

2007 OBSIP Field Programs

East Pacific Rise at 9°N, Eastern Pacific (*Tolstoy et al.*). The primary scientific goal is to obtain a continuous time series of ground motion over a 4-year interval in an attempt to investigate microseismic activity (and magmatic eruption!) along the 9°N ridge. Scheduled from January 10 to February 05 2007 aboard the *R/V Atlantis*, this cruise involves the recovery of 11 LC2000 instruments initially deployed in April 2006 aboard the *R/V Knorr* and after a ~1-year recording duration. This is the fourth and final year of deployments for the project, with final recovery of all instruments taking place during this cruise.

Before commencing the 2007 *Atlantis* recovery effort, a summary of site numbers, the release unit, and the last known status follows:

site#	depth (m)	last estimated lat (dec)	ast estimated lon (deccurrent status)	status
201	2505	9.814835	-104.288645	mute
202	2520	9.824405	-104.285090	mute
203	2515	9.822233	-104.294822	mute
206	2511	9.833185	-104.287183	stuck
208	2468	9.844620	-104.288568	mute
210	2500	9.827180	-104.290413	stuck
211	2453	9.841360	-104.296538	mute
212	2462	9.842920	-104.298080	stuck
site#	depth (m)	last estimated lat (dec)	ast estimated lon (deccurrent status)	status
301	2511	9.816603	-104.284928	alive
302	2528	9.824968	-104.282310	alive
303	2517	9.823455	-104.292772	mute
304	2582	9.831838	-104.306235	alive
305	2513	9.832535	-104.294442	mute
307	2549	9.836277	-104.275398	alive
308	2527	9.844217	-104.287847	alive
309	2513	9.851843	-104.295902	alive
310	2507	9.828085	-104.287915	alive
311	2510	9.837612	-104.288885	alive
312	2515	9.841080	-104.297107	alive

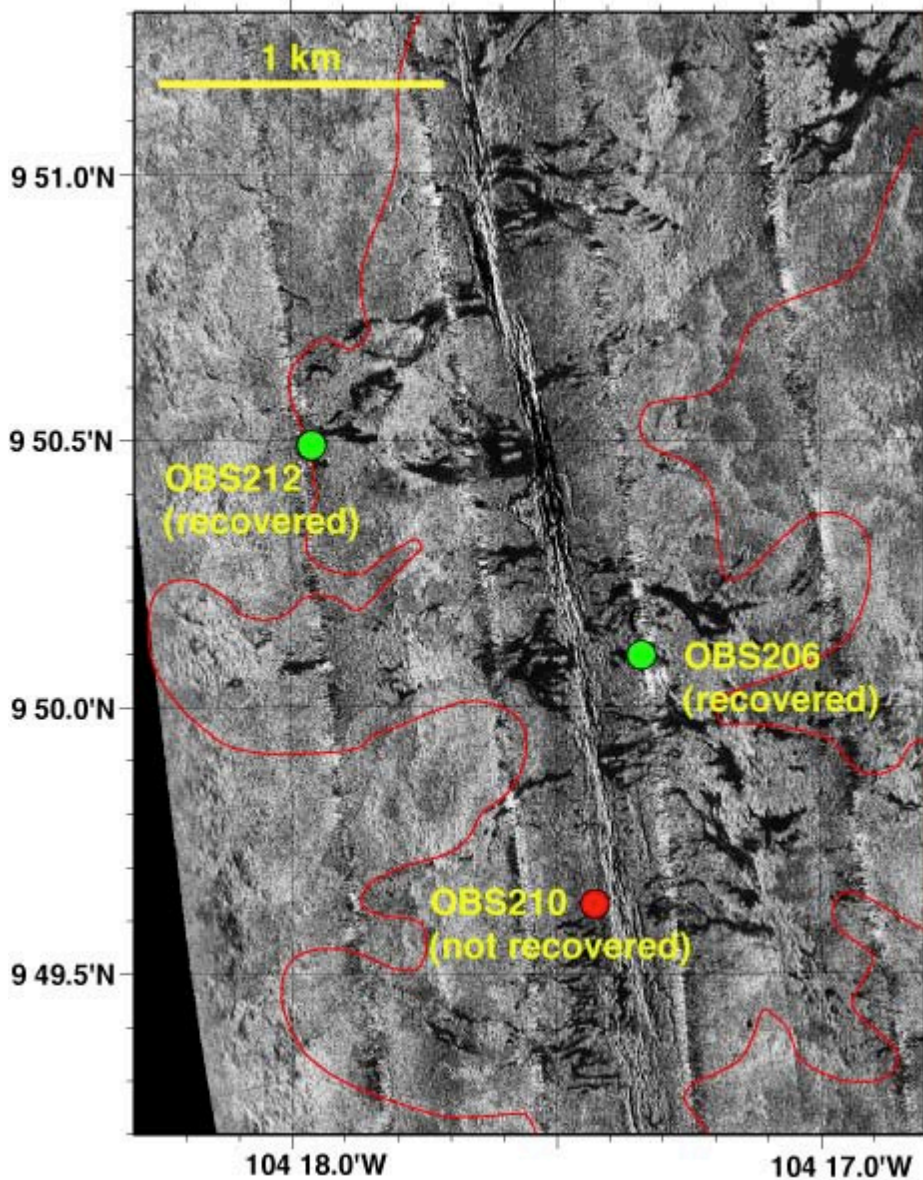
Of the eleven units deployed in April 2006 sites 303, 305 and 310 had been mute shortly after deployment and still had no acoustic communication. However, sites 206, 210, and 212, which are stuck in lava prior the initial eruption discovered January, were still communicating. The acoustics still responding were a positive sign for any proposed recovery efforts by a Jason2 cruise. Eight of the 300 series instruments were recovered during the cruise. All were counting time when recovered, indicating proper program function. The clock drifts ranging from less than 10 msec to 2113 msec., well within clock specifications. All were full of data with closing block numbers over 50 million, or about 28 gigabytes.

The biggest disappointment during the cruise was a lost instrument at site 309 (logger 79, acoustic 79, frame 79, float 43, strobe 35, radio 36). There was acoustic confirmation that the unit released, with observed closing ranges after the end of the burn window. However, when the estimated rise time had elapsed the bridge had not acquired the instrument on the surface. With a night recovery they never heard the radio or saw the flashing light. Sweeping the ocean with the searchlight failed to light up reflector tape. Subsequent acoustic ranging yielded intermittent results, and seemed to indicate bottom depth values. Further acoustic ranging revealed they could not hear one of the direct paths and, thus, were hearing a bottom reflection in the travel path. The Alvin operations require the ship to be in a certain location by dawn, with

daytime sub operations, so no recovery efforts could be done during daylight hours. The next night the *Atlantis* returned to the site 309 to verify it was not still stuck on the bottom. Several commands went unacknowledged, and there were no range replies, all indicating the unit had released and floated away unobserved.

OBS Recovery efforts were subsequently attempted using the unmanned submersible JASON during an R/V *Atlantis* cruise in Mar-Apr 2007; excerpts from the recovery of LC2000 OBS units are included from the report: “*Jason Dive 268 Summary – EPR ISS Infrastructure Dive – (D.J. Fornari & S.A. Soule)*”. The objectives of Dive 268 were to conduct several types of surveys to provide baseline data that would be useful to a broad cross-section of multidisciplinary investigations at the EPR ISS. One of the primary tasks during the survey was to attempt recovery of three ocean-bottom seismometers (OBSs) that were trapped by lava from the 2005-2006 eruptions. In particular, there was an attempt to recover the 3 OBSs that were still communicating acoustically. The following figure shows a map of the OBS locations over new sidescan imagery.

J2-268 OBS Recoveries



Map showing locations of OBS recoveries on AT15-17, Jason2 Dive 268 plotted over the new DSL-120a sidescan sonar data collected during AT15-17. Thin red line is the limit of the 2005-2006 lava flows mapped using TowCam data. Thin blue line shows trace of AST. Dark, dendritic patterns on sidescan image are low reflectivity lava channels emanating from the AST that formed during eruptions.

Below are Jason2 video camera frame grabs of the recovery operations for OBSs 212 and 206, and the attempted recovery of OBS 210. The two recovered OBSs were both trapped by hackly lava flows that clearly compromised the anchors and release assemblies, and partially buried the floatation sphere hardhats. Because the hackly flow was quite broken up in both cases, the OBSs were easily pulled from the flow after each syntactic float pack was attached to the lift bail. For OBS 212 the frame was partially buried and a large rock was wedged between the pressure housings. Once that was cleared and the frame shaken so that the lava rubble fell off, it was

clearly observed to be buoyant and was released. The same was true for OBS 206, which also was easily pulled from the hackly flow, shaken to be sure no large pieces of lava were trapped inside the base, and then released.



Photographs of the recovered OBSs on deck are shown below. The additional ~12# of syntactic floatation helped the OBSs rise quickly at ~35 m/min. In all cases the ship was used to recover the instruments. Given the calm weather and rapid ascent speed, minimal time was lost in having Jason2 off the bottom during recoveries. In some cases sampling or other operations were done during portions of the OBS ascent. The OBSs were washed with fresh water after recovery and placed under a tarp for offloading in San Diego at SIO-MARFAC. The acoustics were disabled when they were on the surface using the ORE deck box left by the WHOI buoy group.