



Week 7 Drilling and Scientific Report for
IODP³-NSF Expedition 501
New England Shelf Hydrogeology, 2025



30th June 00:00 – 6th July 24:00 EDT Eastern Daylight Time (UTC -4)

1. Operations

The 30th of June saw logging complete at Hole M0112A and preparations underway for moving to a new location. A crew change and transfer of ESO staff was completed the night of the 30th June/1st of July and the rest of the 1st of July began with jacking down by 02:30 and the transit to the next Hole. At 03:25 the legs of the LB Robert were lowered and preloading was completed at 17:30.

High winds and swell meant we were waiting on weather until 08:30 on the 2nd, when we began running casing at the new Hole M0112B. Spot coring commenced at 17:35 and depth at midnight was almost 60 mbsf.

On the 3rd of July, two further spot cores were recovered and the remainder of the day spent setting casing, priming the hole with bentonite, and waiting for the bentonite plug to set.

Drilling recommenced at 01:30 on the 4th of July and continued with spot coring until reaching the target depth of around 110 mbsf. The packer was set and pump testing commenced at 21:20 at a rate of around 3L/minute. The 24-12 shift were able to see the 4th of July fireworks from Nantucket and Martha's Vineyard.

Pumping continued at Hole M0112B throughout the 5th of July and sampling commenced.

At 05:45 on the 6th, water quality decreased and the decision was made to stop the pump test. The pumping equipment was recovered and the borehole conditioned before drilling to the next aquifer target at 171 mbsf. The packer was installed and a new pump test begun at 22:00. Pumping was ongoing at midnight.

2. Hole Summary – 30th June to the 6th July.

Hole	M0112B
Latitude	40.99783°N
Longitude	70.33337°W
First Core	2H
Last Core	31R
Cores Recovered	29
Drilled Length (coring)	54.94
Drilled Length (open hole)	126.13
Recovered Length	38.15
Depth in Hole	171.1 mbsf
Hole Recovery	69%

3. Science

During Week 7, the Expedition 501 Science team finalized analytical measurements during wireline logging of Hole M0112A. After the move to Hole M0112B, the science party split their time between sampling, measurements, and preparing for the pump tests. Pump testing is on-going. The first test targeted a shallow clay-sand pairing located between 60 and 110 mbsf. This test ended abruptly after ~32 hours following a sudden increase in solids in the pumped water stream part way through sampling. A second pump test in the deeper, fresher aquifer is imminent. The contributions of entire offshore science team, as well as the drilling, mud, and ship's crews, were essential to the successes during pumping.

Approximately 38 m of core was recovered through spot coring in Hole M0112B. The intention was to document the extent of the clays above the target aquifers and samples were opportunistically collected to better characterize the formations.

The sedimentology team has completed the description of the spot cores from Hole M0112B. The spot coring captured the transition from olive-colored sands (around 55 m) to olive-grey muds (from approximately 58 m to 102 m), followed by dark grey to black muds beginning at around 138 m. These observations are consistent with those from Hole M0112A. The olive-grey coloration has been tentatively interpreted as indicative of glauconite; however, this interpretation will require confirmation through future mineralogical analyses. Black, coarse sand with a dark green sheen were recovered from below 140 mbsf that could also contain glauconite.

The aqueous geochemistry team curated and split the samples from the upper portion of Hole M0112B and the made shipboard measurement of salinity, alkalinity, and pH on the interstitial water samples. The salinity data were consistent in trend and absolute values with Hole M0112A. The team also made spot measurements of salinity during the pump test, showing a parallel decline in salinity as measured by the hydrogeologists YSI water quality probe. The team also processed, subsampled, and curated 10s of liters of water from the pump test.

The noble gas team was in the middle of their extensive pump test sampling scheme when the hole collapsed. The preliminary results from the MiniRuedi suggest the filtering manifold and sampling techniques developed over the course of the previous pump tests have significantly improved the water quality for noble gas work.

The physical properties team measured all measurable core sections collected in Hole M0112B thus far and proceeded with processing of the wireline logging data. The logging data in Hole M0112A show similar stratigraphic pattern to Site M0111 with a thicker depth interval of elevated resistivity with greater absolute values at M0112. The multi-sensor coring logging and the wireline logging data, coupled with the shipboard salinity data, show a very strong consistency between Holes M0112A and M0112B with little depth offset. These data supported the selection of the spot cores and packer depth placement in preparation for the pump tests.

The physical hydrogeologist onboard worked with the science party to prepare for and conduct the first pump test at M0112B. The preliminary data from the borehole logger and water quality logger are being used in planning for the upcoming pump test to ensure adequate purging of the hole while maximizing time for sampling.

4. HSE Activity

The ship's deck was checked regularly for stranded seabirds.

An abandon ship drill was carried out at 06:00 on the 3rd of July.

X501 team members were made aware of deck and operational changes during the switching from running in casing, drilling, and water testing. Continued reminders were made to the team to take care in windy and wet conditions, and to stay hydrated and wear sunscreen in strong sunshine.

5. Outreach Activity

- 1 blog post and corresponding stories.
- Several social media posts including collab posts/reposts on X/Twitter (5), Bluesky (5), Instagram (5), Facebook (1) and Mastodon (3) linking the blogsite plus corresponding stories.
- 1 Ship to Shore (July 3, University of Leicester).
- Uploaded Youtube Videos (<https://www.youtube.com/@ECORDESO>, Topics: Community Engagement, Groundwater).
- 1 newspaper article (Le Monde, France: [Scientific expedition off the US coast seeks out freshwater beneath the sea](#)).

6. Figures

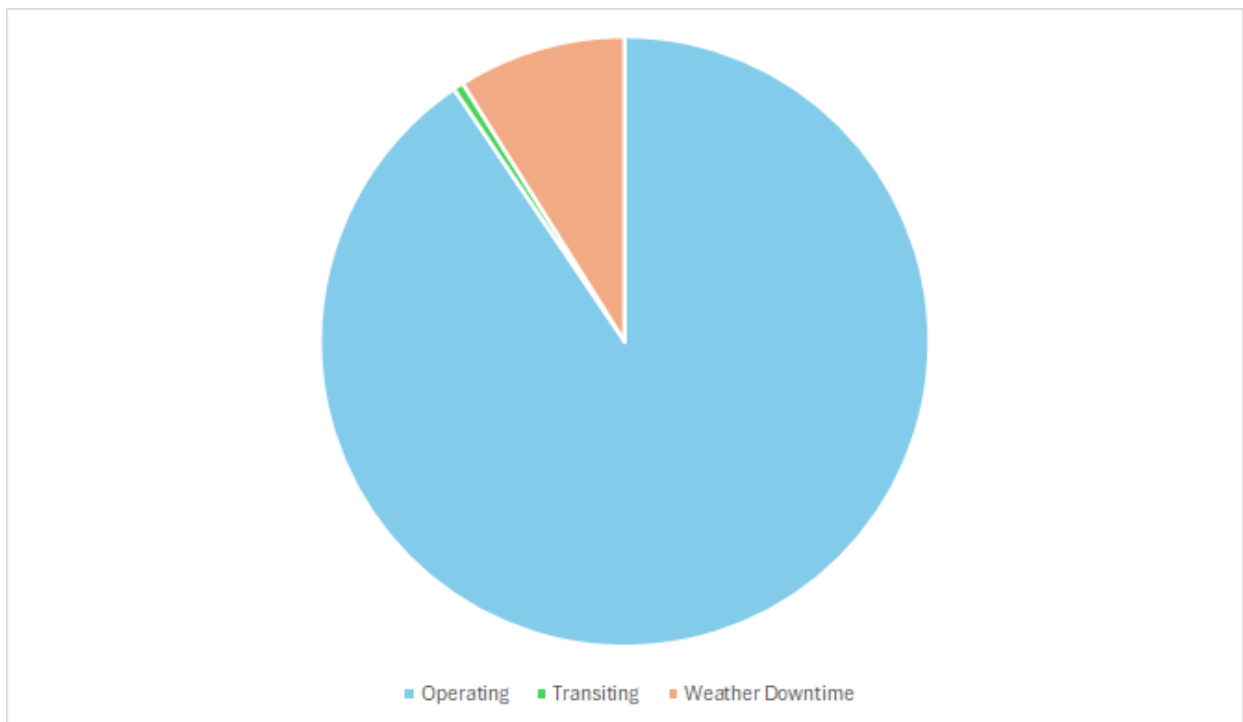


Figure 1 Breakdown of hours for week 7 (30th June to the 6th of July).

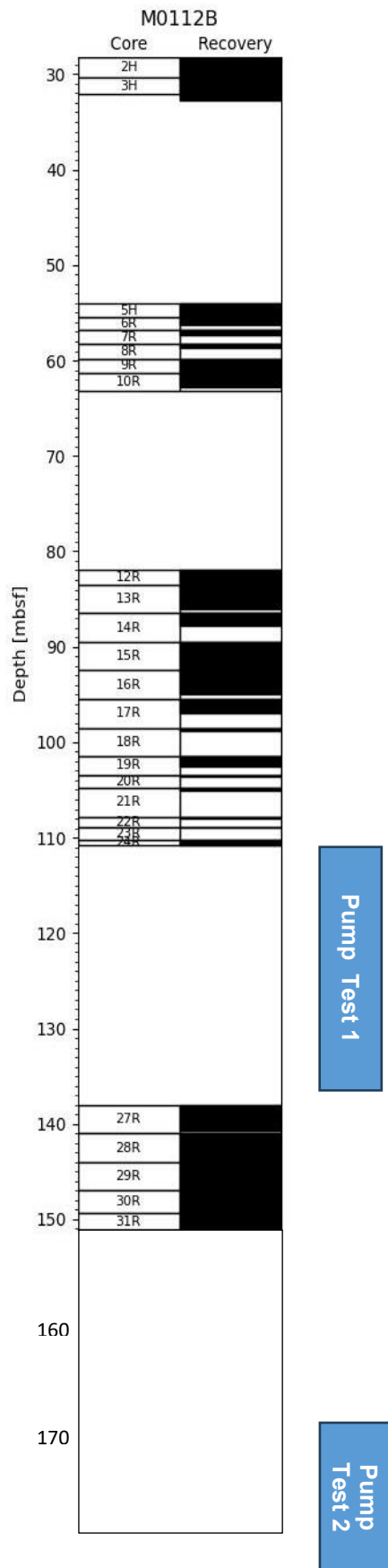
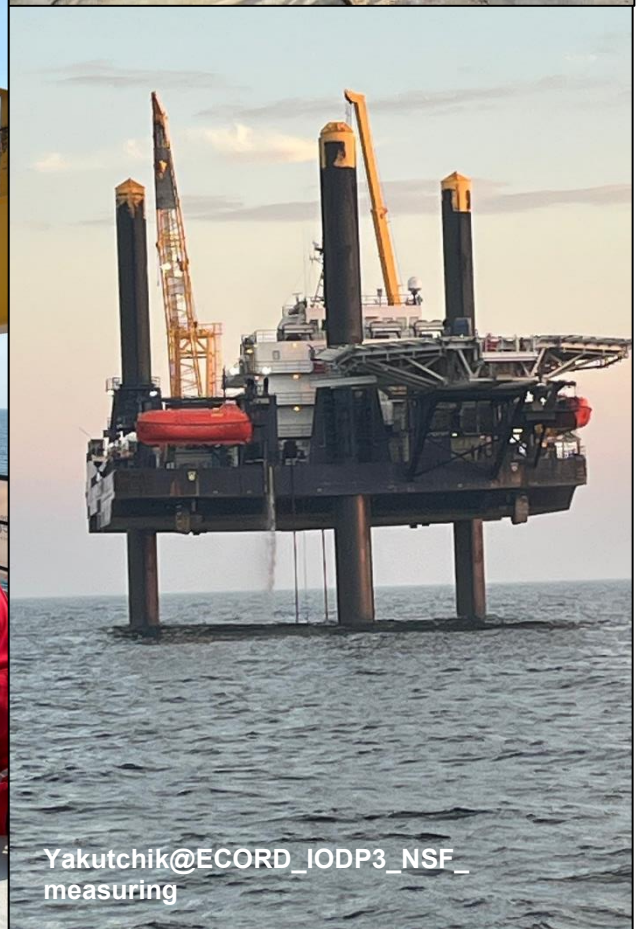


Figure 2 Core recovery for week 7 for Hole M0112B. The approximate location of the pump test intervals (not to exact scale) this week are indicated in blue.

7. Photographs



From top left clockwise: Close-up of the teeth on the vessel leg. Rachel Bell and Graham Tulloch discussing the pump tests. X501 team members measuring the pumping equipment.. A view of the LB Robert from Maryalice Yakutchik arriving to the LB Robert.