

COSTA RICA ACTIVE SOURCE SEISMIC EXPERIMENT
TICO-CAVA, Leg 2

CRUISE REPORT
R/V NEW HORIZON
MARCH 18, 2008 TO APRIL 17, 2008
Puerto Caldera to Puerto Caldera



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1. Science Summary

By Matt McDonald

1.1 Science Goals

Our work in the Pacific Ocean onboard the R/V New Horizon partners with concurrent science operations on the R/V Marcus Langseth as part of a larger research project investigating the Central American subduction zone. The entire project has a variety of scientific goals aimed at improving understanding of both shallow and deep processes across the subduction factory. Line 1W is part of a larger line extending across the isthmus of Costa Rica designed to constrain the structure and bulk composition across the subduction zone. The anisotropy lines (AN, ANE, AW, and SERP) are designed to determine the extent and mechanisms of serpentinization in the subduction zone. The work onboard the New Horizon includes OBS deployments as part of a refraction survey of the Central American forarc, and also 36 deployments of a conductivity, temperature, depth (CTD) sensor for seismic oceanography studies.

1.2 OBS Operations Summary

We deployed ocean bottom seismometers (OBSs) from Scripps Institute of Oceanographic (SIO) and Woods Hole Oceanographic Institute (WHOI) in two stages as summaries below. The OBSs recorded the arrival times of the acoustic pulse emitted from the source array on the Langseth. All instruments from stage 1 were deployed and recovered (excluding lost instruments) before we moved to stage two.

STAGE 1 (Lines Osa, 1W, CR, Cocos)

	Number deployed	Number recovered
WHOI instruments	10	7
SIO instruments	36	36
Total	46	43

Lost instruments (3): WHOI D36 at CR11, WHOI D13 at 1W9, WHOI D24 at 1W10

STAGE 2 (Lines Serp, AN, ANE, AW)

	Number deployed	Number recovered
WHOI instruments	6	6
SIO instruments	38	36
Tethered SIO instrument	1	1
Total	35	33

Lost instruments (2): SIO # 64 at AN-5, SIO # at AW-2

1.3 WHOI Operations Summary

By Alan Gardner

WHOI OBSIP Operations on TICO-CAVA, Leg 2 were primarily conducted out of a 20' Laboratory Van positioned on the port side aft main deck. The Van had been placed aboard in San Diego on 27 February prior to the McArthur transit leg to Puerto Caldera, Costa Rica. Two short power failures early in the cruise did not affect operations. Instrument pre-deployment preparations and post-recovery debriefing were accomplished using a Dell desktop PC in the Van. A weatherproof CAT-5 cable was run to the aft portion of the Main Lab where data were processed using a Mac minicomputer with a MacBook laptop as backup.

The first deployment of ten WHOI D2s was marred by the loss of three instruments. No response was heard from any of the three instruments despite repeatedly sending enable, interrogate, and release commands. At the first of these sites an Edgetech transducer was lowered over the side with no results. At all three sites the Scripps ORE "rescue beacon" was lowered close to the bottom, programmed to send the appropriate release code at one minute intervals. During this lowering, the acoustics were monitored via headphones from the Edgetech 8011A deck unit. The instruments' radio frequencies were monitored on the surface and a watch was kept from the bridge, but there was no sign that the instruments were nearby. After a period of time greater than the expected burn time plus rise time for the site, the instruments were declared lost.

Two of the recovered instruments on Deployment 1 came back with bale hardware missing from the geophone sensors (D06 – no bale, D15 – bent bale). One instrument had a gap in data availability at the beginning of its deployment. Fortunately, this was before the Langseth was shooting in the area. The instrument recorded all shots on its line. Based on a preliminary look at the data, all seven recovered instruments have recorded shots.

Several possible explanations were advanced for the lost instruments. The two considered most likely are glass ball failure (i.e. implosion or leak) and pre-release of the anchor, as both have been observed previously. Glass ball failure has been observed on both WHOI and SIO instruments on previous experiments. On the first TICO-CAVA leg onboard the R/V Langseth one instrument pre-released its anchor during descent. By chance an AB on watch spotted it while OBSIP technicians were trying to disable the acoustics; it was recovered and redeployed with a new anchor. Prior to redeployment, the instrument was examined and it was determined that the ¼" eyebolt which is threaded into the anchor had sheared just below the shoulder of the bolt. This eyebolt is the sole means of connecting the anchor to the D2 via a short metal rope.

Nothing could be done to ameliorate a problem with glass ball failure, but the connection to the anchor could be improved. For the second set of deployments on the second leg, the ¼" threads in the anchors were drilled out to ½" holes. The ¼" eyebolts were replaced with longer ½" eyebolts, with a nylock nut on the back side, and thread locking adhesive on the threads for added security.

Six D2s were deployed in the second deployment of leg 2, all using the modified anchors. These were all recovered without incident. It is impossible to know at this time if the modifications to the anchor addressed the problem responsible for the loss of the three instruments, or if the problem was unrelated. Again, a quick look at the raw data showed that all recovered instruments recorded shot data.

SEGY format data files were created for the seven instruments of Deployment 1. Prior to the end of the cruise the shot file for only one Deployment 2 line had been sent over from the Langseth. Data has been corrected for clock drift and awaits additional shot files to be formatted into SEG Y files.

1.4 SIO Operations Summary

By Crispin Hollingshead

During this second leg of the Holbrook cruise, the SIO group, operating off the New Horizon, deployed two sets of instruments as receivers for the air gun array shooting on the Langseth. After transferring equipment from the Langseth at the port of Puerto Caldera, we steamed to deep water for acoustic release tests. Release test rosettes were lowered to 3300 meters depth on the CTD wire. Each rosette holds 12 releases. All releases worked at depth.

We then deployed a total of 46 sites, along four lines determined by scientists on the Langseth. 10 of the sites were occupied by WHOI instruments, and the remaining 36 were from SIO. Deployments were run around the clock with 12 hours shifts. The instruments were made ready before arriving on each site, and the ship was never kept waiting, so deployments were completed in three days.

As the Langseth finished shooting each line, we began recoveries. During deployments, we watched an instrument descend to greater than 100 meters, then disabled the acoustics, and proceeded to the next site. Recoveries were much slower, since we had to sit around while the instrument rose from the depths. The SIO units have two lithium battery blocks, each with 12 “DD” cells, a three axis L28 seismometer package and a hydrophone for sensors, and a four ball float for floatation. This combination rises through the water at 42 meters per minute.

Recovery took six days. All 36 SIO packages were recovered, with good time drift on the clocks and full of data on the compact flash recording medium. All units burned and lifted off on the first release command. We were able to get enable commands through while the New Horizon was a mile off site and traveling at 9 knots. We did need to secure the Knudsen depth finder to get clear commands through. The acoustic communication on this ship is excellent and notably superior to the Langseth. It is not clear if that is due to better hull transducer of a basically quieter ship.

As soon as all instruments were recovered, we began deploying the second set of sites. We had not received the location and depths on these sites until the last moment. The depths on many of the sites were greater than 3300 meters, so a second set of acoustic test were required. We were able to launch the first 7 locations, since they were less than 3300 meters, and then proceeded to deep water. Two rosettes were lowered to 4450 meters, and all worked as expected. We then finished deploying instruments. A total of 45 sites were deployed on four lines. WHOI occupied 6 sites and SIO occupied the remaining 39. Deployments went well, and finished in a little over three days.

During this deployment series, it was discovered that the seismometer sensor can (2007-029) on frame 2000-056 was leaking silicon oil on the storage rack. The sensor was pulled and the fill screw was not seated fully. Upon investigation, it was seen that water had leaked inside and corroded some of the seismometers. This sensor had been deployed at site L-12 (40 m depth) on Holbrook 1, and at site CR-09 (3383 m depth) on Holbrook 2. The seismometer data quality on these two sites may be corrupted, and should be checked.

At site ANE-05 we deployed a tethered unit as an OBH to record source shot signatures. This experiment resulted from a casual conversation of the previous leg of this cruise. The unit consisted of two parts. The lower part was a standard frame, acoustic unit, and mechanical release connected to a standard anchor. The logger and both sensors were removed. Four hundred meters of polypropylene line connected this lower frame to another standard frame with the logger, sensors, and floatation. The acoustic unit and mechanical release were removed from this frame. The logger was programmed to record at 2 kHz sample rate. Only one battery block was installed, to make sure we had enough floatation lift upon recovery. Three 16 gig compact flash cards were installed for data storage. Calculations showed that this total package would have the same floatation as a standard unit.

We launched off the stern. The upper package was deployed with the crane and pelican hook as usual, and the 400 meters of line were paid out while the ship steamed ahead. The lower unit was also deployed with the crane and pelican hook. It took ten minutes for the lower unit to fall enough to take tension on the upper package and pull it under. The total package sank at 40 meters per minute, slower than a standard unit due to all the extra drag in the water.

We waited a few days for the Langseth to finish shooting the first long line, and began recoveries. 37 units of the 39 units were recovered and full of data. The two lost units were sites AN-05 (logger sn 64) and AW-02 (logger sn 46).

At site AN-05, we had good acoustic communication, but the unit failed to lift off despite 5 Release-1 commands and 3 Release-2 commands. Failed floatation is suspected. This unit was abandoned at the time. Further efforts were made after recoveries were completed, on the transit back to port. The instrument was still there and active. Three more Release-1 commands and two more Release-2 commands were transmitted, but the unit never lifted off the sea floor.

At site AW-02 we had good acoustic communication, but when the release command was sent, the response pings died away in less than a minute. At the end of the 15 minute burn window, the acoustics were strong again, giving good ranges. The 12 volt ping power is tapped off the 18 volt battery stack that burns the wire. The symptom indicates that the burn voltage is being pulled to ground by a low resistance path. When the burn connection shuts off, the alkaline batteries recover enough to give good pings for communication. We sent a total of 15 Release-1 commands, hoping that each increment of burn would eventually be sufficient to release the instrument. We also sent a Release-2 command to see if the problem was specific to the first channel, but the result was the same, so we decided to focus on just one wire. In the end, the batteries were getting weak, the unit was still on the ocean floor, and the instrument was abandoned. It is suspected that the release cable leaked, providing a low resistance seawater short to ground, which precluded the burnwire from actually seeing much voltage.

There were two other minor problems. At site S-15, the unit surfaced without a working light or radio beacon (light sn 08-107, beacon sn 08-107). At site S-08, acoustics sn 72 needed two Release-1 commands before is lifted off the bottom.

The tethered unit was hooked off the starboard side, as usual, but then walked to the stern of the ship, being held away from the ship near the screws. At the stern, a lifting line through the A-frame to the capstan was used to bring the upper package on board. The connecting line was secured while the upper package was dismantled. The connecting line was then pulled aboard using the capstan, and the A-frame brought the lower package aboard. The whole operation from sighting on the surface to all parts on board took an hour. The logger had over 25 gigabytes of data recorded.

2. Cruise Calendar

Sunday	Monday	Tuesday	Wed.	Thursday	Friday	Saturday
16-Mar	17	18	19	20	21	22
		T. Gregg, A. Gardner, and S. Swift arrive on New Horizon	Load gear in Puerto Caldera. Arrival of the rest of the science party. Embark @ 19:00 LT	SIO Rosette/Acoustic release test to ~3200 m	Deploy OBSs to the Osa Line	Deploy CR-Serp and Cocos line OBSs. Begin deploying OBSs to line 1W.
23	24	25	26	27	28	29
Finish deploying OBSs to line 1W. CTDs along 1W.	Begin to recover Osa OBSs.	Finish Osa line recoveries. CTDs along the Quepos line.	Start CR-Serp recoveries.	Continue CR-Serp recoveries, lost 1 WHOI OBS. Recover Cocos line OBSs.	Finish recovery of CR-Serp line OBSs. Begin recovery of line 1W.	Continue recovering the 1W line, lost 2 WHOI OBSs.
30	31	1-Apr	2	3	4	5
Finish 1 st recov 43/46. Begin Serp deployment. SIO acoustic release test to 4250m.	Finish acoustic release tests. Finish deploying to Serp line.	Deploy AN line. Begin deploying AW line.	Finish deploying AW line. Deploy ANE line. Deployed tethered 2 kHz OBS at site ANE-5	Received word of possible lost OBS from the Langseth. Went on search of OBS.	Finished searching for lost OBS - did not find anything. Began recovery of Serp line @ 20:30.	Continue recovering the first 12 Serp line instruments.
6	7	8	9	10	11	12
Finished recovery of first 12 Serp line instruments. Steam to ANE-12.	Begin recovery of ANE-12 to ANE-9.	Finish recovery of ANE-12 to ANE-9. Drop CTDs along the SO1 line.	Recovery of AN-1 to AN-3. CTD drops along the SO3 line.	Recovery of AN-6 and AN-4, missing AN-5 (SIO). Recovery of S-13.	Recovery of S14-S21.	Recovery of S-21, and ANE-8 to ANE-4. Including the tethered OBS at ANE-5
13	14	15	16	17	18	19
Recovery of ANE-3 to ANE-1, and Recovery of AW-6 to AW-3, and S-17.	Recovery of AW-1. Lost AW-2. Retry AN-5 OBS. Finish recov. 2, 43/45. Begin Cul-9 CTD line.	Finish Cul-9 CTD line. Steam back to Puerto Caldera.	Arrive in port by 6:30 a.m.	Van to San Jose		

3. Science and Crew Lists



Science Party:
(from left to right)

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Martin Rapa (SIO)
Crispin Hollingshead (SIO)
Keith Shadle (SIO)
Trish Gregg (WHOI)
Steve Swift (WHOI)
Jake Marson (UW)
Matt McDonald (UW)
Alan Gardner (WHOI)
Dave DuBois (WHOI)
Nik Gribb (UW)

R/V New Horizon Science Party

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R/V New Horizon Crew Roster

John Manion – Captain



Eric Wakeman – First Mate



Richard Chase – Third Mate



Jim Potts – Chief Engineer



Laddie Rayala – Assistant Engineer



Scott Campbell – A/B



Buddy Carron – A/B



Dave Heinrich – A/B



Eddie Bautista – Oiler



Jake Halvorson – Wiper



Eddie Lograsso – Sr. Cook

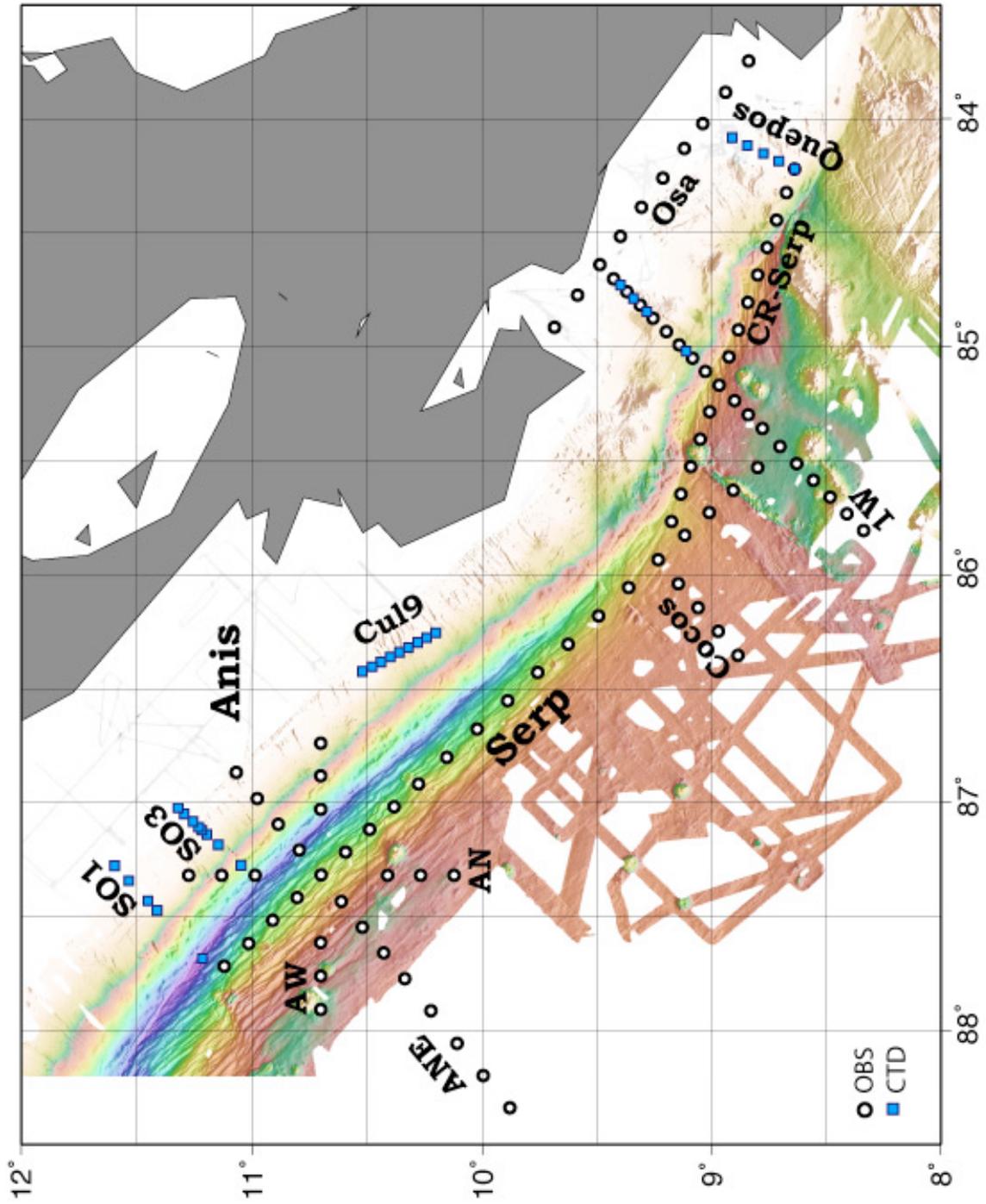


Mark Smith – Cook

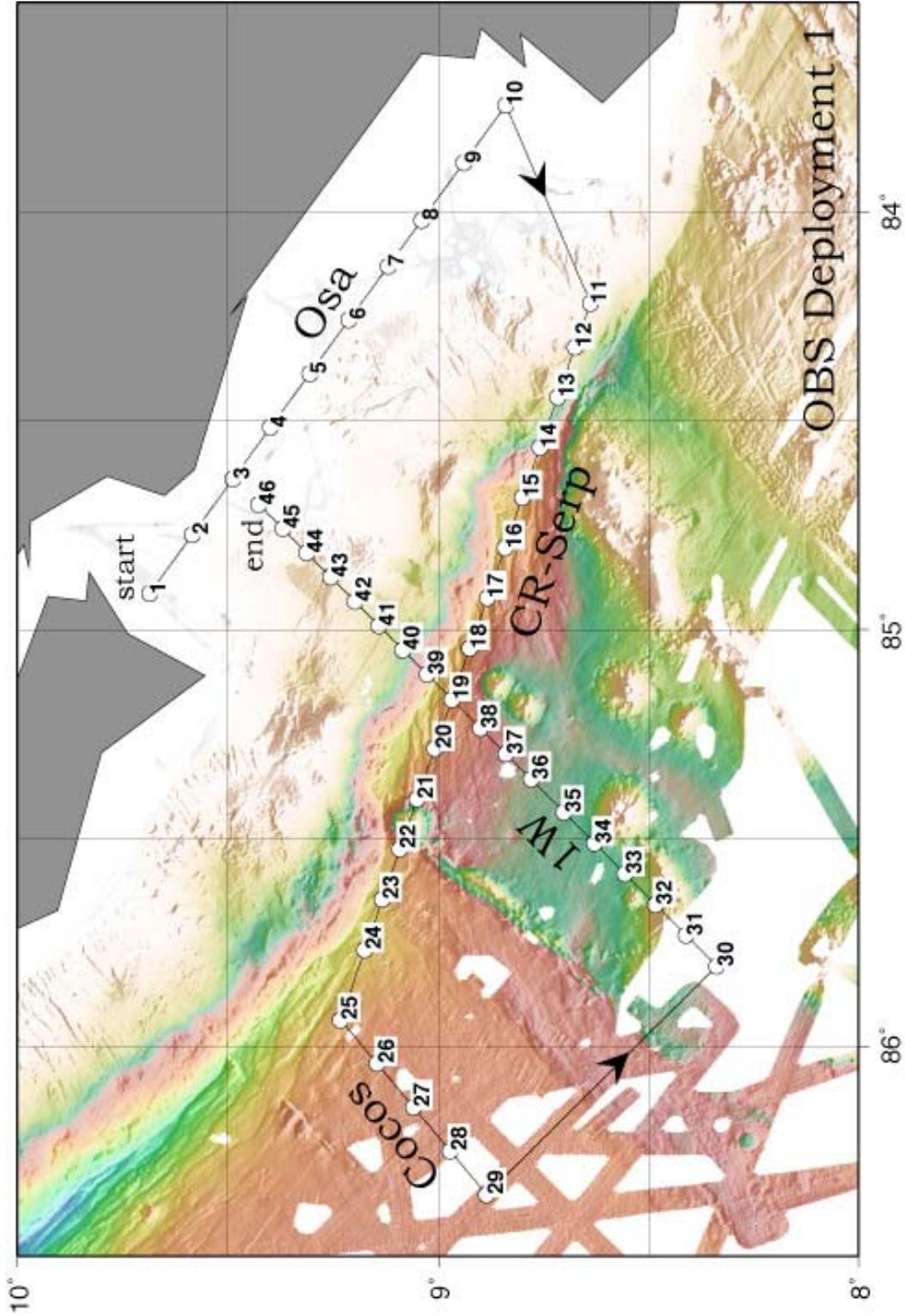


4. Cruise Maps

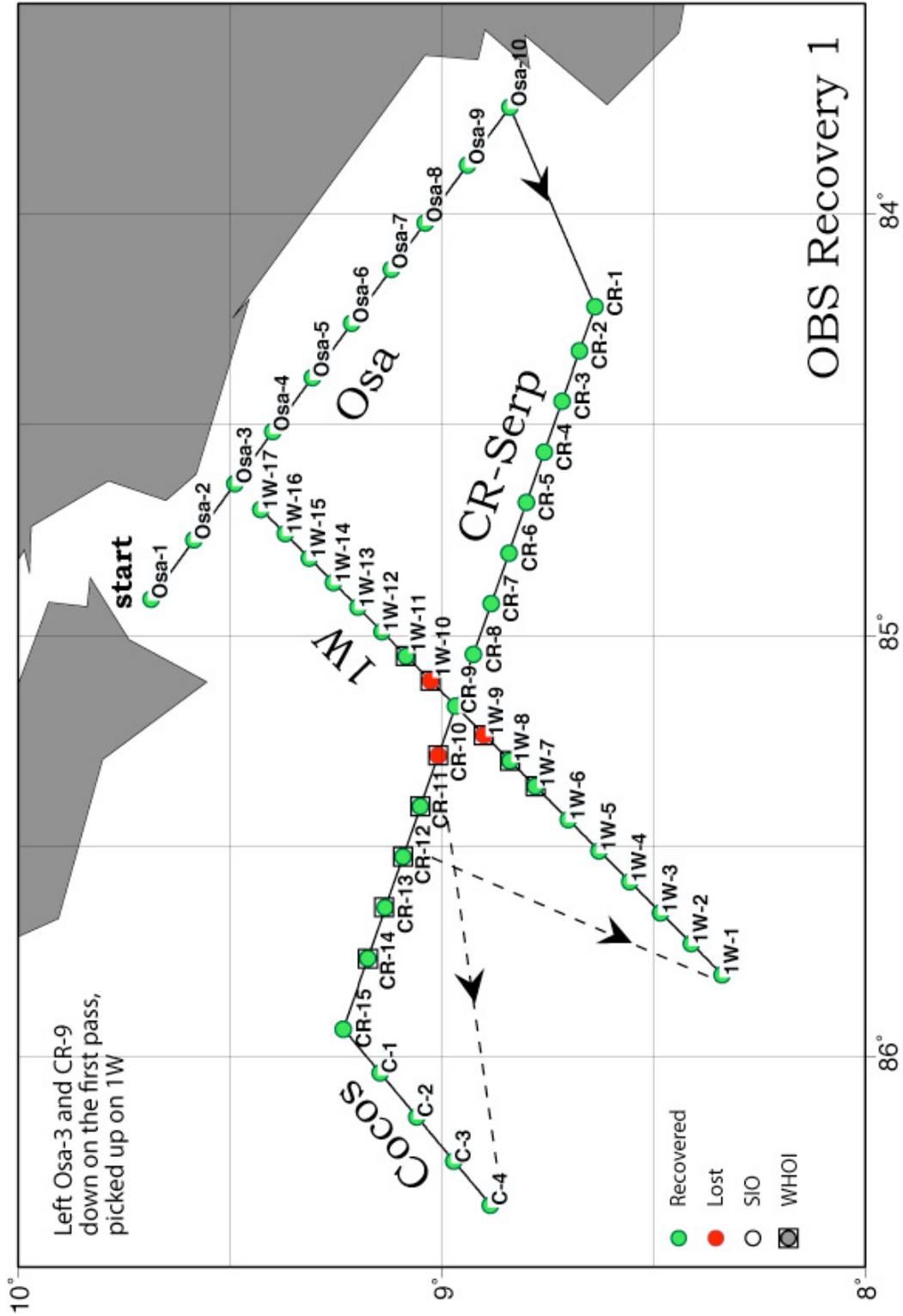
4.1 Total Operations



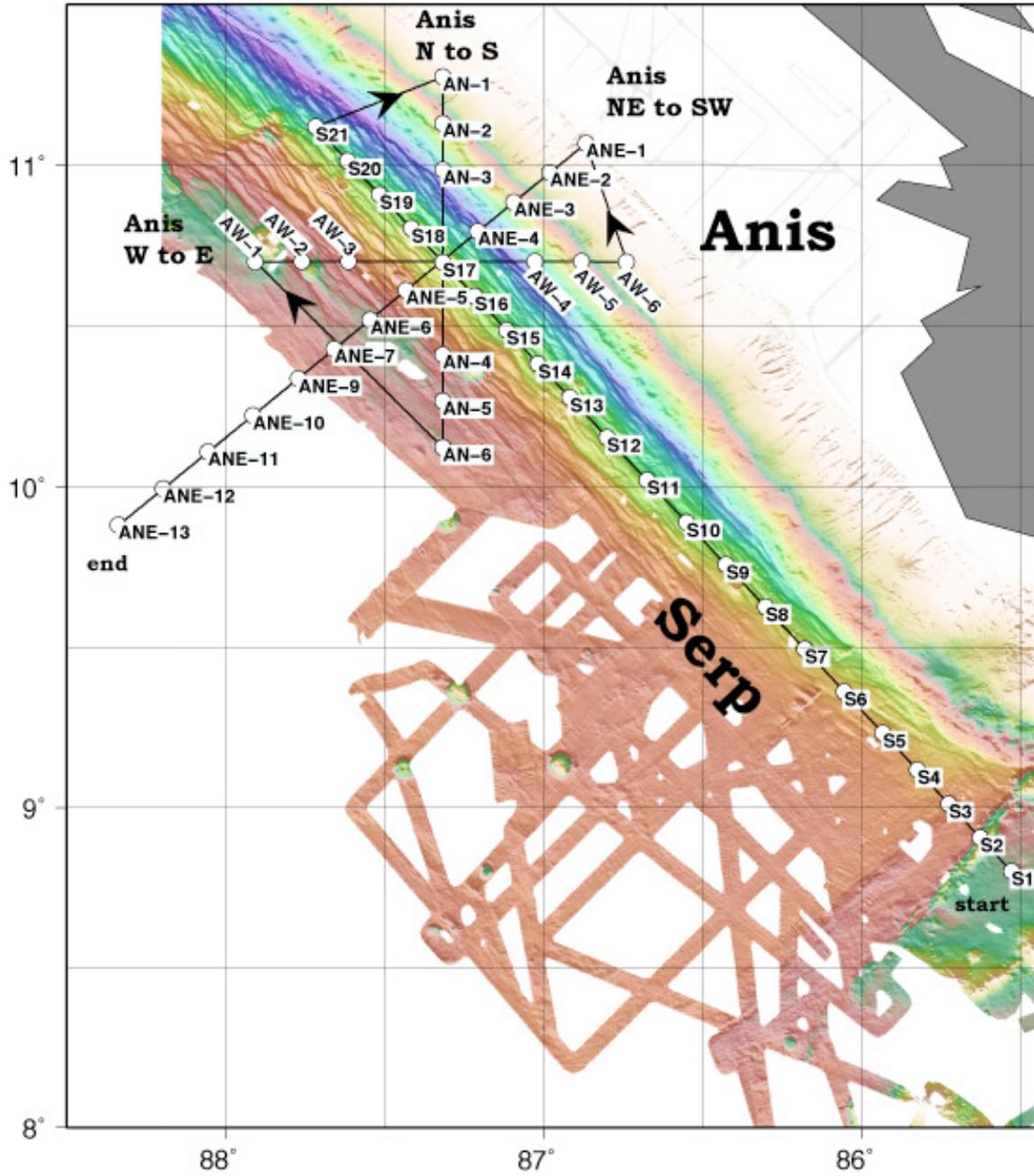
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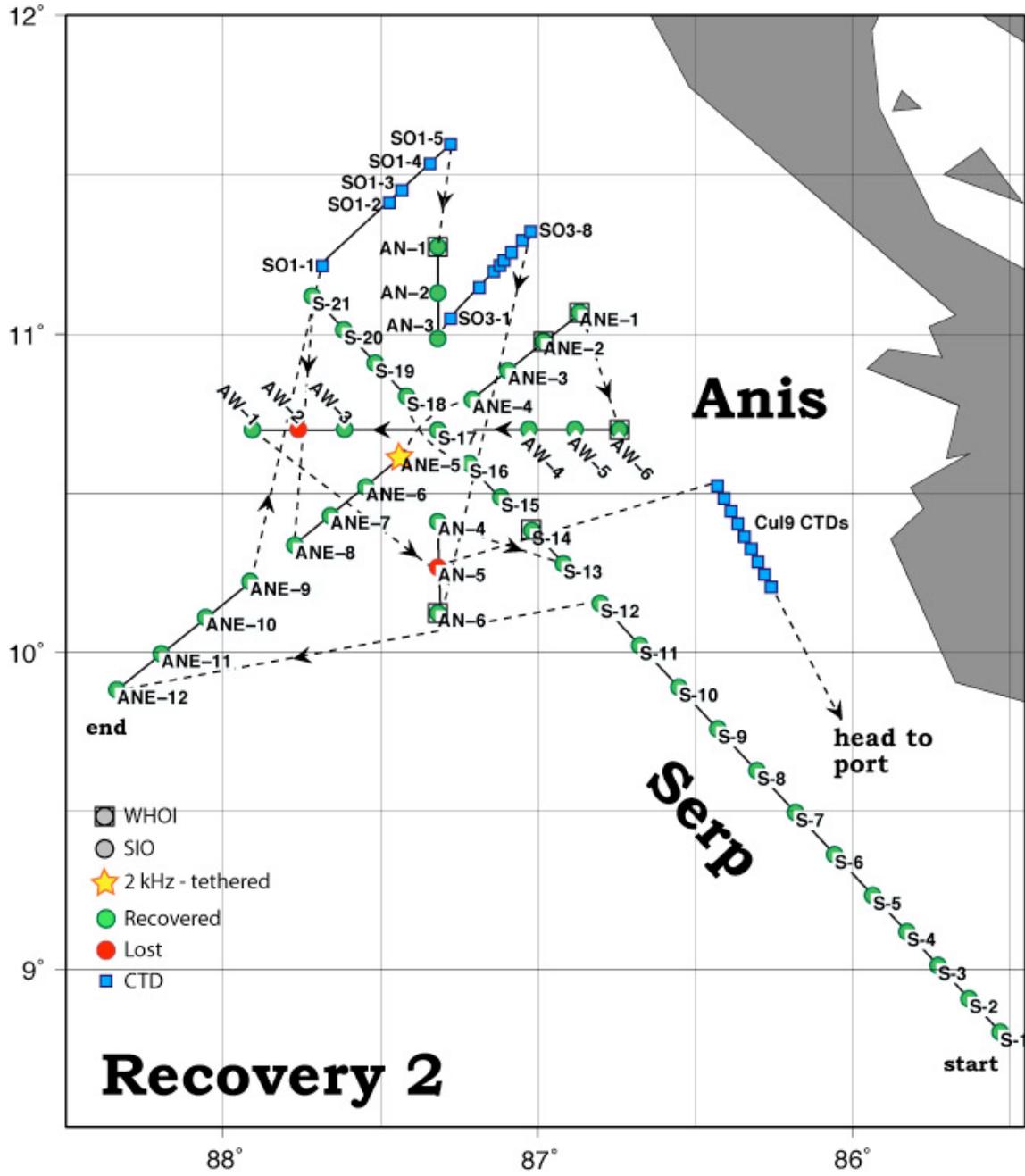
4.3 OBS Recovery 1



4.4 OBS Deployment 2



4.5 OBS Recovery 2



5. Daily Cruise Log

Wednesday, March 19, 2008

Due to space constraints at the Puerto Caldera dock, several changes were made to the initial embarkation schedule. After waiting off shore at Puerto Caldera, we were able to tie up and move all of the equipment across. The move took about 3 hours. After all the equipment was on board we steamed back to Puntarenus and anchored off shore to wait for the rest of the science party. After Alan, Nik, and Jake got aboard and we cleared customs, we embarked for the trench to do acoustic release tests for the SIO OBSs.

Matt and Trish spoke with Steve Holbrook on the R/V Marcus Langseth via radio from the R/V New Horizon and it was determined that everyone was on the same page for the first couple of days of science. Because the internet on the New Horizon is unreliable, communications between the Langseth and New Horizon will occur via email, radio, and satellite phone.

13:00 (19:00 GMT) Equipment transfer at Puerto Caldera

19:30 (01:30 GMT) Science Meeting

Watch standings were assigned as follows:

Noon – midnight:

- Crispin Hollingshead (SIO)
- Martin Rapa (SIO)
- Steve Swift (WHOI)
- Jacob Marson (Univ. WY)
- Woody Sutherland (Res-tech SIO)

Midnight – noon:

- Alan Gardner (WHOI)
- Dave DuBois (WHOI)
- Paul Georgief (SIO)
- Nik Gribb (Univ. WY)
- Keith Shadle (Res-tech SIO)

Trish Gregg (Chief Sci - WHOI) and Matt McDonald (Co-Chief Sci – Univ. WY) will rove and split the watches, with Matt on watch from 10 pm – noon and Trish around most of the time and sleeping between 10 pm and 6 am. Trish showed the survey layout and went over science objectives. The OBS teams expressed their concern over shallow deployments along the Osa line of < 50 m. Fishing is a large problem and loss of an OBS on the first leg in the Caribbean to a fishing dredge has heightened concerns. OBS personnel from both Scripps and WHOI asked that we not deploy in < 20 m of water, but are not pleased with anything less than 100 m. Matt explained that trawling



Loading the ship in Puerto Caldera.

should not be a very big problem on this side of Costa Rica, like it was on the Nicaragua bank.

Internet is a problem as the highseas access has been sporadic at best. All of the science party members were asked to sign up for ship email that will (hopefully) be sent out at the top of the hour every hour. This will allow for communications with the Langseth and land.

19:30 (01:30 GMT) Steam to trench to conduct acoustic release tests



Recovery of the final rosette for the SIO acoustic release testing. (Steve, Woody, Cris, and Martin)

Thursday, March 20, 2008

05:35 (11:35 GMT) On station for acoustic release tests.

Made it on station to conduct acoustic release tests at 05:35 (11:35 GMT). Began acoustic release tests at 05:49 (11:49 GMT). Did 4 drops for a total of ~10.5 hours, we tested 44 releases and all tests were positive. There was a complete power loss at 11:26.50 (15:26.50 GMT) and recovered ~ 5 minutes later with the backup generators. WHOI OBS in the van

were slowly shut down and everything came back without any problems. When the power went down we also lost both internet connections (Hiseas and Ship email). These problems seemed to be resolved by the afternoon.

11:14.5 (05:14.5 GMT) There was another full power outage when the wench was turned on. The power was back on in < 1 minute.

Friday, March 21, 2008

OBSs in the water - 19

00:16 (06:16 GMT) Begin Osa deployment

Today we started deploying OBSs. Steve Holbrook emailed during the night to inform us that the R/V Langseth did not begin shooting before sundown and therefore would have to wait 24 hours to shoot to the 1W-line, which they are hoping to do during the night to coordinate with land seismometers. Since the Langseth is delayed 24 hours, which gives us even more time to do our deployments. For the time being we are staying on our schedule, and will likely finish all of the deployments then see how much time we have for CTDs.



Deploying a SIO OBS the first morning along the Osa Line. (Paul, Alan, Matt, and Dave)

12:05 (18:05 GMT) Finished Osa line

Just after lunch we finished deploying the OBSs along the Osa Line. Everything went very smoothly with no problems to report. After the last Osa deployment we began steaming to the first deployment on the CR-Serp line to the southwest. Before the Midnight-noon watch was relieved we had a quick science meeting and will institute 12:00 (16:00 GMT) science meetings for the rest of the cruise to make sure that everyone is on the same page.

15:39 (21:39 GMT) Arrived onsite at the first CR-Serp deployment location.

CR-Serp line went pretty smoothly in the afternoon. Internet was up and down, the res tech, Woody, said this was due to heading changes, which may be the case. Still, this lack of reliable communications is concerning.

19:00 (01:00 GMT) Langseth email update

The Langseth finished shooting their Nicoya Line and began shooting the 1W line. So far there have been no marine mammal have been observed.

Saturday, March 22, 2008

OBSs in the water – 34



Matt and Nik learn how to service an SIO OBS during the Cocos line drop.

06:21 (12:21 GMT) Deployed the final OBS on the CR-Serp line

The rest of the CR-Serp line went down smoothly. Unfortunately the internet has been down since ~ midnight so there has been no communication with the Langseth. This is becoming a major problem. Test emails were sent to the Chief Sci ship account to see if the F77 back up is working, but they have not come through, causing further concern.

07:20 (13:20 GMT) Begin Cocos

10:15 (16:15 GMT) Last Cocos drop and begin steam to line 1W

We pushed our science meeting up to 10:30 since the midnight shift was pretty dead. Both Paul and Jake have colds; Paul's cold seems fairly severe, possibly heightened by his lack of sleep. During the science meeting there was an update of the Langseth, which finished shooting along 1W at 9 meters depth and is going to do a shoot at 6 meters depth tonight. It looks like they are on schedule to finish shooting to Osa on Monday afternoon, which may give us some much needed down time.

After the science meeting the SIO OBS team brought up that the 12 hour shifts are pretty brutal. Unfortunately, since Alan and Dave have to be on the same shift for recoveries

and there are only 8 watch standers, there is no way to create an 8 hour watch system. Hopefully, the 12 hour is going to work out. We are going to have to be very flexible about giving people some down time during recoveries since a couple of people are already sick, and we want everyone to stay safe.

15:52 (21:52 GMT) First drop on line 1W

As we began along the 1W line we finally came within range of the Langseth for radio communications. We passed the Langseth on our port around 18:30 (00:30 GMT). They were trying to get shooting started up again before night fall. We should find out pretty soon if they were able to do so. If everything works out, they should be ready for us to recover the Osa line around Monday afternoon (24 Mar 08). Otherwise, it could be as late as Tuesday afternoon (25 Mar 08).

19:30 (01:30 GMT) Langseth gets in our way

The Langseth started turning to go back up the 1W line at ~ 7 pm (02:00 GMT). Unfortunately, they are sitting over site 1W-4 so we have to wait until they clear out before we can do that deployment. After they turn we will fall in line behind them and follow them up the 1W line making our deployments along the way. To kill some of the time, I am adding 4 CTD drops to the schedule. At approximately 22:30 (4:30 GMT) we got underway and began deploying OBSs again and a slow pace behind the Langseth.

Sunday, March 23, 2008 - Easter

OBSs in the water – 46



Lowering of the first CTD along the 1W line (Alan and Keith)

06:27 (12:27 GMT) First CTD drop

After deploying 8 OBSs through the night, we arrived on site for the first CTD drop between 1W-11 and 1W-12. Looks like the CTD collected great data. In the end we did four CTD drops (2 deep and 2 shallow) inbetween OBS deployments. We requested 6 CTD drops so we may do the other two later on during the second half of the deployments.

15:00 (21:00 GMT) Final OBS deployment in the first experiment

The last OBS deployment went down giving the science party a much-needed break and a chance for movie watching.

Every one was told to take it easy and get some rest because the next couple weeks will be intense with the OBS recovery. The WHOI group set up a computing station in the science lab to do quick data retrieval off of the OBSs and the Scripps group are set up on three computers. Now we are just waiting

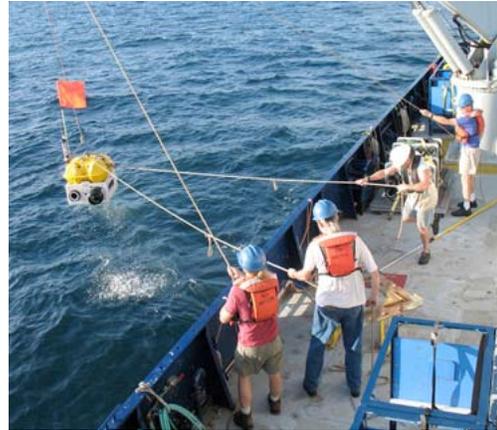
to get the word from the Langseth that we can start recovering the Osa Line. Based on current estimations they should finish shooting Monday afternoon.

Monday, March 24, 2008

Every one was able to enjoy a relaxing morning while we waited to begin recoveries. At the daily science meeting we discussed the recovery order and briefly went over the plan for the rest of the cruise.

16:40 (22:40 GMT) First recovery on Osa Line

We began recovering the Osa Line at 16:40. Unfortunately, Dan and Steve sent word that we could start via email vs. actually calling the ship. Luckily, internet was up and we received word ~30 minutes after they sent it. They asked to leave OBS Osa-8 down for their Bang lines, so we are leaving the OBS at the end of the 1W line as well as Osa-8 down for them to shoot to.



Recovery of Osa-1, first recovery of the cruise, goes smoothly. (Martin, Cris, Jake and Steve)



Watching movies during down time between recovery of Osa and CR-Serp. (Jake, Cris, Alan, and Dave)

Tuesday, March 25, 2008

4:05 (10:05 GMT) Last Osa recovered

Recovery went well through the night and all of the Osa Line OBSs were recovered – aside from Osa-3, which was left down for the 1W line. Matt spoke to the Langseth at ~ 1 am LT and got the go ahead to retrieve the Osa-8 OBS.

8:20 (14:20 GMT) First CTD on Quepos Line

After the recoveries were completed for the Osa line, we slowly transited to the beginning of the Quepos line to take a series of 6 CTDs. During this time, we spoke to the Langseth via radio and found out that they had to maneuver to get around some turtles. In the process, the Langseth was set behind a few hours and the current estimate for the end of their CR-Serp shoot is ~ 14:00 LT on March 26th, depending on the marine mammal situation.

16:36 (22:36 GMT) Finished the last CTD drop

Now we hold tight until the Langseth is finished shooting to the CR-Serp line.

Wednesday, March 26, 2008

9:30 (15:30 GMT) First CR-Serp recovery

Luckily the Lagseth had good luck shooting to CR-Serp without interruption from sea turtles. As such they finished way ahead of their 14:00 LT projected finish. We tried using the WHOI Satellite phone as well as the F77 satellite phone on the bridge to get confirmation that the Langseth had finished, but unfortunately we did not get an answer to our call to the Langseth on either attempt. Eventually, the Res Tech, Keith, was able to Hiseas up just long enough for us to check our email and receive the go ahead.



Martin getting a swim call to cut some fishing line away from the aft propellers.

Recovery of the CR-Serp line continued smoothly through the afternoon, until we literally hit a snag at 16:00 (22:00 GMT) when we got tangled in a long fishing line. We cut the ship away, but there was still quite a bit of line coming out from under the ship. Martin volunteered to dive under the ship and cut the line away from the propellers.

The rest of the afternoon and evening went smoothly.

Thursday, March 27, 2008

7:00 (13:00 GMT) First WHOI recovery

Unfortunately, WHOI instruments are much more difficult to see and the first WHOI recovery took over 20 minutes to find the instrument once it reached the surface. This morning there are 5 WHOI recoveries in a row, so we will see how this all goes.

9:45 (15:45 GMT) Rescue beacon lowered

The second WHOI instrument at CR-11, is not responding to release commands. The WHOI team first tried using the ship's transduce, then threw a transducer over the side, and have just now lowered a Scripps rescue beacon into the water to see if they can lower it to the OBS and get it to release. After they try this final communication with the OBS, we may have to call it quits and leave it behind.

11:00 (17:00 GMT) Left site CR-11 and the WHOI instrument behind

After > 3.5 hours of attempts at contacting the CR-11 WHOI instrument, we have decided that everything has been done that is possible and it is time to move on. Because of the delay caused by looking for CR-11, we have decided to steam to the end of the

Cocos line and begin to recover SIO OBSs. This will give the WHOI guys a chance to get some rest before we go back and try to recover more WHOI instruments.

19:00 (01:00 GMT) Recovery of Cocos #4

After steaming from the middle of CR-Serp to Cocos we have begun recovering the SIO instruments along the Cocos line.



Recovery of CR-14 WHOI OBS, hosing it down with fresh water on deck, Alan and Dave

Friday, March 28, 2008

7:20 (13:20 GMT) Recovery of CR-14, WHOI

11:25 (17:25 GMT) Finished recovery of the CR-Serp and Cocos Lines

The rest of the recoveries went smoothly and we were able to finish all of the recoveries along the CR-Serp and Cocos Lines 30 minutes ahead of the original cruise schedule. At the Noon science meeting we discussed the recovery of the 1W line and options for the second deployments. We are waiting for the final deployment locations from Dan and Steve.

18:25 (00:25 GMT) First recovery on line 1W

Now we are just steaming along Line 1W making recoveries. This should take ~ 30 hours to complete.

Saturday, March 29, 2008

9:00 (15:00 GMT) WHOI OBS on site 1W-9 not responding, presumed lost

Recoveries went well through the night, but the first WHOI OBS along line 1W at site 1W-8 required 3 burn commands to get to the surface, and the WHOI OBS at site 1W-9, at this point is not responding to ship transducer or the rescue beacon that was sent over the side at ~9:26 (15:26 GMT). We let the rescue beacon remain at 2500 m for several minutes before we began reeling it in at ~ 10:30 (16:30 GMT). We will wait onsite until 11:15 (17:15 GMT) before we leave the area and steam to the next OBS location.



Dave recovering the rescue beacon at site 1W-10.

**14:30 (20:30 GMT) WHOI OBS on site 1W-10
not responding, presumed lost**

Once again, a WHOI instrument did not respond to enable and burn signals. We again sent down the rescue beacon in hopes of getting a signal to it at depth.

After discussing the losses with the WHOI OBS Techs it is likely that the OBS are coming loose from their anchor before reaching the bottom. In the next set of deploys we are going to watch them until they reach the bottom to ensure that they are making it all the way down.

Sunday, March 30, 2008

3:25 (9:25 GMT) Last OBS recovered

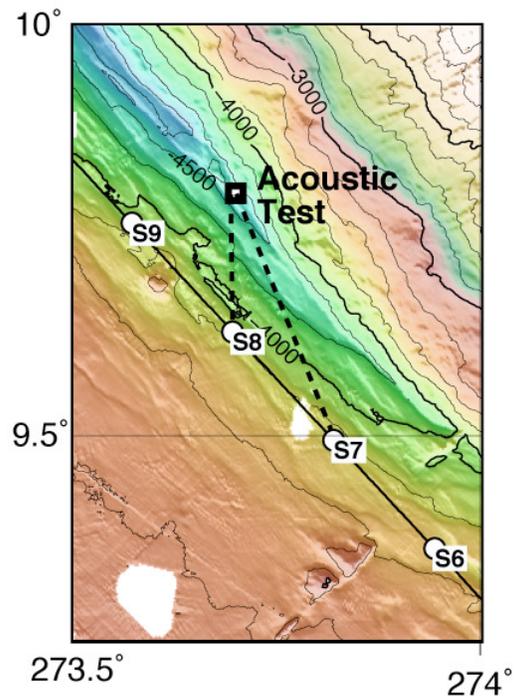
Our final OBS on deck was Osa-3. In the end we recovered 43 of the 46 instruments that were deployed on the first leg. All 3 of the instruments that we lost were from WHOI. Alan and Dave are working hard to figure out what failed during these recoveries. During the next deployments, the WHOI instruments will be monitored to the bottom to ensure that they do not separate from their anchors and float away.

After recovering the final WHOI instrument, we began steaming towards the first site of the second deployment.

12:33 (18:33 GMT) First deployment on the Serp Line.

We have decided to begin by deploying only SIO instruments, reserving the WHOI instruments for the shallow deployments on the edge of the anisotropy star. Taking another look at the depths of the deployments indicated that we have to do another acoustic release test. We had assumed that we would use the WHOI instruments in the deep site due to their fast ascension rates. However, in light of the first survey and the need to watch them hit the bottom, we will be using the SIO instruments for most/all of the deep deployments in the star. Our first set of acoustic tests were conducted at 3200m, so we are going to take a half a day to steam up to the trench and test 24 of the acoustic releases down to ~4500 m. The deepest deployment sites are ~5000 m.

21:30 (3:30 GMT) On site for acoustic release tests to 4450m



Location of the second set of acoustic release tests. Dashed line indicates the transit from S7 to the test site and back to S8 to continue deployments.

Monday, March 31, 2008

3:15 (9:15 GMT) Acoustic release test complete

After finishing the acoustic release test we steamed back to site S-8 to continue the deployments along the Serp line.

12:00 (18:00 GMT) Deployed WHOI instrument at site S-14

After working with the engineers on the ship Alan has reconfigured the anchor so that there is now a much thicker eyebolt, and he has taken steps to ensure that the anchor will not release prematurely. We stayed on site until we were sure that the instrument had made it to the seafloor.

8:40 (02:40 GMT) Finished deploying Serp line OBSs

Putting together an SIO OBS as demonstrated by Martin and Jake:

Step 1:



Put the anchor in place on the launch pad, and prepare the release.

Step 2:



Place the acoustic and data logger frame on the anchor and attach the release to the frame.

Step 3:



Test the acoustics.

Step 4:



After programming the data logger in the science lab, place it inside the frame and secure it.

Step 5:



Attach float package to the top of the frame.

Step 6:



Secure the radio, strobe light and red flag, make sure the radio and strobe are working properly.

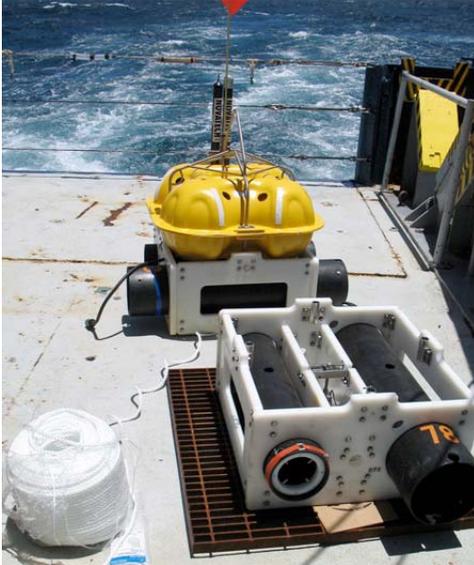
Tuesday, April 1, 2008

00:24 (6:24 GMT) Began deploying instruments along the Anis North-South line (AN).

A WHOI instrument was deployed at the first site on the AN line (AN-1). The ship remained on site until the OBS reached the sea floor.

10:39 (16:39 GMT) Finished deploying Anis North-South line (AN)

16:35 (22:35 GMT) Began deploying Anis West-East (AW)



Tethered OBS setup, the float is attached to a frame containing the data logger and will be suspended 400 m above a second frame containing the acoustic release attached to the anchor. We used 400m of polypro neutral buoyancy rope.

package off the back of the ship. The ship steamed forward at ~ 1knt while we fed out most of the 400 meters of line. Second, we used the crane again to lower the anchor and acoustic release package off the back. We remained on site until the instrument had sunk to ~ 1000 m depth.

Wednesday, April 2, 2008

1:56 (7:56 GMT) Finished deploying Anis West-East (AW)

5:16 (11:16 GMT) Begin deploying Anis NE to SW (ANE)

12:00 (18:00 GMT) Prepare and deploy tethered 2 kHz unit to site ANE-5

There is some question about how to calibrate the source signal from the Langseth. Crispin and others have devised an experiment where we will deploy a tethered OBS and use the hydrophone, recording at 2 kHz, to record the gun signal from the Langseth. By deploying this unit slightly off center in the Anis array, the hydrophone should collect data from a variety of azimuths as the Langseth passes by. We deployed the instrument in two stages. First we used the crane to drop the float and data logger



Deploying the float and data logger package off the stern using the crane under the A-frame.



After feeding out most of the 400 m of line, the anchor and acoustic release package was deployed.

When putting together an OBS this afternoon (Frame #56), Martin noticed that the pressure case for the seismometer leaked. This most likely occurred on the first leg of the

cruise in the Caribbean, and likely means that the data from that and the first deployment on this cruise was compromised.

We realized this evening that there was an error in the list of deployments for the second leg (two locations had the same Lat and Lon). As such, we have enough instruments to deploy and OBS at site ANE-5 along with the tethered instrument. After we complete deployments along ANE, we are going to go back up to ANE-5 and deploy the final WHOI instrument in the vicinity (> 500 m away) of the tethered deployment.

21: 38 (03: 38 GMT) Deployed the last of the ANE line.



Working hard in the science lab between deployments. Note the head clutch as Trish revises yet another recovery schedule. (Trish and Nik)

Thursday, April 3, 2008

7:00 (13:00 GMT) Cancelled deployment of final WHOI instrument.

After finishing the ANE line, we steamed back to ANE-5 where the tethered unit had been deployed. Our goal was to deploy the final WHOI instrument in the same location. Unfortunately, when we arrived on site, the final WHOI OBS was found to have a leak. As repairing it will be time intensive, we decided to forgo deploying this final instrument.

7:30 (13:30 GMT) Received word of OBS on surface from Langseth

First thing this morning, we received an email from the Langseth indicating that one of the OBSs had been picked up over their RDF (See email below). After discussing our options with the Captain and First Mate, we have decided to hold off on CTD work for the time being and head south to see if we can pick up the OBS that is adrift. The plan is to following the Serp line and check the southern 5 deployments to try to narrow down which instrument is missing. It is possible that it is one of the lost WHOI instruments as it is a frequency shared by both SIO and WHOI. One of the WHOI instruments, deployed to 1W-9, would have been broadcasting on that frequency and was not recovered during the first experiment.

Email from Steve:

Date: Thu, 03 Apr 2008 00:44:38 -0600 [04/03/2008 02:44:38 AM EDT]
From: "W. Steven Holbrook" <steveh@uwyo.edu>
To: Trish Gregg <chiefsci@rv-newhorizon.ucsd.edu>, Trish Gregg <trishm@MIT.EDU>, "mcdonald@rv-newhorizon.ucsd.edu" <mcdonald@rv-newhorizon.ucsd.edu>, Dan Lizarralde <danl@whoi.edu>, Harm van Avendonk <harm@utig.ig.utexas.edu>
Cc: Jeff Babcock <jbabcock@ucsd.edu>, Collins <jcollins@whoi.edu>

Subject: OBS on surface

All:

Our bridge has just informed us (00:20 LT) that they are receiving a radio signal on their RDF, transmitting at 160.725 (the only frequency used by both WHOI and SIO).

It is not clear to us whether this is one of the missing WHOI OBS from the first deployment. In fact, we think it is more likely to be the SIO OBS that was deployed at the intersection of lines 1W and SERP. Our reason for believing this is that - as incredibly bad luck would have it - there is a cable-laying ship, the Tyco Resolute, working at this moment, at 8° 42.258' N, 85° 25.833' W, within a few hundred meters of the position of the OBS at the intersection of our two lines. It seems likely that the Resolute has knocked the OBS from its anchor.

We have not spotted the instrument visually (no sign of a strobe) but are looking for it with the "big eyes". Unfortunately, we are not able to pick up the instrument even if we see it (given that we have 8 km of streamer out), nor can we launch the rescue boat at night. If we do see the instrument in the morning, we will ask the captain if we can launch the rescue boat to retrieve the OBS - but that seems unlikely.

I don't know if it makes sense for the New Horizon to head south to chase the instrument. We can certainly live without the CTD's planned for the morning, but it's a long way to go to hunt what might be a needle in a haystack by the time you get there.

Let me know if anyone has any suggestions or brilliant ideas.

-steve

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Feb. 16 - April 12, 2008
AT SEA ABOARD R/V MARCUS LANGSETH

Friday, April 4, 2008

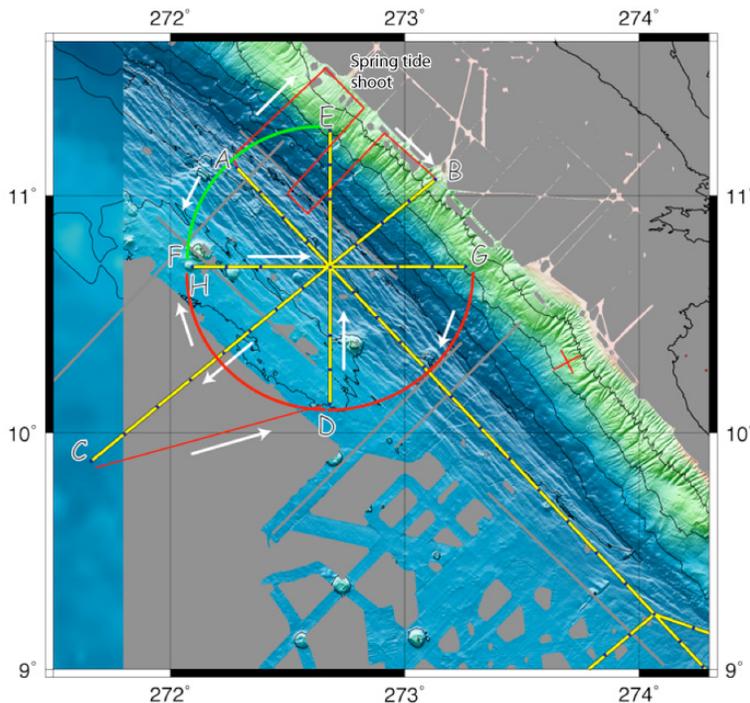
7:00 (13:00 GMT)

During the night we stopped at each of the southern Serp line instruments (S-1 through S-5). All of these instruments were still there and responded to our disable commands. We are now steaming at 4.5 knts with the current to see if we can find the instrument using the radio. We are sending disable commands every once in a while to see if the

instrument responds. We are going to follow the current southeast for 25 km, then loop back to the northwest.

19:00 (01:00 GMT)

After searching for the day we have not heard any radio signals or seen any sign of a stray OBS. Dan Lizarralde sent another emailing from the Langseth describing the radio broadcast as a long chirp (> 3 secs) and a longer pause. The WHOI instrument has a ½ sec chirp and a long pause, and the SIO instrument has a 2 sec chirp and a 4 sec pause. We are now hoping that it isn't one of our instruments.



The best laid plans... the Langseth projected shoot order for the Anisotropy experiment.

20:30 (02:30 GMT)

Begin Recovery

We got the go ahead from the Langseth that they have finished shooting to the Serp line so we can begin to recover the first 12 Serp instruments. In the mean time, they are shooting a new moon, "spring tide" line for seismic oceanography and they will begin to shoot to the NE line of Anis (see figure for details of their opps).

23:30 (05:30 GMT)

First Serp OBS on board.

Saturday, April 5, 2008

We are heading down the Serp line picking up the first 12 OBSs. In the science meeting today we went over the plan for the recovery emphasizing the importance of coordination and communication with the Langseth to ensure that we do not pull OBSs prematurely. Everyone is very excited to begin the last portion of the cruise.

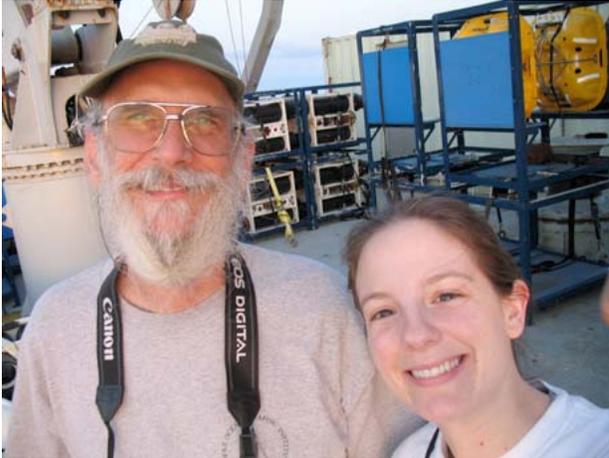
18:30 (00:30 GMT)

The first 8 instruments have been recovered. This has helped to convince us that the signal that the Langseth picked up over the radio was most likely, not a lost SIO OBS. So far the recoveries have



Martin hosing down a recovered OBS.

gone well due to the calm seas. Tomorrow we will steam to the southern end of the NE Anis line (Point C on the above map) to begin recovering along the line after the Langseth has finished shooting on April 7th. There is a good chance that we will be in radio contact with them as they head to point D on the AN line to begin shooting the North-South line.



Crispin and Trish watching a sunset.

Sunday, April 6, 2008

7:00 (13:00 GMT)

Finished recovering the first 12 Serp line instruments with little difficulty. We received word from the Langseth this morning that they were delayed in their seismic oceanography – spring tide – shoot due to turtles. This will put them about a half a day behind in their schedule, but they should finish up sometime tomorrow afternoon by our estimations, and within the time frame of our schedule. We are doing

a slow steam to ANE-12 and will wait on site for the Langseth to finish.

Monday, April 7, 2008

We arrived on site at ANE-12 early this morning and watched the Langseth finish the ANE line at approximately 10:45 (16:45 GMT). Unfortunately, the Langseth ran into quite a few turtles along the landward end of the ANE line, and they weren't able to obtain useful data from that end of the line. Since there is still one contingency day left, we have rearranged the recovery schedule so that the Langseth will have time to reshoot the line. We will be recovering ANE-12 to ANE-9 once the Langseth has moved off the site. After we have finished this portion of the recoveries, we are heading north to the SO1 line to drop 5 CTDs.



We all jump at the chance to get some photos of sea turtles. Unfortunately, we have only seen a couple this entire trip (Matt and Alan).

15:30 (21:30 GMT) recovery of ANE-12

After waiting for a couple of hours for the Langseth to clear the area, we began recovering the southern-most OBSs on the ANE line.

Tuesday, April 8, 2008

00:30 (6:30 GMT) finished recovery of ANE-11 to ANE-9

After picking up the 4 southern OBSs on ANE, we steamed north to the SO1 line to do some CTDs. The Langseth is currently shooting to the AN line and is scheduled to finish around 6 am LT on April 9th.

7:00 (13:00 GMT)

There is a large electrical storm heading our way, so we have secured the deck and are heading to the other side of it. Once the storm has cleared out of our way we will begin CTD SO1-1, which is right on the trench. The seas are pretty calm, so we should have a good day to do CTDs.



Breakfast with a few of the mid-noon watch standers, Paul, Matt, Nik, and Alan. Yay, Bacon!

after we heard the radio signal that told us it was on the surface. So far, the seas have not impacted the recovery of instruments too much.

Thursday, April 10, 2008

After finishing the last CTD along line SO3 at 2:00 (8:00 GMT), we began steaming toward AW-6. As our steam got underway, Matt received word from Steve that there would be a change of plans in the recovery operations. Unfortunately, the rough seas and stiff currents slowed the Langseth down to ~2.5 knts while they were shooting to the first part of the AW line. Since this slow down has caused major delays, the Langseth is going to begin shooting the southern circle before shooting the rest of the AW line. The change in plans has us steaming to the south to AN-6. We will recover AN-6 to AN-4 and S-13 to S-16, then wait for clearance to continue to recover the Serp line.

Wednesday, April 9, 2008

After doing 5 CTD drops we headed over to AN-1 to wait for the Langseth to finish shooting to the AN line so that we can recover AN-1 to AN-2. At ~ 7:00 (13:00 GMT) Matt spoke to Dan Lizarralde and got an update on their progress.

9:00 (15:00 GMT) WHOI OBS on deck from site AN-1

The seas are a high today at 4-5 ft, but we still were able to spot and recover the WHOI instrument ~20 minutes



Nik using a sextant for celestial navigation.

10:30 (16:30 GMT) On site at AN-6

10:45 (16:40 GMT) The SIO instrument is responding to the burn commands and communicating, but is not ascending. After sending 8 burn commands, 5 to the first burn wire and 3 to the second, we have decided to move on to the next site. Crispin, Martin, and Paul are all in agreement that the most likely problem is a leaking floatation device. We are going to continue the recoveries and swing by this site again next week on our way back to

port (if time allows) to try a couple more times to release the instrument.

16:56 (22:56 GMT) Finished recovering AN line.

Friday, April 11, 2008

3:30 (9:30 GMT)

Finished recovering S-13 to S-15.

We gained quite a bit of time during these recoveries and were way ahead of schedule. Luckily the Langseth was also doing quite well, so there was only a few hour wait while the Langseth finished shooting the southern circle. At ~10:00 (16:00 GMT) we received word that we could begin collecting S-16, S-18, S-19, S-20, and S-21. This will take the rest of today and until early tomorrow morning. After we have finished recovering these instruments, we will wait for the Langseth to finish shooting to ANE before we begin to recover the ANE line.



A lone SIO OBS waiting to be recovered.

Saturday, April 12, 2008

00:15 (6:15 GMT) Recovery of S-21

We have now recovered the entire Serp line except for S-17, which is the center of the anisotropy experiment. We will recover S-17 when the Langseth has completed their shooting.

6:00 (12:00 GMT) Begin recovery of ANE-8

We have been heading northeast on the ANE line and have recovered ANE-8 through ANE-6. All were SIO instruments and there were no problems with these recoveries.

We are now steaming to the ANE-5 site where we deployed a tethered 2 kHz instrument. After the recovery of ANE-6 we met on deck where Crispin and Woody walked us through the recovery procedure. We will use a starboard approach, latch on to the instrument and two people will walk it around aft to the A-Frame, which will be used to complete the recovery.

16:10 (22:10 GMT) Spotted the tethered instrument

After approaching the tethered instrument and hooking it along the starboard, it was walked around to the stern and attached to the A-Frame. The floatation package with data logger was dissembled on the stern, then we proceeded to reel in the 400 m of poly pro line and finally the acoustic logger package at 17:08 (23:08 GMT). The entire process ran very smoothly and took approximately 1 hour.



Retrieving the first part of the tethered instrument using the A-frame.



Recovering the acoustic release package.

Sunday, April 13, 2008

4:23 (10:23 GMT) Finished recovering the ANE line

We have recovered all of the instruments deployed along the ANE line and are going to steam to the AW line and wait for the Langseth to finish shooting. They are estimating that they will finish at approximately 9:00 (15:00 GMT).

8:45 (15:45 GMT) Recovery of AW-6

We have recovered the first instrument on the AW line. The plan is to recover all of the AW line including the instrument deployed at S-17 (the center of the experiment). After we have recovered the AW line and S-17, we will steam down to AN-5 and make a second attempt to recover this instrument. Our plan is to check to see if it is still there and then send a few more burn sequences to try to get it to float to the surface.

We have received the final set of CTD positions from Ray Schmidt and will head back towards the coast to drop CTDs after we have finished the OBS recovery.

18:45 (00:45 GMT) S-17 recovered

22:30 (4:30 GMT) AW-2

When the initial commands were sent to the AW-2 SIO instrument, the instrument would start the burn sequence, but stop pinging after 5-6 pings. It seemed like there was not enough current getting to the instrument to complete the burn sequence so we stayed on site until 3:30 (9:30 GMT) trying to get the instrument to complete a burn sequence and complete. After 5 hours of trying, it was decided that there was nothing more that could be done for this instrument.

Monday, April 14, 2008

3:30 (9:30 GMT) Abandoned AW-2

5:50 (11:50 GMT) AW-3 on deck

The final OBS is on deck, so we are heading back to AN-5 to try again to get this instrument to release from the seafloor.

12:15 (18:15 GMT) On site at AN-5

The instrument is still on site. The first burn sequence went through and was completed by the instrument – it pinged back through the entire burn sequence. The second burn sequence went through, but after ~ 10 pings the instrument stopped pinging to tell us it is processing the burn sequence. This response is very similar to what was seen at AW-2. After trying a few more times, neither the first or second burn commands elicited a response from the instrument at ~ 13:30 (19:30 GMT) we terminated our rescue mission.

13:40 (19:40 GMT) Heading towards the Cul9 CTD line.

8:20 (02:20 GMT) Lowering first CTD

As we began lowering the first CTD along the Cul9 line, we realized that the CTD was not working. It looks like when we put it back on it was not terminated correctly. Woody, the Res Tech on watch, is reterminating the CTD. This problem was fixed after a couple of hours and we began the CTD operations.

Tuesday, April 15, 2008

Today we are finishing up the rest of the CTDs along the Cul-9 line. We are waiting to hear word from Vasile the port agent as to when we can dock at Puerto Caldera and may actually head in for tomorrow morning. This possibly means that today will be our last day of operations.

14:10 (20:10 GMT) Finish Cul9 CTDs – Steaming back to Port.

Wednesday, April 16, 2008

Arrival in Puerto Caldera, equipment transfer, and customs.

6. Tables

6.1 OBS Deployment & Recovery 1 Plan

OBS/CTD #	Latitude (°N)	Longitude (°W)	~ Depth	Line	Site #
1	9 41.166	84 54.786	-81	Osa	Osa-1
2	9 35.112	84 46.392	-206	Osa	Osa-2
3	9 29.298	84 38.346	-70	Osa	Osa-3
4	9 23.952	84 30.942	-46	Osa	Osa-4
5	9 18.366	84 23.226	-211	Osa	Osa-5
6	9 12.78	84 15.516	-286	Osa	Osa-6
7	9 7.188	84 7.806	-118	Osa	Osa-7
8	9 2.394	84 1.2	-109	Osa	Osa-8
9	8 56.4	83 52.95	-67	Osa	Osa-9
10	8 50.4	83 44.7	-86	Osa	Osa-10
11	8 38.322	84 13.164	-1423	CR-serp	CR-1
12	8 40.512	84 19.416	-2074	CR-serp	CR-2
13	8 43.026	84 26.622	-2470	CR-serp	CR-3
14	8 45.534	84 33.828	-1975	CR-serp	CR-4
15	8 48.048	84 41.04	-3560	CR-serp	CR-5
16	8 50.55	84 48.246	-3533	CR-serp	CR-6
17	8 53.058	84 55.464	-3393	CR-serp	CR-7
18	8 55.56	85 2.676	-3365	CR-serp	CR-8
19	8 58.116	85 10.05	-3498	CR-serp	CR-9
20	9 0.558	85 17.112	-3328	CR-serp	CR-10
21	9 3.06	85 24.33	-3024	CR-serp	CR-11
22	9 5.55	85 31.548	-3162	CR-serp	CR-12
23	9 8.04	85 38.772	-3640	CR-serp	CR-13
24	9 10.53	85 45.996	-3667	CR-serp	CR-14
25	9 13.986	85 56.064	-3438	CR-serp	CR-15
26	9 8.778	86 2.34	-3253	Cocos	C-1
27	9 3.57	86 8.61	-3156	Cocos	C-2
28	8 58.356	86 14.88	-3200	Cocos	C-3
29	8 53.142	86 21.15	-3136	Cocos	C-4
30	8 20.292	85 48.33	-2890	1W	1W-1
31	8 24.66	85 43.92	-2759	1W	1W-2
32	8 29.028	85 39.51	-2381	1W	1W-3
33	8 33.39	85 35.094	-2670	1W	1W-4
34	8 37.758	85 30.678	-2785	1W	1W-5
35	8 42.12	85 26.262	-2626	1W	1W-6
36	8 46.8	85 21.504	-2840	1W	1W-7
37	8 50.424	85 17.838	-2919	1W	1W-8
38	8 54.042	85 14.16	-3088	1W	1W-9
39	9 1.662	85 6.426	-3519	1W	1W-10
40	9 5.088	85 2.946	-2586	1W	1W-11
CTD-40C	9 6.762	85 1.2	n/a	1W	1W-C1
41	9 8.52	84 59.46	-2262	1W	1W-12
42	9 11.946	84 55.974	-1959	1W	1W-13
43	9 15.372	84 52.488	-1326	1W	1W-14
CTD-43C	9 17.082	84 50.748	n/a	1W	1W-C2
44	9 18.798	84 49.002	-1262	1W	1W-15
CTD-44C	9 20.508	84 47.262	n/a	1W	1W-C3
45	9 22.224	84 45.51	-451	1W	1W-16
CTD-45C	9 23.934	84 43.764	n/a	1W	1W-C4
46	9 25.65	84 42.024	-76	1W	1W-17

6.2 Quepos CTDs Plan

	Latitude (°N)		Longitude (°W)	
Q1	8	54.78	84	4.98
Q2	8	50.676	84	7.02
Q3	8	46.566	84	9.06
Q4	8	42.462	84	11.106
Q5	8	38.358	84	13.146
Q6	8	34.248	84	15.186

6.3 OBS Deployment 2 Plan

	Site #		Latitude (°N)		Longitude (°W)	Depth (m)	Line
SIO	S-1	8	48.024	85	31.776	-2730	SERP
SIO	S-2	8	54.366	85	37.704	-2602	SERP
SIO	S-3	9	0.708	85	43.632	-3324	SERP
SIO	S-4	9	7.05	85	49.566	-3514	SERP
SIO	S-5	9	13.986	85	56.064	-3253	SERP
SIO	S-6	9	21.751	86	3.342	-3575	SERP
SIO	S-7	9	29.669	86	10.776	-3667	SERP
SIO	S-8	9	37.585	86	18.216	-3857	SERP
SIO	S-9	9	45.498	86	25.656	-3865	SERP
SIO	S-10	9	53.408	86	33.108	-3989	SERP
SIO	S-11	10	1.314	86	40.566	-4180	SERP
SIO	S-12	10	9.222	86	48.024	-3883	SERP
SIO	S-13	10	16.686	86	55.08	-3568	SERP
WHOI	S-14	10	23.004	87	1.062	-3912	SERP
SIO	S-15	10	29.322	87	7.044	-3765	SERP
SIO	S-16	10	35.64	87	13.026	-3831	SERP
SIO	S-17	10	41.952	87	19.02	-3859	SERP
SIO	S-18	10	48.264	87	25.014	-4074	SERP
SIO	S-19	10	54.576	87	31.014	-4313	SERP
SIO	S-20	11	0.882	87	37.02	-4177	SERP
SIO	S-21	11	7.188	87	43.026	-4481	SERP
WHOI	AN-1	11	16.47	87	19.08	-1738	North-South
SIO	AN-2	11	7.836	87	19.08	-3092	North-South
SIO	AN-3	10	59.202	87	19.08	-4517	North-South
SIO	AN-4	10	24.666	87	19.08	-3051	North-South
SIO	AN-5	10	16.032	87	19.08	-2965	North-South
WHOI	AN-6	10	7.398	87	19.08	-2989	North-South
SIO	AW-1	10	42.06	87	54.402	-2291	West-East
SIO	AW-2	10	42.072	87	45.618	-2455	West-East
SIO	AW-3	10	42.084	87	36.834	-3070	West-East
SIO	AW-4	10	42.078	87	1.686	-4569	West-East
SIO	AW-5	10	42.072	86	52.902	-3186	West-East
WHOI	AW-6	10	42.054	86	44.388	-1947	West-East
WHOI	ANE-1	11	4.116	86	52.056	-530	NE-SW
WHOI	ANE-2	10	58.644	86	58.86	-1838	NE-SW
SIO	ANE-3	10	53.166	87	5.658	-3298	NE-SW
SIO	ANE-4	10	47.682	87	12.45	-5029	NE-SW
SIO	ANE-5	10	36.714	87	26.022	-3307	NE-SW
SIO	ANE-6	10	31.23	87	32.802	-2857	NE-SW
SIO	ANE-7	10	25.74	87	39.576	-2941	NE-SW
SIO	ANE-8	10	20.25	87	46.35	-3077	NE-SW
SIO	ANE-9	10	13.404	87	54.834	-3212	NE-SW
SIO	ANE-10	10	6.558	88	3.306	-3243	NE-SW
SIO	ANE-11	9	59.71	88	11.772	-3310	NE-SW
SIO	ANE-12	9	52.856	88	20.238	-3455	NE-SW

6.4 OBS Recovery 2 Plan, pt. 1 with S.O. CTDs

OBS Type	Site #	Latitude (°N)	Longitude (°W)	Depth (m)	Line
SIO	S-1	8 48.024	85 31.776	-2730	SERP
SIO	S-2	8 54.366	85 37.704	-2602	SERP
SIO	S-3	9 0.708	85 43.632	-3324	SERP
SIO	S-4	9 7.05	85 49.566	-3514	SERP
SIO	S-5	9 13.986	85 56.064	-3253	SERP
SIO	S-6	9 21.751	86 3.342	-3575	SERP
SIO	S-7	9 29.669	86 10.776	-3667	SERP
SIO	S-8	9 37.585	86 18.216	-3857	SERP
SIO	S-9	9 45.498	86 25.656	-3865	SERP
SIO	S-10	9 53.408	86 33.108	-3989	SERP
SIO	S-11	10 1.314	86 40.566	-4180	SERP
SIO	S-12	10 9.222	86 48.024	-3883	SERP

New Horizon waits for Langseth to shoot the ANE line - 4/07/08 12:00

SIO	ANE-12	9 52.856	88 20.238	-3455	NE-SW
SIO	ANE-11	9 59.71	88 11.772	-3310	NE-SW
SIO	ANE-10	10 6.558	88 3.306	-3243	NE-SW
SIO	ANE-9	10 13.404	87 54.834	-3212	NE-SW

New Horizon drops CTDs, Langseth shoots the AN line - 4/09/08 6:00

CTD-SO1	SO1-1	11 12.844	87 41.023	-5000	SO1
	SO1-2	11 24.755	87 28.308	-1651	SO1
	SO1-3	11 27.055	87 25.874	-1176	SO1
	SO1-4	11 32.069	87 20.526	-672	SO1
	SO1-5	11 35.73	87 16.625	-264	SO1

Langseth finishes shooting the AN line - 4/09/08 6:00

WHOI	AN-1	11 16.47	87 19.08	-1738	North-South
SIO	AN-2	11 7.836	87 19.08	-3092	North-South
SIO	AN-3	10 59.202	87 19.08	-4517	North-South

Langseth shoots line AW while New Horizon drops CTDs along OS1 and OS3

CTD-SO3	SO3-1	11 2.889	87 16.563	-2000	SO3
	SO3-2	11 8.742	87 11.107	-1875	SO3
	SO3-3	11 11.774	87 8.353	-1189	SO3
	SO3-4	11 12.987	87 7.223	-976	SO3
	SO3-5	11 13.85	87 6.43	-849	SO3
	SO3-6	11 15.377	87 5.03	-676	SO3
	SO3-7	11 17.635	87 2.933	-468	SO3
	SO3-8	11 19.3	87 1.394	-280	SO3

Langseth southern circle (finish by 4/11/09 12:00), NH recovers AW4-6

WHOI	AW-6	10 42.054	86 44.388	-1947	West-East
SIO	AW-5	10 42.072	86 52.902	-3186	West-East
SIO	AW-4	10 42.078	87 1.686	-4569	West-East

6.5 OBS Recovery 2 Plan, pt. 2

Langseth shooting CS-55				
Langseth Shoot W to Center along AW				
Type	Site	Latitude (°N)	Longitude (°W)	
SIO	S-16	10 35.64	87	13.026
SIO	S-18	10 48.264	87	25.014
SIO	S-19	10 54.576	87	31.014
SIO	S-20	11 0.882	87	37.02
SIO	S-21	11 7.188	87	43.026
SIO	ANE-8	10 20.25	87	46.35
SIO	ANE-7	10 25.74	87	39.576
SIO	ANE-6	10 31.23	87	32.802
Tethered SIO	ANE-5	10 36.714	87	26.022
SIO	ANE-4	10 47.682	87	12.45
SIO	ANE-3	10 53.166	87	5.658
WHOI	ANE-2	10 58.644	86	58.86
WHOI	ANE-1	11 4.116	86	52.056

Langseth Re-Shooting NE along ANE				
Langseth Steam back SW along ANE				
Langseth Re-Shoot W on AW				
WHOI	AW-6	10 42.054	86	44.388
SIO	AW-5	10 42.072	86	52.902
SIO	AW-4	10 42.078	87	1.686
SIO	S-17	10 41.952	87	19.02
SIO	AW-3	10 42.084	87	36.834
SIO	AW-2	10 42.072	87	45.618
SIO	AW-1	10 42.06	87	54.402
Retry SIO	AN-5	10 16.032	87	19.08

6.6 Cul9 CTD Plan

	Latitude (°N)		Longitude (°W)	
Cul9-1*	10	33.618	86	26.7842
Cul9-2	10	31.23	86	25.5061
Cul9-3	10	28.842	86	24.2281
Cul9-3b	10	27.49	86	23.2
Cul9-4	10	26.454	86	22.95
Cul9-5	10	24.06	86	21.6779
Cul9-6	10	21.672	86	20.3998
Cul9-7	10	19.284	86	19.1222
Cul9-7b	10	17.89	86	18.347
Cul9-8	10	16.896	86	17.85
Cul9-9	10	14.508	86	16.572
Cul9-10	10	12.12	86	15.2998

* The Langseth shortened their line, so we did not drop the CTD at the location Cul9-1.

6.7 OBS Deployment 1 Log

Line Name	OBS Name	Site #	Instr #	Acoustic #	SIO/WHOI	Julian day	Time release	Lat.	Long.	Depth (m)	Watch	Comments
Osa	Osa-1	1	40	27	SIO	81	6:16:34	41.147	54.779	83	JM/MM	Deployment slightly delayed because nav system temp. down.
	Osa-2	2	46	93	SIO	81	8:24:34	35.109	46.392	101.4	MM/NG	
	Osa-3	3	11	101	SIO	81	9:53:58	29.290	38.353	43.4	MM/NG	
	Osa-4	4	21	105	SIO	81	11:05:27	23.959	30.945	49.6	MM/NG	
	Osa-5	5	19	86	SIO	81	12:12:30	18.368	23.234	121.3	MM/NG	
	Osa-6	6	25	39	SIO	81	13:17:45	12.814	15.517	207	MM/NG	The Echo sounder did not record depth properly- a likely depth is around 170 m. On recovery we went back to this point and the water depth was 207 m.
	Osa-7	7	28	104	SIO	81	14:30:31	7.183	7.813	116	MM/NG	
	Osa-8	8	64	56	SIO	81	15:31:55	02.399	01.192	115.8	MM/NG	
	Osa-9	9	67	38	SIO	81	16:41:32	56.398	52.946	152	MM/NG	
	Osa-10	10	32	96	SIO	81	18:03:34	50.399	44.636	80	MM/NG	crossed into coastal waters, noticed water color change
CR-Serp	CR-1	11	66	108	SIO	81	21:39:44	38.322	13.16	1399	TG/JM	
	CR2	12	43	97	SIO	81	22:34:34	40.498	19.41	1893	TG/JM	Just before deploy had to stop to check acoustic release to put dummy on
	CR-3	13	41	83	SIO	81	23:33:01	43.02	26.636	2401	TG/JM	
	CR-4	14	14	64	SIO	82	0:30:55	45.527	33.814	~3176	TG/JM	Depth reading probably incorrect, depth sounder not working
	CR-5	15	17	65	SIO	82	1:29:51	48.04	41.032	3578	TG/JM	
	CR-6	16	10	72	SIO	82	2:38:09	50.55	48.221	3540	TG/JM	
	CR-7	17	55	40	SIO	82	3:39:26	53.067	55.441	3581	TG/JM	
	CR-8	18	61	30	SIO	82	4:54:18	55.575	02.656	3383	MM/JM	
	CR-9	19	13	90	SIO	82	5:53:59	58.116	10.048	3383	MM/JM	

Line Name	OBS Name	Site #	Instr #	Acoustic #	SIO/WHOI	Julian day	Time release	Lat.	Long.	Depth (m)	Watch	Comments
	CR-10	20	D34	26126	WHOI	82	7:01:44	09 00.569	085 17.092	3329	MM/NG	
	CR-11	21	D36	26139	WHOI	82	8:03:12	9 3.055	85 24.336	3124	MM/NG	
	CR-12	22	D10	26097	WHOI	82	9:20:21	09 05.572	085 31.555	3207	MM/NG	
	CR-13	23	D03	26100	WHOI	82	10:15:04	09 08.042	085 38.772	3631	MM/NG	
	CR-14	24	D06	26093	WHOI	82	11:08:53	9 10.545	85 45.994	3638	MM/NG	
	CR-15	25	31	98	SIO	82	12:21:55	09 13.993	085 56.066	3463	MM/NG	
Cocos	C-1	26	47	88	SIO	82	13:19:00	9 08.791	86 02.342	3268	MM/NG	
	C-2	27	7	99	SIO	82	14:18:11	09 03.569	086 08.649	3176	MM/NG	
	C-3	28	3	87	SIO	82	15:17:59	08 58.368	086 14.901	3147	MM/NG	
	C-4	29	23	107	SIO	82	16:14:53	08 53.160	86 21.154	3146	MM/NG	
1W	1W-1	30	1	17	SIO	82	21:52:50	8 20.306	85 48.313	2927	TG/JM	
	1W-2	31	24	62	SIO	82	22:35:05	8 24.655	85 43.9	2658	TG/JM	
	1W-3	32	27	100	SIO	82	23:36:50	08 29.05	85 39.49	2363	TG/JM	
	1W-4	33	2	103	SIO	83	4:30:36	08 33.405	085 35.052	2721	JM/MM	
	1W-5	34	65	106	SIO	83	5:15:18	08 37.764	085 30.677	2711	JM/MM	
	1W-6	35	63	89	SIO	83	6:04:48	08 42.119	085 26.260	2800	NG/MM	
	1W-7	36	D15	26123	WHOI	83	7:03:50	08 46.792	085 21.500	2891	NG/MM	
	1W-8	37	D08	26091	WHOI	83	7:52:50	08 50.425	85 17.832	2973	NG/MM	
	1W-9	38	D13	26094	WHOI	83	8:57:21	08 54.060	085 14.146	3098	NG/MM	
	1W-10	39	D24	26147	WHOI	83	11:02:40	09 01.659	085 06.420	3321	NG/MM	
	1W-11	40	D26	26106	WHOI	83	11:57:30	9 05.081	85 02.945	2533	NG/MM	
	1W-12	41	58	95	SIO	83	14:42:22	09 08.509	084 59.453	2250	NG/MM	
	1W-13	42	60	94	SIO	83	15:19:56	09 11.929	084 55.957	1890	NG/MM	
	1W-14	43	44	69	SIO	83	15:58:53	9 15.350	84 52.483	1643	NG/MM	
	1W-15	44	50	1	SIO	83	18:17:58	9 18.788	84 49.006	1210	TG/JM	
	1W-16	45	56	33	SIO	83	19:55:05	9 22.218	84 45.517	502	TG/JM	
	1W-17	46	33	67	SIO	83	21:01:21	9 25.652	84 42.028	73.54	TG/JM	

6.8 OBS Recovery 1 Log

Line Name	OBS Name	Site #	SIO/WHOI	Julian day	Time spotted	Time Hooked	Time on deck	Lat. Deg.	Lat. Min.	Long. Deg.	Long. Min.	Depth	Watch	Comments
Osa	Osa-1	1	SIO	84		22:40:05		9	41.238	84	54.724		TG/JM	
	Osa-2	2	SIO	84		23:59:12		9	35.09	84	46.408		TG/JM	
	Osa-4	4	SIO	85		2:17:48		9	23.49	84	31.019		TG/JM	
	Osa-5	5	SIO	85		3:38:03		9	18.3	84	84.219		TG/JM	
	Osa-6	6	SIO	85		4:52:15	4:53:13	9	12.805	84	15.536		JM/MM	
	Osa-7	7	SIO	85		6:09:12	6:10:46	9	7.125	84	7.728		NG/MM	
	Osa-8	8	SIO	85	7:18:24	7:25:57	7:27:40	9	2.277	84	1.178		NG/MM	cocoa butter over here!
	Osa-9	9	SIO	85	8:38:49	8:45:32	8:47:09	8	56.349	83	52.827		NG/MM	
	Osa-10	10	SIO	85	10:05:43	10:12:51	12:13:55	8	50.343	83	44.619		NG/MM	
CR-Serp	CR-1	11	SIO	85	16:42:18	16:50:57	16:52:14	8	38.196	84	12.951		TG/JM	
	CR-2	12	SIO	85	18:37:00		18:50:52	8	40.419	84	19.163		TG/JM	
	CR-3	13	SIO	85	20:50	21:06:00	21:06:00	8	43.006	84	26.335	2272	TG/JM	
	CR-4	14	SIO	85	23:20:00		23:36:00	8	45.637	84	33.394		TG/JM	depth: ?
	CR-5	15	SIO	86	2:08		2:18:20	8	48.22	84	40.916		TG/JM	depth: ?
	CR-6	16	SIO	86	4:39:41	4:52:47	4:54:24	8	50.591	84	48.003	3544	JM/MM	
	CR-7	17	SIO	86	7:16:34	7:25:49	7:27:12	8	53.078	84	55.152	3470	NG/MM	
	CR-8	18	SIO	86	3.91875	9:57:33	9:58:40	8	55.555	85	2.213	3470	NG/MM	
	CR-10	20	WHOI	86	12:41	13:01:54	13:03:44	9	0.894	85	16.882	3451	NG/MM	
Cocos	C-4	29	SIO	86	0:56:00	1:04:00	1:05:00	8	53.244	86	21.405	N/A	TG/JM	
	C-3	28	SIO	86	3:21:00	3:29:00	3:31:00	8	58.459	86	15.107	N/A	TG/JM	
	C-2	27	SIO	86	5:49:19	5:57:53	5:59:39	9	3.7	86	8.783	3179	JM/MM	
	C-1	26	SIO	86	8:17:40	8:29:28	8:30:44	9	8.868	86	2.426	3265	NG/MM	
CR-Serp	CR-15	25	SIO	86	10:54:18	11:03:55	11:05:35	9	14.032	85	56.201	3265	NG/MM	
	CR-14	24	WHOI	86	13:16:34	13:25:17	13:26:56	9	10.703	85	46.151	3639	NG/MM	
	CR-13	23	WHOI	86	15:22:32	15:30:21	15:31:35	9	8.135	85	38.933	3568	NG/MM	
	CR-12	22	WHOI	86	17:25:30	17:33:30	17:34:54	9	5.694	85	31.682	3275	NG/MM	
1W	1W-1	30	SIO	87	00:16:00	0:23:00	0:24:00	8	20.529	85	48.148	N/A	TG/JM	
	1W-2	31	SIO	87	2:07:00	2:18:00	2:19:00	8	24.882	85	43.694	N/A	TG/JM	

Line Name	OBS Name	Site #	SIO/WHOI	Julian day	Time spotted	Time Hooked	Time on deck	Lat. Deg.	Lat. Min.	Long. Deg.	Long. Min.	Depth	Watch	Comments
	1W-3	32	SIO	87	4:03:49	4:10:12	4:11:10	8	29.294	85	39.444	2386	JM/MM	
	1W-4	33	SIO	87	5:58:59	6:07:09	6:08:38	8	33.61	85	34.892	2738	JM/MM	
	1W-5	34	SIO	87	7:59:54	8:10:28	8:11:45	8	37.954	85	30.439	2716	NG/MM	
	1W-6	35	SIO	87	10:00:20	10:07:23	10:09:17	8	42.259	85	26.085	2795	NG/MM	
	1W-7	36	WHOI	87	12:36:33	12:46:20	12:48:00	8	46.881	85	21.24	2887	NG/MM	
	1W-8	37	WHOI	87	14:09:53	14:18:17	14:19:35	8	50.526	85	17.623	2961	NG/MM	
CR	CR-9	19	SIO	87	19:36:00	19:40:00	19:41	8	58.106	85	9.923	3387	TG/JM	
	1W-11	40	SIO	88	23:53	0:00:00	0:01:00	9	5.214	85	2.99	2520	TG/JM	
	1W-12	41	SIO	88	1:42:00	1:52:00	1:53	9	8.65	84	59.496	2299	TG/JM	
	1W-13	42	SIO	88	3:14	3:19:00	3:20	9	11.978	84	55.992	1894	TG/JM	
	1W-14	43	SIO	88	4:39:34	4:47:00	4:48:48	9	15.389	84	52.454	1644	JM/MM	
	1W-15	44	SIO	88	6:00:06	6:06:05	6:07:02	9	18.76	84	48.974	1202	NG/MM	
	1W-16	45	SIO	88	7:01:44	7:11:40	7:13:45	9	22.227	84	45.454	1201	NG/MM	
	1W-17	46	SIO	88	8:05:42	8:13:45	8:15:08	9	25.659	84	41.996	70	NG/MM	
OSA	OSA-3	3	SIO	88	9:18:10	9:24:19	9:25:19	9	29.326	84	38.814	41	NG/MM	

6.9 OBS Deployment 2 Log

Line Name	OBS Name	Site #	Instr #	Acoustic #	SIO/WHOI	Julian day	Time release	Lat. Deg.	Lat. Min.	Long. Deg.	Long. Min.	Depth (m)	Watch	Comments
Serp	S-1	1	11	101	SIO	90	18:33:40	8	48.02	85	31.784	2854	TG/JM	
	S-2	2	33	67	SIO	90	19:33	8	54.37	85	37.703	2608	TG/JM	
	S-3	3	44	69	SIO	90	20:29:45	9	0.711	85	43.623	3332	TG/JM	
	S-4	4	56	33	SIO	90	21:25	9	7.062	85	45.579	3505	TG/JM	
	S-5	5	50	1	SIO	90	22:51	9	13.987	85	56.069	3463	TG/JM	
	S-6	6	7	99	SIO	90	0:00	9	21.735	86	3.337	3594	TG/JM	
	S-7	7	14	64	SIO	91	1:11:02	9	29.673	86	10.798	3690	TG/JM	
	S-8	8	31	72	SIO	91	10:34:27	9	37.598	86	18.218	3840	NG/MM	OBS S-8 deployed
	S-9	9	47	82	SIO	91	11:50:19	9	45.491	86	25.675	3920	NG/MM	OBS S-9 deployed
	S-10	10	63	98	SIO	91	13:04:39	9	53.395	86	33.106	4106	NG/MM	OBS S-10 deployed
	S-11	11	2	89	SIO	91	14:16:17	10	1.317	86	40.568	4015	NG/MM	OBS S-11 deployed
	S-12	12	65	107	SIO	91	15:28:11	10	9.208	86	48.03	4108	NG/MM	OBS S-12 deployed
	S-13	13	66	34	SIO	91	16:45:57	10	16.681	86	55.101	3711	NG/MM	OBS S-13 Deployed
	S-14	14	D08	26091	WHOI	91	18:04:41	10	23.042	87	1.05	4068	TG/JM	OBS S-14 Deployed
	S-15	15	32	103	SIO	91	20:19:30	10	29.312	87	7.046	3765	TG/JM	OBS S-15 Deployed
	S-16	16	23	106	SIO	91	21:20:45	10	35.631	87	13.026	3881	TG/JM	OBS S-16 Deployed
	S-17	17	3	87	SIO	91	22:18:10	10	41.95	87	19.037	3961	TG/JM	OBS S-17 Deployed
	S-18	18	81	97	SIO	91	23:27:37	10	48.253	87	25.036	3870	TG/JM	OBS S-18 Deployed
	S-19	19	10	65	SIO	92	0:38:30	10	54.559	87	31.032	4068	TG/JM	OBS S-19 Deployed
	S-20	20	55	30	SIO	92	1:40:15	11	0.865	87	37.023	4240	TG/JM	OBS S-20 Deployed
	S-21	21	43	88	SIO	92	2:40:28	11	7.172	87	43.018	4391	TG/JM	OBS S-20 Deployed
Anis N to S	AN-1	22	D10	26097	WHOI	92	6:24:19	11	16.474	87	19.073	1675	NG/MM	OBS AN-1 Deployed

Line Name	OBS Name	Site #	Instr #	Acoustic #	SIO/WHOI	Julian day	Time release	Lat. Deg.	Lat. Min.	Long. Deg.	Long. Min.	Depth (m)	Watch	Comments
	AN-2	23	28	104	SIO	92	8:06:40	11	7.837	87	19.098	3414	NG/MM	OBS AN-2 Deployed
	AN-3	24	27	83	SIO	92	9:24:57	10	59.203	87	19.081	4724	NG/MM	OBS AN-3 Deployed
	AN-4	25	60	78	SIO	92	13:55:44	10	24.686	87	19.094	3009	NG/MM	OBS AN-4 Deployed
	AN-5	26	64	56	SIO	92	15:20:09	10	16.045	87	19.085	2986	NG/MM	OBS AN-5 Deployed
	AN-6	27	D03	26100	WHOI	92	16:39:45	10	7.402	87	19.092	2962	NG/MM	OBS AN-6 Deployed
Anis W to E	AW-1	28	25	39	SIO	92	22:35:22	10	42.057	87	54.423	2344	TG/JM	OBS AW-1 Deployed
	AW-2	29	46	93	SIO	92	23:57:50	10	42.072	87	45.634	2984	TG/JM	OBS AW-2 Deployed
	AW-3	30	19	86	SIO	93	1:14:05	10	42.084	87	36.839	3092	TG/JM	OBS AW-3 Deployed
	AW-4	31	41	73	SIO	93	5:41:03	10	42.066	87	1.692	4463	MM/JM	OBS AW-4 Deployed
	AW-5	32	17	50	SIO	93	6:47:42	10	42.078	86	52.908	3152	NG/MM	OBS AW-5 deployed
	AW-6	33	D34	26126	WHOI	93	7:56:47	10	42.054	86	44.366	1832	NG/MM	OBS AW-6 Deployed
Anis NE to SW	ANE-1	34	D31		WHOI	93	11:16:40	11	4.105	86	52.074	543	NG/MM	OBS ANE-1 Deployed
	ANE-2	35	D06	26093	WHOI	93	12:40:00	10	58.643	86	58.877	1677	NG/MM	OBS ANE-2 Deployed
	ANE-3	36	21	105	SIO	93	14:25:47	10	53.162	87	5.682	3735	NG/MM	OBS ANE-3 Deployed
	ANE-4	37	67	40	SIO	93	15:38:40	10	47.705	87	12.472	5016	NG/MM	OBS ANE-4 Deployed
	ANE-5	38	29	57	SIO	93	18:25:24	10	36.663	87	26.242	3440	TG/JM	OBS ANE-5 Anchor Deployed
	ANE-6	39	40	27	SIO	93	19:59:48	10	31.222	87	32.822	2875	TG/JM	OBS ANE-6 Deployed
	ANE-7	40	38	28	SIO	93	21:05:35	10	25.728	87	39.579	3464	TG/JM	OBS ANE-7 Deployed
	ANE-8	41	57	47	SIO	93	22:13:00	10	20.267	87	46.358	3128	TG/JM	OBS ANE-8 Deployed
	ANE-9	42	13	108	SIO	93	23:33:41	10	13.405	87	54.855	3176	TG/JM	OBS ANE-9 Deployed
	ANE-10	43	58	100	SIO	94	0:55:43	10	6.572	88	3.309	3288	TG/JM	OBS ANE-10 Deployed
	ANE-11	44	1	38	SIO	94	2:17:30	9	59.725	88	11.788	3304	TG/JM	OBS ANE-11 Deployed
	ANE-12	45	24	62	SIO	94	3:36:20	9	52.877	88	20.248	3351	TG/JM	OBS ANE-12 Deployed

6.10 OBS Recovery 2 Log

Line Name	OBS Name	Site #	SIO/WHOI	Julian day	Time spotted	Time Hooked	Time on deck	Lat. Deg.	Lat. Min.	Long. Deg.	Long. Min.	Depth	Watch	Comments
Serp	S-1	1	SIO	96	5:22:04	5:31:15	5:32:30	8	48.087	85	31.525	2855	MM/JM	SERP-1 hooked
	S-2	2	SIO	96	7:42:53	7:51:02	7:52:14	8	54.42	85	37.621	2067	MM/NG	SERP-2 hooked
	S-3	3	SIO	96	10:14:13	10:23:21	10:24:21	9	0.765	85	43.641	2576	MM/NG	SERP-3 hooked
	S-4	4	SIO	96	12:50:05	12:59:34	13:00:44	9	7.075	85	49.71	3500	MM/NG	SERP-4 hooked
	S-5	5	SIO	96	15:33:56	15:46:53	15:48:00	9	13.826	85	56.105	3471	MM/NG	
	S-6	6	SIO	96	18:32	18:39	18:41	9	21.608	86	3.326	3592	TG/JM	SERP-6 hooked
	S-7	7	SIO	96	21:26	21:32	21:32	9	29.65	86	10.908	3688	TG/JM	SERP-7 hooked
	S-8	8	SIO	97	0:28	0:38	0:39	9	37.565	86	18.305	3796	TG/JM	SERP-8 hooked
	S-9	9	SIO	97	3:20	3:31	3:31	9	45.348	86	25.461	3874	TG/JM	SERP-9 hooked
	S-10	10	SIO	97	6:32:00	6:39:55	6:41:00	9	53.199	86	32.82	4100	MM/NG	SERP-10 hooked
	S-11	11	SIO	97	9:36:51	9:46:28	9:47:50	10	1.123	86	40.524	3966	MM/NG	SERP-11 hooked
	S-12	12	SIO	97	12:50:22	12:57:16	12:58:28	10	9.093	86	46.096	4109	MM/NG	SERP-12 hooked
ANE	ANE-12	13	SIO	98	21:40	21:48	21:49	9	52.967	88	20.456	3351	TG/JM	ANE-12 hooked
	ANE-11	14	SIO	99	0:30	0:39	0:40	9	59.907	88	12.133	3309	TG/JM	ANE-11 hooked
	ANE-10	15	SIO	99	3:17:00	3:29	3:30	10	6.657	88	3.745	3289	TG/JM	ANE-10 hooked
	ANE-9	16	SIO	99	6:18:03	6:35:10	6:36:30	10	13.385	87	55.379	3180	MM/NG	ANE-9 hooked
AN	AN-1	17	WHOI	100	14:52:05	15:03:24	15:05:24	11	16.104	87	19.372	2119	MM/NG	AN-1 Hooked
	AN-2	18	SIO	100	17:28:00	17:39:28	17:40:53	11	7.47	87	19.244	3466	MM/NG	AN-2 hooked
	AN-3	19	SIO	100	20:35:00	20:46	20:47	10	58.775	87	19.218	4687	TG/JM	AN-3 hooked
	AN-6	20	WHOI	101	17:12:36	17:18:56	17:21:24	10	7.332	87	19.437	2970	MM/NG	AN-6 hooked
	AN-4	22	SIO	101	22:48	22:54	22:56	10	24.455	87	19.271	3087	TG/JM	AN-4 hooked
Serp	S-13	23	SIO	102	4:20	4:29	4:30	10	16.87	86	55.315	3774	MM/JM	S-13 hooked

Line Name	OBS Name	Site #	SIO/WHOI	Julian day	Time spotted	Time Hooked	Time on deck	Lat. Deg.	Lat. Min.	Long. Deg.	Long. Min.	Depth	Watch	Comments
	S-14	24	WHOI	102	6:32:49	6:38:49	6:40:49	10	22.833	87	1.054	4094	MM/NG	S-14 hooked
	S-15	25	SIO	102	9:28:19	9:38:23	9:39:28	10	29.005	87	6.881	4117	MM/NG	S-15 hooked
	S-16	26	SIO	102	17:49:46	17:52:48	17:54:48	10	35.348	87	13.045	3835	MM/NG	S-16 hooked
	S-18	28	SIO	102	21:25	21:34	21:35	10	47.922	87	25.176	3915	TG/JM	S-18 hooked
	S-19	29	SIO	103	0:16	0:25:09	0:26:09	10	54.254	87	31.155		TG/JM	S-19 hooked
	S-20	30	SIO	103	3:15:03	3:29:14	3:30:25	11	0.48	87	37.185	4270	TG/JM	S-20 hooked
	S-21	31	SIO	103	6:15:21	6:30:10	6:31:10	11	6.871	87	43.186	4358	MM/NG	S-21 hooked
ANE	ANE-8	32	SIO	103	13:28:30	13:41:26	13:42:45	10	20.254	87	46.855	3133	MM/NG	ANE-8 hooked
	ANE-7	33	SIO	103	16:21:21	16:26:38	16:23:21	10	25.558	87	40.038	2993	mm/ng	ANE-7 hooked
	ANE-6	34	SIO	103	19:05	19:13:26	19:14:24	10	30.984	87	33.192	2888	TG/JM	ANE-6 hooked
	ANE-5	35	SIO	103	22:09	22:23	23:08	10	36.427	87	26.307		TG/JM	ANE-5 hooked(tether)
	ANE-4	36	SIO	104	3:28	3:38	3:39	10	47.299	87	12.494	5053	TG/JM	ANE-4 hooked
	ANE-3	37	SIO	104	6:15:05	6:25:31	6:27:31	10	52.794	87	5.732	3735	NG/MM	ANE-3 hooked
	ANE-2	38	WHOI	104	8:45:00	8:57:37	8:58:42	10	58.271	86	59.177	1757	MM/NG	ANE-2 hooked
	ANE-1	39	WHOI	104	10:23:53	10:32:24	10:34:24	11	4.033	86	52.151	687	MM/NG	ANE-1 hooked
AW	AW-6	40	WHOI	104	15:42:26	15:45:47	15:47:47	10	41.915	86	44.544	1880	MM/NG	AW-6 hooked
	AW-5	41	SIO	104	18:09	18:18:05	18:19:12	10	41.868	86	53.096	3186	TG/JM	AW-5 hooked
	AW-4	42	SIO	104	21:03	21:12	21:13	10	41.638	87	1.967	N/A	TG/JM	AW-4 hooked
Serp	S-17	43	SIO	105	0:33	0:43:37	0:44:26	10	41.563	87	19.267	3999	TG/JM	S-17 hooked
AW	AW-3	44	SIO	105	3:45:30	3:50:59	3:51:54	10	41.804	87	37.1	3094	TG/JM	AW-3 hooked
	AW-1	46	SIO	105	11:36:32	11:45:37	11:47:08	10	41.913	87	54.866	2322	MM/NG	AW-2 hooked

6.11 CTD Deployment Log

Subject	Time & Date		Coordinates				Water Depth (m)	Comment/Event
	Julian Day	GMT	Lat. Deg	Lat. Min	Long. Deg	Long. Min		
-								
CTD	83	13:31:20	9	6.579	85	1.303	2312	CTD 1W-40C reached max depth at 2200 m and now we're bringing it back up
CTD		14:11:16	9	6.424	85	1.601	2326	CTD 1W-40 out of the water
CTD		16:28:33	9	16.996	84	50.803	1455	CTD 1W-43C deployed
CTD		17:11:00	9	17.03	84	50.727	1400	CTD 1W-43 reached max depth at 1400 m and now we're bringing it back up
CTD		17:38:13	9	16.993	84	50.651	1415	CTD 1W-43 is out of the water
CTD		18:47:00	9	20.529	84	47.108	842	CTD 1W-44C deployed to depth of 750 m
CTD		19:22:49	9	20.23	84	46.896	811	CTD 1W-44C on deck
CTD		20:20:00	9	23.93	84	43.689	100	CTD 1W-45C deployed to depth of 90 m
CTD		20:29:10	9	23.93	84	43.689	100	CTD 1W-45C on deck
CTD	85	14:20:59	8	54.626	84	4.855	87.7	Deployed CTD Q1. We took it down to around 80m. It was back on deck at 14:29:24.
CTD		15:24:32	8	50.615	84	6.888	134	Deployed CTD Q2. We took it down to around 130 m. It was back on deck at 15:44:05 at Lat: 8 50.506 and Long: 84 6.616.
CTD		16:24:27	8	46.504	84	8.929	387.6	Deployed CTD Q3. We took it down to around 380 m.
CTD		17:07:35	8	46.042	84	8.675	N/A	CTD Q3 on deck.
CTD		17:43:48	8	42.356	84	11.017	785.5	Deployment of CTD Q4 unsuccessful due to drift because of currents. Will bring up and find new location to deploy.
CTD		18:18:44	8	41.859	84	10.414	N/A	CTD Q4 back on deck.
CTD		18:22:00	8	41.8	84	10.37	856	CTD Q4b deployed to 800 m.
CTD		18:52:45	8	41.426	84	10.319	N/A	CTD Q4b on deck.
CTD		19:34:48	8	38.38	84	13.33	1407	CTD Q5 deployed to 1350 m.
CTD		20:28:25	8	38.014	84	12.891	N/A	CTD Q5 on deck.
CTD		21:07:57	8	34.49	84	15.264	2435	CTD Q6 lowered to 2375 m.
CTD		22:36:52	8	33.356	84	15.339	N/A	CTD Q6 on deck.
CTD	99	14:38:53	11	12.806	87	41.103	5285	CTD SO1-1 deployed to 5000 meters.
CTD		18:05:00	11	13.374	87	41.507	5235	CTD SO1-1 on deck.

Subject	Time & Date		Coordinates				Water Depth (m)	Comment/Event
	Julian Day	GMT	Lat. Deg	Lat. Min	Long. Deg	Long. Min		
-								
CTD		20:28:45	11	24.872	87	28.294	1663	CTD SO1-2 deployed to 1620 meters
CTD		21:35:38	11	24.241	87	28.254	1705	CTD SO1-2 on deck
C TD		22:10:05	11	26.862	87	25.943	1199	CTD SO1-3 deployed to 1150 meters.
CTD		22:54:32	11	26.79	87	25.937	1200	CTD SO1-3 on deck
CTD		23:58:40	11	31.964	87	20.541	689	CTD SO1-4 deployed to 620 meters.
CTD	100	0:25:33	11	31.893	87	20.49	688.5	CTD SO1-4 on deck.
CTD		1:09:47	11	35.613	87	16.734	268.4	CTD SO1-5 deployed to 230 meters.
CTD		1:24:43	11	35.528	87	16.618	265.4	CTD SO1-5 on deck.
CTD		22:02:39	11	1.985	87	19.552	4358	CTD SO3-1 deployed to 2000m. Slightly SW of desired coordinates because of fishing boat in area.
CTD		23:20	11	1.985	87	19.552	4358	CTD SO3-1 on deck
CTD	101	1:14:05	11	8.687	87	11.255	1991	CTD SO3-2 Deployed to a depth of 850m
CTD		2:22:23	11	8.563	87	11.254	1985	CTD SO3-2 on deck.
CTD		3:09:20	11	11.687	87	8.425	1210	CTD SO3-3 Deployed to a depth of 1150m
CTD		4:02:32	11	11.361	87	8.296	1228	CTD SO3-3 on deck.
CTD		4:27:20	11	13.026	87	7.301	950	CTD SO3-4 deployed to a depth of 900m.
CTD		5:03:15	11	13.02	87	7.165	953	CTD SO3-4 on deck.
CTD		5:25:56	11	13.99	87	6.434	834	CTD SO3-5 deployed to a depth of 800m
CTD		6:00:06	11	13.923	87	6.569	849	CTD SO3-5 on deck.
CTD		6:26:45	11	15.353	87	5.122	754	CTD SO3-6 Deployed
CTD		6:56:11						CTD SO3-6 on deck
CTD		7:24:08	11	17.623	87	3.002	471	CTD SO3-7 Deployed
CTD		7:45:21						CTD SO3-7 on deck
CTD		8:06:15	11	19.277	87	1.396	280	CTD SO3-8 deployed
CTD		8:21:10						CTD SO3-8 on deck
CTD	106	2:19:54	10	31.265	86	25.651	929.1	Cul9-2 deployed to 10m and was forced to retract because of winch malfunction. Woody is attempting to fix.
CTD		4:24:26	10	31.236	86	25.547	929.1	Winch fixed and Cul9-2 deployed to depth of 900m.

Subject	Time & Date		Coordinates				Water Depth (m)	Comment/Event
	Julian Day	GMT	Lat. Deg	Lat. Min	Long. Deg	Long. Min		
CTD		5:43:06	10	28.982	86	24.152	1099	Cul9-3 deployed and heading down to 1000m.
CTD		6:25:00						Cul9-3 on deck
CTD		7:00:56	10	27.377	86	23.736	1258	Cul9-3b down to ~1180 m
CTD		7:52:09						Cul9-3b on deck
CTD		8:23:18	10	26.482	86	22.399	1300	Cul9-4
CTD		8:54:30						Cul9-4 at depth ~1250
CTD		9:20:50						Cul9-4 on deck
CTD		10:00:00	10	24.196	86	21.685	1562	Cul9-5
CTD		10:34:21						Cul9-5 at depth ~1500
CTD		11:01:52						Cul9-5 on deck
CTD		11:38:12	10	21.437	86	20.147	1717	Cul9-6
CTD		12:11:37						Cul9-6 at depth ~1650
CTD		12:41:41						Cul9-6 on deck
CTD		13:12:43	10	18.99	88	19.123	1669	Cul9-7
CTD		13:48:30						Cul9-7 at depth ~1600
CTD		14:17:50						Cul9-7 on deck
CTD		14:46:43	10	18.001	86	18.614	1602	Cul9-7b
CTD		15:28:07						Cul9-7b at depth ~1600
CTD		15:54:29						Cul9-7b on deck
CTD		16:25:00	10	16.594	86	17.775	1654	Cul9-8
CTD		17:01:25						Cul9-8 at depth ~1600
CTD		17:29:42						Cul9-8 on deck
CTD		18:02:43	10	14.508	86	16.689	1587	Cul9-9
CTD		18:36:00						Cul9-9 at depth ~1600
CTD		19:03:26						Cul9-9 on deck
CTD		19:40:56	10	11.819	86	15.092	1558	Cul9-10
CTD		20:10:09						Cul9-10 at depth ~1450
CTD		20:37:24						Cul9-10 on deck

6.12 Total Operations Log

Subject	Time & Date		Coordinates				Water Depth (m)	Comment/Event
	Julian Day	GMT	Lat. Deg	Lat. Min	Long. Deg	Long. Min		
-	80	11:49:00	9	14.194	85	56.118	3250	Started release test (SIO)
Rosette		12:39:00	9	14.39	85	56.538	N/A	Winch Stopped-equip. problem
Equip. prob		12:44:46	9	14.423	85	56.589	N/A	Winch lowering rosette again
Rosette		12:50:00	9	14.167	85	56.645	N/A	Rosette @ 3300m
Rosette		13:30:00	9	14.669	85	56.945	N/A	Rosette test complete, coming up
Rosette		14:18:56	9	14.934	85	57.117	N/A	Rosette test #1 on deck
Rosette		14:30:10	9	15.109	85	57.213	N/A	Rosette test #2 ready and deployed
Rosette		15:23:48	9	15.481	85	57.598	N/A	Rosette test #2 @ target depth
Equip. prob		15:26:50	9	15.481	85	57.598	N/A	New Horizon complete power loss, generators offline. Power on at 15:28:50. winch, depth sounder, extra monitor offline
Rosette		15:54:38	9	13.986	85	56.064	N/A	Rosette test #2 complete & coming up
Comment		16:26:38						Winch readout on line
Rosette		16:46:41	9	15.808	85	57.725	N/A	Rosette test #2 on deck.
Rosette		16:57:08	9	15.789	85	57.731	N/A	Rosette test #3 ready and deployed
Rosette		17:55:22	9	15.917	85	57.963	3300	Rosette test #3 @ target depth
Rosette		18:46:52	9	15.964	85	58.003	N/A	Rosette test #3 complete and coming up
Rosette		19:52:20	9	16.09	85	58.03	N/A	Rosette test #3 on deck.
Rosette		19:59:50	9	16.096	85	58.036	N/A	Rosette test #4 deployed
Rosette		20:51:50	9	16.328	85	58.234	3300	Rosette test #4 @ depth
Rosette		21:03:10	9	16.393	85	58.276	N/A	Rosette test #4 complete and coming up
Rosette		22:08:00	9	16.834	85	58.489	N/A	Rosette test #4 on deck
Transit		22:10:19	9	16.866	85	58.436	N/A	Underway to first obs deployment on OSA line. Approx. arrival time 7:00:00 GMT 03/21/08
Equip. prob	81	5:14:30	9	39.221	84	55.904	N/A	Power outage- Woody is attempting to get all computers back on line. Lat. and Long. will be slightly off because they came from Nick's GPS.
OBS		6:16:37	9	41.147	84	54.779	83	OBS OSA-1 deployed----smooth as cocoa butter!
OBS		8:24:34	9	35.109	84	46.392	101.4	OBS OSA-2 deployed
Transit		9:39:37	9	28.947	84	39.3	47.6	We are maneuvering around fishing gear in the water

OBS		9:53:58	9	29.29	84	38.353	43.4	OBS OSA-3 deployed
OBS		11:05:27	9	23.959	84	30.945	49.6	OBS OSA-4 deployed
OBS		12:12:30	9	18.368	84	23.234	121.3	OBS OSA-5 deployed
OBS		13:17:45	9	12.814	84	15.517	40.2	OBS OSA-6 deployed
OBS		14:30:31	9	7.183	84	7.813	116	OBS OSA-7 deployed
OBS		15:31:55	9	2.399	84	1.192	115.8	OBS OSA-8 deployed
OBS		16:41:32	8	56.398	83	52.946	152	OBS OSA-9 deployed.
OBS		18:03:34	8	50.399	83	44.636	80	OBS OSA-10 deployed. Begin steam toward OBS CR-Serp 1.
OBS		21:39:44	8	38.322	84	13.16	1399	OBS CR-1 deployed.
OBS		22:34:34	8	40.498	84	19.41	1893	OBS CR-2 deployed, had to pause to put "dummy connector" on acoustic release before sending it over
OBS		23:33:01	8	43.02	84	26.636	2401	OBS CR-3 deployed
OBS	82	0:30:55	8	45.527	84	33.814	~3176	OBS CR-4 deployed, depth sounder not working, unsure of depth
Equip. prob		0:57:00	8	47.339	84	36.771	N/A	Have had consistant trouble keeping the ships server and High Seas Net active. Unsure if ships server is functioning properly and High Seas Net is sporadic at best.
OBS		1:29:51	8	48.04	84	41.032	3578	OBS CR-5 deployed
OBS		2:38:09	8	50.55	84	48.221	3540	OBS CR-6 deployed
OBS		3:39:26	8	53.067	84	55.441	3581	OBS CR-7 deployed
OBS		4:54:18	8	55.575	85	2.656	3383	OBS CR-8 deployed
OBS		5:53:59	8	58.116	85	10.048	3383	OBS CR-9 deployed
OBS		7:01:44	9	0.569	85	17.092	3329	OBS CR-10 deployed
OBS		8:03:12	9	3.055	85	24.336	3124	OBS CR-11 deployed
OBS		9:20:21	9	5.572	85	31.555	3207	OBS CR-12 deployed
OBS		10:15:04	9	8.042	85	38.772	3631	OBS CR-13 deployed
OBS		11:08:53	9	10.545	85	45.994	3638	OBS CR-14 deployed
OBS		12:21:55	9	13.993	85	56.066	3463	OBS CR-15 deployed
OBS		13:19:00	9	8.791	86	2.342	3268	OBS C-1 deployed
OBS		14:18:11	9	3.569	86	8.649	3176	OBS C-2 deployed
OBS		15:17:59	8	58.368	86	14.901	3147	OBS C-3 deployed
OBS		16:14:53	8	53.16	86	21.154	3146	OBS C-4 deployed

Transit		16:15:00	8	53.16	86	21.154	N/A	Begin transit to OBS 1W-1 site. ETA 22:15:00 03/22/08 GMT
OBS		21:52:50	8	20.306	85	48.313	2927	OBS 1W-1 deployed
OBS		22:35:05	8	24.655	85	43.9	2658	OBS 1W-2 deployed
OBS		23:36:50	8	29.05	85	39.49	2363	OBS 1W-3 deployed
Transit		23:55:00	8	30.791	85	36.479	N/A	On two hour delay to allow the Langseth to pass along the port side.
Transit	83	1:30:00	8	32.8889	85	32.389	N/A	New plan has been worked out with the Langseth. The Langseth is making a premature 180 deg turn to come onto the 1W(6m) line. We are making a S. Easterly turn to starboard to come around at a position approx. 6 miles behind the Langseth. Will begin be deploying 1W-4 when in position. To make best use of time once behind the Langseth we will be making a number of CTD deployments to allow the Langseth to steam ahead.
OBS		4:30:36	8	33.405	85	35.052	2721	OBS 1W-4 deployed
OBS		5:15:18	8	37.764	85	30.677	2711	OBS 1W-5 deployed
OBS		6:04:48	8	42.119	85	26.26	2800	OBS 1W-6 deployed
OBS		7:03:50	8	46.792	85	21.5	2891	OBS 1W-7 deployed
OBS		7:52:50	8	50.425	85	17.832	2973	OBS 1W-8 deployed
OBS		8:57:21	8	54.06	85	14.146	3098	OBS 1W-9 deployed
OBS		11:02:40	9	1.659	85	6.42	3321	OBS 1W-10 deployed
OBS		11:57:30	9	5.081	85	2.945	2533	OBS 1W-11 deployed
CTD		12:27:55	9	6.719	85	1.285		CTD 1W-40C deployed
CTD		13:31:20	9	6.579	85	1.303	2312	CTD 1W-40C reached max depth at 2200 m and now we're bringing it back up
CTD		14:11:16	9	6.424	85	1.601	2326	CTD 1W-40 out of the water
OBS		14:42:22	9	8.509	84	59.453	2250	OBS 1W-12 deployed
OBS		15:19:56	9	11.929	84	55.957	1890	OBS 1W-13 deployed
OBS		15:58:53	9	15.35	84	52.483	1643	OBS 1W-14 deployed
CTD		16:28:33	9	16.996	84	50.803	1455	CTD 1W-43C deployed
CTD		17:11:00	9	17.03	84	50.727	1400	CTD 1W-43 reached max depth at 1400 m and now we're bringing it back up
CTD		17:38:13	9	16.993	84	50.651	1415	CTD 1W-43 is out of the water
OBS		18:17:58	9	18.788	84	49.006	1210	OBS 1W-15 deployed
CTD		18:47:00	9	20.529	84	47.108	842	CTD 1W-44C deployed to depth of 750 m
CTD		19:22:49	9	20.23	84	46.896	811	CTD 1W-44C on deck

OBS		19:55:05	9	22.218	84	45.517	502	OBS 1W-16 deployed
CTD		20:20:00	9	23.93	84	43.689	100	CTD 1W-45C deployed to depth of 90 m
CTD		20:29:10	9	23.93	84	43.689	100	CTD 1W-45C on deck
OBS		21:01:21	9	25.652	84	42.028	73.54	OBS 1W-17 deployed
Transit		21:10:00	9	25.414	84	41.618	70.7	Stand-by for approx. 1 day to wait for Langseth to finish line. Will begin recovery of OBS lines; OSA, CR-Serp, Cocos and 1W when given the go ahead by Langseth.
Transit	84	19:12:00	9	41.575	84	54.65	78.5	Stand-by on OBS Osa-1 location for recovery go ahead from the Langseth.
OBS		22:16:00	9	40.773	84	54.52	88.2	Given the go ahead from the Langseth to begin recovery of the first OBS on Osa line. Apparently could have begun pick-up hours ago but lack of proper communication has caused a bit of a delay. Suggest rework notification protocol to optimize pick-up.
OBS		22:40:05	9	41.238	84	54.724	90.4	OBS Osa-1 recovered (hook time given) and stowed.
OBS		23:59:12	9	35.09	84	46.408	108.3	OBS Osa-2 recovered (hook time given) and stowed.
OBS	85	2:17:48	9	23.49	84	31.019	55.4	OBS Osa-4 recovered (hook time given) and stowed.
OBS		3:38:03	9	18.3	84	84.219	142.4	OBS Osa-5 recovered (hook time given) and stowed.
OBS		4:52:15	9	12.805	84	15.536	206.5	OBS Osa-6 hooked. On deck at 4:53:13.
OBS		6:09:12	9	7.125	84	7.728	115.3	OBS Osa-7 hooked. On deck at 6:10:46.
OBS		7:25:57	9	2.277	84	1.178	116	OBS Osa-8 hooked. On deck at 7:27:40. Spotted at 7:18:24
OBS		8:45:32	8	56.349	83	52.827	78	OBS Osa 9 hooked. On deck at 8:47:09. Spotted at 8:38:49.
OBS		10:12:51	8	50.343	83	44.619	78.5	OBS Osa-10 hooked. On deck at 12:13:55. Spotted at 10:05:43.
Transit		12:27:42	8	53.331	83	56.994	64.9	We have finished recovering the Osa line and we plan to do CTD deployments before we recover line CR-SERP. We have around 24 hours to do 3 CTD tests before the Langseth finishes shooting to line CR-SERP. We are dumping our waste storage tanks and we plan to begin CTD deployments in a few hours.
CTD		14:20:59	8	54.626	84	4.855	87.7	Deployed CTD Q1. We took it down to around 80m. It was back on deck at 14:29:24.
CTD		15:24:32	8	50.615	84	6.888	134	Deployed CTD Q2. We took it down to around 130 m. It was back on deck at 15:44:05 at Lat: 8 50.506 and Long: 84 6.616.
CTD		16:24:27	8	46.504	84	8.929	387.6	Deployed CTD Q3. We took it down to around 380 m.
CTD		17:07:35	8	46.042	84	8.675	N/A	CTD Q3 on deck.
CTD		17:43:48	8	42.356	84	11.017	785.5	Deployment of CTD Q4 unsuccessful due to drift because of currents. Will bring up and find new location to deploy.

CTD		18:18:44	8	41.859	84	10.414	N/A	CTD Q4 back on deck.
CTD		18:22:00	8	41.8	84	10.37	856	CTD Q4b deployed to 800 m.
CTD		18:52:45	8	41.426	84	10.319	N/A	CTD Q4b on deck.
CTD		19:34:48	8	38.38	84	13.33	1407	CTD Q5 deployed to 1350 m.
CTD		20:28:25	8	38.014	84	12.891	N/A	CTD Q5 on deck.
CTD		21:07:57	8	34.49	84	15.264	2435	CTD Q6 lowered to 2375 m.
CTD		22:36:52	8	33.356	84	15.339	N/A	CTD Q6 on deck.
OBS	86	16:52:14	8	38.196	84	12.951	1383	OBS CR-1 on deck.
OBS		18:50:52	8	40.419	84	19.163	1868	OBS CR-2 on deck.
OBS		21:06:00	8	43.006	84	26.335	2272	OBS CR-3 on deck.
Comment		22:06:00	8	45.354	84	32.757	N/A	Have snagged a fishing line. Heave to in order to untangle. Will continue to primary way point as soon as we have completed detanglement.
Comment		22:33:00	8	45.259	84	32.268	N/A	Martin entered water and cut tangled fishing line. We are now underway.
OBS		23:36:00	8	45.637	84	33.394	N/A	OBS CR-4 on deck.
OBS	87	2:18:20	8	48.22	84	40.916	N/A	OBS CR-5 on deck.
OBS		4:52:47	8	50.591	84	48.003	3544	OBS CR-6 hooked. Sighted at 4:39:41. On deck 4:54:24.
OBS		7:25:49	8	53.078	84	55.152	3470	OBS CR-7 hooked. Sighted at 7:16:34. On deck 7:27:12.
OBS		9:57:33	8	55.555	85	2.213	3470	OBS CR-8 hooked. Sighted at 9:51:03. On deck 9:58:40.
OBS		13:01:54	9	0.894	85	16.882	3451	OBS CR-10 hooked. Sighted at 12:41. On deck 13:03:44.
OBS		15:15:50	9	3.254	85	24.656		WHOI instrument D36 is not enabling. Rescue beacon was deployed to 2000 m, but did not communicate with instrument.
Transit		16:39:04	9	3.358	85	24.396		Transiting to site C-4 on the Cocos line. We will pick up the remaining WHOI instruments on line CR-SERP on the next night shift when the WHOI guys are working.
OBS	88	1:04:00	8	53.244	86	21.405		OBS C-4 hooked. Sighted at 00:56:00. On deck 01:05:00
OBS		3:30:00	8	58.459	86	15.107		OBS C-3 hooked. Sighted at 03:21:00. On deck 03:31:00
OBS		5:57:53	9	3.7	86	8.783	3179	OBS C-2 hooked. Sighted at 5:49:19. On deck 5:59:39.
OBS		8:29:28	9	8.868	86	2.426	3265	OBS C-1 hooked. Sighted 8:17:40. On deck 8:30:44.
OBS		11:03:55	9	14.032	85	56.201	3265	OBS CR-15 Hooked, Sighted 10:54:18. On deck 11:05:35
OBS		13:25:17	9	10.793	85	46.151	3639	OBS CR-14 hooked. Sighted 13:16:34. On deck 13:26:56.
OBS		15:22:32	9	8.135	85	38.933	3568	OBS CR-13 hooked. Sighted 15:22:32. On deck 15:31:35.
OBS		17:33:30	9	5.694	85	31.682	3275	OBS CR-12 hooked. Sighted at 17:25:30. On deck 17:34:54.
OBS	89	0:24:00	8	20.529	85	48.148	N/A	OBS 1W-1 on deck.

OBS		2:19:00	8	24.882	85	43.694	N/A	OBS 1W-2 on deck.
OBS		4:10:12	8	29.294	85	39.444	2386	OBS 1W-3 hooked. Sighted 04:03:49. On deck 4:11:10.
OBS		6:07:09	8	33.61	85	34.892	2738	OBS 1W-4 hooked. Sighted 5:58:59. On deck 6:08:38.
OBS		8:10:28	8	37.954	85	30.439	2716	OBS 1W-5 hooked. Sighted 7:59:54. On deck 8:11:45.
OBS		10:07:23	8	42.259	85	26.085	2795	OBS 1-6 hooked sighted 10:00:20 on deckified 10:09:17
OBS		12:46:20	8	46.881	85	21.24	2887	OBS 1-7 hooked. Sighted 12:36:33. Deckified 12:48:00.
OBS		14:18:17	8	50.526	85	17.623	2961	OBS 1W-8 on hooked
OBS		15:26:03	8	53.821	85	14.133	3067	OBS 1W-9 did not respond (15:00). Got out rescue beacon (15:14) and sent it down (15:26:03)
OBS		17:18:30	8	53.821	85	14.133	3067	rescue beacon recovered. Plan is to return to deployment site and search for OBS in route the next site.
OBS		19:41	8	58.106	85	9.923	3387	OBS CR-9 on deck.
Equip. Prob.		20:30:00	9	1.437	85	6.43	N/A	Heave to in attempt to recover OBS 1W-10. Have sent rescue beacon down with no response yet. Will continue rescue attempt than steam to next OBS recovery site.
Equip. Prob.		21:54:00	9	1.743	85	6.336	N/A	Retract rescue beacon per effort to recover 1W-10 unsuccessful. Will steam to next way point after waiting for possible sighting of OBS and rescue beacon is back on board.
Comment		22:32:00	9	1.743	85	6.336	N/A	Rescue beacon on deck, will lay for ten minutes to wait for OBS to surface. If not sighted we will steam to next way point.
Transit		22:42:00	9	1.743	85	6.336	N/A	Efforts to recover OBS have been in vain. Never again shall we see our beloved instrument again. Farwell sweet prince of the deep, God speed. Begin transit to 1W-11.
OBS	90	0:01:00	9	5.214	85	2.99	2520	OBS 1W-11 on deck.
OBS		1:53	9	8.65	84	59.496	2299	OBS 1W-12 on deck.
OBS		3:20	9	11.978	84	55.992	1894	OBS-13 on deck. Sighted at 3:14.
OBS		4:48:48	9	15.389	84	52.454	1644	OBS 1W-14 on deck. Sighted at 4:39:34.
OBS		6:06:05	9	18.76	84	48.974	1202	OBS 1W-15 hooked. On deck 6:07:02. Sighted 6:00:06.
OBS		7:11:40	9	22.227	84	45.454	1201	OBS 1W-16 hooked. On deck 7:13:45. sighted 7:01:44
OBS		8:13:45	9	25.659	84	41.996	70	OBS 1W-17 hooked. On deck 8:15:08. Sighted 8:05:42.
OBS		9:24:19	9	29.326	84	38.814	41	OBS OSA -3 hooked. On deck 9:25:19. sighted 9:18:10
OBS		18:33:40	8	48.02	85	31.784	2854	OBS S-1 deployed.
OBS		19:33	8	54.37	85	37.703	2608	OBS S-2 deployed.
OBS		20:29:45	9	0.711	85	43.623	3332	OBS S-3 deployed.

OBS		21:25	9	7.062	85	45.579	3505	OBS S-4 deployed.
OBS		22:51	9	13.987	85	56.069	3463	OBS S-5 deployed.
OBS	91	0:00	9	21.735	86	3.337	3594	OBS S-6 deployed.
OBS		1:11:02	9	29.673	86	10.798	3690	OBS S-7 deployed.
Transit		1:12:00	9	29.673	86	10.798	N/A	Transit N.W. toward expected area of depth +4600 meters to deploy and perform Rosette test.
Rosette		3:16:00	9	47.712	86	17.995	4550	Heave to and deploy Rosette to depth of 4450 meters.
Rosette		4:45:52	9	47.712	86	17.995	4550	Rosette at depth and testing in progress
Rosette		4:56:32	9	47.712	86	17.995	4550	Test 1 complete all transponders good to go. Rosette on the way back to the surface.
Rosette		6:10:00	9	47.87	86	17.84	4556	Rosette test 1 secured.
Rosette		6:16:45	9	47.87	86	17.84	4556	Rosette test 2 on it's way down.
Rosette		7:32:32	9	47.87	86	17.84	4556	reached depth of 4450m
		7:59:26	9	47.87	86	17.84	4556	rosette coming back up
		9:16:22	9	47.87	86	17.84	4556	rosette on deck
OBS		10:34:27	9	37.598	86	18.218	3840	OBS S-8 deployed
OBS		11:50:19	9	45.491	86	25.675	3920	OBS S-9 deployed
OBS		13:04:39	9	53.395	86	33.106	4106	OBS S-10 deployed
OBS		14:16:17	10	1.317	86	40.568	4015	OBS S-11 deployed
OBS		15:28:11	10	9.208	86	48.03	4108	OBS S-12
OBS		16:45:57	10	16.681	86	55.101	3711	OBS S-13 Deployed
OBS		18:04:41	10	23.042	87	1.05	4068	OBS S-14 Deployed
OBS		20:19:30	10	29.312	87	7.046	3765	OBS S-15 Deployed
OBS		21:20:45	10	35.631	87	13.026	3881	OBS S-16 Deployed
OBS		22:18:10	10	41.95	87	19.037	3961	OBS S-17 Deployed
OBS		23:27:37	10	48.253	87	25.036	3870	OBS S-18 Deployed
OBS	92	0:38:30	10	54.559	87	31.032	4068	OBS S-19 Deployed
OBS		1:40:15	11	0.865	87	37.023	4240	OBS S-20 Deployed
OBS		2:40:28	11	7.172	87	43.018	4391	OBS S-20 Deployed
OBS		6:24:19	11	16.474	87	19.073	1675	OBS AN-1 Deployed
OBS		8:06:40	11	7.837	87	19.098	3414	OBS AN-2 Deployed
OBS		9:24:57	10	59.203	87	19.081	4724	OBS AN-3 Deployed

OBS		13:55:44	10	24.686	87	19.094	3009	OBS AN-4 Deployed
OBS		15:20:09	10	16.045	87	19.085	2986	OBS AN-5 Deployed
OBS		16:39:45	10	7.402	87	19.092	2962	OBS AN-6 Deployed
OBS		22:35:22	10	42.057	87	54.423	2344	OBS AW-1 Deployed
OBS		23:57:50	10	42.072	87	45.634	2984	OBS AW-2 Deployed
OBS	93	1:14:05	10	42.084	87	36.839	3092	OBS AW-3 Deployed
OBS		5:41:03	10	42.066	87	1.692	4463	OBS AW-4 Deployed
OBS		6:47:42	10	42.078	86	52.908	3152	OBS AW-5 deployed
OBS		7:56:47	10	42.054	86	44.366	1832	OBS AW-6 Deployed
OBS		11:16:40	11	4.105	86	52.074	543	OBS ANE-1 deployed
OBS		12:40:00	10	58.643	86	58.877	1677	OBS ANE-2 Deployed
OBS		14:25:47	10	53.162	87	5.682	3735	OBS ANE-3 Deployed
OBS		15:38:40	10	47.705	87	12.472	5016	OBS ANE-4 Deployed
OBS		18:25:24	10	36.663	87	26.242	3440	OBS ANE-5 Anchor Deployed
OBS		19:59:48	10	31.222	87	32.822	2875	OBS ANE-6 Deployed
OBS		21:05:35	10	25.728	87	39.579	3464	OBS ANE-7 Deployed
OBS		22:13:00	10	20.267	87	46.358	3128	OBS ANE-8 Deployed
OBS		23:33:41	10	13.405	87	54.855	3176	OBS ANE-9 Deployed
OBS	94	0:55:43	10	6.572	88	3.309	3288	OBS ANE-10 Deployed
OBS		2:17:30	9	59.725	88	11.788	3304	OBS ANE-11 Deployed
OBS		3:36:20	9	52.877	88	20.248	3351	OBS ANE-12 Deployed
Transit		3:38:03	9	52.815	88	20.325	N/A	Begin steam back to ANE-5 to deploy WHOI OBS.
OBS		13:12:22						WHOI OBS for ANE-5 WHOI needs servicing and will not be deployed
Transit		14:10:40						SIO obs on surface, seen by langseth. Transiting to location to search s end of CR-Serp line
OBS	95	4:00:00						Confirm communication with Serp-5
OBS		5:08:00						Confirm communication with Serp-4
OBS		6:08:00						Confirm communication with Serp-3
OBS		7:07:00						Confirm communication with Serp-2
OBS		8:02:00						Confirm communication with Serp-1
Transit	96	0:57:26					N/A	Discontinue search for ghost beacon, begin steam toward first OBS pick-up.

Comment		3:08:00					N/A	Received word from Langseth they have completed shooting Serp and have given us the go ahead to begin pick up of OBS line Serp. Will arrive at first waypoint at approx. 4:00 a.m. GMT 04/05/08.
OBS		5:31:15	8	48.087	85	31.525	2855	SERP-1 hooked
OBS		7:51:02	8	54.42	85	37.621	2067	SERP-2 hooked
OBS		10:23:21	9	0.765	85	43.641	2576	SERP-3 hooked
OBS		12:59:34	9	7.075	85	49.71	3500	SERP-4 hooked
OBS		15:46:53	9	13.826	85	56.105	3471	0
OBS		18:39:00	9	21.608	86	3.326	3592	SERP-6 hooked
OBS		21:32:00	9	29.65	86	10.908	3688	SERP-7 hooked
OBS	97	0:38:00	9	37.565	86	18.305	3796	SERP-8 hooked
OBS		3:31:00	9	45.348	86	25.461	3874	SERP-9 hooked
OBS		6:39:55	9	53.199	86	32.82	4100	SERP-10 hooked
OBS		9:46:28	10	1.123	86	40.524	3966	SERP-11 hooked
OBS		12:57:16	10	9.093	86	46.096	4109	SERP-12 hooked
OBS		21:48:00	9	52.967	88	20.456	3351	ANE-12 hooked
OBS	98	0:39:00	9	59.907	88	12.133	3309	ANE-11 hooked
OBS		3:29:00	10	6.657	88	3.745	3289	ANE-10 hooked
OBS		6:35:10	10	13.385	87	55.379	3180	ANE-9 hooked
CTD	99	14:38:53	11	12.806	87	41.103	5285	CTD SO1-1 deployed to 5000 meters.
CTD		18:05:00	11	13.374	87	41.507	5235	CTD SO1-1 on deck.
CTD		20:28:45	11	24.872	87	28.294	1663	CTD SO1-2 deployed to 1620 meters
CTD		21:35:38	11	24.241	87	28.254	1705	CTD SO1-2 on deck
C TD		22:10:05	11	26.862	87	25.943	1199	CTD SO1-3 deployed to 1150 meters.
CTD		22:54:32	11	26.79	87	25.937	1200	CTD SO1-3 on deck.
CTD		23:58:40	11	31.964	87	20.541	689	CTD SO1-4 deployed to 620 meters.
CTD	100	0:25:33	11	31.893	87	20.49	688.5	CTD SO1-4 on deck.
CTD		1:09:47	11	35.613	87	16.734	268.4	CTD SO1-5 deployed to 230 meters.
CTD		1:24:43	11	35.528	87	16.618	265.4	CTD SO1-5 on deck.
Transit		1:26:00	11	35.528	87	16.618	268.3	Underway to begin recovery of AN-1. Will begin recovery at 6 a.m. Apr. 9th LT.
OBS		15:03:24	11	16.104	87	19.372	2119	OBS AN-1 redcovered

OBS		17:39:28	11	7.47	87	19.244	3466	OBS AN-2 hooked
OBS		20:46	10	58.775	87	19.218	4687	AN-3 hooked
CTD		22:02:39	11	1.985	87	19.552	4358	CTD SO3-1 deployed to 2000m. Slightly SW of desired coordinates because of fishing boat in area.
CTD		23:20	11	1.985	87	19.552	4358	CTD SO3-1 on deck
CTD	101	1:14:05	11	8.687	87	11.255	1991	CTD SO3-2 Deployed to a depth of 850m
CTD		2:22:23	11	8.563	87	11.254	1985	CTD SO3-2 on deck.
CTD		3:09:20	11	11.687	87	8.425	1210	CTD SO3-3 Deployed to a depth of 1150m
CTD		4:02:32	11	11.361	87	8.296	1228	CTD SO3-3 on deck.
CTD		4:27:20	11	13.026	87	7.301	950	CTD SO3-4 deployed to a depth of 900m.
CTD		5:03:15	11	13.02	87	7.165	953	CTD SO3-4 on deck.
CTD		5:25:56	11	13.99	87	6.434	834	CTD SO3-5 deployed to a depth of 800m
CTD		6:00:06	11	13.923	87	6.569	849	CTD SO3-5 on deck.
CTD		6:26:45	11	15.353	87	5.122	754	CTD SO3-6 Deployed
CTD		6:44:36						CTD SO3-6 at depth and coming up
CTD		6:56:11						CTD SO3-6 on deck
CTD		7:24:08	11	17.623	87	3.002	471	CTD SO3-7 Deployed
CTD		7:35:31						CTD SO3-7 at depth and coming up
CTD		7:45:21						CTD SO3-7 on deck
CTD		8:06:15	11	19.277	87	1.396	280	CTD SO3-8 deployed
CTD		8:14:23						CTD SO3-8 at depth and coming up
CTD		8:21:10						CTD SO3-8 on deck
OBS		17:18:56	10	7.332	87	19.437	2970	OBS AN-6 hooked
OBS		18:31:20	10	15.763	87	19.112	2900	OBS AN-5 not responding to initial burn sequence. Will continue to send burn commands for next two hours if necessary.
OBS		20:33:47	10	15.78	87	19.092	2900	OBS AN-5 Did not have successful burn. Unable to retrieve after 8 burn attempts. Begin transit to AN-4.
Comment		20:38:00					N/A	Discussed option of steaming back toward OBS AN-5 site after pick up of last OBS on schedule to attempt a last burn sequence.
OBS		22:54	10	24.455	87	19.271	3087	AN-4 hooked
OBS	102	4:29	10	16.87	86	55.315	3774	S-13 hooked
OBS		6:38:49	10	22.833	87	1.054	4094	S-14 hooked
OBS		9:38:23	10	29.005	87	6.881	4117	S-15 hooked

OBS		17:52:48	10	35.348	87	13.045	3835	S-16 hooked
OBS		21:34:00	10	47.922	87	25.176	3915	S-18 hooked
OBS	103	0:25:09	10	54.254	87	31.155	0	S-19 hooked
OBS		3:29:14	11	0.48	87	37.185	4270	S-20 hooked
OBS		6:30:10	11	6.871	87	43.186	4358	S-21 hooked
OBS		13:41:26	10	20.254	87	46.855	3133	ANE-8 hooked
OBS		16:26:38	10	25.558	87	40.038	2993	ANE-7 hooked
OBS		19:13:26	10	30.984	87	33.192	2888	ANE-6 hooked
TETHER		22:23:00	10	36.427	87	26.307	0	ANE-5 hooked(tether)
OBS	104	3:38:00	10	47.299	87	12.494	5053	ANE-4 hooked
OBS		6:25:31	10	52.794	87	5.732	3735	ANE-3 hooked
OBS		8:57:37	10	58.271	86	59.177	1757	ANE-2 hooked
OBS		10:32:24	11	4.033	86	52.151	687	ANE-1 hooked
OBS		15:45:47	10	41.915	86	44.544	1880	AW-6 hooked
OBS		18:18:05	10	41.868	86	53.096	3186	AW-5 hooked
OBS		21:12:00	10	41.638	87	1.967	N/A	AW-4 hooked
OBS	105	0:43:37	10	41.563	87	19.267	3999	S-17 hooked
OBS		3:50:59	10	41.804	87	37.1	3094	AW-3 hooked
OBS		4:39:00	10	42.156	87	45.991	N/A	OBS AW-2 has been acknowledged but there seems to be a voltage drain resulting in an early burn termination. OBS stops pinging after a few minutes and after three burn commands is still on bottom.
OBS		9:36:29	10	42.101	87	45.669	2984	OBS AW-2 abandoned after 15 unsuccessful burn commands.
OBS		11:45:37	10	41.913	87	54.866	2322	AW-1 hooked
CTD	106	2:19:54	10	31.265	86	25.651	929.1	Cul9-2 deployed to 10m and was forced to retract because of winch malfunction. Woody is attempting to fix.
CTD		4:24:26	10	31.236	86	25.547	929.1	Winch fixed and Cul9-2 deployed to depth of 900m.
CTD		5:04:36	10	31.236	86	25.547	N/A	Cul9-2 on deck.
CTD		5:43:06	10	28.982	86	24.152	1099	Cul9-3 deployed and heading down to 1050m.
CTD		6:08:00						Cul9-3 at depth 1000m
CTD		6:25:00						Cul9-3 on deck
CTD		7:00:56	10	27.377	86	23.736	1258	Cul9-3b
CTD		7:27:38						Cul9-3b at depth ~1180

CTD		7:52:09						Cul9-3b on deck
CTD		8:23:18	10	26.482	86	22.399	1300	Cul9-4
CTD		8:54:30						Cul9-4 at depth
CTD		9:20:50						Cul9-4 on deck
CTD		10:00:00	10	24.196	86	21.685	1562	Cul9-5
CTD		10:34:21						Cul9-5 at depth ~1500
CTD		11:01:52						Cul9-5 on deck
CTD		11:38:12	10	21.437	86	20.147	1717	Cul9-6
CTD		12:11:37						Cul9-6 at depth ~1650
CTD		12:41:41						Cul9-6 on deck
CTD		13:12:43	10	18.99	86	19.123	1669	Cul9-7
CTD		13:48:30						Cul9-7 at depth ~1600
CTD		14:17:50						Cul9-7 on deck
CTD		14:46:43	10	18.001	86	18.614	1602	Cul9-7b
CTD		15:28:07						Cul9-7b at depth ~1600
CTD		15:54:29						Cul9-7b on deck
CTD		16:25:00	10	16.594	86	17.775	1654	Cul9-8
CTD		17:01:25						Cul9-8 at depth ~1600
CTD		17:29:42						Cul9-8 on deck
CTD		18:02:43	10	14.508	86	16.689	1587	Cul9-9
CTD		18:36:00						Cul9-9 at depth ~1600
CTD		19:03:26						Cul9-9 on deck
CTD		19:40:56	10	11.819	86	15.092	1558	Cul9-10
CTD		20:10:09						Cul9-10 at depth ~1450
CTD		20:37:24						Cul9-10 on deck