

IODP Expedition 395E: Complete South Atlantic Transect Reentry Systems

Week 5 Report (2 – 8 May 2021)

During Week 5 of Expedition 395E, Complete South Atlantic Transect Reentry Systems, we installed reentry systems at Sites U1557 and U1556, which previously had been cored to basement on Expedition 390C in November–December 2020. At Hole U1557D we installed 10¾ inch casing and nested it in the existing reentry cone and 60 m of 16 inch casing. At Hole U1556B, we drilled in 10¾ inch casing and a reentry cone.

Operations

Hole U1557D

Week 5 began on 2 May 2021 with drilling in progress at Hole U1557D at 500.6 meters below seafloor (mbsf). We continued to drill down with the 14¾ inch drill bit, reached the sediment/basement contact at 566.6 mbsf at 0830 h, and reached the target depth of 576.6 mbsf at 1600 h. We then swept the hole of cuttings by pumping 50 bbl of high viscosity mud. Next, we made a wiper trip to clear the hole of obstructions and infill. We racked the top drive and raised the drill bit to the base of the 16 inch casing (60 mbsf), then lowered the drill bit back down to 524.1 mbsf. At that point, we reinstalled the top drive and rotated the drill bit down, encountered infill at 568.1 mbsf, and then washed it out down to the hole depth of 576.6 mbsf. We made another sweep of the hole with 50 bbl of high viscosity mud, and then filled the hole with 12 ppg heavy mud to help reduce any caving of the borehole walls.

On 3 May, we pulled the drill bit out of the hole, clearing the seafloor at 0315 h and reaching the rig floor at 1430 h. We assembled the casing running tool and set it aside in the derrick, and then assembled the casing string, which took the remainder of the day. On 4 May, we lowered the casing string down to 4978 meters below sea level (mbsl), and at 1000 h we started to lower the subsea camera. We reentered Hole U1557D at 1245 h, and lowered the casing string to 554 mbsf. At that depth we engaged the top drive to allow rotation, if required, and continued lowering the casing to its full depth of 571.6 mbsf at 1535 h, landing the top of the casing in the existing reentry cone. There was no circulation in the hole while pumping, showing that the formation had sealed around the casing, and that the base of casing would not need to be cemented. We released the casing from the Dril-Quip running tool and cleared the reentry cone at 1600 h.

Transit to Site U1556

Starting at 1645 h on 4 May, the *JOIDES Resolution* offset from Hole U1557D to Site U1556 in dynamic-positioning mode, travelling 3.6 nmi in 12.5 h at an average speed of 0.3 kt. During the slow transit, the subsea camera was brought back aboard at 1830 h. We raised the bottom-hole

assembly (BHA) and the Dril-Quip casing running tool and had disassembled it by 0630 h on 5 May, officially ending operations at Hole U1557D. We arrived at Site U1556 at 0715 h.

Site U1556

Hole U1556A (proposed Site SATL-53B) had been drilled during Expedition 390C in October 2020 to establish the water depth (5006.4 mbsl) and depth of the sediment/basement contact (278 mbsf), and to collect gas safety measurements. In preparation for installing casing in Hole U1556B, we made up the hydraulic release tool (HRT) and set it aside in the derrick at 0715 h on 5 May. We then assembled 284.2 m of 10³/₄ inch casing and landed it on the base of the reentry cone in the moonpool. From 1700 to 2215 h, we assembled the stinger (comprising a 9⁷/₈ inch bit, underreamer, and mudmotor), tested it in the moonpool, and lowered it down through the casing. The same assembly had been used to drill Hole U1560B earlier in the expedition. The HRT running tool was attached and bolted to the base of the reentry cone, and the reentry cone was welded to the base. At 0230 h on 6 May, we lowered the assembly through the moonpool and started the pipe trip to 4994 mbsl. At 1300 h, we started to lower the subsea camera; while it was descending, we slipped and cut 115 ft of drilling line as part of regular maintenance.

We started Hole U1556B at 1655 h on 6 May at 30°56.5244'S, 26°41.9472'W, and by 2000 h we had drilled-in the casing to 75.5 mbsf. During this operation, the cable to the subsea camera had wrapped around the drill pipe eight times, which is more than usual, so we paused drilling and slowly raised the subsea camera to the ship. It was back on board at 2245 h. We resumed drilling, and reached 282.3 mbsf by 1530 h on 7 May. At 282.3 mbsf, the weight of the casing was no longer supported by the drill string, indicating that the casing had landed. The target depth was 286.2 mbsf, indicating that the seafloor at Hole U1556B is shallower than expected, in comparison to the mudline depth at Hole U1556A. (Note: On 10 May we observed that the top of the reentry cone was level with the seafloor, and the water depth determined by tagging was 5001.8 mbsl for Hole U1556B. This depth is 4.6 m shallower than the mudline depth at Hole U1556A.) At 1630 h we released the casing from the HRT. We filled the hole with 75 bbl of heavy mud and raised the drill bit, clearing the seafloor at 1920 h. From 0245 to 1200 h on 8 May we disassembled the bit, underreamer, and mudmotor, and then assembled the BHA for cementing. After stowing the casing deployment equipment, we lowered the cementing BHA to 4408 mbsl, ending activities for the week. Cementing operations were expected to be delayed as a result of worsening weather.

Science Results

No further scientific measurements were made on the cores from Hole U1560A.

Outreach

No onboard Outreach Officer is sailing during Expedition 395E. Social media posts were made via the JR Facebook (<https://www.facebook.com/joidesresolution>) and Twitter (<https://twitter.com/TheJR>) accounts, run by the JRSO technical staff.

We conducted a virtual ship tour with a class from the Austin Community College in Texas.

Technical Support and HSE Activities

Laboratory Activities

- The gauge on the liquid nitrogen generator was found to be frozen. We shut down the unit and vented the liquid nitrogen for 24 h. The generator restarted and fully recharged. During this process, the O₂ sensor readings spiked in the Chemistry Laboratory but returned to normal once the generator was operating normally again.
- Cleaned up and reorganized the aft end of the Upper Tween Deck starboard store.
- Updated the advanced piston corer temperature (APCT-3) procedure as a result of computer updates, making changes to the Data Download and Data Processing steps.
- Updated the Section Half Multisensor Logger (SHMSL) code so the laser stops after the end of the section.
- Updated the superconducting rock magnetometer (SRM) AUX data file to enable data review.
- Wrote Python scripts for conductivity-temperature-depth (CTD) instrument, underway geophysics, and SRM data processing.
- Completed inventory on critical items for upcoming expeditions.
- Conducted a hard rock curation class for new staff, and demonstrated methods for collecting Rhizon pore water, paleomagnetic cube, and moisture and density samples.
- Built a store item display for the Bridge Deck.

IT Support Activities

- Conducted a risk assessment and made several software and security updates.

Developer Activities

- Updated the LORE Carbonates standard report on ship and shore to use a more accurate constant in calculations.

- Deployed Template Manager v0.0.21 to shore for the GEODESC project.
- Made small changes to the Drilling report.

HSE Activities

- Safety shower and eye wash stations were tested.
- There was an abandon ship drill.