IODP Expedition 390C: South Atlantic Transect Reentry Systems

Week 5 Report (1–7 November 2020)

Operations

During Week 5 of the International Ocean Discovery Program (IODP) Expedition 390C, South Atlantic Transect Reentry Systems, we reached basement and completed coring in Hole U1556A and began coring at Site U1557.

Hole U1556A

The final core from Hole U1556A, Core 33X, was brought on deck at 0140 h on 1 November 2020. Cores U1556A-30X to 33X advanced 5.8 m into basement and recovered 4.33 m (75% recovery). Excluding Core 30X, which recovered the sediment/basement interface, recovery was 90% in basement. In total, Hole U1556A reached a depth of 283.8 m below seafloor (mbsf) and recovered 243.78 m (86%). Following recovery of Core 33X, we raised the drill pipe to ~20 m above seafloor. The seafloor was cleared at 0410 h on 1 November, ending Hole U1556A. We then moved in dynamic positioning mode ~3.6 nmi to Site U1557.

Site U1557

Site U1557 is proposed alternate Site SATL-56A. We opted to core and install a reentry system at this site instead of what was originally primary Site SATL-54A as the thinner sediment layer (originally estimated at 510 m instead of 640 m) would allow installation of casing to basement. Stress calculations indicated that casing could only be installed to 600 m without exceeding the safe utilization threshold of the drill pipe.

Hole U1557A

We arrived at Site U1557 and spaced out the bit to 5003.9 m below sea level (mbsl) for the first core, based on the precision depth recorder (PDR) seafloor depth of 5011.3 mbsl. The first mudline core came back empty but with some indication that we had touched sediment. A second mudline core, attempted from a drill string depth of 5009.9 mbsl, also came back empty. The drill string was lowered to 5011.9 mbsl and a third attempt was made. Core U1557A-1H overpenetrated and came back with a full core barrel. We thus ended Hole U1557A and offset the ship 20 m east to begin Hole U1557B.

Hole U1557B

Hole U1557B was spudded at 1615 h on 1 November from a drill string depth of 5006.9 mbsl. Core 1H recovered 4.1 m of sediment and established the seafloor depth as 5012.3 mbsl. Cores 1H to 11H advanced to 99.1 mbsf and recovered 90.95 m (92%). Cores 1H to 11H were oriented with the Icefield MI-5 core orientation tool, and formation temperatures were taken on Cores 4H, 7H, and 10H with the advanced piston corer temperature (APCT-3) tool. Because Core 11H required an overdrill to release it from the formation, the decision was made to switch to the

extended core barrel (XCB) coring system using the polycrystalline diamond compact (PDC) cutting shoe. XCB coring continued smoothly from 2 November to the end of the week. Cores 12X to 60X advanced from 99.1 to 546.7 mbsf and recovered 306.59 m (68%). The sinker bars were removed after a hard layer was encountered at 239 mbsf. The rate of penetration for Cores 12X to 44X averaged 14.6 m/h. Starting with Core 45X, the rate of penetration decreased substantially in increasingly hard sediment, averaging 6.0 m/h for Cores 45X to 60X.

Science Results

Hole U1556A

Core U1556A-33X, containing basement material, was not split but was analyzed on whole-round track systems before preservation in a nitrogen gas-flushed bag.

Site U1557

Cores U1557A-1H as well as U1557B-1H through 60X have been split and measured on the track systems. In addition, we took one whole-round sample per core for chemical analysis of interstitial waters. Sediment lithology oscillates between layers of clay and carbonate ooze with sharp contacts in between. After Core 32X (bottom depth 296.1 mbsf), lithology transitioned toward predominantly carbonate ooze with less frequent and thinner clay layers. Physical properties such as magnetic susceptibility and natural gamma radiation generally correlate with lithology. Alkalinity increases with proximity to basement. No core description will occur during Expedition 390C.

Outreach

No onboard Outreach Officer is sailing during Expedition 390C. Limited social media posts were made via the JR Facebook and Twitter accounts.

Platform	# of posts	Analytics	Notes
Facebook	5	693 engagements (comments, shares, likes, or clicks on parts of the post)	
Twitter	5	1372 engagements (including 25 retweets, 1 comment, 161 likes), 2 new followers	Does not include retweets of other accounts. The National Science Foundation account (@NSF) retweeted a post.

Technical Support and HSE Activities

Laboratory Activities

- Processed core from Holes U1556A, U1557A, and U1557B.
- Testing and troubleshooting of the Fantail Levelwind sensor continued.
- The Siem Offshore electrician replaced the solenoid valve of the catwalk deck drain trough.
- The performance of the X-ray imager is being monitored as it intermittently produces black images. Sections that generated black images were rescanned. There are spares onboard if needed.
- The core logistics spreadsheet was updated. No extra bulk material is needed in the next four months.
- The Aeris X-ray diffractometer (XRD) vendor company (Malvern) was able to log in remotely and disable the auto sampler function, which was generating errors and was not allowing the instrument to function. Single samples can now be run manually.
- A new motor key was manufactured for the spare repaired Haskris water chiller. It has been running continuously and with minimum noise for several days.
- Staff contributed to the GEODESC, Catwalk sampling module, and diversity, equity, and inclusion (DEI) projects.

Application Support Activities

- The XRD label scanner was reprogrammed to a different format.
- Deployed a new version of the Catwalk sampling module. Staff on shore were additionally alerted to several issues with Catwalk that are currently being fixed.

- Deployed a new version (0.0.12) of Template Manager.
- Deployed a minor fix to the old Summary Reports application to populate dropdowns.

IT Support Activities

- Assisted the XRD technician in allowing the vendor to log in remotely to the Aeris XRD.
- Evaluated the possibility of upgrading ship macOS systems to v10.15 (Catalina).
- Temporarily installed a matte screen monitor at the Section Half Imaging Logger workstation at the request of the Imaging Specialist.
- Explored options for upgrading or replacing aging server OS to comply with TAMU security practices. New operating systems were downloaded from the shore FTP server.

HSE Activities

- Tested emergency shower and eye wash stations.
- Conducted a fire/lifeboat drill.