Week 9 Drilling and Scientific Report for IODP Expedition 313

New Jersey Shallow Shelf

25th June – 1st July 2009

1. Operations

In the early hours of 25th June attempts continued to free the stuck PQ drill pipe. At 0400 hrs rotation was re-established. Six rod stands were removed with difficulty and the hole circulated. The PQ string was reamed to the base of the hole and the hole advanced by openhole drilling to 117 mbsf where 2 core runs were made. This was followed by further openhole drilling to 148 mbsf to the seismic reflection thought to be m1. At midnight on 25th June, 3 core runs had been completed, giving a total of 4 core runs and total penetration for the day of 60m. Openholing and spot coring continued throughout 26th June apart from a short time when operations were suspended due to a lightning storm. By midnight the hole had advanced to 224 mbsf with 9 core runs and 67m penetration.

At 0100 hrs on the 27th June, drilling operations were suspended for 1.5 hrs due to another lightning storm. After operations recommenced, open holing and spot coring continued until 1500 hrs, by which time the base of the hole was at 257 mbsf. The operation then switched to continuous coring. Recovery was poor in loose sands and various bit combinations were tried to improve recovery. By midnight 11 core runs had been completed with 48m penetration. Core recovery generally improved on 28th June although recovery varied from 7% to 100% with 14 core runs completed. At midnight another 40m penetration had been achieved and the base of the hole advanced to 312 mbsf. Coring progressed steadily on 29th June, completing 13 core runs, with recovery between 50% and 114%, the majority nearer 100% and a penetration of 35m reaching 352 mbsf by midnight. Coring continued throughout 30th June in clay with 15 core runs and an average recovery of over 93% per core run. By midnight 40m penetration had been achieved and the base of the hole advanced to 395 mbsf. On 1st July, coring operations were suspended several times due to lightning storms. Despite the weather downtime, 12 core runs had been completed by midnight, all with greater than 90% recovery, and the base of the hole advanced to 434 mbsf.

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	Currently coring	
Core runs made	1H to 224R (224 runs)	1R to 170R (170 runs)	1R to 100R (100 runs)	**494 runs**
Drilled length	547.01 m	476.97 m	284.45 m	**1308.43 m**
Recovered length	471.59 m	385.5 m	154.98 m	**1012.07 m**
Core recovery	86.21 %	80.82 %	54.48 %	**77.35 %**
Final/current depth	631.01 mbsf	674.34 mbsf	434.71 mbsf	
Hole recovery	74.74 %	57.17 %		

3. Science

At MAT 3A, the week was initially characterised by spot coring the uppermost 100-260 m of a conformable Miocene sediment package. Continuous coring began below 260m, in clinoform bodies. Coring in the uppermost part was very difficult, going slowly, often with limited recovery. Coring in the lower part, went much faster peaking at 40m/day with a recovery rate that progressively rose to c.100%.

In the upper part we spot sampled four main targets:

- The fine-grained material at the top of a large channel at 117 and 120 mbsf (cores 23-24R) for porewater geochemistry sampling; we retrieved light grey, fine to medium-grained quartz sands with some granules and rare pebbles with no shells.
- The m1 unconformity (Serravalian/Tortonian), where we recovered six cores (148-163 mbsf, cores 25R-30R). At c.157m, the core showed coarse-grained, pebbly, light grey sands (core 27R) overlying laminated fine sands and clay/silts (cores 28-30R) that could be interpreted as the location of the m1 unconformity.
- The m3 unconformity **(**intra-Serravalian**),** where we recovered five cores (31-35R). The first two cores (31-32R) came up empty. However, at c.193m, the cores show unsorted, very coarse-grained and pebbly, light grey sands, containing a large piece of wood (core 33R) that overlies,

and partially penetrates into, laminated organic-rich clay/silts (core 34R). These in turn pass downward into fine sands with granules (core 35R) that may likely correspond to the m3 unconformity.

- The m4 unconformity (Langhian-Serravalian). Here we recovered seven cores (221-239mbsf, cores 36-42R) that came back with alternations of interlaminated silt/fine sands and clays with well-sorted fine-grained, silty quartz sands. At 221m (core 36R), a layer of poorly-sorted, coarse-grained quartz sands with granules and pebbles is a candidate for the location of the m4 unconformity.

At 260 mbsf, a few tens of meters above the large progradational stack of the Miocene NJ platform, we started continuous coring. We initially drilled through a series of five 10 m scale, coarsening upward sequences of sediments from 260 to 348 mbsf, followed by a more homogenous sediment package from 348 to 395 mbsf. The boundaries of the coarsening up sequences fit the main high amplitude reflectors that bound the main seismic stratigraphic packages on our reference seismic line 0c270 529. From top to base, the coarsening up sequences are as follows:

- **CU1** (260-273 mbsf, cores 42-47R) exhibits well-sorted, silty, fine-grained quartz sands passing upward to medium-grained and then coarse-grained, pebbly quartz sands.
- **CU2** (273-294 mbsf, cores 53-47R) shows well-sorted, fine-grained shelly sands passing upward to moderately-sorted fine to medium-grained quartz sands with lignite, capped by tight, unsorted, coarse to very coarse, pebbly sands.
- **CU3** (294-315 mbsf, cores 53-62R) is slightly finer-grained. It exhibits well-sorted, very fine-grained, silty sands with rare shell debris, passing upward to fine-grained quartz sands with shells, capped by unsorted, coarse-grained sands with granules and shells.
- **CU4** (315-348 mbsf, cores 62-77R) starts with a coarse glauconitic sandy clay and claystone lying above very fine-grained, silty quartz sand. The sequence gives rise up section to micaceous clays, silty clays, well-sorted very fine to fine-grained sands containing forams, lignite, micas and shell debris, and then moderately-sorted coarse-grained sands.
- **CU5** (348-361 mbsf, cores 73-77R) is made up of micaceous, slightly shelly sandy silts grading upward to fine-grained silty sands.

Below (361-428 mbsf, cores 77-100R), the sediments look more homogeneous and/or exhibit subtle changes in character that will require further study. The sediments are made up of dark-brownish-grey lignitic, micaceous, and slightly glauconitic and clayey silts to silty clays containing gastropods, bivalves and occasional diatoms and forams. Faunal diversity, proportions of the different elements and bioturbation varies progressively with depth. However, some notable beds punctuate the sedimentary record, such as a burrowed, laminated, very fine-grained quartz sand and a set of pyritized diatom-rich horizons, that fit well with some of the high amplitude reflectors on the seismic line Oc270 529.

4. HSE Activities

Drilling operations had to be halted, and the drill floor and deck evacuated three times on July 1st, due to severe thunderstorms and risk of lightning strikes. The emergency procedures for all personnel and shut-down policies for all containers are being reviewed in light of this.

5. Figures

On next two pages:

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

Figure 2 – Breakdown of hours up to 2400 hrs on the 1st of July.

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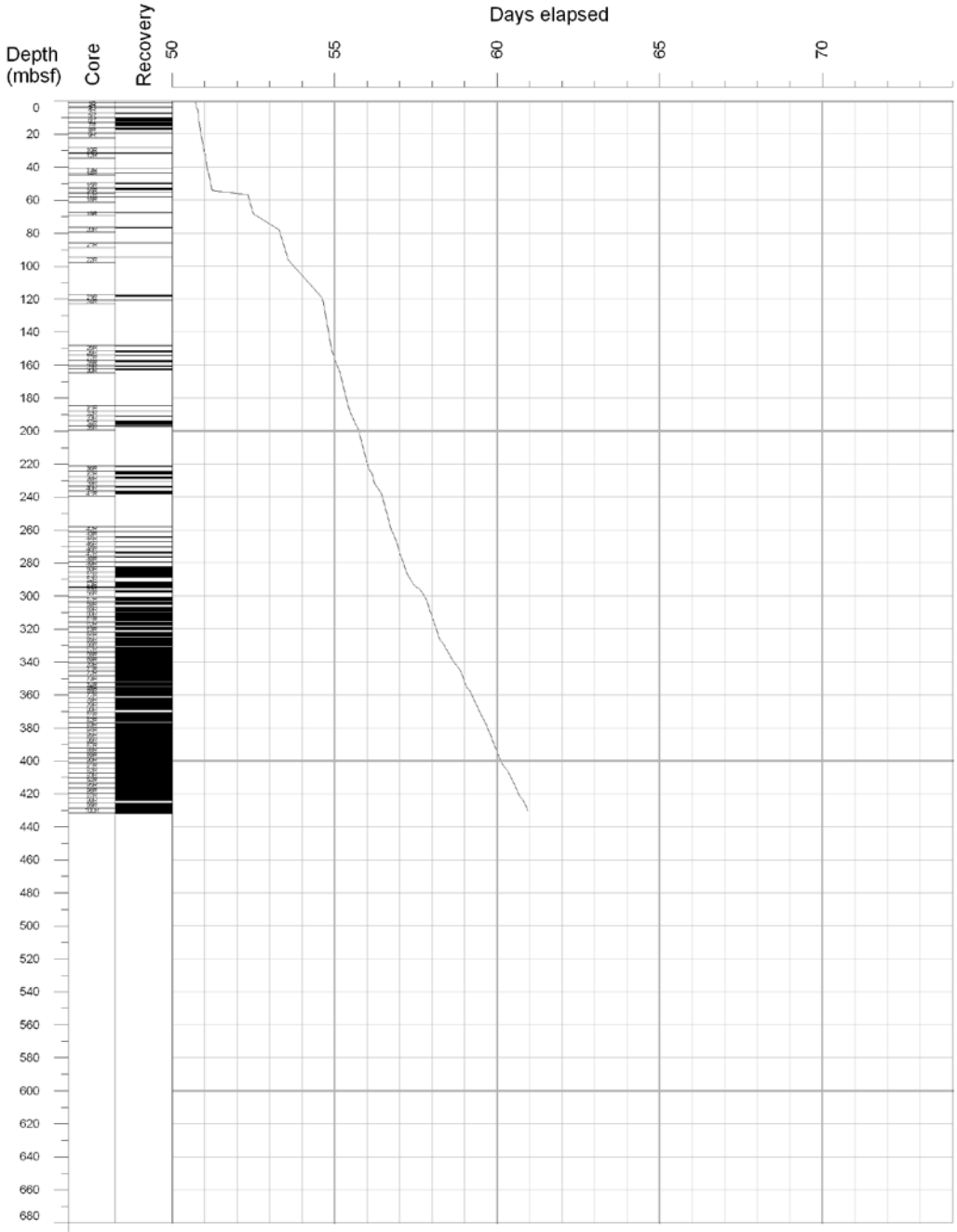
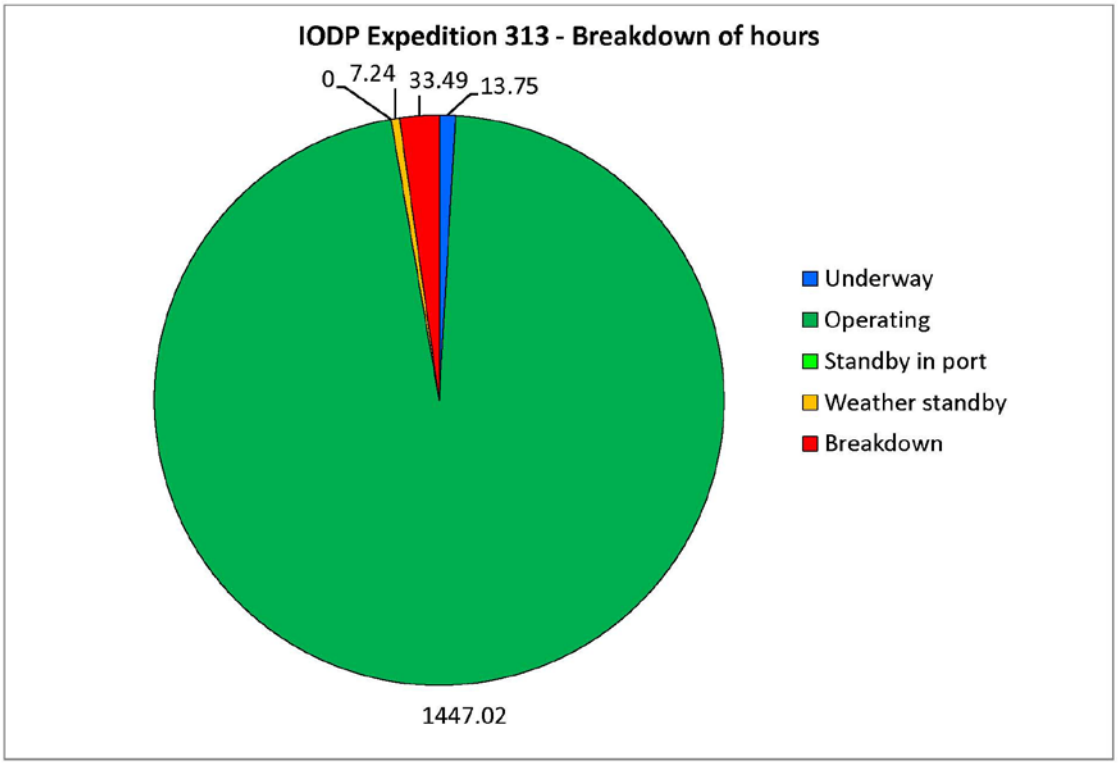
Hole M0029A progress summary

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




IODP Expedition 313 - Breakdown of hours
0
7.24
33.49
13.75
1447.02
Underway
Operating
Standby in port
Weather standby
Breakdown