

IODP Expedition 393: South Atlantic Transect 2

Week 1 Report (7–11 June 2022)

Operations

Port Call and Transit Activities

International Ocean Discovery Program (IODP) Expedition 393, South Atlantic Transect 2, started in Cape Town, South Africa, at 0800 h (UTC + 2 h) on 7 June 2022. Most of the crew, science party, and *JOIDES Resolution* Science Operator (JRSO) personnel had arrived in Cape Town on 2 June in order to quarantine in the hotel for seven days prior to boarding. Due to weather-related travel delays, some personnel arrived later, on 3 and 4 June. All oncoming personnel took COVID-19 tests on Day 3 and Day 6 of their quarantine, which was 5 and 8 June for the personnel who arrived on 2 June. Most of the scientists and JRSO personnel boarded the *JOIDES Resolution* (JR) on 9 June; those who arrived one or two days late in Cape Town boarded the ship on 10 or 11 June after their seven days of quarantine.

On the previous expedition, Expedition 390, South Atlantic Transect 1, one of the two electromagnetic drawworks brakes broke, causing an early end to operations. The ship arrived in Cape Town on 31 May, 8 days ahead of schedule. The early arrival allowed time for the brake to be replaced and for some of the oncoming freight to be loaded before the start of Expedition 393.

On 7 June, the first catering provisions were delivered to the ship and a core reefer was loaded with offgoing Expedition 390 cores for shipment. On 8 June, representatives of the US National Science Foundation (NSF) inspected the vessel. On 9 June, the final three scientists boarded the ship at 0630 h. The pilot boarded at 0910 h and the ship departed Repair Quay 3, with the last line released at 0949 h. Two contractors came aboard during departure to conduct testing of the 50 kVA uninterruptible power supply (UPS) system under different levels of electrical load, which included dynamic positioning and running drilling equipment and mud pumps. This testing took place at a location outside the harbor, and by 1443 h testing was complete and the contractors left by launch boat. We started the sea voyage at 1455 h. At the end of the week, the ship had completed 96 nmi of the 1706 nmi voyage to Site U1559 (proposed Site SATL-13A).

Science Objectives

The South Atlantic Transect expeditions (engineering Expeditions 390C and 395E as well as Expeditions 390 and 393) aim to drill seven sites to recover a complete sedimentary section as well as the upper ~250 m of the underlying oceanic crust at each site. This drilling forms a transect along a slow/intermediate spreading rate crustal flow line at 31°S. Crustal age at the transect sites ranges from 7 to 61 Ma, filling critical gaps in sampling of intact ocean crust with

regard to age, spreading rate, and sediment thickness. A primary objective is to investigate the history and trajectory of low-temperature hydrothermal interactions between the aging ocean crust and the evolving South Atlantic Ocean, and to quantify past hydrothermal contributions to global geochemical cycles. Another primary objective is to investigate the microbial ecosystem's response to variable conditions in a low-energy gyre and in aging ocean crust. Analysis of sediment collected during the South Atlantic Transect expeditions will generate records of carbonate chemistry and deepwater mass properties across the western South Atlantic through key Cenozoic intervals of elevated atmosphere CO₂ and rapid climate change.

Expedition 393 will first visit the youngest site of the transect (Site U1559, 7 Ma crust) to core basement in Hole U1559B, where a reentry system was installed during Expedition 390C. Basement drilling at this site had been planned for Expedition 390 but was postponed because of the drawworks brake failure. The ship will then transit to Site U1558 (on 49 Ma crust), the westernmost site of Expedition 393, where we will core a sediment hole and a basement hole. We will then move to the only site along the transect that has yet to be visited, proposed Site SATL-33B (on 31 Ma crust), to core two sediment holes and one basement hole. Finally, the ship will core two sediment holes and one basement hole at Site U1560 (15 Ma crust). The basement holes at the four Expedition 393 sites will be logged.

Science Results

The Expedition 393 science party includes shipboard scientists from nine IODP member countries and shorebased scientists from one additional member country. There is one shipboard Outreach Officer and one shorebased Outreach Officer, both from the USA. The seven-day hotel quarantine period ran from 2–9 June. On 3 June, crossover meetings were held between the laboratory groups of Expeditions 390 and 393 before most of the Expedition 390 scientists disembarked from the JR on 4 June. From 4 to 8 June, Expedition 393 scientists received a virtual orientation to the ship and IODP procedures, including publication obligations, curation, laboratory safety, shipboard outreach, onboard computing and shipboard software, and life at sea. Scientists gave presentations of their individual research objectives, began organizing research collaborations, and worked within their laboratory groups to review methods from Expedition 390.

At 1100 h on 9 June, most of the Expedition 393 scientists and JRSO staff boarded the ship and moved into their cabins. All scientists immediately went onto shift as part of the COVID mitigation protocols. Scientists who were on shift in the afternoon took a safety and orientation tour of the vessel and began familiarizing themselves with the laboratories and connecting to the ship's computer network. On 10 June, six more JRSO staff and scientists boarded the ship. All shipboard personnel took a final PCR test for COVID-19 before departure. Antigen testing will be used during the 14-day COVID-19 mitigation period at sea. The captain gave ship safety and orientation presentations to the day shift and night shift scientists, and scientists on the night shift

took a safety and orientation tour of the ship. On 11 June, the final three scientists boarded the ship at 0630 h. The pilot boarded at 0910 h and the ship departed Repair Quay 3, with the last line released at 0949 h.

Education and Outreach

This week, the Onboard Outreach Officer posted on social media, contacted programs to generate interest for ship-to-shore broadcasts, and wrote a post for the expedition log.

- [Twitter](#) had an average 83 engagements and 9 news followers per day and an engagement rate of 3%.
- [Facebook](#) had reached 8,892 people, with 282 page views, and added 36 followers.
- [Instagram](#) had 12 new posts, reached 2,577 accounts, engaged 320 accounts, and had 75 new followers, 10 unfollows.
- On 10 June we held an introductory video link with the Reach the World educational organization, which will be posted on the Reach the World blog and YouTube channel.
- One new [JR blog](#) post: All we want are some rocks, published 9 June by Tessa Peixoto.

Technical Support and HSE Activities

The following technical support activities took place during Week 1.

Laboratory Port Call and Transit Activities

- Technicians unpacked oncoming freight, trained new staff, and gave ship safety tours, safety training, and laboratory introductions to the scientists in each laboratory.
- Five unsplit uppermost basement sections from Holes U1558A and U1560A, cored on Expeditions 390C and 395E, were recurated and the 360° exterior was imaged on the Deutsche Montan Technologie (DMT) scanner.
- Preparations were made for microbiological sampling at the first site, Site U1559. One microbiological chemical reagent did not make the shipment and an emergency replacement was ordered and sent to Cape Town. It arrived in time and was delivered on the boat that picked up the UPS contractors of 11 June.
- Instruments in the laboratories were calibrated.
- The Bruker X-ray diffraction (XRD) instrument does not stay on long enough to run samples, so we will use the older AERIS XRD instrument on this expedition.
- The magnetic orientation tools (Icefield 2043 and 2052) passed alignment and rotational tests.
- Both superconducting rock magnetometer (SRM) Haskris cooling systems were flushed and cleaned. The backup system is primed, tested, and ready to go online. Technicians

and paleomagnetists were trained in the procedure for swapping the Haskris systems. The SRM profile was within ± 10 nT so it was not necessary to re-trap the field re-trap.

- Emergency showers and eye-wash stations were checked.

IT support

- Gave onboarding information to scientists and new staff and configured their personal devices for the ship network.
- Conducted the start-of-expedition MCS procedures and environment checks. Created multiple expedition related distribution lists per requests from the Expedition Project Manager and technical staff.

Applications support

- Created LIMS accounts for scientists and new staff, and set the necessary LIMS permissions to those accounts. Cleaned LIMS tables.
- Reset “legacy” flag to the cores, sections, and section halves of Expeditions 390C and 395E which are being described on this expedition.
- Fixing a bug in LIVE data viewer.