Week 11 Drilling and Scientific Report for IODP Expedition 313

New Jersey Shallow Shelf

9th July – 15th July 2009

1. Operations

The start of the week was one of uninterrupted, trouble-free and steady drilling and high core recovery. With the target objectives of the hole met, coring stopped at 1820 hrs on July 11th at a TD of 756.65 mbsf. On completion of coring the rig floor was prepared for the logging programme and the hole conditioned.

During the day, the VSP equipment including the airguns were prepared and tested and the logging programme began with through-pipe VSP from the base of the hole. Just after midnight a storm approached the platform and the lightning safety procedure was implemented. Through-pipe VSP operations were suspended at 0145 hrs (at approximately 200 mbsf). The deck was evacuated and all personnel remained inside the accommodation module until it was safe to return to the deck at approximately 0400 hrs. Due to darkness at that time, it was not possible to restart the airgun as the VSP permit stipulates start-up during daylight. It was decide to abandon the through-pipe VSP operation and switch to through-pipe natural gamma wireline logging. The logging operation of the entire hole was completed successfully by 1215 hrs, although the winch motor was running very hot.

The next stage in the plan was to pull the pipe back to 600 mbsf and log the bottom, open-hole section of the hole. However, the drill pipe was stuck and required significant effort to free it. Alternating pulling pipe with reaming and flushing continued for most of the day without significant improvement in the condition of the hole. As by this time the pipe had been pulled back above the 600 mbsf level, the decision was made to continue the hole conditioning operation pulling up to the next logging step at 480 mbsf, and from there try to log the bottom 2 sections of the hole. This depth was reached at 2245 hrs on July 12th and the drill floor was then prepared for logging.

The logging operation was completed at 0300 hrs on July 13th. The hole was conditioned and the sonic tool was lowered. At 624 mbsf the power supply to the winch tripped several times and eventually both the winch motor and control box burned out. The tool was recovered to deck by manually heaving the 600 m of wire back up the drill pipe, and it was back on deck at 0905 hrs. The winch was removed from the drill floor and replaced with the back-up logging winch which had been used for VSP operations. Logging recommenced, first with the sonic, then with the magnetic susceptibility tool. Between each logging run the drill hole was conditioned by rotating and moving the pipes for a period of time.

At 1925 hrs on July 13th the acoustic imaging tool, was connected to the winch cable on deck. No signal was detected indicating a faulty tool, cable or connector. Fault-finding efforts continued until 0200 hrs on July 14th with several faults being repaired, and the tool replaced. On deployment of the tool, a further fault developed with the winch, then, fatally, all contact was lost with the tool. The generator was also causing concern but kept functioning. The tool was retrieved by 0515 and fault finding restarted. An earth-leakage fault in the winch cable at the tool-connector end was finally identified. A section of cable was removed and the end of the cable was re-terminated. Once fixed and tested, the log run was successful.

Before tripping pipe up to the top of the next logging interval, the opportunity was taken to complete the through-pipe VSP, which had been aborted on 12th July. The top section of the hole (0-200 mbsf) was logged successfully. Once VSP work was complete, the drill pipe was tripped back to the top of the next logging interval at 335 mbsf.

On July 15th, the pipe tripping was completed by 0150. The natural gamma tool was lowered down the hole, but did not progress very far. It punched through an upper bridge, but could not penetrate further than 350 mbsf due to another bridge. A reaming operation started at 0825 and was completed at 1845 hrs. After this the resistivity tool was lowered down the hole at 1900 hrs. It was unable to penetrate the bridge at the same depth as the last logging run. Further reaming and probing indicated open hole beneath 357 mbsf. The decision was taken to ream down to the beneath the bridges and log the lower part of the logging interval. However on reaming to this depth the probe revealed that a new bridge had formed at 400 mbsf. Further reaming continued to remove this bridge

During July 14th, the Sorensen Miller conducted a post-drill survey of the MAT-2D site with side-scan and magnetometer, and on completion, came alongside and transferred ESO personnel to Staten Island for

medical treatment onshore. It returned on July 15th, and two ESO personnel came onboard. Due to restrictions on the number of personnel allowed onboard for the Kayd transit back to Atlantic City, ESO personnel not required for demobilisation and all scientists (including the co-chiefs) departed the Kayd for Staten Island. This was the last supply boat trip.

Towards the end of the week, the curation, MSCL and geochemistry containers were prepared for the transit back to Atlantic City and transportation back to the UK and Germany.

2. Hole summaries

Hole	M0027A	M0028A	M0029A	**Total**
Latitude	39° 38.04606 N	39° 33.94279' N	39° 31.1705' N	
Longitude	73° 37.30146' W	73° 29.83481' W	73° 24.7925' W	
First core	02/05/09 at 00:10	26/05/09 at 15:15	21/06/09 17:05	
Last core	18/05/09 at 22:10	16/06/09 at 02:40	11/07/09 at 18:20	
Core runs made	1H to 224R (224 runs)	1R to 170R (170 runs)	1R to 217R (217 runs)	**612 runs**
Drilled length	547.01 m	476.97 m	609.44 m	**1633.42 m**
Recovered length	471.59 m	385.5 m	454.31 m	**1311.4 m**
Core recovery	86.21 %	80.82 %	74.55 %	**80.29 %**
Final/current depth	631.01 mbsf	674.34 mbsf	756.65 mbsf	
Hole recovery	74.74 %	57.17 %	60.04%	

3. Science

On July 9th, 10 cores and 28m of sediment were recovered between 675 and 706 mbsf. Three main packages bounded by unconformities were described. First, micaceous clayey silt and silty clay capped by glauconite sand above the m5.45 unconformity. Secondly, glauconitic sandy silt with fine-grained glauconite clasts, interlaminated with a glauconitic sandy silt. The sharp facies change from glauconitic coarse sandy silt to silty clay at 693 mbsf, may correspond to the m5.47 unconformity. Thirdly, coarsening upward, fine to medium grained glauconite sand (>40% glauconite) This package is bounded above by a sharp change in facies from sand to silt, that fits with a high amplitude seismic reflection on the oc270 529 seismic line, and is bounded below by tight sand to sandstone, that is a candidate to correspond to the m.5.6 unconformity.

These thin sediment packages and their bounding unconformities represent a period of c.1.5Ma, at approximately 20Ma BP. They characterize a period of relative sediment starvation, which may have separated the onset of formation of two major prograding clinoform bodies that compose the Early Miocene New Jersey margin.

On July 10th, 11 cores and 25m of sediment were recovered between 706 and 736 mbsf. Two main packages.were described. The lower package is light brownish grey, micaceous, massive or micro-laminated clay. The upper package exhibits a fining and coarsening upward sequence, going from dark greenish-grey, poorly-sorted, very fine to medium grained, glauconite sand with granules (207R) to glauconitic clayey silt with abundant forams and diatoms and back again to moderately sorted, glauconitic sand. The sharp change from clay to sand at 730-732.2m, already recognized in other holes, may correspond to the unconformity m5.7 on the seismic record (line oc270 529).

On July 11th, 8 cores and 20 m of sediment were recovered between 736 and 756.65 mbsf. Two main packages were described. Firstly, an upper package comprising, light brownish grey, micaceous, massive or micro-laminated clay. Secondly, a lower package consisting of a fining upward sequence of dark greenish-grey, fine grained glauconitic sands and glauconitic sandy clayey silts. The sandy lower part overlies, in the last core, strongly expanding glauconitic sandy clay horizons. The boundary between the two sediment packages is thought to represent the downlap surface of the basal set of clinoforms of the Miocene margin (m5.8) and concluded the very successful coring operations on Expedition 313.

Through-pipe VSP logging operations started on July 11 and continued into July 12th The first processing, shows a strong first arrival and weak sediment arrivals. This could be due to an imperfect contact between the pipe and the borehole. Further analysis showed that some velocities may be extracted from the lower 200 m of the hole.

The VSP was followed by through-pipe gamma ray logging. The total GR data appears very good with only limited attenuation by the steel of the pipe. The total GR signal can be separated into its K, U and Th components with enough quality to make it unnecessary to have to run an open hole gamma ray for the entire hole. The main lithologies and the main unconformities bounding stacks of progradational and retrogradational events can be identified. These data are important in helping to fill in the gaps in core recovery and to tie the core data to the overall large-scale geometry of the sediment bodies as observed on the seismic profiles.

On July 13th, logging commenced in open hole resistivity, sonic and magnetic susceptibility tools from 481 mbsf to TD. The data look very promising and correspond well with the gamma ray log, MSCL data and with visual core descriptions.

On July 14th, the acoustic televiewer logged the section between 484 and 660 mbsf. It was run at its highest resolution. The quality of the data is good, showing bedding planes, unconformity surfaces, facies changes, hole diameter, inclination etc. Through-pipe VSP data were then collected in the upper 200m of the hole to complete the VSP data, The data are of average quality partly because of the drill pipe knocking against the casing introducing noise to the record, and an imperfect sediment contact against the drill pipe beneath the casing. The VSP data will provide a continuous record of velocities at MAT-3A to compare to the more detailed but discontinuous MSCL data, and will tie the hole to the seismic line Oc270 529.

On July 15th the pipe was tripped back to the top of the next logging interval at 334 mbsf. Only a small section of openhole gamma-ray logging was possible due to a bridge at 350 mbsf. However, it was sufficient to be able to calibrate the through-pipe gamma ray data collected for the entire hole. Further logging was not possible due to reaming operations and further bridges.

4. HSE Activities

A marine mammal watch was maintained on July 12th for airgun testing and subsequent VSP operations. After darkness, night vision binoculars were used. No mammals were observed throughout the periods of observation. The observers also watched out for thunderstorms. One approached the platform just after midnight. The Lightning Procedure was implemented in the early hours of 13th July. A lightning watch was also maintained on the evening of July 13th to track a storm cell that was a potential threat to operations.

A marine mammal watch was also maintained on July 14th during airgun testing and VSP operations. No mammals were observed.

5. Figures

On next two pages:

Figure 1 – Depth versus time plot and recovery for Hole M0029A, up to 2400 hrs on the 15th of July.

Figure 2 – Breakdown of hours up to 2400 hrs on the 15th of July.

Figure 3 – Drilling progress comparison between all three sites

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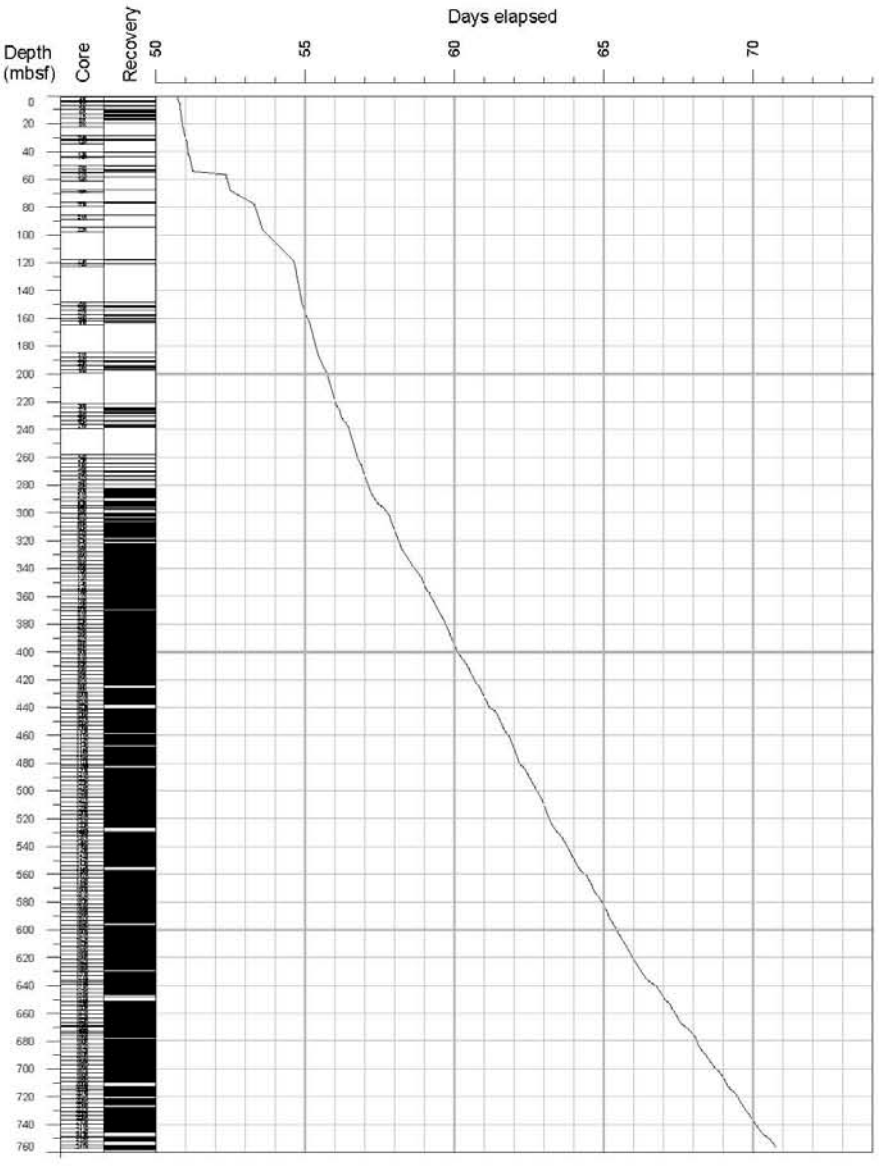
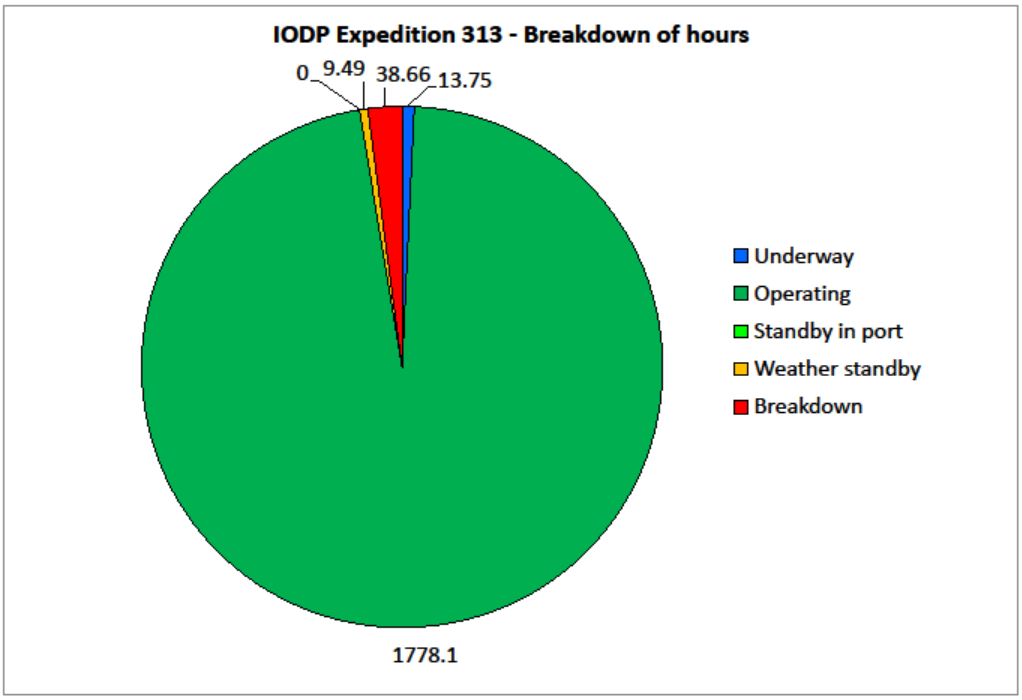
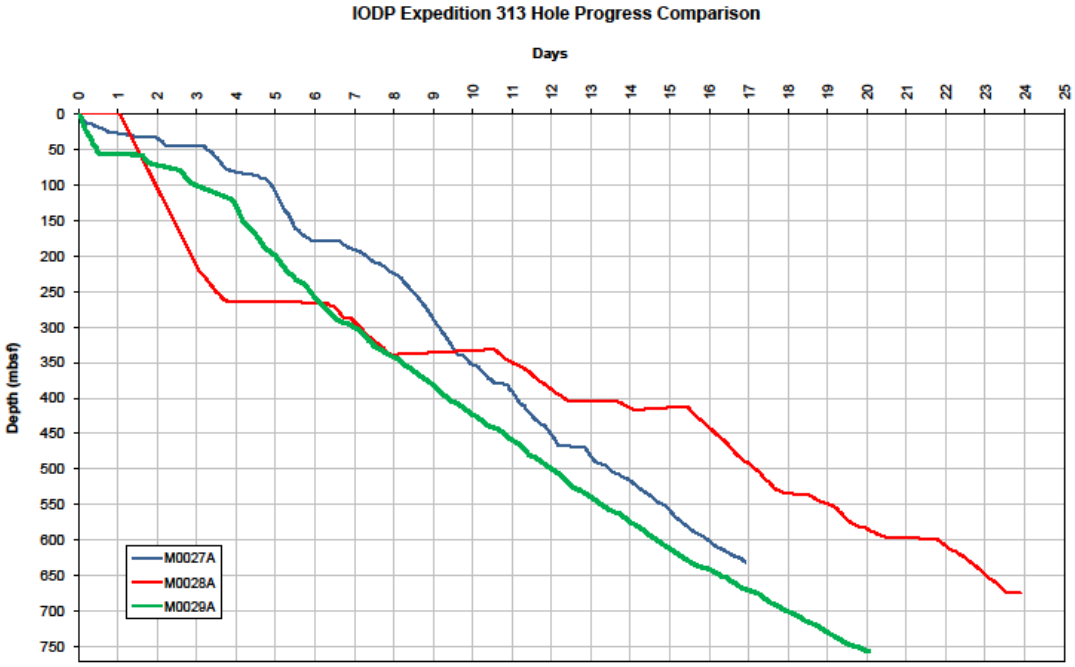
Hole M0029A progress summary

Latitude: 39° 31.1705' N
Longitude: 24.7925' W
Water depth: 35.97 m




IODP Expedition 313 - Breakdown of hours
0
9.49
38.66
13.75
1778.1
Underway
Operating
Standby in port
Weather standby
Breakdown


IODP Expedition 313 Hole Progress Comparison
Days
Depth (mbsf)
M0027A
M0028A
M0029A