

## **IODP Expedition 335: Superfast Spreading Rate Crust 4 Week 2 Report (18-24 April 2011)**

### **Operations**

The 478 nmi voyage to Hole 1256D was accomplished at an average speed of 10.6 knots. The vessel was positioned on the established coordinates of the hole at 0115 hr on 19 April. The water depth established on Leg 206 is 3645.4 mbrf. The final depth of the hole at the end of Expedition 312, when this hole was last visited in December 2005, was 1507.1 mbsf.

Hole 1256D was reentered with a hard formation Smith 9 7/8" F9 tricone bit affixed to an mechanical bit release (MBR) and 4-stand bottom hole assembly (BHA). The initial objective was to test the openness of the hole to a depth of 1100 mbsf without circulation or rotation so that, if clear, an equilibrium temperature profile could be run to 1350 mbsf using the MTT logging suite. This would be followed by a borehole water/microbiology sampling run using the WSTP.

The drill string was lowered to a depth of ~920 mbsf where it encountered a ledge precluding the planned wireline operations. This interval had impeded smooth transit of the drill string on initial re-entry during Expedition 312. The wireline caliper, FMS and UBI logs from that expedition indicate an eroded zone from ~920 to 935 mbsf. Starting at 2330 hr on 19 April and for 32 hours until 0600 hr on 21 April the driller attempted to work past the obstruction without success, and the drill string was recovered. A more aggressive Reed 9 7/8" tricone bit (IADC Type 517), usually employed in softer formations, was mounted along with a tandem set of junk subs and Hole 1256D was reentered for the second time at 0105 hr on 22 April. Drilling on the bridge resumed at 0445 hr and continued to 2100 hr (16.3 hours) without discernible progress. The drill string was recovered with the bit clearing the rotary table at 0605 hr on 23 April. The contents of the junk baskets were examined and found to contain angular coarse sandy basaltic chips along with a few small (2-3 cm) sub-rounded basaltic clasts, consistent with the rocks cored when this interval was first drilled on Expedition 309. After discussing options with the onboard scientific leadership, it was decided that placing a cement plug at and above the bridge could possibly stabilize the zone and allow us to advance past the obstruction.

A cementing assembly was made up of the used Reed 9 7/8" tricone bit without jets and two stands of drill collars and deployed. Hole 1256D was reentered for the third time at 1520 hr on 23 April. After the driller tagged the bridge with the bit at 922 mbsf, the circulating head was made up to the drill string and tested to 1500 psi. Five barrels of 16 ppg (pounds per US gallon; S.G. ~1.9) blended cement was then pumped into the hole and chased with a column of seawater equal to the volume of the drill string. The drill pipe was then pulled back to 807 mbsf where an additional seawater flush consisting of 3 drill string volumes was pumped through the system.

After rigging down the cementing equipment, the drill pipe was recovered with the bit clearing the rotary table at 0515 hr on 24 April. The Reed bit was replaced with a new 9

7/8" tricone bit (Atlas HP61) and the drill string was deployed to 1596 mbrf. Hole 1256D was reentered for the fourth time at 1655 hr. We are presently running in with the drilling assembly.

### **Science Results**

The week commenced with an intensive series of introductory science meetings to highlight the cruise objectives and team sessions for the various groups to familiarize themselves with laboratory procedures and equipment. With a healthy mix of experience aboard, numerous training sessions have been run (e.g., curation, imaging, microscopy) by the technical specialists supplemented by ongoing mentoring by seasoned scientists. The logging groups and geochemistry prepared for the planned initial wireline phase.

In anticipation of the recovery of plutonic rocks the science party has been adapting and enhancing description protocols to enable the capture of igneous and alteration petrologic and structural observations. This work built on the templates developed at the pre-cruise core-logging meeting held at TAMU in March 2011. The science party then received training in using the DESClogik data capture application and database system. The archive and working halves of cores recovered on Expedition 312 from the dike-gabbro boundary and below are aboard, and these have been used to further refine the core logging templates. The archive halves are presently being systematically logged by the petrological groups. This will help tune the data capture systems and create a seamless observational record from the Expedition 312 cores to those recovered on this cruise. Daily science seminars on the formation and evolution of mid-ocean ridges from ocean floor and ophiolite perspectives have been held, with presentations to date principally lead by early career researchers. Calm seas, beautiful sunshine and Expedition 335's first barbeque on Sunday helped assuage a growing hunger for fresh core.

### **Education and Outreach**

Following a successful press conference with Costa Rican media as well as ship tours for ~60 visitors during the port call, the science party received a presentation on education and communication outreach, including the impact of embargo policies of major peer-reviewed journals and the IODP 1-year data moratorium. The science party was also given blogging and social media guidelines and was encouraged to sign up to blog on the JR.org site and/or to help recruit schools to participate in the ship-to-shore video broadcasts. First blogs were published on the JR.org site, including an illustration prepared by the shipboard scientific illustrator as part of her duties to develop a portfolio of ocean crust accretion diagrams for Expedition 335 and the wider ocean lithosphere community.

### **Technical support and HSE activities**

Science Mission Support: The Science Party members were introduced to their labs, met technical staff, and trained on data systems and instrument host software. Seafloor magnet and bathymetric data were collected during our transit from Puntarenas to our first site. The WSTP downhole tool was prepared to sample borehole fluids. Other technical activities included:

- Continued development for DESCLogik project.
- Installed and tested new pyncometer interface board.
- Moved excess furniture into DOD van for shipment back to College Station.
- Installed new counter top in the Planning Area and re-plumbed coffee machine.
- ODL engineers started investigation into Core Lab exhaust ducting issues.
- Relocation and clean up work for science pallet storage reorganization.
- Troubleshooting aft VSAT installation.
- Loaded emergency D-tube supplies into the aft “Bat Cave” storage.
- Installed and tested the whole round imaging tray, developed measurement protocols.

The science party and new technical staff completed Transocean’s safety induction and IODP’s Lab Safety Tour. The weekly fire and abandon ship drill was held as scheduled.