

February 14, 2005

**IODP EXPEDITION 305:
OCEAN CORE COMPLEX FORMATION, ATLANTIS MASSIF
WEEK 5 REPORT**

OPERATIONS

During this week, we deepened Hole U1309D to 1000.8 mbsf by 0130 hr on 9 February, before the pipe was recovered to change the bit. For this bit run, the average ROP was 1.7 m/hr, with 81.8 m cored and 94% average recovery. After the pipe trip, we reentered Hole U1309D and continued coring to 1101.6 mbsf by 1115 hr on 12 February. Another bit trip ensued after coring 88.6 m with 88% recovery. The average ROP with this bit was 2.0 m/hr. In accordance with routine, a 20-barrel mud sweep was circulated every 10 m of advance. As the week ends we continue coring in Hole U1309D through 1143.9 mbsf.

INITIAL SCIENTIFIC RESULTS

From February 7 to February 13, deepening of Hole U1309D (Core 305-U1309D-194R to Core 305-U1309-237R, 938.2 to 1144 mbsf) continued successfully, with an average recovery of 86%. We recovered dominantly varitextured, medium- to coarse-grained gabbro and olivine gabbro, and minor intervals of oxide gabbro. Contacts between grain size changes are commonly sharp, but with variable attitude, while changes in mode are more gradational. In places variations in grain size occur in patches smaller than the diameter of the core, resulting in islands of coarser grained gabbro nestled within isotropic medium-grained gabbro. Olivine gabbro is the dominant lithology from ~1030 mbsf down core. A 1.3 m thick interval of diabase was recovered in Cores 305-U1309D-205R and -206R. Starting in Core 305-U1309D-227R (~1094 mbsf), we recovered a ~7 meter thick unit of very fresh olivine-rich troctolite. Both the upper and lower contacts with surrounding olivine gabbros are sharp. Serpentinization grades from about 50% near the contacts to ~10 % in the middle of the unit. The sequence continues down core with coarse-grained olivine gabbro, alternating through variably gradational contacts with olivine-rich troctolitic intervals.

Gabbros and olivine gabbros vary from weakly altered to virtually fresh. Discrete metamorphic alteration includes high temperature amphibole veins, talc/carbonate/zeolite and prehnite/zeolite veins. Magmatic foliations, moderately to steeply dipping, remain weak but are consistently observed in microgabbros and olivine gabbros. Crystal-plastic deformation is rare to nonexistent, and a few cataclastic zones were recovered.

Discrete sample shipboard measurements continue apace with the steady core recovery. The gabbroic rocks between 400 and 780 mbsf are among the most primitive known from the oceanic crust and overlap in composition with gabbros of the upper 400 m of Hole U1309D. Bulk-rock geochemical analyses indicate olivine and olivine-bearing gabbros range in Mg# from 73 to 86, gabbros and gabbro-norites have slightly more evolved Mg# between 78 and 66, respectively. Average bulk densities, porosities, and P-wave velocities reflect the dominantly gabbroic rock types: 2.7 g/cm³, <1%, and 5.7 km/s, respectively. The magnetic properties of recovered rocks show mostly similar characteristics to those observed in past weeks, continuing to show dominantly reversed magnetization and some normal polarity intervals. Principal component analyses of archive half cores indicate negative inclination is slightly shallower than the expected geocentric axial dipole field. Distinctive changes in both magnetic susceptibility and intensity are attributed to lithological units. As they get fresher, the gabbros appear to carry a more stable characteristic remanent magnetization component.

LABORATORY STATUS

With hole conditions stable and core coming on deck approximately every 3 hours the shipboard labs are busy processing the hard rock cores of Site U1309. In preparation for Expedition 307 and its biology component supplies are being inventoried and lab spaces prepared.

HSE

A fire and lifeboat drill was held on Monday for all the ships crew. In preparation for the possibility of H₂S being encountered on Expedition 307 the H₂S monitoring systems have been tested, calibrated, and spare parts ordered.