**Week 8 Drilling and Scientific Report for IODP Expedition 313**

**New Jersey Shallow Shelf**

**18th – 24th June 2009**

## 1. Operations

At midnight on the 18th of June, the HQ string continued to be pulled slowly out of Hole M0028A. The cautious approach was to prevent the hole from back-filling with sand, and this was verified when logging tool passed the base of the PQ string. After successfully completing the VSP run, the resistivity and acoustic tools were run in the open hole interval directly below the PQ string. Various attempts were then made to lift the PQ string which was found to be stuck fast, and likely to be held higher up in the hole. Various attempts were made to cut the PQ using a cutting tool, which finally succeeded before the HQ string and cutter also became stuck.

The HQ rods were worked through the night into the 19th of June in an effort to free the string. Meanwhile, a spare cutter was ordered from the shore. Other methods to free the HQ string were explored: a heavy tool was manufactured which was intended to break the tool joint connecting the cutter to the string, and a pinch bar was attached to the wireline and repeatedly hammered, through freefall, onto the top of the cutter. Neither method worked, although an increase in water flow, partial rotation and slow pull-up of the HQ pipe was achieved. After further working of the rods, the HQ pipe was finally released with the cutter and box end missing. While waiting for the spare cutter to arrive, a Bowen Spear was deployed to try and pull the PQ. This was unsuccessful, so a fresh PQ pipe was attached to the top of the string by jacking the Kayd up and down.

Throughout the rest of the day, various attempts were made to free the PQ. Backing off was also attempted, but only resulted in disconnecting close to the drill floor and not below the seabed. The PQ rods continued to be worked overnight into the 20th of June. At 0600 hrs, the spare cutter arrived and shortly after 0900 hrs the PQ had been successfully cut just inside the casing and the HQ string and cutter were returned to deck. By 0930 hrs, what was left of the PQ string was recovered.

To free the stuck casing, the 6 5/8” casing cutter was modified by removing the centralising ball bearings so that it was able to fit inside the buttress casing. The casing was successfully cut, allowing the team to recover the casing and rig down in anticipation of sailing to the next site.

At 1815 hrs, the Kayd jacked down and commenced transit to M0029A (MAT-3A), arriving there by 1915 hrs. For the next 12 hrs, the Kayd underwent its preload procedure.

During the morning of the 21st of June, the ESO and drilling teams prepared the Kayd for coring at Hole M0029A, and by 1030 hrs the casing was ready to be run in. The first three core runs had no recovery, and it was suspected that the soft sediment could not break through the microsphere bags. The microsphere bags were changed over to softer sample bags, and this combined with a slight change in lithology resulted in core collection in run four. For the rest of the day, continuous coring was completed to 19 mbsf, beyond which a switch was made to conducting a 3 m core run every 9 m.

Coring continued to progress well for the rest of the day and through the night into the 22nd of June. After reaching 55 mbsf by 0530 hrs, preparations were made to set the casing deeper into the seabed. The PQ string was pulled and the casing carefully rotated into the ground. To speed the process up, the Kayd’s jacking capability was used to assist setting the casing. Rapid progress was made until the top drive sprung an oil leak and had to be stripped down. Progress resumed and the casing was successfully set within a clay layer approximately 11 m into the seabed. After reaming back down the hole, coring had resumed by midnight and continued into the 23rd of June.

At 0930 hrs, our guests and media crews arrived. After a short safety briefing, they were given access to a series of locations from where they could see and hear about the operation taking place on board this MSP. A short, clay core arrived on deck just before midday, which provided an opportunity for the film crews to observe the process of core extraction and curation. However, this was the last core of the day as the PQ string became stuck and a twist-off of the core bit and reamer occurred. After tripping the PQ string and fishing the bit and reaming shell back onto deck, a new outer core barrel was made up and deployed back down the hole.

Early on the 24th of June, the base of the hole was reached. A lumpy mud mix caused blockage in the core barrel and caused the inner and outer core barrels to stick together. The hole continued to be advanced by spot coring with little recovery. Progress halted when the PQ became stuck with no flush, rotation or lift possible, and for the next 3 hours various attempts were made to release the string. The Kayd was lowered

and the casing sank further into the seabed, allowing the HQ to be run to base of the hole with core barrel. Seawater was pumped down the HQ string until midnight, and an attempt lift the PQ will be made when the sand and seawater are returned.

### 2. Hole summaries

| **Hole** | M0027A | M0028A | M0029A | **Total** |
|---|---|---|---|---|
| **Latitude** | 39° 38.04606 N | 39° 33.94279' N | 39° 31.1717' N | |
| **Longitude** | 73° 37.30146' W | 73° 29.83481' W | 73° 24.7957' 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 22R (22 runs) | **417 runs** |
| **Drilled length** | 547.01 m | 476.97 m | 55.7 m | **1079.68 m** |
| **Recovered length** | 471.59 m | 385.5 m | 9.2 m | **866.29 m** |
| **Core recovery** | 86.21 % | 80.82 % | 16.52 % | **80.24 %** |
| **Final/current depth** | 631.01 mbsf | 674.34 mbsf | 97.81 mbsf | |
| **Hole recovery** | 74.74 % | 57.17 % | | |

### 3. Science

The week began with a largely successful VSP run at Hole M0028A through the PQ pipe from 396 to 22 mbsf; only the interval 334-294 mbsf experienced pipe reverberations. Sharp first arrivals were recorded at a 2 m spacing, assuring that we'll be able to match reflections from major surfaces to features in the cores. We were able to lower the geophone out of the bottom of the PQ pipe into, and below, the sand-prone interval that had caused difficulties in the preceding days. Excellent induction and acoustic imaging log data were then collected in the 425-396 mbsf interval. This section was of high interest because it contained the facies interpreted as algal mats and oyster shells recovered sparingly in Cores 71R-75R. The acoustic imager was run at its highest resolution and revealed dipping beds and well-defined features that have yet to be understood fully. Efforts then turned to removing some or all of the PQ pipe to enable open-hole logging above 396 mbsf. To everyone's great disappointment this proved impossible, and we were compelled to cut the pipe and move on to our third and final site.

Our first core at Hole M0029A was intended to tag the seafloor and penetrate 80 cm into a hard sandy bottom; it returned empty. Our next three attempts recovered just a few cm of loose, medium-sized quartz sand. Core 5R (7-10 mbsf) recovered silty dark gray clay beneath a 10 cm layer of shelly gravel and provided good material for shore-based microbiological investigations. Despite low recovery, cores 6R-8R (10-19 mbsf) recovered sufficiently fine-grained material to continue sampling for microbiology and porewater chemistry. We then encountered a long interval of coarse-grained sediment comprising medium to coarse quartz sand, gravel and broken shells from cores 10R-14R (28-44 mbsf). While core 15R (50-53 mbsf) was a firm clay, core 16R (53-56 mbsf) was again a poorly sorted medium-sized sand with pebbles.

We then pulled the PQ pipe, reset the casing deeper in the hole, and drilled back to where we had left off. We switched to a strategy of coring one 3 m interval and drilling down two. The next core 17R (56-58 mbsf) came up empty, 18R (58-61) returned stiff gray clay in the core catcher only, and Core 19R (67-69 mbsf) was a poorly sorted pebbly sandy clay, slightly micaceous and lignitic. The bit sheared off while attempting to advance, and following a short delay fishing for, retrieving, and replacing the bit we resumed with minor recovery of medium quartz sand in Cores 20R and 21R.

### 4. HSE Activities

On the 21$^{st}$ of June, Beau Marshall (DOSECC) sustained a light crush to a finger when the PQ casing cutter he was servicing dropped and his finger was caught between the cutter and a wrench.

### 5. Figures

On next two pages:

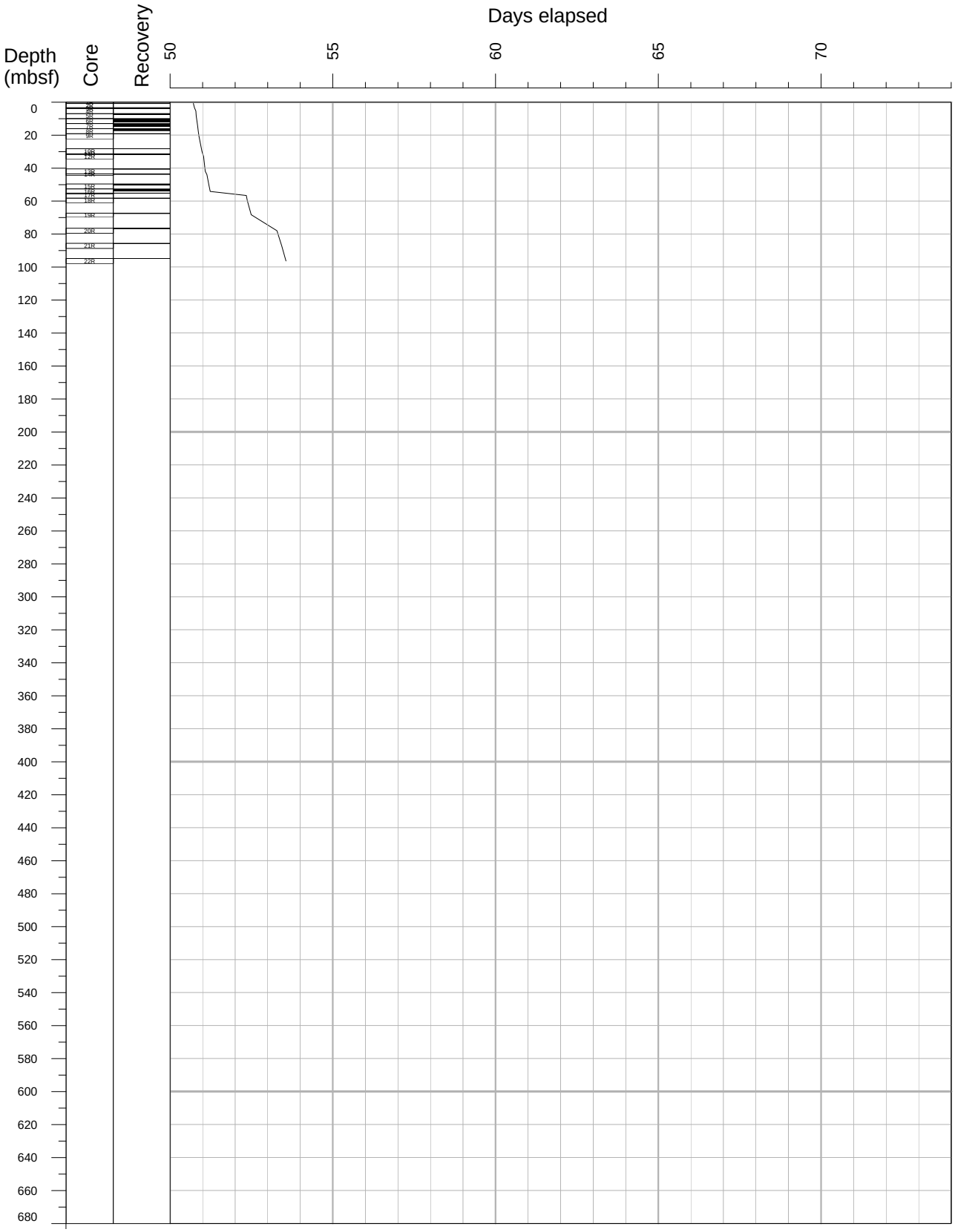
Figure 1 – Depth versus time plot and recovery for Hole M0029A, up to 2400 hrs on the 24$^{th}$ of June.

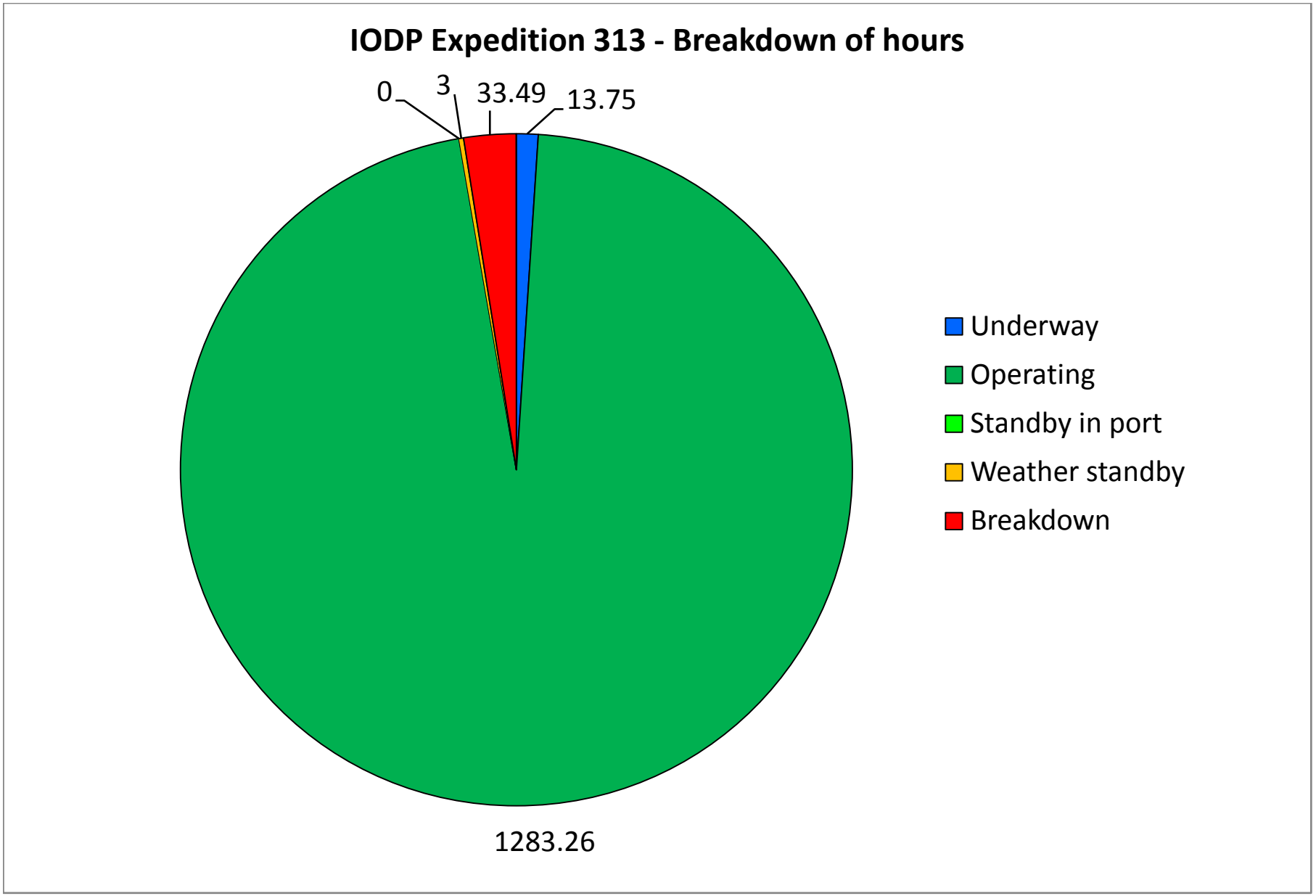
Figure 2 – Breakdown of hours up to 2400 hrs on the 24$^{th}$ of June.

# IODP Expedition 313

# Hole M0029A progress summary

Latitude: 39° 31.1717' N
Longitude: 24.7957' W
Water depth: 35.97 m




IODP Expedition 313 - Breakdown of hours
0
3
33.49
13.75
1283.26
Underway
Operating
Standby in port
Weather standby
Breakdown