August 27, 2005

IODP EXPEDITION 309:
SUPERFAST SPREADING RATE CRUST 2
WEEK 7 REPORT

OPERATIONS

Reentry #11 (Logging BHA): RCB bit #9 was laid out and a logging BHA made up. The BHA reentered the hole at ~0800 on 21 August. The bit was set approximately 6 m above the casing shoe and preparations were made for logging Hole 1256D. Hole 1256D was logged with the Triple Combo, FMS-sonic, and the UBI. An attempt to log with the WST was unsuccessful. The WST could not be lowered more than 40 m below the drill pipe. Two passes were made with the FMS-sonic. Logging began with the Triple Combo at the 0945 hr on 21 August and was completed with the second FMS-sonic log at 0500 hr on 24 August.

Transit to Balboa: The drill string was pulled out of the hole and the ship secured for transit at 1300 hr on 24 August. The ship began its transit to Balboa. At 0530 on 25 August the engines were stopped due to propulsion motor problems. Two motors were taken off line and the ship was underway again at 0700 on 24 August. ETA Balboa is 0600 on 28 August.

SCIENCE UPDATE

The majority of the massive basalts from Cores 165R to 170R are aphyric cryptocrystalline to microcrystalline basalts. The constituent minerals are plagioclase, clinopyroxene, titanomagnetite, and apatite with, holocrystalline and intergranular textures. Sub-vertical dikes are common and the intruding rocks are aphyric to sparsely plagioclase-phyric cryptocrystalline basalts.

The Mg# of the basalts range from 45 to 62 and average 53. Trace element concentrations are within the range of EPR-NMORBs albeit on the trace element depleted side of the average. Site 1256 basalts have lower Zr/TiO_2 and Zr/Y ratios than modern EPR lavas, although they are not as trace element depleted as lavas from Hole 504B. There are no systematic geochemical differences between sheet flows, massive Flows, and Dikes.

The basalts in Cores 164R to 170R are grayish green slightly to moderately altered host rocks with single and composite dark/light gray/green alteration halos adjacent to veins. In these halos the basalts are moderately to highly altered. There are also common highly altered prehnite-anhydrite-chlorite patches. The dark gray color of the dike-chilled margins reflects only a slight alteration but veins and breccias along the chilled margins are common filled with chlorite, actinolite, titanite, sulfides, quartz, epidote, prehnite, anhydrite, and calcite.

XRD has confirmed that anhydrite is common in veins throughout this section. Chlorite is also common. Laumontite is abundant in Section 162R-3 and occurs in both pure laumontite veins or else with quartz, pyrite and chlorite. Mixed anhydrite-laumontite veins have not been observed.

From Section 166R-1 to Section 170R-3 fracturing is heterogeneously partitioned. Section 166R-1 is characterized by moderate fracturing linked to multiple dike injection. Centimeter-wide

chilled dikes are associated with vertical veins. From Section 166R-2 downhole fracturing is slight to moderate and characterized by systems of conjugate veins. Gently dipping joints are also common.

Drilling overprint remains a tough problem for paleomagnetic studies but the calculated paleomagnetic inclinations of the last portion of Hole 1256D from 1214.99 to 1255.1 mbsf show good agreement between the values obtained from the archive and working halves. This suggests that these samples suffered minimal overprinting by drilling and have a high data quality.

The major change in physical properties identified at 1060 mbsf is further supported by measurements of samples to 1256 mbsf. Discrete samples from the Sheeted Intrusives have a relatively low porosity (2 ±1%), high seismic velocity (5.8 ± 0.1 km/s) and high thermal conductivity (2.1 ± 0.1 W/m/K), compared to the rocks above.

A preliminary attempt at integrating core images with FMS images show a few promising matches. Integration of images is more likely to occur with longer core sections (> 34 cm). Gently dipping fractures in the cores can be seen a sinusoidal curves on the FMS image and steep core fractures appear as high angle marks. Within Section 85R-1, Piece 1 (1.40 m), five fracture matches have been made, four strong sinusoidal curves and one steeply dipping fracture.

LAB REPORT

The hole was reentered for the last time for this expedition with a logging bit. This set the sequence for the WST/VSP experiment at dawn on the 23rd. While the tool was slowly achieving depth, a single test shot was made. The tool could not be lowered into the formation and the experiment concluded. The seismic source was retrieved and secured to be later disassembled, rinsed, and stored. The logging program concluded a few hours early the following day and the ship was U/W at 130PM.

Over 20 cores had to be reshot when some aspect of the photo wet chemistry deteriorated. A solution to this problem is being researched. The hold refrigerator door was repaired where it was beginning to de-laminate. After final sample selections were made, cutting and curating them took nearly two complete days. The airfreight shipment is being prepared including the DMT to be crated for return to Germany. The normal ventilation plan was varied to minimize the infiltration of painting fumes.

HSE: A boat drill was conducted underway; all were to muster at their boat station.