Week 5 Drilling and Scientific Report for IODP Expedition 313
New Jersey Shallow Shelf

28th May – 3rd June 2009

1. Operations

On 28th May, the casing was being run into the sea bed throughout the night and most of the day, interrupted for a few hours by mechanical problems with the drilling rig. An ROV inspection in the morning showed that the casing entered the sea bed close to the previously abandoned casing and clear of any casing pipe debris. The operation was completed at 1945 hrs, by which time the foot of the casing was at 22.39mbsf and occupied the hole from which the PQ pipe and casing were tripped previously. The pace of progress was deliberately slow to ensure that the casing was buried as deep and as stably as possible beneath the sea bed. The operation to lower the PQ drillpipe back to 264m and to clean and ream the hole continued overnight and was completed at 1945 hrs on 29th May.

The first cores were very sandy with poor recovery. There were also problems getting the core barrel to latch in due to sand entering the BHA. This required removal of some pipes to raise the bit from the bottom of the hole, and pumping mud to clear the BHA. Once flushed clear, the core barrel was lowered and latched in, and then the drillpipe was lowered to the base of the hole to begin coring again. Back pressure due to artesian water was also encountered in this zone. By midnight on 29th May the base of the hole had advanced to 270.00m. Coring continued throughout 30th May with the ALN core barrel and by midnight the hole had advanced to 317.62m. There were some problems with recovery and blocked core barrels due mainly to alternating beds of lithified sandstones and unlithified silty sands and clays. Zones of high back pressure were also encountered at 274 and 305m, but there is no evidence for gas being the cause.

The coring operation continued overnight with good core recovery. From about 0800 hrs on May 31st, recovery dropped significantly as a coarse, sandy formation was encountered. By 1200 hrs the bottom of the hole had advanced to 339m. At this time the drillpipe (probably the BHA) got stuck in the hole following a cave-in. After some effort, the drillpipe was freed, but it was apparent that there was a problem with the bit on the BHA. There was little further penetration, and on retrieval, the inner barrel showed signs of damage and scoring. The drillpipe was tripped and the BHA was on deck at 1720 hrs. This confirmed that the bit and reaming shell were missing – probably sheared off while freeing the drillpipe. Rather than attempt to restart drilling immediately with a new BHA, it was decided to fish for the missing parts as they could impede further progress in the hole. The Bowen spear was made ready and the fishing operation which began at 2020 hrs was continuing at midnight.

The fishing operation proceeded very slowly throughout the night. At 0600 hrs on 1st June the tool was at a depth of 198m. It was encountering bridges that were difficult to wash away. Before 1200 hrs the tool had encountered a zone of swelling clays which was known to extend to 240 mbsf. Progress was halted by the clays, torque on the string was very high and the drill string was not advancing. At 1230 hrs the decision was taken to abandon the fishing operation as there was little chance of further progress downhole and there was the danger that the tool would be lost also. The tool was tripped and was back on deck at 1430 hrs. A new BHA was prepared with a diamond impregnated drill bit to drill through or push the obstruction aside. By midnight on 1st June the string had advanced to 143 mbsf and by midnight on 2nd June it was at 326.77 mbsf.

Coring started at 0215 hrs on 3rd June and continued until midnight. The cored material was very variable for several core runs, from solid sandstone to running sand, with thin clay layers. The loose sand caused caving and slowed the progress for approximately 15m with several cores obtained incorporating infill. The supply boat arrived at 1050 hrs and departed 1430 hrs.

2. Hole summary

Hole	M0028A
Latitude	39° 33.94279' N
Longitude	73° 29.83481' W
First core	26/05/09 at 15:15
Last core	
Cores recovered	17R to 54R (38 cores)
Drilled length	104.34 m
Recovered length	75.21 m
Core recovery	72.08 %
Final depth	363.37 mbsf so far
Hole recovery	78.08 % so far

3. Science

No cores were recovered on 28th May so work continued on analysing the data acquired in MAT-1A, and comparing the MSCL data from the existing MAT-2D cores with the same section in MAT-1A. Core recovery re-started at 2100 hrs on 29th May. By midnight 1.24m of dark olive-grey, poorly sorted, very fine- to coarse-grained quartz sand with mica, glauconite, lignite and shell fragments had been recovered. The quartz grains are rounded to subangular and the glauconite grains well rounded. This unsorted and immature sediment characterizes the top of the progradational clinoforms, below the M5 unconformity.

30th May was a day of excellent recovery with 35.7m of a broadly coarsening upward series of sediment between the m5 and m5.2 unconformities (Langhian 16.1-15.6 Ma). The sequence consists of stiff, silty clays with shell fragments giving rise up section to well-sorted, fine-grained clayey sands with glauconite, poorly-sorted medium to coarse-grained glauconite sand, and then quartz sands and sandstones with granules, pebbles, shells and lignite. The m5.2 unconformity is represented by the stiff silty clays.

The excellent coring continued during 31st May until the core barrel became stuck at 337mbsf. Initially the sediment was a continuation of the micaceous silty clays containing diatoms and sponge spines. Below 320 mbsf, the sediment consists of dark-olive-grey, poorly sorted, very fine to very coarse-grained, glauconite and quartz clayey sand, containing rare and altered shell fragments and phosphate aggregates. The clayey matrix of the sand shows rough banding of soft, tan/whitish and hard, dark/olive grey horizons. The quartz grains are poorly mature, subrounded to subangular whilst the glauconite grains are well rounded. Downhole, the glauconite content decreases progressively. At the same time the granule grain size and shell debris fractions increase. The granule and pebbly character of the sediment at the base of the sequence of cores suggests that coring stopped at (or just above?) the m5.3 late Burdigalian unconformity.

No core was collected on 1st and 2nd June so work continued on assessing data from MAT-1A. Core recovery resumed on 3rd June at 0215 hrs. Core 45R (328-331 mbsf) was recovered from several meters above the anticipated depth of the bit assembly. By core 49R (339-342 mbsf) we had passed the previously drilled depth with no indication of the bit. Furthermore, cores 45R-49R were the expected lithologies (glauconitic quartz sandstone) showing no evidence of caved-in material as might have been found if we had followed the existing hole down to the old bit. Drilling continued for the rest of the day, ending with core 54R at 357-360 mbsf, still in glauconitic quartz sandstone, very close to the major m5.3 sequence boundary of early Miocene age.

4. HSE Activities

There were no health and safety accidents / incidents to report during week 5.

5. Figures

On next two pages:

Figure 1 – Recovery and depth versus time plot at Hole M0028A, up to 2400 hrs on 27th May. Due to having to re-enter hole MAT-2D after the BHA became stuck in the hole, and the reaming shell and bit shearing off, the coring re-commenced ~10m above the last cored depth. This was to ensure that any formation boundaries were captured and not lost in the re-start. Because of this, the timeline log of progress and recovery shows a glitch over this period before re-establishing itself on Day 33.

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Hole M0028A progress summary

Latitude: 39° 33.94279' N
Longitude: 73° 29.83481' W
Water depth: 35.1 m

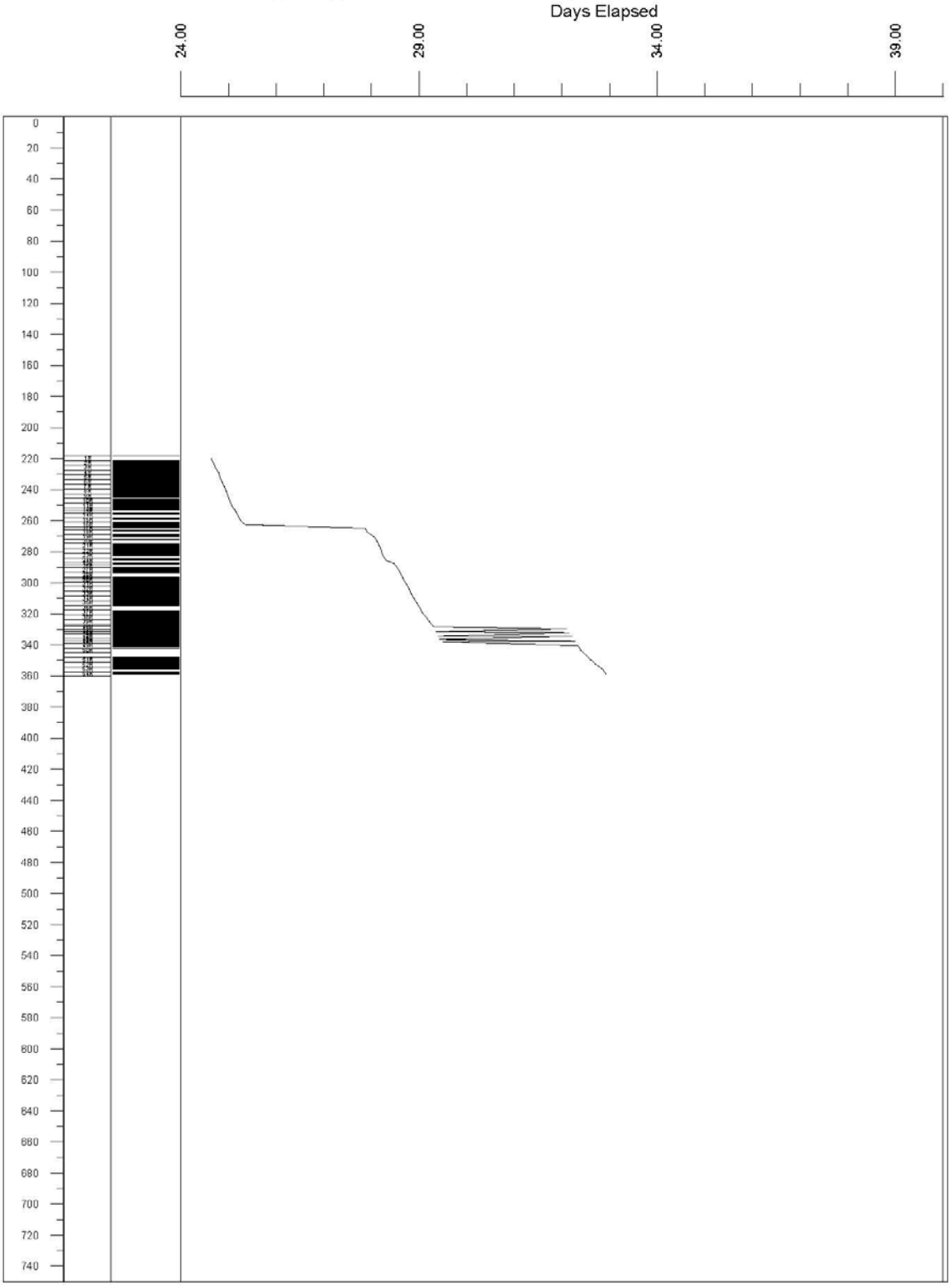

Figure 2 – Breakdown of hours up to 2400 hrs on 3rd June.