



Week 8 Drilling and Scientific Report for  
IODP<sup>3</sup>-NSF Expedition 501  
New England Shelf Hydrogeology, 2025



7<sup>th</sup> July 00:00 – 13<sup>th</sup> July 24:00 EDT Eastern Daylight Time (UTC -4)

## 1. Operations

The start of week 8 of the expedition began with a full day of water extraction on the 7<sup>th</sup> of July. A near-constant flow was achieved, but the extracted water was still largely opaque at midnight.

The 8<sup>th</sup> was a busy day as conditions became favourable for a full suite of discrete groundwater samples. Sampling was ongoing until around 16:00 and a hydrogeological step test was performed until 20:30 when preparations were made to resume drilling and spot coring.

The 9<sup>th</sup> was spent further drilling and coring with an aim to confirming suitable cores to set the packer for the next pump test. Lithologies were as expected from Hole M0112A. A transfer of X501 team members on and off the Robert was complete at 20:00, with eight colleagues heading off on the OSV Gaspee.

On the 10<sup>th</sup> of July, the borehole was advanced to the target depth (255 mbsf), with 5 sport cores collected. The borehole was conditioned and filled with seawater, and the pumping system deployed. Pumping began at 13:50 and continued to midnight with monitoring of mud flow and head height.

Pumping continued into the 11<sup>th</sup> but flow rates were low, and the pump cut out at 06:55; the decision was made to stop pumping and measure recharge. After the recharge rate was tested, the pump and packer were removed and we began drilling to our next target for spot cores near to the TD from Hole M0112A. Coring using the alien corer began just before midnight at around 320 mbsf.

Coring progressed well on the morning of the 12<sup>th</sup> of July and reached TD for the SCIMPI by 11:55. Gamma ray logging was run successfully through pipe and completed by 16:05. However, problems were encountered when attempting to trip out the casing, and the casing was still stuck at midnight.

The morning of the 13<sup>th</sup> was spent tripping the CHD and attempting to cut the casing. After several attempts, the casing was cut and tripped, but this affected the CHD string. Work continued until midnight to recover the CHD and check for damage.

## 2. Hole Summary – 7<sup>th</sup> July to 13<sup>th</sup> of July

Hole	M0112B
Latitude	40.99783°N
Longitude	70.33337°W
First Core	35R
Last Core	66R
Cores Recovered	55
Drilled Length (coring)	44.62
Drilled Length (open hole)	139.8
Recovered Length	21.1
Depth in Hole	339.82
Hole Recovery	47%

### **3. Science**

During Week 8 the Expedition 501 Science Team focused on wrapping up science operations and summarizing initial results at Hole M0112B. Science operations included pumping tests, spot coring, wireline logging, and observatory preparation.

The hydrogeology, geochemistry, and microbiology teams were busy with back-to-back pumping tests in Hole M0112B. The teams completed pumping test #2 which included continuous downhole measurements of temperature, electrical conductivity, and hydraulic head and surface measurements of flow rate. Once conditions were favorable and indicative that formation fluids were being pumped from the borehole, surface measurements of electrical conductivity, dissolved oxygen, temperature, and pH began along with a suite of specialized samples to help address the science objectives of Expedition 501. These rig-floor samples included discrete water samples for microbiology, standard geochemistry, and isotope geochemistry. Semi-continuous measurements for some noble gases were also made and some discrete samples were collected for shore-based noble gas analyses.

After pumping test #2, the science team returned to core flow operations as spot coring was done while the hole was advanced to the depth for pumping test #3. Initial characterization of the sediments documented a sand and mud system as anticipated from observations at Hole M0112A. The science team processed the spot cores through standard MSCL logging and geochemical analyses and took samples for post-expedition geochemical and microbiological studies.

Once the borehole was advanced to the depth for pumping test #3, the hydrogeology team set up the pumping test manifold system and prepared for downhole and rig floor measurements. After preparations were complete, multiple water level measurements were made with a dip meter to assess hydraulic head prior starting the pumping test. The team initiated the pumping test with a low flow rate and continuous downhole measurements of hydraulic head, temperature, and electrical conductivity. After multiple hours of pumping at low flow rates, however, pumping was stopped due to decreases in flow rate accompanied with decreases in hydraulic head. After multiple recovery hours (no pumping) that showed poor head recovery, the pumping test #3 was aborted prior to any sampling of formation fluids.

Hole M0112B was then advanced to a TD of ~338 mbsf with coring near the bottom of the hole to provide correlation with Hole M0112A and to provide samples from the previously unsampled depths of Site M0112. All cores went through standard curation. MSCL logging and interstitial water sampling were done where core conditions allowed. After reaching TD, the wireline logging team completed a gamma ray log of the entire hole through pipe with good results that will allow correlation with cores in Hole M0112B and with the section drilled and sampled at Hole M0112A.

The science team ended the week with preparing the Simple Cabled Instrument for Measuring Parameters In-situ (SCIMPI) system for deployment, and preparing summary presentations for Site M0112 which will be discussed during the transit to MV-04C.

### **4. HSE Activity**

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

X501 team members continued to be made aware of hazards associated with operational changes from coring to pump testing and logging. The team were also reminded of protocols for Billy Pugh basket transfers and to take care appropriate to weather conditions (e.g. sunscreen or slip hazards).

### **5. Outreach Activity**

- 2 blog posts.
- several social media posts incl collab posts/reposts on X/Twitter (4), Bluesky (4), Instagram (5).and Mastodon (4) linking the blogsite plus corresponding stories.
- Upload short videos on Youtube for social media.

## 6. Figures

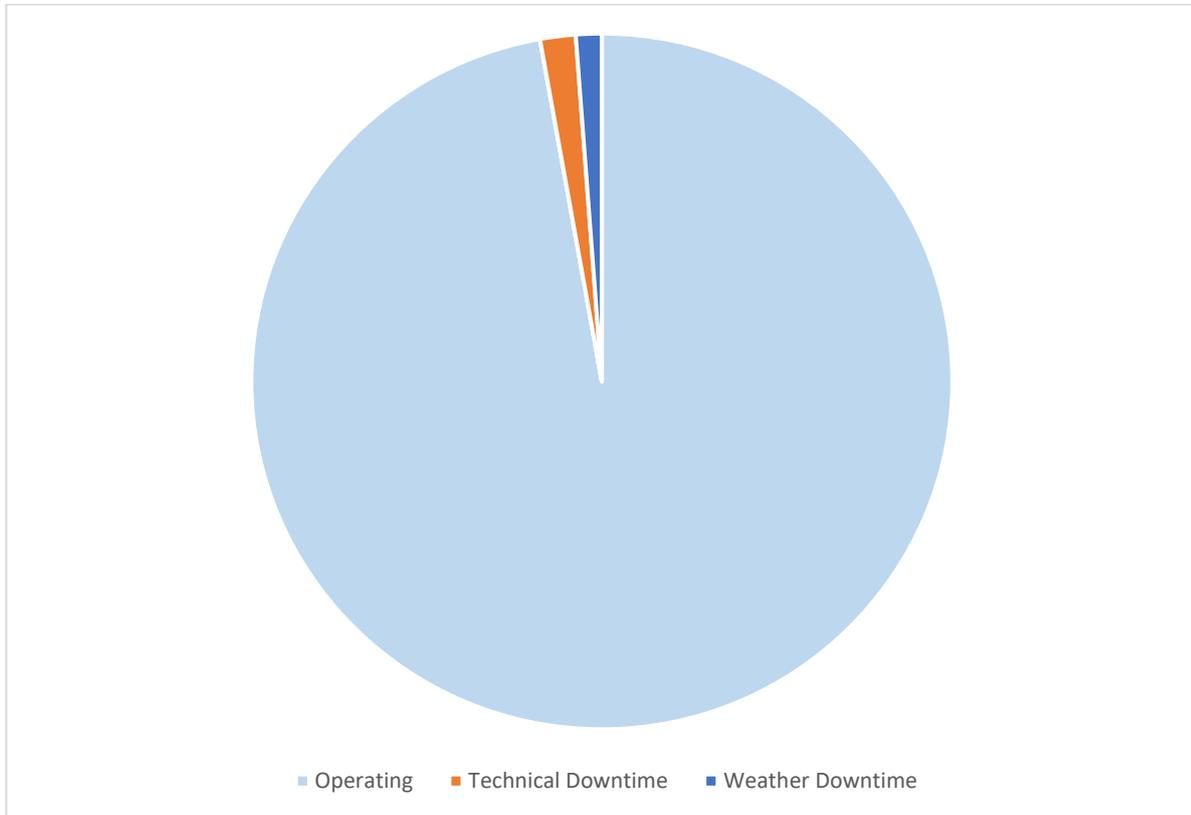


Figure 1 Breakdown of hours for week 8 (7<sup>th</sup> to 13<sup>th</sup> of July).

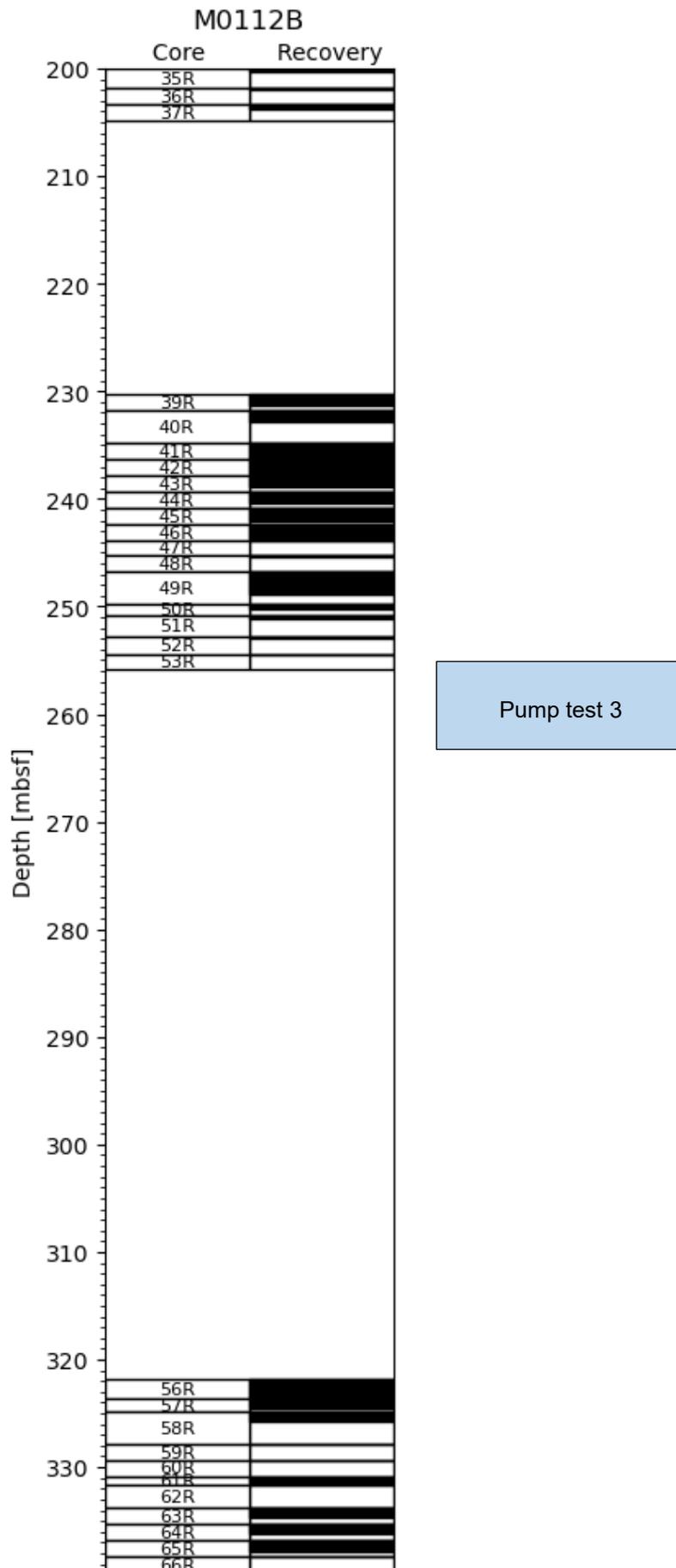


Figure 2 Recovery Plot for Week 8, 7<sup>th</sup> July to 13<sup>th</sup> July. The approximate depth (not to scale) of pump test 3 is shown in blue.

7. Photographs



Figure 2 Core recovery for week 8 for Hole M0112B. The approximate location of the pump test

From top left clockwise: Marisa Rydzy adjusting the pump. A beautiful sunset on the 10<sup>th</sup>. Andrew McIntyre supervises the logging system being lowered into the hole. Fadl Raad and Antonia Witzleb helping to setup the SCIMPI system on deck. A dragonfly resting on Mark Person's hard hat. Rachel Bell watching the live pump test data while Chris Delahunty has a quick rest.