December 13, 2004

IODP EXPEDITION 304:
OCEAN CORE COMPLEX FORMATION, ATLANTIS MASSIF
WEEK 4 REPORT

OPERATIONS

The BHA with an RCB and a CC-7 bit was tripped to just above the reentry cone and the subsea camera was deployed to make the reentry into Hole U1309D. The first reentry into Hole U1309D was accomplished in 10 minutes by 0240 hours on 6 December. Cores U1309D-1R to-22R (20.5 to 131.0 mbsf, 51% recovery) were predominantly 4.5 m penetrations, but two ~9.5 m cores (Cores U1309D-16R and -17R, 89.0 to 107.9 mbsf) were cut to compare recovery rates. Penetration rates and operating parameters were similar to pilot Hole U1309B. Coring was terminated at 60.75 bit rotating hours to prevent bit deterioration from affecting hole conditions. After the bit cleared the top of the reentry cone at Hole U1309D, the vessel was moved to Site U1310 using the dynamic positioning (DP) system. During the DP transit to Site U1310, drill pipe was added to reach the estimated 2580 m of water depth. A subsea camera survey located a target for Hole U1310A, and after a punch test to determine sediment thickness, the pipe was recovered. The bit cleared the rotary table at 1520 hours on 10 December 2004, officially ending Hole U1309D and starting Hole U1310A. The bit was in poor condition with numerous missing and broken teeth and three loose cones.

The HRRS was assembled and tested at the rig floor prior to deployment. During the initial assembly an error was discovered in the length measurement of the new nonagon bit; it resulted in the overall casing length being too short for the BHA. The bottom joint of casing had to be removed and the ring bit removed from the casing and reinstalled on a longer cut-off joint of casing. The completed assembly was then deployed to the seabed and an accurate drill pipe measurement to the seafloor was recorded at 2594 mbrf. The HRRS was spudded at 0000 hours on 12 December 2004. Hammer drilling continued for the next 6.75 hours with little penetration. The HRRS was pulled back to the surface and the nonagon pilot bit and nonagon ring bit were changed to a SDS hammer wing bit and a Texas style casing shoe. The HRRS was then run back to bottom.

SITE U1309 INITIAL SCIENTIFIC RESULTS

Coring continued in Hole U1309D (30°10.1195'N, 42°07.1131'W) until Thursday, December 9. The sequence cored is similar to that recovered in Hole U1309B: interfingered diabase and gabbro cut by rare aphyric to sparsely plagioclase-phyric basaltic dikes. On December 10 we moved to the hanging wall site and began operations to set a reentry system for deep penetration at Site U1310.

We have completed the primary objective at the footwall site (Site U1309) for this expedition: Hole U1309D was cored to 131.0 mbsf (average recovery 51%) and conditions for deeper penetration appear to be good. There is evidence within the upper 55 m (through Core U1309D-8R) of brittle deformation and multiple episodes of hydrothermal alteration. Deeper in the hole, a complex series of gabbro, troctolite and diabase show less alteration. Coarse-grained intervals exhibit a steeply dipping, high-temperature, foliated and lineated mylonitic fabric. Serpentinized peridotite was recovered from approximately the same depth (~60 mbsf) as in Hole U1309B and showed a sharp upper contact with gabbro. No lower contact was recovered, and

subsequent cores yielded another sequence of moderately altered diabase and gabbro, with rare, thin intrusive intervals of aphyric basalt. Throughout work at Hole U1309D there were no indications of material falling into the hole, and consistent coring parameters suggest it is a clean, gauge hole. An interval of no/low recovery was encountered at 102-118 mbsf but recovery in the last two half-cores taken was back up to the average rate. Confirmation, to the extent possible, of deep penetration capability at Hole U1309D was considered complete at 131 mbsf and ~ 60 hours of rotary bit time.

The ship transited ~6 km NE to Site U1310 (Prospectus Site AMHW-01A). A brief camera survey centered on a prior seafloor gravity station (Alvin dive 3643, AT3-60, 2000) indicated a barren, mud-covered seafloor, with a gentle slope to the west. Two minor outcrops of pillow basalt were noted. We are attempting to set an HRRS at this site.

LABORATORY STATUS

All instruments and equipment are operating. PP's endeavor to saturate minicores with seawater before measuring the velocities, using a vacuum over the water, caused the failure of a vacuum pump. DIS artifacts have not been repeated since the rail bearings and seals were re-positioned and seated. The last of the Site U1309 thin section billets have been cut.

There was trouble with SQL queries to JANUS where ICP and X-ray data, which can share samples, looks alike or was sometimes invisible. There has also been trouble with subsequent thin section sample entries, cut from same billet, writing over one another. Both problems were sorted out ashore and fixed onboard. The port magnetometer sensor has been disassembled for troubleshooting.

Hole U1309B cores were boxed and the 36 D-tubes were moved to the core refrigerators to make room for new material. The archive halves remain available in the refrigerator for reference. Recovery remained about 50% for Hole U1309D. 105 m were recovered from this site.

The whine of air powered-grinders is intruding into the cabin spaces as ship maintenance continues. Ship's electricians have thoroughly cleaned all of the fluorescent fixtures in IODP open spaces. A ship's electrician is correcting the lab elevator landing misalignment problem.

Organizers are soliciting talent for the Christmas celebration and a fireplace is under construction.

HSE

Fire and boat drill was conducted with instructions how to proceed to another lifeboat in the event your assigned boat could not be launched. Instructions were given covering the inventory and use of the pyrotechnics stored aboard the craft. The location of the VHS radio with each craft was mentioned but the unit will be demonstrated and detailed at another time. A safety video selection has been posted for the specialist to review.