

January 31, 2005

**IODP EXPEDITION 305:
OCEAN CORE COMPLEX FORMATION, ATLANTIS MASSIF
WEEK 3 REPORT**

OPERATIONS

The week began with our third reentry into Hole U1309D during Expedition 305. Rotary coring advanced from 645.4 mbsf to 755.8 mbsf by 0600 hr on 27 January, when the bit had accumulated more than 50 rotating hr. The average ROP for this bit was 2.2 m/hr with 81.6 m recovered (74%). We reentered Hole U1309D with our fourth bit for this expedition and coring resumed at 1930 hr, 27 January. Rotary coring advanced from 755.8 mbsf to 837.4 mbsf with 71.1 m recovered (87%). After accumulating 50.2 hr of rotating time (average ROP 1.6 m/hr), coring operations were suspended to conduct a full logging program. Following a wiper trip up to 144 mbsf, the hole was displaced with 250 barrel of fresh water for logging. During coring operations, a 20-barrel mud sweep was circulated every 10 m of advance. Since coring was initiated on Expedition 305, Hole U1309D has been deepened by 436.1 with an average recovery of 81% and an average ROP of 2.2 m/hr.

INITIAL SCIENTIFIC RESULTS

From Core 305-U1309D-131R to -171R (645.4 to 837.4 mbsf, average recovery 79.3%), we continued to recover dominantly medium- and coarse-grained gabbro, with minor intervals of microgabbro, oxide gabbro, olivine-bearing and olivine gabbro, troctolite, and wehrlite. The lithology tends to be more homogeneous down core, the last cores being mostly gabbro. Modal and grain size transitions are, for the most part, fairly abrupt, but the scale ranges from layered intervals only a few centimeters to a few tens of centimeters thick, to sections of coarse-grained gabbro a few meters thick. The top of Core 305-U1309D-136R (~670 mbsf) recovered plagioclase-bearing, wehrlitic, olivine gabbro, in sharp contact with cataclastic, coarse-grained gabbro. Oxide gabbros are found variably in undeformed intervals, from 1 centimeter to a few meters thick, or in association with shear zones. Core 305-U1309D-137R (~675 mbsf) recovered a subvertical, sheared intrusion of fine-grained oxide gabbro that meanders through more than 3 m of core, entraining pieces of the gabbroic wall rock and exhibiting high-temperature ductile deformation. A ~ 4 meter thick interval of diabase was recovered in Cores 305-U1309D-154R and -155R (~756 to 760 mbsf), as well as a 5 cm thick, moderately steeply dipping diabase dike in Core 305-U1309D-165R (~ 804 mbsf).

Alteration continues to be weak to moderate, and decreases progressively down core. It is locally more intense in halos around fractures and veins. Coarse-grained intervals are, in general, more pervasively altered. Epidote is present in veins and patches. The core is regularly crosscut by leucocratic veins, chlorite/actinolite veins and carbonate/talc veins.

Magmatic fabrics are still weak to moderate, and tend to be more frequent and to dip slightly shallower (40° on average) below 700 mbsf (Core 305-U1309D-142R). Crystal-plastic structures tend to be more pronounced in the interval from Core 305-U1039D-137R to -146R (~675 to 720 mbsf), with several ductile shear zones. Deformation continues to be dominantly brittle. Two fault zones were identified in Cores 305-U1309D-152R, and -161R (~ 746, and 785 mbsf, respectively), on the basis of lower recovery, occurrence of fault gouge, and increasing brittle fabrics.

Shipboard, room pressure, compressional ultrasonic velocity measurements average around 5.9 km/s in this interval. Sample porosities are low, on the order of 1%.

Shipboard paleomagnetic measurements on the rocks from Hole U1309D continue to show large variations in NRM intensity, inclination and magnetic susceptibility. The reversed component of magnetization is dominated in the Fe-Ti oxide gabbro and metagabbro, as revealed by both pass-through magnetometer measurement and thermal demagnetization of discrete samples. In several intervals where olivine gabbro and troctolite are dominantly recovered, however, magnetization is characterized by positive inclination (normal polarity), stronger NRM intensity, and higher magnetic susceptibility values.

LABORATORY STATUS

The shipboard labs are busy processing the excellent recovery of hard rock cores from Site U1309. In preparation for running a VSP/Check Shot operation during the upcoming logging of the hole, a meeting was held to go over the marine mammal safety policy and procedures. A marine mammal watch was instituted and the GI gun was successfully deployed and test fired.

HSE

A fire and lifeboat drill was held on Monday for all the ships crew.