Cascadia Initiative

Cruise OC1208B *R/V Oceanus*

(Cascadia 2012 Leg 5)

August 31, 2012 – September 6, 2012

Newport, Oregon to Newport, Oregon

Douglas Toomey, University of Oregon

Susan Schwartz, University of California Santa Cruz

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Background

As part of the 2009 American Recovery and Reinvestment Act (ARRA) spending, NSF's Earth Sciences (EAR) and Ocean Sciences (OCE) divisions each received $5M in facility-related investment. The funds are targeted toward Facilities that support EarthScope and GeoPRISMS science objectives, with an initial emphasis on onshore/offshore studies of the Cascadia margin. The ARRA funds have been used by UNAVCO, IRIS, and OBSIP to improve seismic and geodetic datasets in the Cascadia region including improvements to real-time GPS capabilities, densification of the onshore seismic networks, and the construction and deployment of an array of 60 ocean-bottom seismographs (OBS) for offshore community experiments.

The Cascadia Initiative (CI) is an onshore/offshore seismic and geodetic experiment that addresses questions ranging from the structure of the megathrust and its potential for large earthquakes to volcanic arc structure, and to the formation, deformation and hydration of the Juan de Fuca and Gorda plates. An article in the GeoPRISMS Newsletter (Spring 2011, issue No. 26) described CI scientific objectives, the outcome of an open community workshop held in October 2010 to develop deployment plans for the offshore component of the experiment, and formation of the Cascadia Initiative Expedition Team (CIET). Over its planned 4-year data acquisition period, the offshore portion of the Cascadia Initiative will involve the deployment and recovery of ~280 OBSs at ~160 different sites and a total of about 25 cruises.

Cruise Objectives and Assessment

The OC1208B cruise objective was to deploy 15 of the trawl resistant OBS built by Scripps Institute of Oceanography (SIO) in the Year 2 array designed by the community. Both the science party and OBS personnel worked a 24 hour schedule to get all of the instruments deployed while the weather permitted. For the seven-day duration of the cruise, swells were 5-15 feet and wind waves 2-6 feet. In addition to the OBS deployments, we also performed 3 CTD casts, surveyed 6 WHOI instruments (G11, G21, G20, G35, J28, J27) and interrogated 2 others (G36, J11) that were deployed during Leg4 and were within our cruise track and left unsurveyed. The position of the 15 OBSs deployed are shown in Figure 1 and listed in Table 2. The OBSs will record continuously until their recovery in 2013. The OBSs will then be redeployed at Year 3 sites in summer 2013.

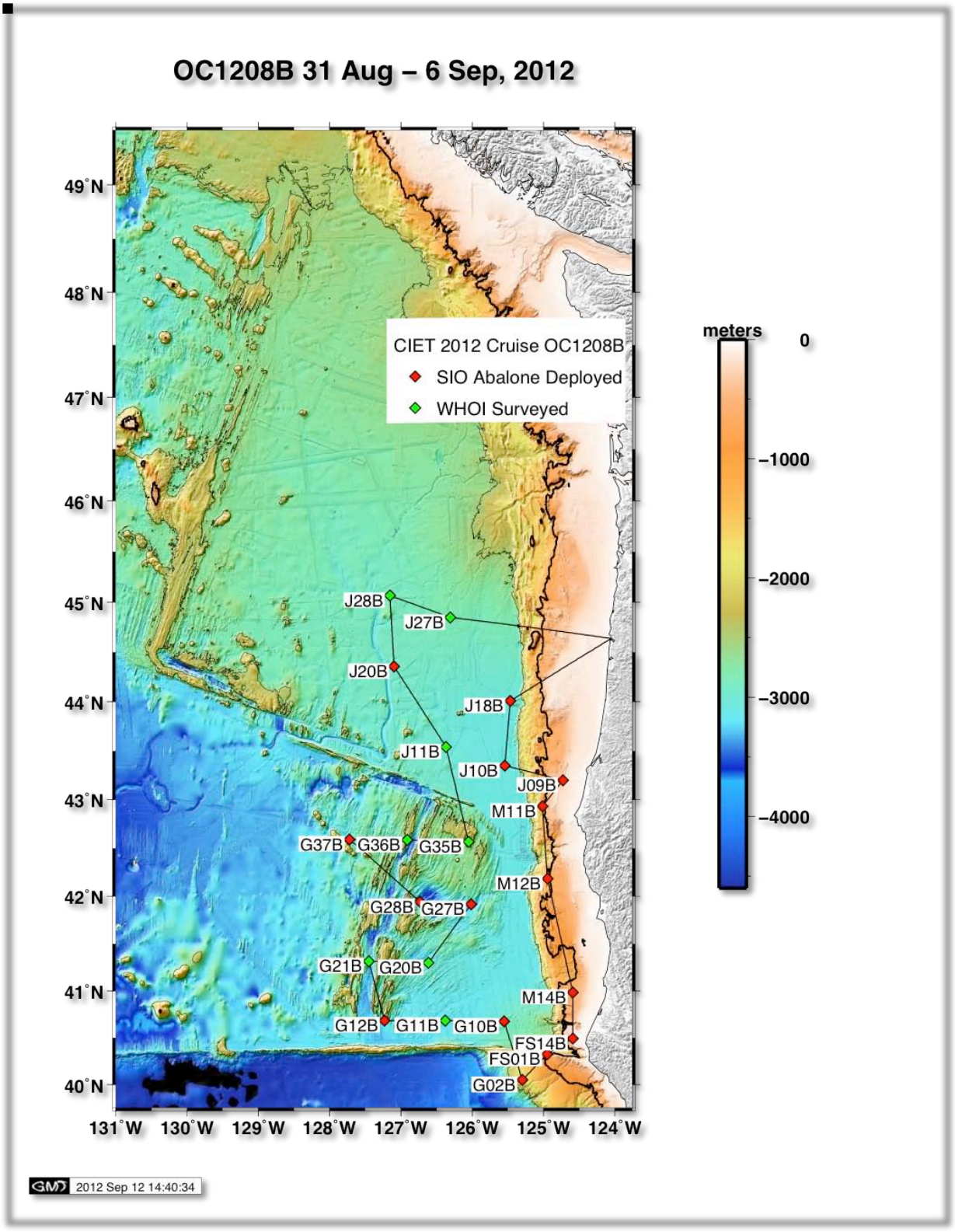

Figure 1. OC1208B cruise track with deployment and survey sites indicated.

OC1208B Science Party

Douglas Toomey	Chief Scientist in Charge	University of Oregon
Susan Schwartz	Co-Chief Scientist	Univeristy of California Santa Cruz
Martin Rappa	OBS Technician	Scripps Institute of Oceanography
Phil Thai	OBS Technician	Scripps Institute of Oceanography
Ray Klein	OBS Technician	Scripps Institute of Oceanography
Brandon VanderBeek	Graduate Student	University of Oregon
Stephen Hernandez	Graduate Student	University of California Santa Cruz
Stephanie Taylor	Graduate Student	University of California Santa Cruz
Annie Douglas	Marine Mammal Observer	Cascadia Research Center
Alexandra Vanderzee	Marine Mammal Observer	
Erik Arnesen	Marine Technician	Oregon State University

OC1208B Oceanus Crew

Jeff Crews	Master
Bob Ashley	Chief Engineer
John Forgione	First Mate
Patrick Breshears	Second Mate
Bob Ashley	Chief Engineer
Colin Caskey	Engineer
Jay Jean-Bart	Engineer
Doug Beck	Bos'n
Tony Jackson	AB
Marc Simpson	AB
Kris Alberty	Cook
Taylor Williams	Steward

Cruise Narrative

This cruise departed on August 31, 2012. Both this cruise and the preceding one (OC1208A) were delayed several days because the *R/V Oceanus* needed to enter dry dock for repairs in mid August. For logistical reasons the end date of the cruise could not be extended beyond 8 AM on September 7, 2012. However, this slightly compressed time schedule still allowed us to deploy, track to the bottom and acoustically survey all 15 of the OBS. In addition we performed 3 CTD casts at stations J18, M14B and G27 and surveyed 6 and interrogated 2 WHOI instruments that were left unsurveyed and were within our cruise track.

Wednesday, August 29. Chief Scientist Doug Toomey, co-chief Susan Schwartz, grad students, and SIO OBSIP group arrive in Newport.

Thursday, August 30. SIO OBSIP group begins work preparing the OBSs. Marine mammal observers arrive in afternoon. Oceanus arrives and docks by 14:00 and WHOI OBSIP unload.

Friday, August 31. 07:00 SIO group loads OBSs, 09:00 science meeting onboard Oceanus.

10:30 Safety drill and departure at 11:30. Moderate seas, winds out of north at 15-20 knots. First OBS deployment is at site J18B whose location was modified 3900 m to the northwest of the original site to avoid a submarine landslide deposit.

1) Station J18B

On Station:	9/1/2012 00:12 UTC (8/31/2012 17:12 local)
OBS Type:	SIO Abalone No. 8 S/N 152
Deploy Time:	9/1/2012 00:26 UTC
Deployed Position:	44° 00.5148' N, 125° 28.0320' W
Water Depth:	3045 m
Range to which tracked	Tracked to bottom
OBS on Seafloor:	9/1/2012 01:18 UTC
OBS Fall Speed:	59 m/min
Start Acoustic Survey:	9/1/2012 02:09 UTC
Disable Acoustic Release:	9/1/2012 03:12
Depart Station:	9/1/2012 03:14
CTD Cast #:	01
CTD Max. Depth:	1000 m
Time on Station:	3 hr 02 min

CTD began on 9/1/2012 01:14 UTC brought up after 1000m.
The second deployment of the day is J10B

2) Station J10B

On Station:	9/1/2012 06:33 UTC (8/31/2012 23:33 local)
OBS Type:	SIO Abalone, No. 12, S/N 157
Deploy Time:	9/1/2012 06:35 UTC
Deployed Position:	43° 20.9308' N, 125° 32.6814' W
Water Depth:	3093 m
Range to which tracked	Tracked to Bottom
OBS on Seafloor:	9/1/2012 07:28 UTC

OBS Fall Speed:	58m/min
Start Acoustic Survey:	9/1/2012 07:36 UTC
Disable Acoustic Release:	9/1/2012 08:26 UTC
Depart Station:	9/1/2012 08:28 UTC
Time on Station:	1 hr 55 min

Saturday, September 1.

3) Station J09B

On Station:	9/1/2012 11:44 UTC (9/1/2012 4:44 local)
OBS Type:	SIO Abalone , No. 5, S/N 164
Deploy Time:	9/1/2012 11:58 UTC
Deployed Position:	43° 09.0865' N, 124° 43.6436' W
Water Depth:	252 m
Range to which tracked	Tracked to bottom
OBS on Seafloor:	9/1/2012 12:02
OBS Fall Speed:	62m/min
Start Acoustic Survey:	9/1/2012 12:15
Disable Acoustic Release:	9/1/2012 12:29 UTC
Depart Station:	9/1/2012 12:31 UTC
Time on Station:	0 hr 47 min

Heading south with winds at ~20 knots and seas ~4 feet. We modified M11's location about 2300 m to the southeast of the original station to be in a flatter area.

4) Station M11B

On Station:	9/1/2012 13:57 UTC (9/1/2012 06:57 local)
OBS Type:	SIO Abalone No. 12, S/N 154
Deploy Time:	9/1/2012 14:06 UTC
Deployed Position:	42° 55.9851'N, 125° 01.0130'W
Water Depth:	1108 m
Range to which tracked	Tracked to bottom
OBS on Seafloor:	9/1/2012 14:25 UTC
OBS Fall Speed:	58.9 m/min
Start Acoustic Survey:	9/1/2012 14:27
Disable Acoustic Release:	9/1/2012 14: 50 UTC
Depart Station:	9/1/2012 14: 51 UTC
Time on Station:	0 hr 54 min

SIO group rested for ~7 hours. Ship steamed to next site at 8 kts, speed preferred for MMOs. We reached site before 7 hours had passed, consequently steam past site and return. Wind out of the NW ~23 knots, seas of ~4 ft.

5) Station M12B

On Station:	9/1/2012 22:05 UTC (9/1/2012 15:05 local)
OBS Type:	SIO Abalone No. 2, S/N 158
Deploy Time:	9/1/2012 22:12 UTC
Deployed Position:	42° 11.0961' N, 124° 56.6945' W
Water Depth:	1066 m
Range to which tracked	321 m

OBS on Seafloor:	Tracked to bottom
OBS Fall Speed:	60m/min
Start Acoustic Survey:	9/1/2012 22:35 UTC
Disable Acoustic Release:	9/1/2012 22:56 UTC
Depart Station:	9/1/2012 22:57 UTC
Time on Station:	0 hr 52 min

6) Station M14B

On Station:	9/2/2012 04:52 UTC (9/1/2012 21:52 local)
OBS Type:	SIO Abalone No. 9, S/N 160
Deploy Time:	9/2/2012 05:10 UTC
Deployed Position:	40° 59.106' N, 124° 35.409' W
Water Depth:	638 m
Range to which tracked	Tracked to bottom
OBS on Seafloor:	9/2/2012 05:21
OBS Fall Speed:	57 m/min
Start Acoustic Survey:	9/2/2012 06:03 UTC
Disable Acoustic Release:	9/2/2012 06:21 UTC
Depart Station:	9/2/2012 06:22 UTC
CTD Cast #:	02
CTD Max. Depth:	500 m
Time on Station:	1 hr 30 min

CTD cast began shortly after deployment; running CTD to 500 m depth. At 500m at 05:43 UTC. On surface at 05:52, on deck at 05:56. Seas have laid down a bit, winds down to less than 20 kts.

Sunday, September 2

Day began with ship steaming toward FS14B. Site FS14B moved ~1400 m upslope to NE. Winds 20 kts, 12˚C, seas moderate.

7) Station FS14B

On Station:	9/2/2012 8:50 UTC (9/2/2012 01:50 local)
OBS Type:	SIO Abalone, OBS 4, S/N 161
Deploy Time:	9/2/2012 9:10 UTC
Deployed Position:	40° 29.762' N, 124° 35.496 ' W
Water Depth:	107 m
Range to which tracked	Tracked to bottom
OBS on Seafloor:	9/2/2012 9:12 UTC
OBS Fall Speed:	52 m/min (short fall)
Start Acoustic Survey:	9/2/2012 09:20 UTC
Disable Acoustic Release:	9/2/2012 09:35 UTC
Depart Station:	9/2/2012 09:38 UTC
Time on Station:	0 hr 48 min

Underway for FS01B, riding in the trough. Site FS01B moved ~1400 m to the south to a flatter area. Noticeably higher seas splashing on fantail. Weather forecast predicts worsening wind and waves; 2 OBSs prepped on deck. If seas come up too much, will impact prep time and require more time on site.

8) Station FS01B

On Station:	9/2/2012 11:23 UTC (9/2/2012 04:23 local)
OBS Type:	SIO Abalone No. 10, S/N 153
Deploy Time:	9/2/2012 11:33
Deployed Position:	40° 19.696' N, 124° 56.991' W
Water Depth:	949 m
Range to which tracked	Tracked to bottom
OBS on Seafloor:	9/2/2012 11:50
OBS Fall Speed:	56.2 m/min
Start Acoustic Survey:	9/2/2012 11:53
Disable Acoustic Release:	9/2/2012 12:12 UTC
Depart Station:	9/2/2012 12:13 UTC
Time on Station:	0 hr 50 min

Underway for G02B.

9) Station G02B

On Station:	9/2/2012 14:12 UTC (9/2/2012 07:12 local)
OBS Type:	SIO Abalone No. 1, S/N 156
Deploy Time:	9/2/2012 14:22 UTC
Deployed Position:	40° 2.951' N, 125° 17.927' W
Water Depth:	1920 m
Range to which tracked	Tracked to bottom
OBS on Seafloor:	9/2/2012 14:55 UTC
OBS Fall Speed:	58.1 m/min
Start Acoustic Survey:	9/2/2012 14:56
Disable Acoustic Release:	9/2/2012 15:35 UTC
Depart Station:	9/2/2012 15:35 UTC
Time on Station:	1 hr 23 min

Both wind and swell picked up to 25-30 knots and 8-12 feet respectively. SIO team is taking well-deserved rest and we plan to arrive at the next station, G10B at 15:00

10) Station G10B

On Station:	9/2/2012 22:00 (9/2/2012 15:00 local)
OBS Type:	SIO Abalone, No. 03, S/N 151
Deploy Time:	9/2/2012 22:13 UTC
Deployed Position:	40° 40.700' N, 125° 33.1195' W
Water Depth:	2967 m
Range to which tracked	Tracked to bottom
OBS on Seafloor:	9/2/2012 23:04 UTC
OBS Fall Speed:	58 m/min
Start Acoustic Survey:	9/2/2012 23:09 UTC
Disable Acoustic Release:	9/3/2012 00:05 UTC
Depart Station:	9/3/2012 00:06 UTC
Time on Station:	2 hr 6 min

Following deployment of G10B we steamed toward site G11B in order to survey a WHOI instrument that was deployed during leg 4. Winds are 25 kts on the starboard beam, riding the

trough westward. The Oceanus likes to roll. Most midlife changes result in sagging, however, the Oceanus midlife refit added weight up top. It rode better in 92.

11) Station G11B

On Station:	9/3/2012 03:11 (9/2/2012 20:11 local)
OBS Type:	WHOI AARA, No T111
Deploy Time:	Previous leg 8/28/2012
Deployed Position:	40° 41.156' N, 126° 22.683' W
Water Depth:	3138 m
Start Acoustic Survey:	9/3/2012 03:15 UTC
Disable Acoustic Release:	9/3/2012 04:15 UTC (14/15; range no reply)
Depart Station:	9/3/2012 04:17 UTC
Time on Station:	1 hr 6 min

Survey of WHOI OBS performed by SIO OBSIP team. Pattern for ranging is circle with radius of one-half the water depth. SIO will invert for the position. OBS disabled, 14/15 pings returned. Ranging to OBS does not yield a reply.

Monday, September 3rd

After surveying of G11B ship steams westward toward G12B, riding in the trough. Station moved ~2100 m to west to avoid a major scarp. If the weather is like this for the next leg, then deployment of the TRMs may be problematic. We arrive on site shortly after midnight, on schedule.

12) Station G12B

On Station:	9/3/2012 0739 UTC (9/3/2012 0039 local)
OBS Type:	SIO Abalone, No. 1001, S/N 165
Deploy Time:	9/3/2012 0752 UTC
Deployed Position:	40° 41.2564' N, 127° 13.7995' W
Water Depth:	3108 m
Range to which tracked	Tracked to bottom
OBS on Seafloor:	9/3/2012 0849 UTC
OBS Fall Speed:	54 m/min
Start Acoustic Survey:	9/3/2012 0852 UTC
Disable Acoustic Release:	9/3/2012 0947 UTC
Depart Station:	9/3/2012 0948 UTC
Time on Station:	2 hr 9 min

Following deployment of G12B ship transits NNW to WHOI site G21B, which we will survey. Seas have lessened, winds at 20 kts.

13) Station G21B

On Station:	9/3/2012 1314 UTC (9/3/2012 0615 LT)
OBS Type:	WHOI AARA, ID T102
Deploy Time:	Previous leg 8/28/2012
Deployed Position:	41° 19.002' N, 127° 27.315' W
Water Depth:	3178 m
Start Acoustic Survey:	9/3/2012 1317 UTC
Disable Acoustic Release:	9/3/2012 1417 UTC (9/15; multiple ranges no reply)

Depart Station:	9/3/2012 1420 UTC
Time on Station:	1 hr 6 min

Survey of G21B goes well. Martin retrieves lines sans tuna. Underway for site G20B (WHOI ARRA) for survey.

14) Station G20B

On Station:	9/3/2012 1724 UTC (9/3/1024 LT)
OBS Type:	WHOI AARA, I.D. T113, S/N 35732
Deploy Time:	Previous leg 8/28/2012
Deployed Position:	41° 17.959' N, 126° 36.824' W
Water Depth:	3164 m
Start Acoustic Survey:	9/3/2012 1730 UTC (15/15 replies)
Disable Acoustic Release:	9/3/2012 1827 UT (8/15 then 11/15 replies)
Depart Station:	9/3/2012 1828 UTC
Time on Station:	1 hr 4min

Came on site, enabled successfully. Completed survey in 1 hour. Sent two disables, with replies of 8/15 and 11/15, respectively. Ranged to instrument multiple times, no reply.

Upon reviewing the timeline and work left to do, we have opted to decrease transit speeds and to consider further Leg 4/WHOI sites to be surveyed. This will also allow the SIO group to rest. Lines set for Albacore, water temperature a bit cool at 14.9°C. No tuna caught, though air temperature is mild and with some care a dry place can be found outside for catching some sun and reading. Underway for site G27B to deploy. G27B was moved ~2300 m southwest to a flatter area.

15) Station G27B

On Station:	9/4/2012 00:54 UTC (9/3/2012 17:55 local)
OBS Type:	SIO Abalone, No. 1000, S/N 162
Deploy Time:	9/4/2012 01:00 UTC
Deployed Position:	41° 55.04' N, 126° 01.12' W
Water Depth:	3367 m
Range to which tracked	Tracked to bottom
OBS on Seafloor:	9/4/2012 02:14 (rough estimate)
OBS Fall Speed:	Not a useful estimate
Start Acoustic Survey:	9/4/2012 02:17
Disable Acoustic Release:	9/4/2012 03:15 (6/7 pings)
Depart Station:	9/4/2012 03:17
CTD Cast #:	03
CTD Max. Depth:	1000 m
Time on Station:	2 hr 24 min

CTD cast began about 30 minutes after deployment; running CTD to 1000 m depth. At 500m at 05:43 UTC. On surface at 05:52, on deck at 05:56. Weather remains sloppy, winds 25-30 kts. Following deployment of G27B we steam westwards toward G28B, riding the trough. Relatively short transit.

16) Station G28B

On Station:	9/4/2012 06:26 UTC (9/3/2012 22:26 local)
OBS Type:	SIO Abalone, No. 6, S/N 163
Deploy Time:	9/4/2012 06:34 UTC
Deployed Position:	41° 56.5101' N, 126° 43.9952' W
Water Depth:	3327 m
Range to which tracked	Tracked to bottom
OBS on Seafloor:	9/4/2012 07:32
OBS Fall Speed:	57 m/min
Start Acoustic Survey:	9/4/2012 08:00 UTC
Disable Acoustic Release:	9/4/2012 08:53 (7/7)
Depart Station:	9/4/2012 08:54
Time on Station:	2 hr 28 min

Tuesday September 4th

G28B deployed successfully. Winds still 25-30 kts. Transit NNW toward G37B. G37B was moved ~870 m east to avoid steep slopes. During the night the winds calm somewhat but pick up again in the morning. Transit speed is set to put us on sight at 0900 local, providing a longer rest for the SIO team and other personnel.

17) Station G37B

On Station:	9/4/2012 15:55 UTC (9/4/2012 08:55)
OBS Type:	SIO Abalone, No. 11, S/N 159
Deploy Time:	9/4/2012 16:04 UTC
Deployed Position:	42° 35.5011' N, 127° 43.2452' W
Water Depth:	3008 m
Range to which tracked	Tracked to Bottom
OBS on Seafloor:	9/4/2012 16:56
OBS Fall Speed:	58 m/min
Start Acoustic Survey:	9/4/2012 16:58 UTC
Disable Acoustic Release:	9/4/2012 18:01 UTC (7/7 pings)
Depart Station:	9/4/2012 18:02 UTC
Time on Station:	2 hr 7 min

Weather remains sloppy, winds at 30 kts, long period swell from the NNW. Following deployment of G37B we transit toward Leg 4/WHOI sites G36B2 and G36B. Some good rollers with the swell to the beam. Salty day. We arrive on site for surveying of G36B2 at ~1430 LT

Lines set during survey; 6 kts for better "acoustics". Water temperature is 14.7°C; bit low. As survey of G36B2 nears completion, lines stowed sans tuna.

18) Station G36B2

On Station:	9/4/2012 21:28 UTC (9/4/2021 14:38 LT)
OBS Type:	WHOI AARA, I.D. T101, S/N 35744
Deploy Time:	Previous leg 8/28/2012
Deployed Position:	42° 35.959' N, 126° 54.201' W
Water Depth:	2459 m (1st range is 2439 m)
Start Acoustic Survey:	9/4/2012 21:28 UTC (14/15 replies)
Disable Acoustic Release:	9/4/2012 22:19 UTC (15/15 replies; no reply to ranging)

Following survey of G36B2 we turn toward G36B, a site which lost communications during the previous cruise.

19) Station G36B

On Station:	9/4/2012 21:28 UTC (9/4/2021 14:38 LT)
OBS Type:	WHOI AARA, I.D. T1115, S/N 35736
Deploy Time:	Previous leg 8/28/2012
Deployed Position:	42° 35.044' N, 126° 54.854' W
Water Depth:	2444 m
Start Acoustic Survey:	Unsuccessful
Disable Acoustic Release:	9/4/2012 22:128 UTC (no reply to disable)

Using the 8011M we send several enable commands at various sensitivities and power; no response. This is followed by sending several disable commands; no response. Acoustics communications are switched from the 8011M to the SABER (an SIO manufactured deck box). Only disable commands are sent to G36B. No response. We are unsuccessful in communicating with this instrument.

At ~2245 we turn the ship toward G35B, a WHOI site to be surveyed, beam to the swell; again. Winds appear to be lessening, ~25 kts.

Transiting is entertaining. Winds holding steady at 25-30 kts. There are two sets of swells, one from the NW, the other from the NE. Occasionally they interfere constructively, with predictable results: 40˚ rolls. It's an impressive show of slow motion force. For dinner the course is adjusted slightly, then back to the trough. AC leaks spring up, a random fuse drops from somewhere, chairs get tied down, etc.

20) Station G35B

On Station:	9/5/2012 02:39 UTC (9/4/2012 1939 LT)
OBS Type:	WHOI AARA, I.D. T109, S/N 35733
Deploy Time:	Previous leg 8/28/2012
Deployed Position:	42° 35.059' N, 126° 3.205' W
Water Depth:	2385 m
Start Acoustic Survey:	9/5/2012 02:45 UTC (15/15 replies)
Disable Acoustic Release:	9/4/2012 03:37 UTC (13/15 replies; no reply to ranging)

Another successful survey. We turn NNW toward J11. Out of the trough and on the nose. It's likely that J11 will be a short visit, since it did not respond on the previous leg.

Wednesday September 5th

21) Station J11B

On Station:	9/5/2012 11:09 UTC (9/5/2021 04:09 LT)
OBS Type:	WHOI AARA, I.D. T112, S/N 35739
Deploy Time:	Previous leg 8/28/2012
Deployed Position:	43° 32.428' N, 126° 22.060' W
Water Depth:	3031 m
Start Acoustic Survey:	Unsuccessful
Disable Acoustic Release:	9/5/2012 11:14 UTC (no reply to disable)

Sent only disable commands (6 total) to J11; no response. We are unsuccessful in communicating with this instrument. Ship heads northwest to station J20 to deploy final SIO Abalone. J20 was moved ~1600m to the southeast away from slopes.

22) Station J20B

On Station:	9/5/2012 17:33 UTC (9/5/2012 10:33 local)
OBS Type:	SIO Abalone No. 13, S/N 155
Deploy Time:	9/5/2012 17:48 UTC
Deployed Position:	44° 21.25' N, 127° 05.75' W
Water Depth:	2942 m
Range to which tracked	tracked to seafloor
OBS on Seafloor:	9/5/2012 18:37 UTC
OBS Fall Speed:	60 m/min
Start Acoustic Survey:	9/5/2012 18:50 UTC
Disable Acoustic Release:	9/5/2012 19:56 UTC
CTD Cast #:	04
CTD Max. Depth:	1000 m
Depart Station:	9/5/2012 18:05 UTC
Time on Station:	2 hr 23 min

The SIO Abalone to be deployed at J20 experienced an electrical short (during shipping?) and a drop in battery voltage within the logger. Details are to be found in the SIO report. Repairs were made, however, to prevent further drop in voltage, this logger is not installed on the frame until we reach the site. When installed in the frame, the batteries in the logger will be in series with batteries on the frame. It is estimated that there is sufficient power for 500 days of recording.

While on site the logger is installed in the frame; however, it is soon realized that the experiment software is not correctly initialized. The logger is brought back to the lab and the experiment software is setup. This only takes a few minutes. Deployment goes quickly and smoothly. The Abalone is an easy package to work with on deck.

After J20B was deployed we headed due north to survey WHOI AARA instrument at J28.

23) Station J28B

On Station:	9/6/2012 00:17 UTC (9/5/2012 17:17 LT)
OBS Type:	WHOI KECK, I.D. S83, S/N 31656
Deploy Time:	Previous leg 8/24/2012
Deployed Position:	45° 3.836' N, 127° 9.375' W
Water Depth:	2885 m
Start Acoustic Survey:	9/6/2012 00:21 UTC (11/15 replies)
Disable Acoustic Release:	9/6/2012 01:16 UTC (3/15, 6/15, 15/15 replies; no reply to ranging)

Final station is J28B. Site is successfully surveyed, Patrick executed a circle Pythagoras would be proud of. With the swell it is a bit noisy and we attempt disable from a short distance (3/15 replies). Turn ship toward center of circle and perform 2 more disables (6/15 and 15/15 replies). Ranging results in no reply; disabled. We set course for our last survey, site J27B.

24) Station J27B

On Station:	9/6/2012 04:41 UTC (9/5/2012 21:41 LT)
OBS Type:	WHOI KECK, I.D. T107, S/N 35740
Deploy Time:	Previous leg 8/24/2012
Deployed Position:	44° 50.837' N, 126° 18.455' W
Water Depth:	2843 m
Start Acoustic Survey:	9/6/2012 04:41 UTC (9/15 replies)
Disable Acoustic Release:	9/6/2012 05:36 UTC (15/15 replies)

J27B successfully surveyed. Disable successful; ranges result in no reply. Ship's heading is Newport, OR.

Thursday September 6th

Day begins with Oceanus steaming toward Newport.

OBS Operations

OC1208B deployed 15 OBSs (SIO Abalones) at 15 sites as part of the Year 2 oceanographic component of the Cascadia Initiative. The 15 sites are located on the Juan de Fuca and Gorda plates south of Newport, OR and on the Pacific plate south of the Mendocino Fracture Zone and west of the Gorda ridge (Fig. 1).

The 15 OBSs were of a new SIO design, the construction of which was funded through the American Recovery and Reinvestment Act (ARRA). The SIO-designed ARRA OBS (Figures 2-4, Table 1) carry a Trillium Compact intermediate-period seismometer and a Cox-Deaton-Webb Differential Pressure Gauge (DPG). The Abalone data logger is a custom design that achieves low power with a notably smaller form factor compared to previous generation OBSs. Timing is provided by a Seascan clock; power is provided by two lithium packs. Floatation is provided by syntactic foam housed within a rotationally molded polyethylene frame. All the OBS sampled at 50 Hz.

OBSs were deployed off the starboard side using the Oceanus' Morgan knuckle-boom crane. Initial OBS preparation and electronics check-out were done while underway. The Abalone design is easy to work with on deck in heavy seas and all deployments proceeded remarkably quickly once on site. All the OBS were tracked acoustically as they fell to the seafloor and acoustically surveyed (Table 1). The surveyed locations are listed in Table 1, the deployed OBS locations are compared with the planned locations in Table 2. Minor adjustments to planned locations were necessary to account for local bathymetric features.

For all OBS data to determine on-bottom location was obtained in the usual manner by ranging to the instrument from a number of locations at varying ranges and azimuths (Table 1). The transponder is offset 61.5' aft from the navigation GPS and is 5 m below the water line. We used the ship's hull-mounted 12 kHz transducer for all acoustic communication other than on-deck testing. The Oceanus' acoustics were excellent.

Table 1. SIO OBS Configuration and Surveyed Site Positions

Site Name	Logger	Trillium	Acoustic	Frame	Lat			Lon			Water Depth	Num Chn.	SPS
J18	8	10	152	5	44	0.498	44.0083	-125	27.9588	-125.46598	3047	4	50
J10	12	11	157	10	43	20.9637	43.349395	-125	32.6119	-125.543532	3093	4	50
J9	5	13	164	15	40	12.0688	40.20114667	-124	43.6281	-124.727135	252	4	50
M11	7	?	154	12	42	55.9222	42.93203667	-125	1.0273	-125.017122	1109	4	50
M12	2	?	158	11	42	11.0396	42.18399333	-124	56.7662	-124.946103	1045	4	50
M14	9	4	160	3	40	59.1026	40.98504333	-124	35.3849	-124.589748	638	4	50
FS14	4	8	161	1	40	29.7303	40.495505	-124	35.5049	-124.591748	107	4	50
FS01	10	7	153	8	40	19.6063	40.32677167	-124	56.9501	-124.949168	940	4	50
G02	1	14	156	2	40	2.9164	40.04860667	-125	17.8155	-125.296925	1920	4	50
G10	3	12	151	9	40	40.6723	40.67787167	-125	33.2004	-125.55334	2936	4	50
G12B	1001	4	165	6	40	41.2162	40.68693667	-127	13.7315	-127.228858	3080	4	50
G27	1000	5	162	4	41	54.9946	41.91657667	-126	1.0016	-126.016693	3480	4	50
G28	6	3	163	14	41	56.5654	41.94275667	-126	44.0311	-126.733852	3327	4	50
G37	11	1	159	13	42	35.4778	42.59129667	-127	43.2803	-127.721338	3004	4	50
J20B	13	15	155	7	44	21.2511	44.354185	-127	5.71	-127.095167	2934	4	50

Table 2. Planned and Deployed OBS Locations

Table 3. CTD Locations and Depths

OC1208A CTD Locations and Depths

CTD Number	Station Name	Deployment Date	Deployment Time (UTC)	CTD Station Latitude (deg)	CTD Station Latitude (min)	CTD Station Latitude (hemi)	CTD Station Longitude (deg)	CTD Station Longitude (min)	CTD Station Longitude (hemi)	CTD Station Latitude (decimal degrees)	CTD Station Longitude (decimal degrees)	CTD Max Depth (m)	Filename
1	J18B	9/1/12	1:11	44	0.501	N	125	28.019	W	44.0084	-125.4670	1000	cast01sound_spdderived.csv
2	M14B	9/2/12	5:30	40	59.11	N	124	35.409	W	40.9852	-124.5902	500	cast02sound_spdderived.csv
3	G27B	9/4/12	1:29	41	55.196	N	126	1.092	W	41.9199	-126.0182	1000	cast03sound_spdderived.csv
4	J20B	9/5/12	18:05	44	21.245	N	127	5.756	W	44.3541	-127.0959	1000	cast04sound_spdderived.csv

Figure 2. A SIO Abalone OBS being moved into position for deployment. Phil Thai (SIO), Doug Beck (Bos'n), Erik Arenesen (Marine Tech) and Martin Rapa (SIO), left to right.

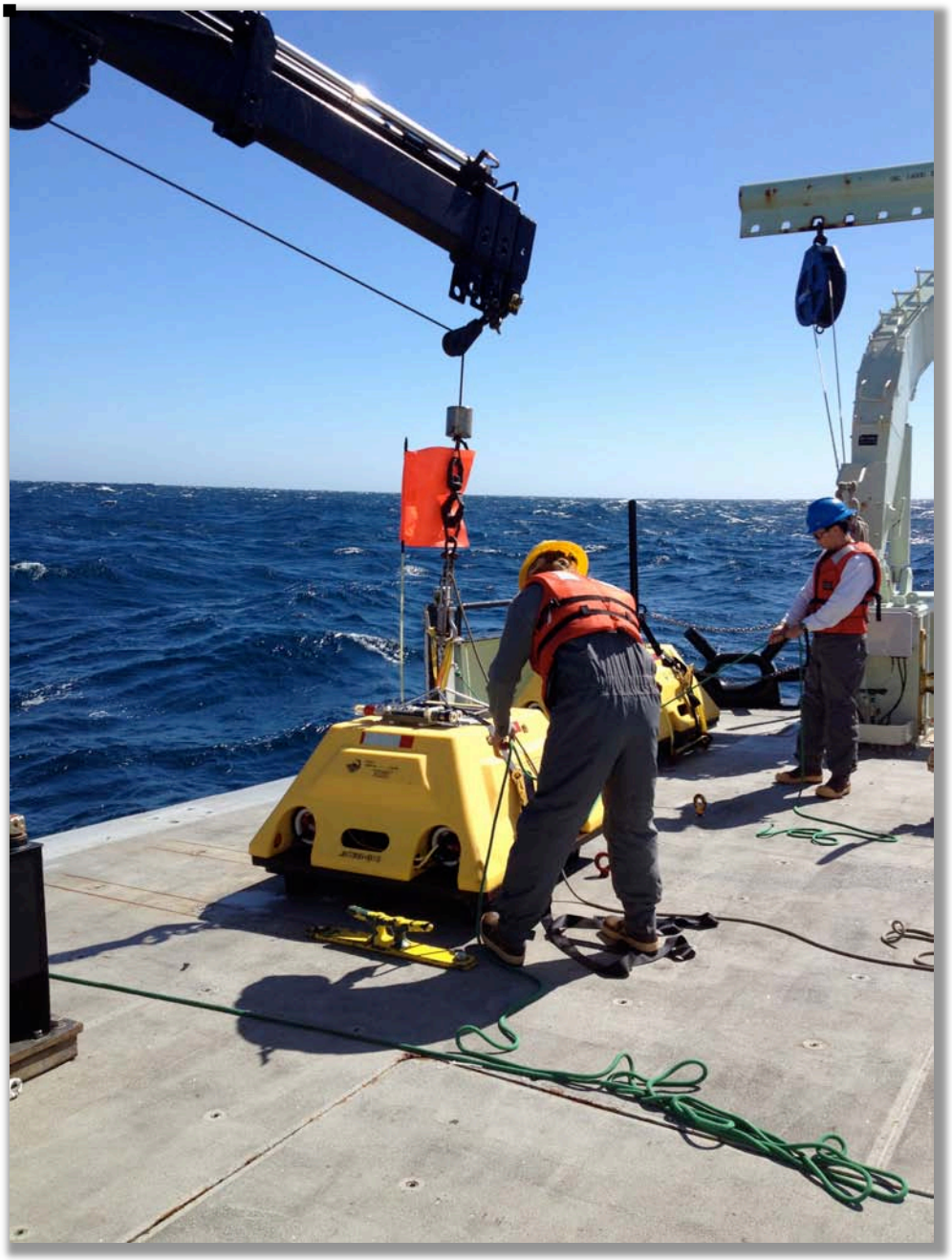

Figure 3. Deploying an SIO Abalone. Martin Rapa (SIO) and Phil Thai (SIO).

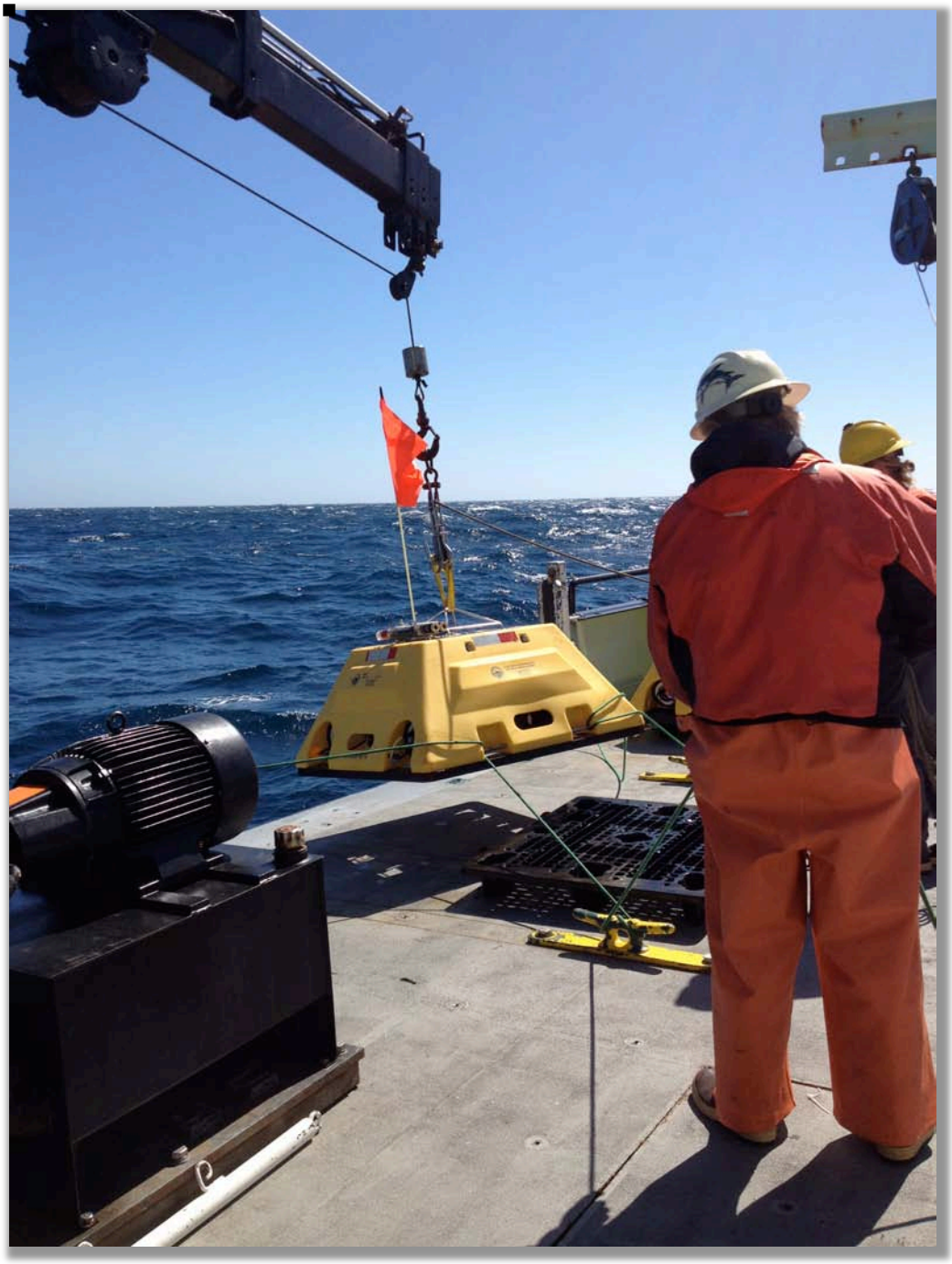

Figure 4. Deploying an SIO Abalone OBS.

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