July 5, 2005

IODP EXPEDITION 308:
GULF OF MEXICO HYDROGEOLOGY
WEEK 5 REPORT

OPERATIONS

Hole U1324C: Operations in Hole U1324C continued with the deepening of the hole to 250.0 mbsf where a DVTP-P measurement was done followed by a single piston core. The hole was then drilled from 250.0 mbsf to 300.0 mbsf where the fifth T2P deployment of the hole was made followed by a single APC core. The hole was then drilled to 405.0 mbsf and 505.0 mbsf followed each time by a single piston core. The last piston cored advanced to a final depth of 511.8 mbsf. When the driller advanced beyond 481.0 mbsf, heavy mud (10.5 ppg) was continuously pumped in accordance with the operating protocol for this site. A total of eight piston cores were obtained with the last seven advanced by recovery. The cored interval was 55.1 with an average recovery of 100.9%. Before the drill string was withdrawn from Hole U1324C, the hole was observed via the VIT camera and no flow was evident. Because penetration in the hole was terminated above the sand layers, it was not necessary to plug this hole with cement. The bit was pulled free of the sea floor at 0135 hr on 28 June and positioned 204 meters above the sea floor. The beacon was recovered before departing location at 0240 hr.

Hole U1322B: The vessel was offset 6.2 nmi to Site U1322 at 0915 hr on 28 June. After observing the sea floor with the VIT, Hole U1322B was spudded with the APC at 1145 hr. Piston coring advanced the hole to a depth of 61.0 mbsf when operations were interrupted because of the failure of a control transformer in the variable field supply of the core winch. This required 3.75 hours to trouble shoot and repair. Piston coring resumed at 2345 hr 28 June and continued to 0730 hr on 30 June when the total depth of 234.5 mbsf was attained. The average recovery for the hole was 101.0%. The T2P probe was deployed three times in this hole. The first measurement in the hole was made at 42.0 mbsf following Core U1322B-5H. The second attempt was made at 134.3 mbsf subsequent to Core U1322B-15H. On this occasion, the hole was displaced with 10.5 ppg mud. The last deployment was at a depth of 157.8 mbsf. This deployment was made after recovering Core U1322B-18H and with the hole displaced with 55 barrels of 10.5 ppg mud. The DVTP-P probe was deployed once at a depth of 166.7 mbsf following Core U1322B-19H. On this occasion, the hole was displaced with 55 barrels of 10.5 ppg mud. The bit was pulled free of the hole at 1010 hr on 30 June.

Hole U1322C: Hole U1322C was dedicated to temperature and pressure measurements. Following a dynamic positioning offset of 20 m west of Hole U1322A, the VIT was deployed. The visual examination of the sea floor confirmed a clear area under the bit. Hole U1322C was spudded with the APC at 1125 hr on 30 June. Hole U1322C was then drilled in six intervals to a final depth of 231.5 mbsf. The T2P probe was deployed at 50 mbsf, 75 mbsf, 150 mbsf, and 200 mbsf. After the first measurement attempt, the hole was stabilized by displacing it with 10.5 ppg mud. The DVTP-P was deployed at 100 mbsf, 220 mbsf, and 238 mbsf. The hole was also displaced with heavy mud prior to each deployment and no circulation or rotation were applied. The hole was displaced with an additional 75 barrels of 10.5 ppg mud prior to abandonment. The bit cleared the sea floor at 1824 hr on 1 July and was observed with the VIT. No flow was emanating from this hole. While operating on Hole U1322C, the *M/V Emily G* made the third and final visit to the JR. The *M/V Emily G* was on location and standing by at 0400 hr on 30 June. The work boat offloaded catering supplies and freight originally destined for Panama. We also loaded 35.5 short tons (710 sacks) of

Florigel (Attupulgite) from the *Emily G*. The work boat departed for Port Fourchon, La. at 0930 hr transporting the Mud Engineer and two other personnel to shore.

Hole U1322D: The vessel was offset 20 m north of Hole U1322A and Hole U1322D was spudded with the APC at 1925 hr on 1 July. This followed a sea floor survey with the VIT. The hole was drilled and cored in five incremental steps to a total depth of 175.0 mbsf. Three piston cores were obtained from the sea floor to 9.5 mbsf, 70.0 mbsf to 79.5 mbsf, and 100.0 mbsf to 107.8 mbsf. The average recovery of the cored interval of 26.8 m was 101.5%. The T2P probe was deployed four times at 40.0 mbsf, 70.0 mbsf, 100 mbsf, and 134 mbsf. The DVTP-P was deployed at 175.0 mbsf. With the exception of the first T2P run, the holes were displaced with heavy mud prior to tool deployment and all downhole measurements were attempted with no circulation or rotation. All operations concluded by 1600 hr on 2 July to allow sufficient time to recover the drill string, beacons, and disassemble and store the bottom hole assembly components. The VIT was deployed prior to withdrawal of the drill string from the hole and a short inspection of the top of Hole U1322D confirmed the absence of any flow. After the drilling equipment was secured, the vessel began the voyage to Panama at 0030 hr on 3 July.

PRELIMINARY SCIENCE RESULTS

The main lithologies encountered at Site U1322 range from greenish gray muds to greenish gray clays, with some intervals containing minor amounts of silt. The most interesting features found in the cores are faults and folds often associated with mud clasts. These structures were interpreted to be mass transport complexes (most likely slumps). Two main intervals of mass transport deposits are recognized at Site U1322: from Core U1322B-5H to Core U1322B-7H (38 mbsf to 60 mbsf) and from Core U1322B-11H to U1322B-14H (92 mbsf to 128 mbsf). From Core U1322B-17H to Core U1322B-29H (142 mbsf to 235 mbsf), nine distinct intervals are interpreted as mass transport deposits. This indicates that mass transport was more frequent towards the bottom of the hole. A striking feature of these mass transport complexes is that they have lower porosity than overlying and underlying sediments that are not deformed. Biostratigraphy was used to date the bottom of the hole at approximately 60,000 years BP. Preliminary log-seismic interpretations indicate that the upper slumped unit is traceable throughout the Ursa basin, and can be correlated between Site U1322 and Site U1324.

In Hole U1322C there was one high quality DVTP-P deployment at 236 mbsf and one high quality T2P deployment at 150 mbsf. These provided us with a reasonable record of in-situ temperature and pressure for Site U1324. Most of the other deployments recorded sub-hydrostatic pressures immediately after the drill string was raised after penetration. We interpret that when the drill string was raised, some extensional force was felt by the probe even though the colletted delivery system is designed to not place tension on the tool. Based on these results (or lack thereof), we decided to spend the remaining 36 hours of operation time drilling an additional geotechnical hole on this site. This decision was also motivated by the fact that our revised authorized depth of penetration at Site U1323 (174 mbsf) meant that the interval of major scientific interest could not be penetrated. The purpose of the new Hole U1322D was to deploy the pressure and temperature probes and spot core after each deployment. The cores obtained were to be sampled for geotechnical analysis and then processed through the onboard laboratories.

T2P probe and DVTP-P measurements at Sites U1322 and U1324 provided critical data for understanding overpressure and associated flow in the Ursa basin. Dissipation curves at Site U1322 (seven measurements) and Site U1324 (nine measurements) document overpressure at 50 mbsf and continuing to the bottom of each site. The temperature gradient at Site U1324 is 18.6 ^{o}C/km (17 measurements from 50-608 mbsf); however at

Site U1322 the gradient is 26.4°C/km (13 measurements from 42-238 mbsf). This elevated temperature gradient could be due to lateral transport of warm fluids towards Site 1322 from Site 1324 within the Blue Unit Further analyses of the flow field and the geochemical signature of the fluids will hopefully provide insights on the source of the fluids.

The acquisition of reasonable in situ measurements means that the primary objective of Expedition 308 was fulfilled. Once further analyzed, the data obtained will allow us to test our conceptual model of this overpressured basin. Preliminary results show that the modeled prediction that fluid pressure in the Ursa Basin would fall between hydrostatic and lithostatic was correct. Refined analysis will tell if differences in pressure between Site U1324 and Site U1322 exist.

TECHNICAL SUPPORT ACTIVITES

A supply boat arrived on June 30. Freight for Expedition 309 was delivered and bulk was loaded. Three personnel departed on the vessel for shore. At the end of the week the *JOIDES Resolution* began the transit to Panama at 0300 hrs on July 3.

HSE ACTIVITIES

A fire and boat drill was held Monday for all the ships complement. The METs team suited up for Monday's fire drill and responded with a 4-man hose team to a fire in the paint locker. Following the paint locker drill, fire hoses were charged and the team practiced using foam.