

June 20, 2005

**IODP EXPEDITION 308:
GULF OF MEXICO HYDROGEOLOGY
WEEK 3 REPORT**

OPERATIONS

Hole U1321A: The *JOIDES Resolution* arrived at the location of Site U1321 by midnight and a beacon was deployed at 0005 hr on 13 June. The driller tagged the sea floor at 1468.0 mbrf (PDR = 1467.4 mbrf) and observed the spudding via the subsea camera at 0205 hr. MWD drilling proceeded without incident to the depth objective of 140.0 mbsf by 0900 hr at a controlled rate of penetration of 30.0 meters per hour. The bit was recovered and the MWD drilling package was disassembled, laid down, and secured for the sea voyage to the next site. The vessel departed for URS-3C at 1500 hr on 13 June.

Transit to the Ursa basin: The 293 nmi transit from Site U1321 to Site U1322 (URS-3C) was made at an average speed of 11.0 knots. A beacon was deployed at Site U1321 at 1815 hr on 14 June.

Hole U1322A: Hole U1322A was spudded at 0130 hr on June 15 when the driller tagged the sea floor at 1330.0 mbrf (PDR = 1336.4 mbrf). The bit was jetted to 3.8 mbsf and the VIT recovered. The hole was then drilled from 3.8 to 200.0 mbsf at an average ROP of 30 m/hr. To insure that we did not exceed our target depth, the interval from 200 mbsf to 238.0 mbsf was drilled at an ROP of 20 m/hr. There was no indication of pressurized sands throughout the drilled interval. Resistivity and gamma ray data indicated that the main lithology was mud.

Hole U1323A: A beacon was deployed at Site U1323 at 1854 hr. Hole U1323A was spudded at 2025 hr on 15 June as the driller tagged the sea floor at 1271.0 mbrf (PDR = 1278.4 mbrf). The VIT was recovered and MWD drilling advanced to 206 mbsf. A sand layer, approximately 1.5 m in thickness (as interpreted from natural gamma ray resistance data from the MWD bit) was detected at 204 mbsf. Simultaneously, a jump in pressure of 150 psi over the background drilling pressure in the PWD log was observed. A residual backpressure of 150 psi was also observed by the driller when he shut down the mud pumps. We pumped 50 barrels of 10.5 ppg in the hole and noted that the backpressure went to zero. When this mud was displaced with sea water, the pressure returned. The pipe was filled with 110 barrels of 10.5 ppg mud and a wiper trip was made to 51.1 mbsf and back to 204.6 mbsf. The overpressure remained and it was decided to continue to drill ahead at a very low ROP gradually increasing to 30 m /hr, and with "pumping and dumping" 10.5 ppg mud. At 242 mbsf, a rapid drop in gamma ray, suggestive of a second sand interval, was observed in the data. At this point, it was decided that to maximize the amount of science and to conserve mud, we should move to the location of URS-1B (BP Block MC 897) and plug and abandon Hole U1323A. We displaced the hole with 73 barrels of 13.5 ppg mud. The VIT was deployed and the top of the hole was observed to confirm that there was no flow. A Free Fall Funnel (FFF) was deployed and inspected again with the VIT. We reentered Hole U1323A at 0300 hr on 17 June, and the hole was displaced with 31.8 barrels of 14.0 ppg cement that applied a cement plug from 140 mbsf to 40 mbsf. The drill string was then recovered, clearing the sea floor at 0550 hr and the rotary table at 1010 hr on 17 June.

This was the *JOIDES Resolution's* first experience with riserless drilling with a weighted mud. It was a valuable learning exercise and everyone came away with confidence in the ability to handle downhole pressures in a routine fashion. We confirmed that we can

carefully monitor shallow flows, take appropriate action to control the flow, and drill ahead under appropriate conditions, provided we have accurate real-time downhole information. We also demonstrated that we can plug and abandon the hole in this environment without leaving any fluid flow.

Hole U1324A: A beacon was deployed at Site U1324 at 1040 hr on 17 June. Hole U1324A was spudded at 1610 hr on 17 June when the driller tagged the sea floor at 1066.0 mbrf (PDR = 1078.0 mbrf). After the bit was washed ahead to 5.0 mbsf, and MWD drilling advanced without incident to 333.4 mbsf at an ROP of 30 m/hr where a wiper trip was made back to 60.8 mbsf. MWD drilling resumed to 477.7 mbsf where another wiper trip was made back to 330.4 mbsf. Because of the potential for interbedded levee sands below 481 mbsf, heavy mud was continuously pumped from this depth to the total depth of 612 mbsf (20 m above the top of the Blue Unit). At ~2045 hr on 18 June, MWD drilling advanced slowly at an ROP of 20 m/hr and gradually increased to 30 m/hr while "pumping and dumping" 10.0 ppg mud. The drilling advanced to the depth objective of 612 mbsf by 0410 hr the next morning. A free fall funnel was made up and deployed at 0808 hr on 19 June with the bit at ~80 mbsf. The VIT was deployed and a visual inspection confirmed that there was no flow emanating from the top of the FFF and that the funnel was upright. The bit was pulled free of the sea floor at 0853 hr.

PRELIMINARY SCIENCE RESULTS

Coring operations for Brazos-Trinity Basin IV were terminated on Sunday June 12, and the third week of Expedition 308 was dedicated to Measuring While Drilling (MWD) and Logging While Drilling (LWD) operations. MWD is an essential monitoring component of the "riserless controlled drilling" strategy employed by IODP to drill the over-pressured URSA basin. Science and operation activities of the third week of Expedition 308 provided an opportunity to test this system.

The first MWD/LWD-dedicated hole in the Brazos-Trinity Basin was Hole U1320B. Hole U1320B was drilled from 13 to 320 mbsf, and the gamma ray data indicated intercalated layers of sand, silt, and mudstone in the upper part of the hole (65 to 170 mbsf). Data retrieved from 170.0 mbsf to 299.6 mbsf in Hole U1320B were very homogenous, and correlate with mud and clays and the absence of sand layers as described in cores. The second MWD/LWD hole of Expedition 308 was Hole U1319B. MWD/LWD operations began at 0945 hr on June 12 and were terminated at the target depth of 180 mbsf at 2210 hr 5 the same day. Trends seen in MWD/LWD logs match well with trends seen in cores recovered in Hole U1319A. Since operations at Brazos Trinity Basin were ahead of schedule, we decided to drilled an extra hole (prospectus Site BT4-3A, Site U1321) between Site U1319 and U1320. The rationale for drilling at this location was to be able to correlate intervals of sandy turbidites across Brazos Trinity Basin based on downhole logs, and study the lateral pinching of these sediments. Hole U1321A was drilled on June 13 using MWD/LWD to a target depth of 140 mbsf (base of the sand turbidites interval).

MWD/LWD operations in the over pressured Ursa basin began at 0045 hr on June 15 with the spudding of Hole U1322A. Hole U1322A was then drilled with an MWD/LWD drill string from 3.8 to 238 mbsf. Operations proceeded smoothly down to the target depth, and resistivity and gamma ray data indicated a lithology characterized by mud. MWD/LWD operations at Hole U1323A started on June 16. The first lithologies encountered consisted of mud, and MWD progress was good until 207 mbsf. As indicated in the summary of operations, at 207 mbsf a 1.5 m-thick layer of sand was encountered, and pressure readings on the MWD tool suddenly increased by 150 psi. When a second layer of sand was encountered, it was decided to move to Hole U1324A (proposed URSA-1B). As of Sunday June 19, MWD/LWD operations had reached the target depth of 612 mbsf at Hole U1324A.

The lithologies encountered were mainly mud, with some intervals of sand or silt. Coring operations will allow us to ground truth observations made in the logs with lithostratigraphic observations.

The two major scientific achievements of the MWD/LWD operation in the Ursa basin, in particular at Hole U1323A, are that 1) it was demonstrated that sand layers or pockets in the Ursa basin are over pressured at sediment depths shallower than previously thought, and 2) "controlled riserless drilling" was proved to be effective, thus opening new fields of research.

TECHNICAL SUPPORT ACTIVITIES

During the week of June 13 the shipboard labs finished processing cores and samples recovered at holes U1319A and U1320A. Plans were finalized for mounting of the Infrared track system to be mounted on the catwalk for Expedition 311.

HSE ACTIVITIES

The marine specialists viewed safety videos about chemical and general lab safety. Mid week the marine specialists attended training to make them aware of the location of safety gear, fire alarms, fire extinguishers, safety showers, acid spill kits and escape routes in the laboratory spaces. Potential hazards were pointed out and responses to spills discussed.

A fire and boat drill was held on 18 June for the entire ship's complement. The Marine Emergency Team, (MET team) mustered on the catwalk during the fire drill. The team then proceeded to the main deck by thruster pod no.3 in bunker gear to train. Fire hoses were laid out. A four man METS hose team responded to a darkened S-deck and a simulated fire in the quarters.