

January 24, 2005

**IODP EXPEDITION 305:
OCEAN CORE COMPLEX FORMATION, ATLANTIS MASSIF
WEEK 2 REPORT**

OPERATIONS

At 0027 hr on 17 January we reentered Hole U1309D. The drill string was advanced to a depth of 396 mbsf where a WSTP water sample and temperature measurement was attempted. To minimize contamination or disturbance of the water column, the drill string was lowered to approximately five meters off the bottom of the hole with minimum rotation and no circulation. After the WSTP was retrieved, a core barrel was dropped and the borehole cleared of three meters of fill. The recovered core was given the designation 305-U1309D-79G as no new penetration was achieved. Hole U1309D was cored from 401.3 mbsf to 535.0 mbsf at an average rate of penetration of 2.6 m/hr (Cores 305-U1309D-80R to -107R). A total of 133.7 m was cored and 107.27 m recovered (80.2% average recovery). A 20-barrel mud sweep was circulated every 10 m of advance. A total of 50.7 hours of rotation was accumulated on the bit by the morning of 20 January and the pipe was recovered. The used bit was in relatively good condition with all cone inserts intact, the seals effective, and only 1/16 of an inch under gauge.

The drill string was redeployed and we reentered Hole U1307D at 1850 hr on 20 January. Coring was resumed at 2215 hr that evening and advanced from 535.0 mbsf to 645.4 mbsf by 1830 hr on 23 January (Cores 305-U1309D-108R- to -130R). By this time, the bit had acquired 50.5 rotating hours and coring was interrupted for the second bit trip of the expedition. The drill string cleared the sea floor at 2030 hr. The used bit was on deck at 2330 hr on 20 January. A total of 110.4 m was cored and 91.77 m recovered (83.1% average recovery). A 20-barrel mud sweep was circulated every 10 m of advance. The average ROP for this bit was 2.2 m/hr. Since coring was initiated in Hole U1309D on Expedition 305, a total of 244.1 m has been cored with an average recovery of 81.5% at an average ROP of 2.4 m/hr.

INITIAL SCIENTIFIC RESULTS

On January 17, we started deepening Hole U1309D (30°10.1195'N, 42°07.1131'W). Reentry went smoothly and we have cored from 401.3 to 645.4 mbsf (Cores 305-U1309D-79G to -130R, average recovery 81.5%). This interval continues the patterns of interfingered gabbroic units recovered at the end of Expedition 304, alternating on a scale of a few centimeters to ~2 meters. Cores are dominantly medium- to coarse-grained olivine gabbro and coarse-grained to pegmatitic gabbro. Less common intervals of microgabbro, oxide gabbro, sulfide-bearing gabbro, troctolitic gabbro, troctolite, and wehrlite were also recovered. A broader scale pattern shows alternating zones, a few tens of meters thick, of olivine-rich rocks (dominated by olivine gabbro and troctolite) and less olivine-rich rocks, mostly olivine-bearing gabbro and gabbro. Many contacts are sharp, but gradational transitions between lithologies are common. Modal mineralogy (abundance of olivine, clinopyroxene, or plagioclase), as well as grain size, can vary over a few centimeters, even in intervals characterized as an individual lithologic unit. A thin (<50 cm) interval of diabase was recovered in the bottom of Core 305-U1309D-94R (~471 mbsf). A 1 cm thick basaltic sill was recovered in Core 305-U1309D-124R (~613 mbsf), and two intervals of diabase were recovered in Core 305-U1309D-127R (~620 mbsf).

Alteration is slight to moderate (<10% to 60%) overall, with rare, more pervasively altered intervals or patches, commonly associated with veins. The coarser grained gabbro intervals

generally appear to be more altered than the medium- to coarse-grained olivine-bearing gabbro. Various types of veins were recovered, including late, magmatic, felsic veins or dikes, epidote and chlorite veins, serpentine and/or talc veins, and carbonate veins. A ~1 m thick epidote-rich band crosscuts one of the coarse grained gabbroic intervals in Core 305-U1309D-84R (~ 421 mbsf). The occurrence of epidote in veins and patches increases down core. Pervasive talc alteration zones, a few cm thick, were observed adjacent to talc veins in gabbros in Core 305-U1309D-111R (~ 550 mbsf).

Magmatic foliations vary from rare in general, to weak and rarely moderate when present. This fabric is more systematically observed in medium-grained olivine gabbro, steeply dipping from Core 305-U1309D-111R down core. Plastic strain is generally absent, except for a few intervals with very weak foliations, a partially recovered mylonitic zone (a few tens cm thick) in Core 305-U1309D-82R (~ 414 mbsf), and another, few-cm-thick, semi-brittle shear zone in Core 305-U1309D-117R (~ 578 mbsf). Deformation seems to be mostly accommodated by fractures and cataclastic zones; observed strain is very low.

Shipboard paleomagnetic measurements and analyses show that much of the recovered rocks have very similar magnetic properties to those recovered during Expedition 304. All gabbro samples have reversed polarity, consistent with their cooling in the Matuyama Chron. The borehole water sample obtained at the beginning of our operations on January 17 shows no significant difference with the sea bottom water collected during Expedition 304 at Site U1309.

LABORATORY STATUS

The shipboard labs are busy processing the excellent recovery of hard rock cores at Site U1309D.

HSE

The ODL ships deckhands were given a hazardous substance class and tour of the lab stack by the Lab Officer. This was to familiarize the crew with the locations and types of hazards found in the lab stack should they be required to respond to an emergency or fire. The locations of safety equipment, eye wash stations and showers were pointed out along with the location of spill clean up kits.