Week 2 Drilling and Scientific Report for
IODP[3]-NSF Expedition 501
New England Shelf Hydrogeology, 2025

ECORD Science Operator

2nd June 00:00 – 8th June 24:00 EDT Eastern Daylight Time (UTC -4)

1. Operations

Pump testing at Hole M0111B continued into the 2nd of June with groundwater sampling beginning at 00:30 from a depth of 272 mbsf. High silt content precluded large volume recovery but smaller samples for the noble gas team were recovered. The decision was made to switch back to coring with a delay caused by bit wear. Coring began again at 15:30 at a depth of 276 mbsf. Eleven cores were recovered with a total length of 12.8 m and reaching 304.78 mbsf by 24:00 on the 2nd of June.

Coring continued from 00:00 to 21:00 on the 3rd of June, with a total of 29 cores recovered. Recovery was low due to the presence of loose sands, with 22.53 m of core recovered from a total drilled length of 47.3 m (48% recovery). At 21:00 the BHA was pulled out to replace the bit; the BHA was being run back into the hole at 24:00 on the 3rd of June.

Coring resumed at 01:00 on the 4th of June and continued to 17:30, advancing to 387.93 mbsf. Loose sands continued to affect recovery, with 9.28 m of core recovered from an advance of 40.85 m (23% recovery). A stuck core barrel meant it was necessary to pull out of the hole at 17:30, and attempt to retrieve the core barrel. The new BHA was being run back into the hole at 24:00.

The hole was washed down to 392.2 mbsf by 04:00 on the morning of the 5th of June and attempts were made to recovery the core barrel using a wireline tool, which stuck, and was parted at 05:30. It was decided to remove the drill string from the borehole, and the process of tripping out as completed by 09:30. From 09:30 to 17:00 the BHA was made and run down the hole, with gamma ray logging through pipe operational from 17:00 until 24:00.

The 6th of June saw PVC casing successfully run into Hole M0111B to a depth of 343 mbsf by 06:00. Logging through the PVC commenced at 09:00 throughout the day from the base of the borehole, reaching the upper section (20 – 120 mbsf) by midnight.

Logging Hole M0111B finished at 03:30 on the 7th of June with all equipment recovered to surface. By 09:00 preparations were underway to adjust position and move the LB Robert to site M0111C. The vessel rotated and jacked down between 13:00 and 15:00, with pre-loading procedures ongoing from 15:00 until 24:00 on the 7th of June at the location for Hole M0111C. The science team spent this time developing strategy for coring and testing at Hole M0111C.

Pre-loading continued until 09:00 on the 8th of June followed by rig-up operations. Casing was run from surface to 30 mbsf from 11:00 to 16:00 and then paused while awaiting the arrival of bentonite plugs to improve mud returns. The plugs arrived on the offshore supply vessel (OSV) at 23:30 and were being received at 24:00.

A recovery log is shown in Figure 1 and a breakdown of hours can be seen in Figure 2.

2. Hole Summary

Hole	**M0111B**
Latitude	40.8746°N
Longitude	70.2697°W
First Core	113R
Last Core	172R
Cores Recovered	60
Drilled Length (coring)	111.4 m
Drilled Length (open hole)	n/a
Recovered Length	45.77
Depth in Hole	387.93 mbsf
Hole Recovery	41%

3. Science

During Week 3 the Expedition 501 Science Team wrapped up its analyses for Hole M0111B.

The sedimentology team continued lithological description based on core section photographs taken while the cores were in the liners. Through-liner descriptions of cores from for the depth interval of 127 – 384 mbsf documented sand- and mud-rich intervals. Sand description was limited due to pore recovery. Mud ranged in color from dark grey to light grey to reddish brown.

The aqueous geochemistry team collected performed measurement salinity, ammonium, alkalinity, and pH on samples from the pumping tests completed in Hole M0111B. The geochemistry team and microbiology team worked on subsampling of fluids from pumping tests.

The physical properties team complete P-wave velocity, bulk density, magnetic susceptibility, electrical resistivity, and natural gamma radiation measurements on cores from Hole M0111B and completed QA/QC on select cores from Hole M0111B.

The hydrogeology team completed the first pumping tests in Hole M0111B which included measurements of water quality and isotope analyses as well as some noble gases. Upon completion of the tests, the team evaluated how decrease suspended sediment during tests and to improve subsampling procedures.

To complete science operations at Hole M0111B, a full suite of wireline logging data was completed through PVC casing from 340 – 20 mbsf. The suite was composed of multiple tool runs and included gamma radiation (total and spectral), magnetic susceptibility, electrical resistivity, and nuclear magnetic resonance. Data have undergone initial QA/QC and are being correlated with MSCL data.

4. HSE Activity

None to report

5. Outreach Activity

- 3 blog posts (see https://expedition501.wordpress.com/)
- 7 collab-posts on Insta plus corresponding stories
- Stories for World Ocean Day (June 8, feat. BGS and ANZIC, Past Ocean Oxygen)
- Several social media posts on X (3), Bluesky (3), Instagram (2) and Mastodon (3) linking the blogsite and news (successful pump test) plus corresponding stories
- 1 media article following the press release
- 2 Ship-2-Shore events (Brandon Dugan - Nantucket New School, UNOC off-site side event)

6. Figures

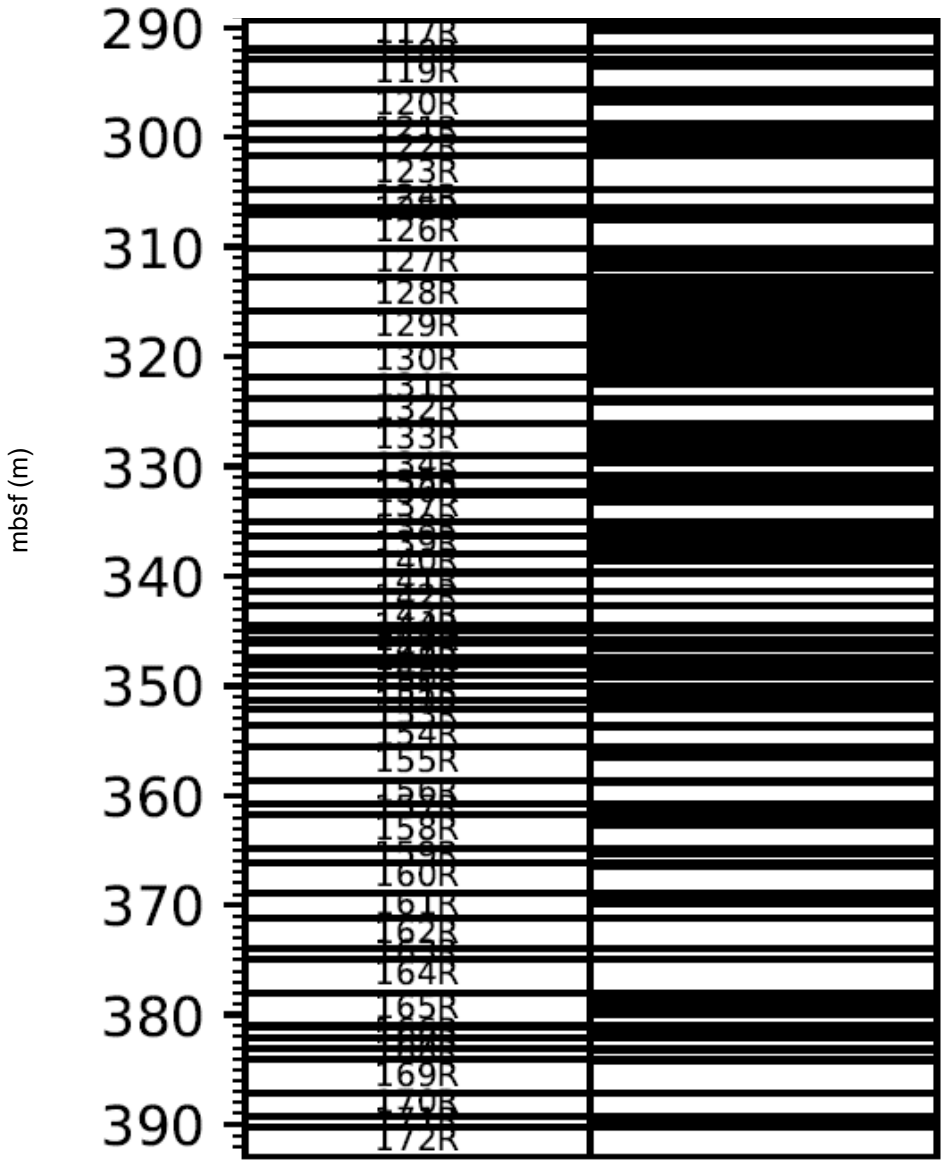

Figure 1 Core Recovery for Week 3 from Hole M0111B (white gaps indicate no recovered core).

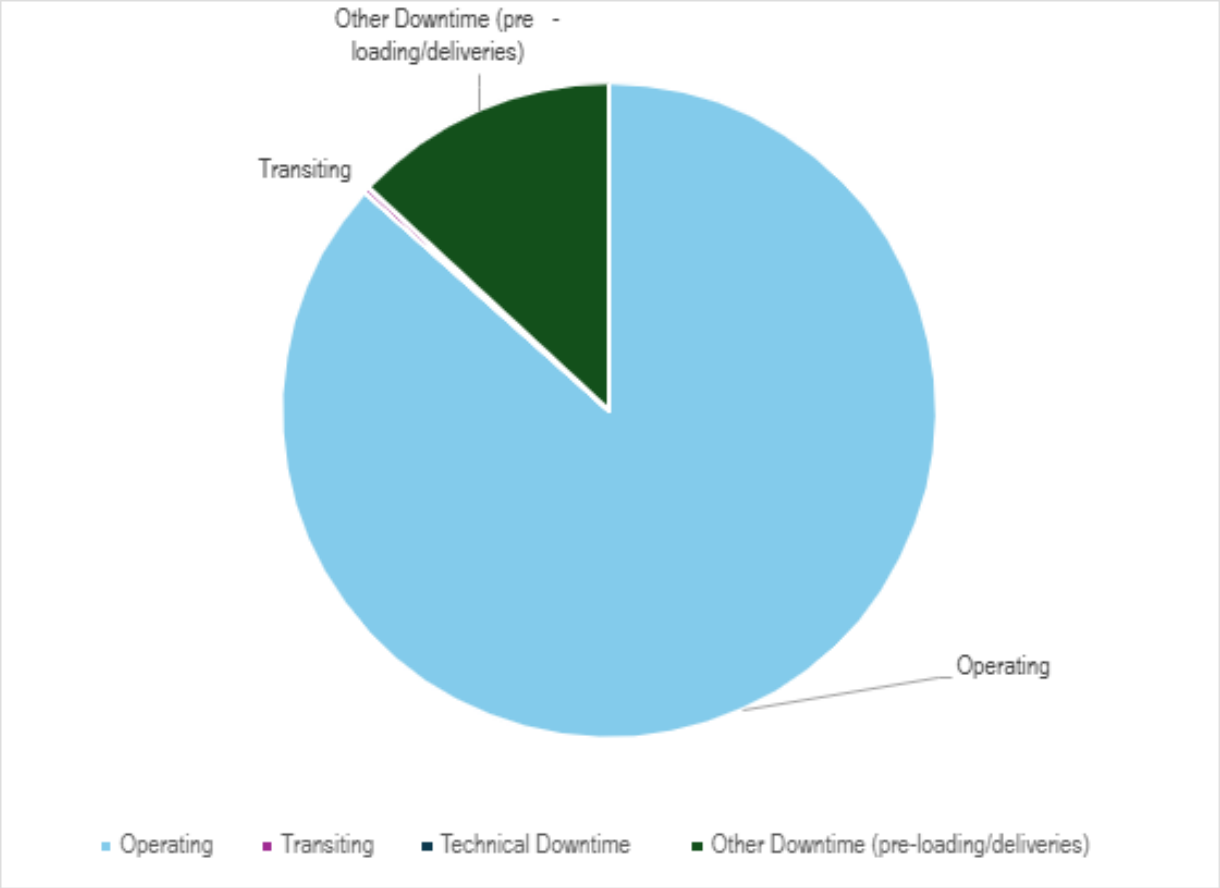

Figure 2 Breakdown of hours from 00:00 June the 2nd to 24:00 June the 8th 2025

7. Photographs

Clockwise from top left: ‘Fogbow’ from the starboard side. Expedition operations manager Graham Tulloch moving pipe. Simon Barry showing David Bekaert logging results. Sunrise on the 24 to 12 shift. Bentje Brauns monitoring groundwater quality during a pump test.