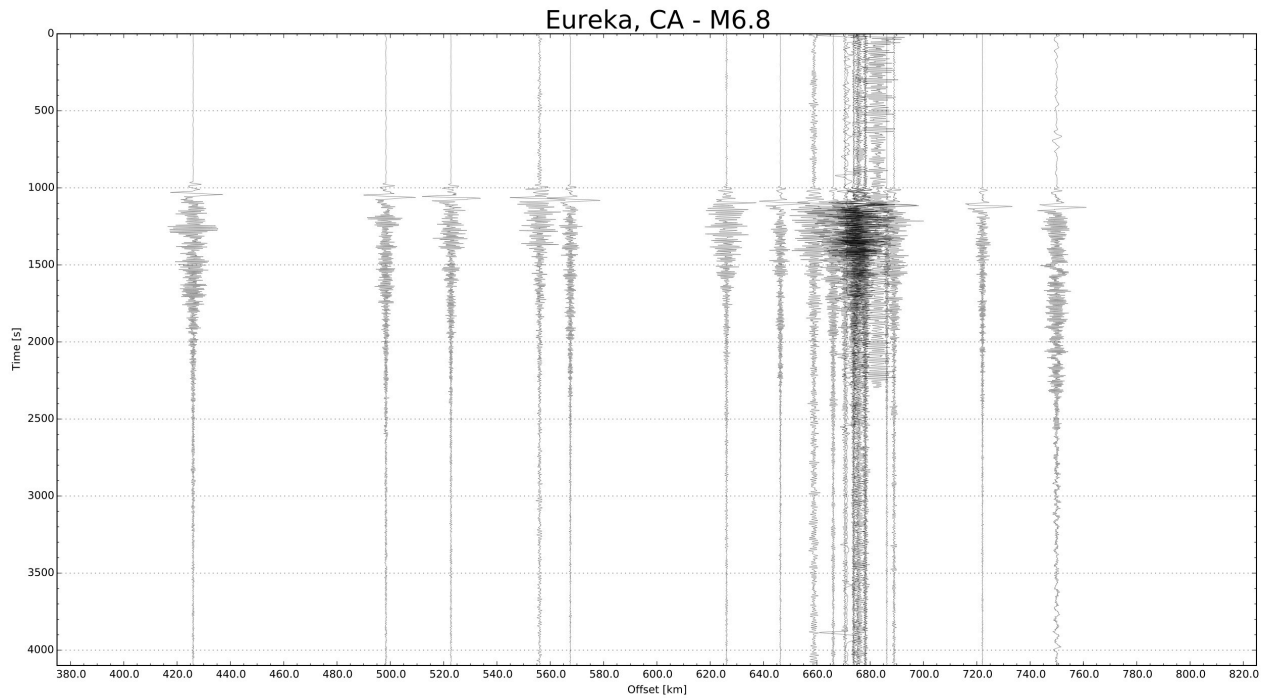
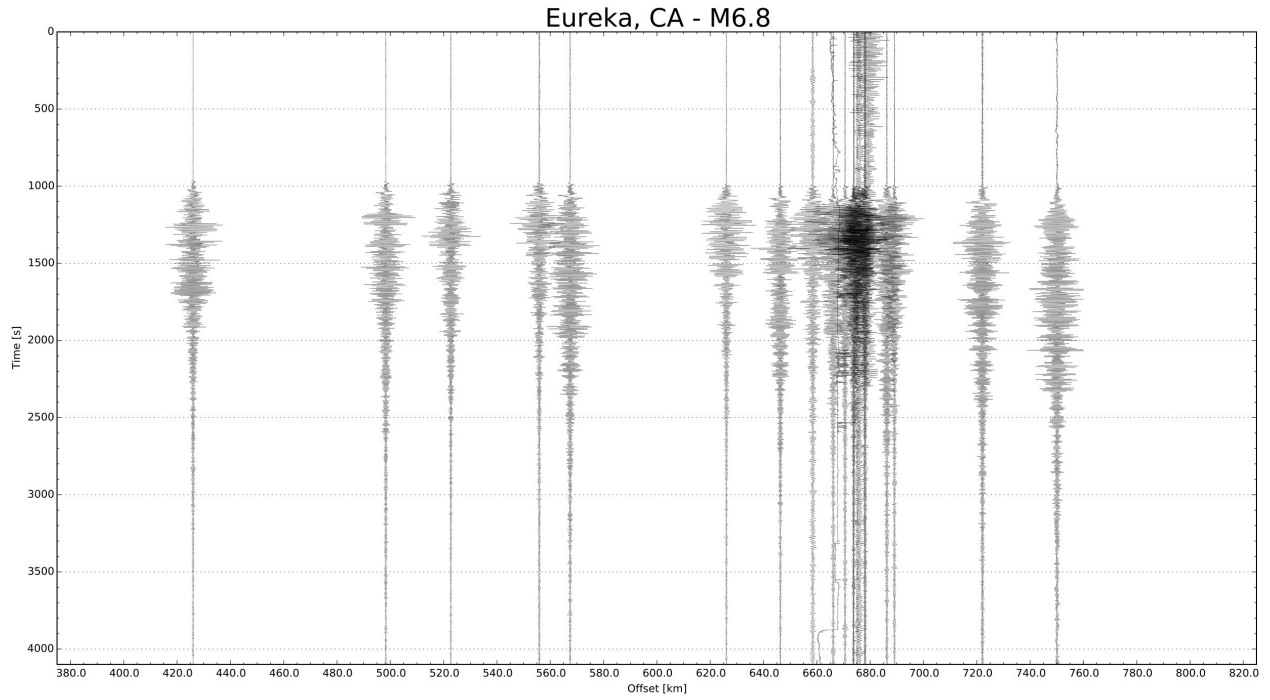


Figure 19. Record sections of data recorded by recovered instruments for the M6.8 Eureka, California earthquake. Top: unfiltered data. Bottom: data filtered at 100-20 sec. Earthquake origin time: 2014-03-10T05:18:13, location 40.83 -125.13, depth 16.6 km.