

2006 OBSIP Field Programs

East Pacific Rise at 9°N, Eastern Pacific (*Tolstoy et al.*). LEG 4 served as a recovery cruise for 12 instruments deployed in LEG 3, and also included the deployment of a replacement fleet of 12 units. This represents the fourth set of one-year deployments of the SIO LC2000 in the active configuration. Through OBSIP funds we deployed an upgraded, tested tri-axial LC2000 package. Structurally unmodified LC2000 units record for the entire year-long deployment, a testament to the low power logger design.

The *R/V Knorr* was boarded in the Galapagos on March 28th but did not arrive on site for OBS operation at 9°N until April 24th. This was primarily a mapping and dredging cruise at a fracture zone south of the equator (Forsyth et al.), with the OBS work a two-day add-on at the end. Because of limited deck space and very limited time constraints, deployment of the 12 new/replacement instruments occurred first. One of the units showed signs of a malfunctioning disk drive during instrument checkout and therefore was not deployed. Upon deployment units were not followed to the bottom, as the deadline to leave for San Diego was firm and time was a consideration.

Upon commencing recovery efforts from the leg3 / year3 deployment fleet only 4 of the originally deployed 12 units could be recovered. The remaining fleet were either non-responsive (5 units) or in acoustic communication but failing to lift off the bottom (3 units). The units stuck on the bottom had very strong acoustics and responded on the first command, but refused to lift off, even after five or more release commands. The *Knorr* would hold position, but the ranges didn't vary more than a meter. The four units recovered showed little signs of corrosion – a few washers left rust streaks, a typical observation for year-long deployments. Unfortunately two of the four units recovered had issues with their disk drives and data recording. Partial data recovery with expected (perhaps due to the rough environmental conditions), although this will require a considerable amount of effort. All the clocks had drifted less than 1.2 seconds.

Upon closer inspection of the deployment grid Crispin Hollinshead, our sole OBSIP representative from SIO, noticed that the only units recovered were at the outer edges of the work area, the two furthest west, the furthest east, and the furthest north. Robert Weekly, working at LDEO with Maya Tolstoy on data analysis, has been working with the data recovered in 2005 indicated they observed increased activity toward the southern end of the array. Maya Tolstoy had also told him that there was indication that something had happened more recently. We began to consider that there had been an eruption, which had inundated our missing gear. During the dredge portion of the cruise a mid-water data collector called a MAPR (Miniature Autonomous Plume Recorder) was employed, which records temperature and particulate density with a nephelometer. Chief scientist Don Forsyth (OBSIP oversight committee member) decided to do a series of short vertical profiles of the lower 500 meters at the 9°N site, spaced every half kilometer along the spreading axis, from north to south. The first survey (Tuesday, April 25th) recorded huge signals from the nephelometer, an order of magnitude larger than what we saw at any of the other sites. The evidence seemed to confirm the eruption hypothesis, and subsequently stirred a great deal of interest from the RIDGE 2000 community.

During MAPR dredge deployments the *Knorr* passed over the 11 units we deployed the first day on site (Monday), and pinged them by sending a Disable command to see if they were still alive.

Hollinshead was concerned that they might have unknowingly deployed them into active magma. They passed over 8 along the main axis and the eastern portion and all were responding. The following day they pinged the other three units – two were mute, sites 305 & 303, and site 310 was no longer responding, even though it has replied the day before. The bridge monitored the RDF the entire time and nothing had surfaced.

A summary of site numbers, the release unit, and the last known status follows:

site# (year 3)	release #	status 26APR06	site# (year 4)	release #	status 26APR06
201	36	mute	301	49	alive
202	12	mute	302	47	alive
203	70	mute	303	13	mute
204		recovered	304	15	alive
205		recovered	305	05	mute
206	31	stuck			
207		recovered	307	64	alive
208	26	mute	308	66	alive
209		recovered	309	79	alive
210	45	stuck	310	73	mute
211	35	mute	311	27	alive
212	38	stuck	312	57	alive

This inferred eruption spurred two additional reconnaissance cruises to the 9°N area that confirmed that an eruption (and OBS inundation) had occurred: a May 4-23 rapid response cruise aboard the *R/V New Horizon* and a June 18-July 7 *R/V Atlantis* cruise. Both cruises included OBS lab support with gear and/or personnel and included the use of the WHOI TowCam unit attempting to salvage accessible LC2000 units. Though the TowCam was not able to salvage OBS units, valuable pictures and acoustic ranging information was obtained on each cruise.



Near bottom photo of LC2000 buried in Lava using the WHOI TowCam aboard the R/V New Horizon (left – care of Dan Fornari). Photo of completely inundated LC2000 unit from lava flow (right – taken from Alvin). Note: both units shown were still in acoustic communication.