



**Week 2 Drilling and Scientific Report for
IODP³-NSF Expedition 501
New England Shelf Hydrogeology, 2025**



26th May 00:00 – 1st June 24:00 EDT Eastern Daylight Time (UTC -4)

1. Operations

Operations on the 26th of May started well with 11 cores and 80% recovery by 10:30. At that time progress was halted due to bit balling and bit clogging. While troubleshooting, potential issues with the casing were also observed. Attempts to run back in- hole were made, without success. An optical logging tool was run inside the cased hole down to the shoe depth (14 mbsf) and identified a potential break in the casing. The decision was made to run PQ rods back in hole down to 120 mbsf, using them as casing, and to continue coring operations with smaller diameter HQ rods and BHA. At 21:00 the HQ BHA was run and coring began at a depth of 121 mbsf. At 23:50 Core 34R was recovered to deck with a length of 1.58m.

During the 28th coring continued successfully throughout the day to 203 mbsf. Thirty five cores were recovered, with a total recovered length of 59.2m.

The 29th started well with 6 cores retrieved and 7.86m of core recovered, however as the morning progressed decreasing recovery indicated a change in lithology. From 08:25 to 15:00 preparations were made to attempt a pump test around this interval, with two more cores recovered at 15:00 to 16:25 to a depth of 230.68 mbsf. The first pump test was run at 21:15 until 22:00. Issues with flow rates led to stopping the pumping test and attempts made to improve hole conditions were ongoing at 24:00.

On the morning of the 30th the borehole was checked by advancing back to TD and coring operations in order to prepare borehole for another pumping test. A second pump test was carried out but no formation water was recovered. Further attempts were unsuccessful, despite the equipment apparently functioning correctly, and it was finally decided to displace the seawater in the hole with drilling mud and progress the hole, returning to coring using the HQ BHA, with first core on deck arriving before the midnight shift change.

Coring operations continued on the 31st with the hole advancing to 281.53 mbsf, however mixed lithologies, particularly clays and loose sands affected recovery throughout coring. During the afternoon 3 personnel transfers were made by helicopter. Operations were halted due to high winds. At 20:00 hrs preparations for pump testing began, and the test started at 22:05 and continuing into June the 1st with tests 4,5, and 6, with the formation isolated from below 272 mbsf. The pumping tests provided better drawdown and recovery rates. Pumping tests 4 and 5 were interrupted due to lack of hydraulic head at the pump level. Test 6 sustained a stable flowrate that enabled the cleaning of the borehole and samples of formation fluid to be taken. Sample-taking started at 21:00 and continued past midnight.

A breakdown of hours can be seen in Figure 1, and logs of recovery in Figure 2.

2. Hole Summary

Hole	M0111B
Latitude	40.8746°N
Longitude	70.2697°W
First Core	22H
Last Core	111R
Cores Recovered	90
Drilled Length (coring)	181.04 m
Drilled Length (open hole)	0 m
Recovered Length	129.83 m
Depth in Hole	281.53 mbsf
Hole Recovery	72%

3. Science

During Week 2 the Expedition 501 Science Team continued description of cores, analyses of water chemistry, and bulk physical properties based on multi-sensor core logger (MSCL) data from Site M0111, and performed the first pumping tests at Site M0111.

The sedimentology team continued lithological description based on core section photographs taken while the cores were in the liners. Initial through-liner descriptions from Hole M0111B were completed for the depth interval of 62-127 mbsf. The team interpreted distinct sand-dominated and mud/silt-dominated intervals that ranged in color from light grey to grey (sand) and light grey to dark grey (mud/silt). Shell fragments were absent in most zones, however, in a few sections shell fragments were rare.

The aqueous geochemistry team collected interstitial water samples using Rhizon and squeeze cake sampling methods for samples from Hole M0111B. Salinity, ammonium, alkalinity, and pH analyses were completed for interstitial water to from ~85 mbsf to ~278 mbsf. Preliminary assessment confirms that data will be valuable for testing Expedition 501 hypotheses. The geochemistry team and microbiology team continued to take sample splits and preserve samples for shore-based interstitial water and microbiological analyses.

With the change in core diameter in Hole M0111B, the physical properties team built calibration standards for the smaller diameter cores and re-calibrated the P-wave velocity, bulk density, magnetic susceptibility, electrical resistivity, and natural gamma radiation sensors. All cores from Hole M0111B were logged and QA/QC of these data were completed. Initial discussions of the data centered around correlation of NGR data with core descriptions and comparison of electrical resistivity data with interstitial water salinity. The physical properties team also continued to revise the MSCL manual to allow faster training of scientists who will be joining Expedition 501.

The hydrogeology team conducted the first pumping tests of Expedition 501 in Hole M0111B. The first pumping tests did not provide data from the formation, yet provided a learning opportunities for the rig crew, the ESO team, and the offshore science team. These initial tests also confirmed the functionality of the packer system, submersible pump, and sampling manifold system. A pumping test with multiple drawdown and recovery periods started on May 31 and continued through June 1 providing valuable data to determine in situ hydrogeological properties. Water quality monitoring during the test provided information on fluid electrical conductivity, temperature, and pH. All these data are crucial to meeting the objectives of Expedition 501.

The expedition science team held one ship-to-shore meeting (28th of May) to provide onshore science team members with updates about offshore operations. The meeting also included a brief virtual tour of rig floor and science laboratory activities.

4. HSE Activity

A Man Overboard drill was conducted on the 1st of June.

5. Outreach Activity

The team from CBS News (USA) were on board from the 31st of May to 1st of June, conducting interviews and filming.

One blog was posted on the ECORD page, plus posts on social media.

6. Figures

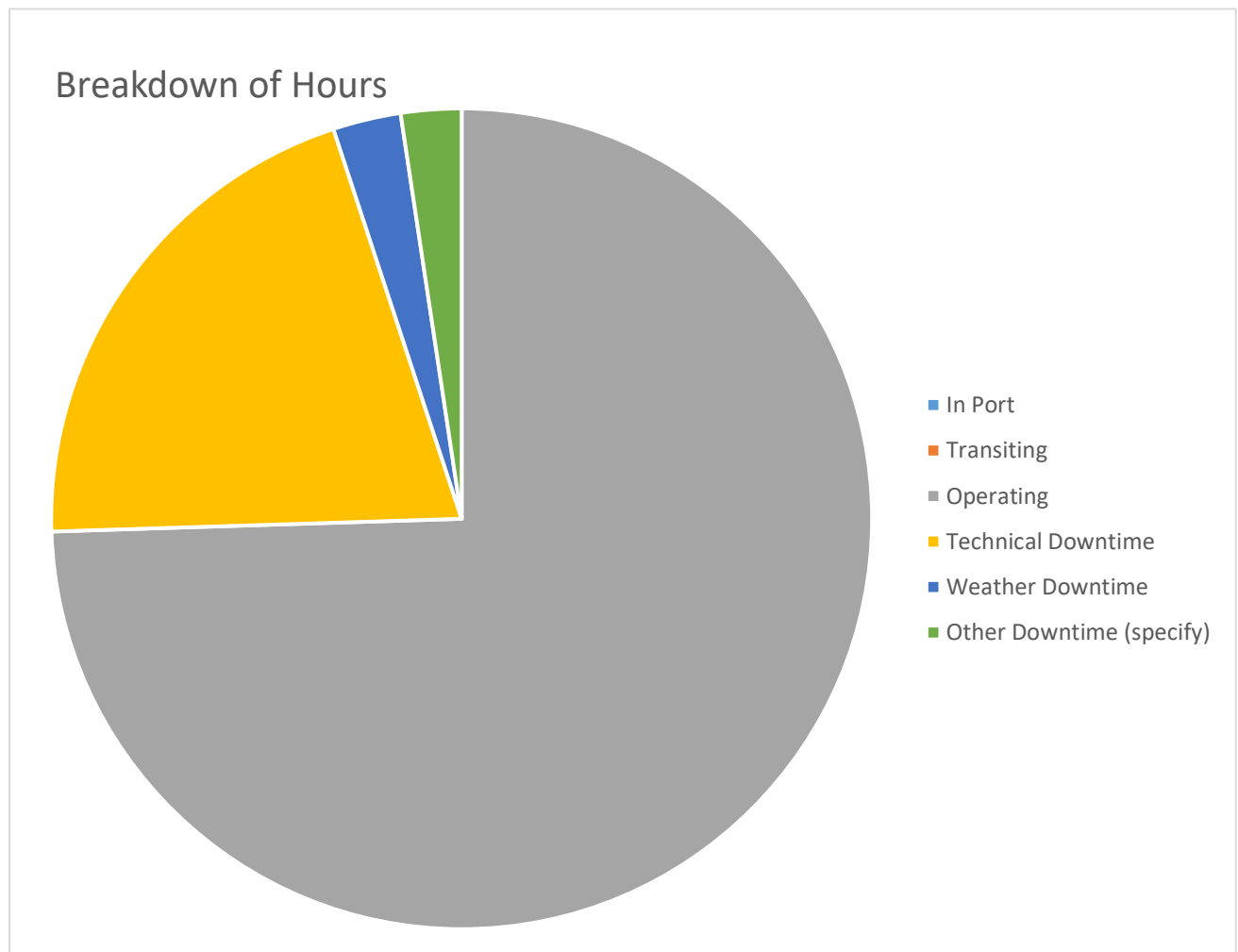


Figure 1: Breakdown of hours from 00:00 May the 26th to 24:00 June the 1st 2025

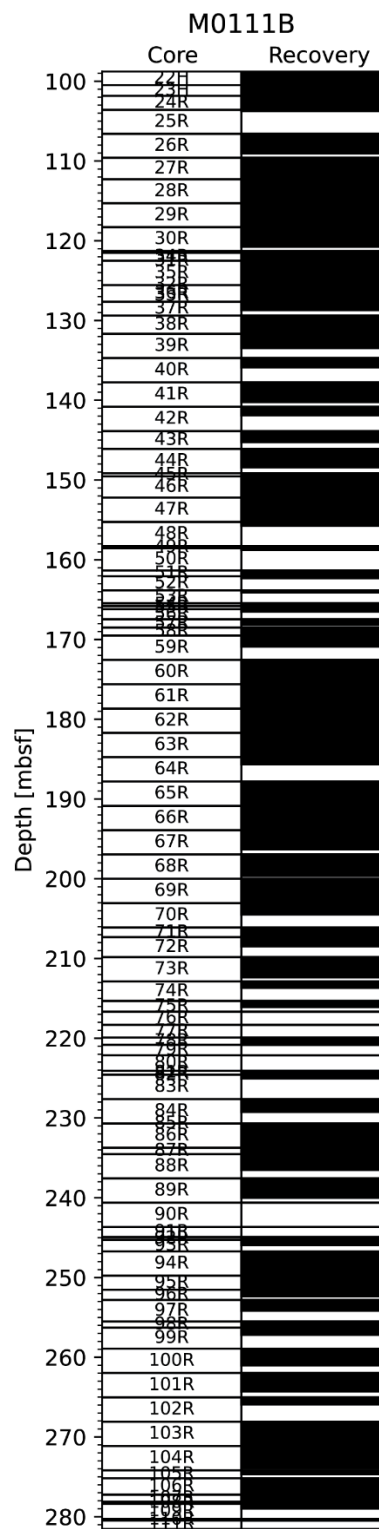
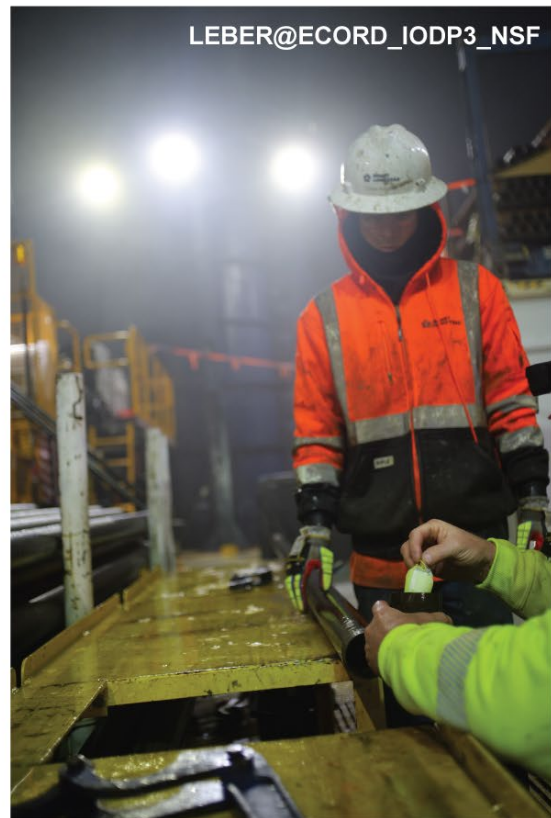


Figure 2: Core Recovery for Week 2 from Hole M0111B (white gaps indicate no recovered core)

7. Photographs



Clockwise from top left: Exp.501 Science Team member Ellie Miller at work in the Geochemistry container; the drill crew prepare the core barrel with microsphere tracers; arrival of team members by helicopter transfer; the team on Night Shift as a pump test extracts low salinity water from the aquifer; sunrise over the starboard quarter of the L/B Robert.