

IODP Expedition 391: Walvis Ridge Hotspot

Week 3 Report (19–25 December 2021)

The third week of the International Ocean Discovery Program (IODP) Expedition 391, Walvis Ridge Hotspot, included the completion of the transit back to Cape Town, South Africa, and handling the shipboard medical situation that prompted the temporary return to port. All times in this report are in ship local time (UTC + 2 h).

Operations

This week began with the vessel underway to Cape Town, South Africa, with several suspected cases of COVID-19 on board. At the start of Week 3, there were 220 nmi remaining in the 977 nmi voyage. The ship reduced its speed to arrive at the anchorage location outside of Cape Town harbor in the early morning of 20 December 2021. At 0650 h on that day, the anchor was dropped. The personnel who had tested positive for the COVID-19 virus through rapid (antigen) testing were disembarked by water taxis and taken to a Cape Town hotel for isolation. The harbor pilot boarded the vessel at 1114 h and the anchor was raised and off bottom at 1120 h. Directed by the harbor pilot, the vessel proceeded to Landing Wharf 2 in the port of Cape Town. Two harbor tugboats joined the vessel at 1142 h and assisted in its mooring. The first line ashore was at 1224 h, ending the 1.75 nmi pilotage passage from the anchorage to the berth site. All lines were secured by 1307 h and the pilot departed the vessel. COVID-19 PCR testing for all remaining shipboard personnel was performed shortly after arrival. Personnel who were close contacts of those who tested positive were disembarked from the vessel and transferred to a hotel to quarantine. An additional positive test was recorded from the first round of shipboard PCR testing. On 21 December, antigen testing continued for crew members that were close associates of the infected personnel, revealing another positive test. These additional infected crew members were disembarked to a hotel to isolate. On 22 December, antigen testing continued for close contacts with the crew. Another positive test was recorded, and the individual was transferred to isolation in a hotel. A protocol of alternating daily PCR and antigen testing was established for all shipboard personnel that started with performing a round of PCR testing on 22 December, which returned only negative results. On 23 December, another complete round of antigen testing was performed, and no positive results were recorded. On 24 December, the first two crew members returned to the ship from hotel isolation. Another round of PCR testing was completed for all vessel personnel. No positive tests were recorded from continued close contact antigen testing. However, one crew member who tested negative was isolated on board with a suspected COVID-19-related symptom. On 25 December, the results from the previous day's PCR testing were received and antigen tests were performed on all personnel aboard the ship. The symptomatic crew member isolated on board was confirmed as a positive COVID-19 case by not only the PCR testing but also the antigen test administered, representing the only positive

result on that day. The infected person departed the ship to isolate in a hotel. The scientists and JRSO personnel continued to test negative.

Science Results

Scientists spent the week continuing laboratory preparations. They also held meetings to discuss science priorities for the remaining operational time. Enhanced shipboard COVID-19 mitigation protocols were followed.

Core Description

The core description team continued to familiarize itself with Core Laboratory instruments, receiving training on those instruments and associated techniques. DESClogik core description software templates for macroscopic and microscopic core observations were further refined.

Biostratigraphy

In the paleontology laboratory, the micropalaeontologists processed several “play” samples collected during previous trainings on sediment sampling. Those samples enabled scientists to test the transmitted light and stereo microscopes as well as the IODP JRSO Image Capture software. Moreover, the micropaleontology team submitted a proposal for the drilling site preferences to both the Expedition Project Manager and Co-Chief Scientists that was subsequently presented to the entire science party during the drill site science priorities meeting.

Paleomagnetism

Since the *JOIDES Resolution* was back in port, it provided an opportunity for the paleomagnetists to measure anisotropy of magnetic susceptibility (AMS) on dummy samples with the new AGICO Multifunction Kappabridge MFK2 magnetic susceptibility meter. This machine is so sensitive that it had been impossible to use it so far while at sea. The paleomagnetism laboratory staff managed to run a calibration experiment with the 2D and the 3D rotators of the MFK2 instrument, as well as the 2D rotator of the older KLY-4 Kappabridge susceptibility meter. Utilizing each of these three calibrations, the values of bulk susceptibility and the various anisotropy parameters (K1, K2, K3, lineation, foliation) were measured three different times, yielding consistent values on six “play” soft sediment cubes and one sedimentary rock cube. Unfortunately, these measurements could be done only once, as every other time, the thermal stability was not good enough to carry out reliable measurements. Attempts at improving the magnetic shielding of the MFK2 instrument were explored but ultimately failed to significantly reduce the ambient field. As such, we have decided not to use the new MFK2 instrument during the expedition and will instead conduct susceptibility measurements with the older AGICO KLY-4 susceptibility meter. Also, more in-depth research was conducted on the bounds of the expected basement ages of the primary sites for Expedition 391 to determine those most likely to produce paleolatitudes constraining relevant true polar wander events. A report

discussing the identified preferred sites (proposed primary Sites CT-04A and VB-12A) based on this research was written and sent to the Expedition Project Manager and Co-Chief Scientists, as well as discussed in person.

Geochemistry

The IW and organic geochemists continued to familiarize themselves with the laboratory instruments, including testing the instruments. The team received training on ion chromatography (IC) sample preparation and the use of related software. They performed the test to measure major cations and anions in IW using the diluted standard seawater (IAPSO). The team was also trained on how to store data obtained from the laboratory instruments using LIMS. Further, the team discussed its research priorities for preferred drill sites, and also had similar discussions with other research teams.

The igneous geochemistry team performed a preliminary experiment using reference materials for an additional digestion method of chalcophile elements.

Physical Properties

The physical properties specialists continued to refine their methods chapter and measurement techniques. Whole-round and section half sections and cylindrical specimens of “play” sediment core were used to simulate workflow and gain familiarity with physical properties instrumentation, software, and data sets. IODP JRSO laboratory technicians provided guidance for hypothetical core processing scenarios and provided suggestions for optimizing the timing of measurements and sampling. Finally, physical properties specialists collaborated with other shipboard scientists to map out the measurement and sampling sequence in the Core Laboratory.

Outreach

This week, Expedition 391 hosted six live broadcast events, reaching an audience of 349 people in two countries (USA and Namibia). A Facebook Live video event also took place, featuring both R/V *JOIDES Resolution* and E/V *Nautilus*. Forty-eight people attended the live event, and 667 people have viewed the video since. Twelve posts were made on [Twitter](#), leading to 41,889 impressions, 1609 engagements, 376 likes, 55 retweets, and 28 replies. Twitter engagement increased by 206% compared to the previous seven days. Ten posts were made on [Facebook](#) that reached 19,253 people, leading to 1,822 engagements, 743 reactions, 23 shares, and 88 comments. Facebook engagement increased by 179% compared to the previous week. Five posts were made to [Instagram](#). These Instagram posts reached 4,235 people, elicited 496 reactions, eight shares, and six comments. One new blog post was written by the Outreach Officer for the *JOIDES Resolution* web page. Website page views are up 7% compared to the previous 30 days.

Technical Support and HSE Activities

This week, JRSO technical staff focused on continued laboratory orientations for the science party as well as assistance with setting up the instruments and coordination of COVID-19 testing schedules. The technical staff also worked on several laboratory projects.

Laboratory Activities

- Coordinated daily meal selections for meal delivery service and daily COVID-19 testing for the IODP JRSO staff and science party.
- The issue reported two weeks ago on the bead maker not fusing beads at the correct temperature has been resolved. Upon return to Cape Town harbor, the internal components were inspected, cleaned, and tightened by an electronics technician.
- The Thin Section Technician gave instructional seminars on the making of thin sections to interested staff and scientists.
- The X-ray Technician was instructed on the clay separation technique. The X-ray Technician also inventoried the powder standards and updated laboratory documentation.
- Work continued on integrating the new ZEISS microscope cameras into the IODP JRSO workflow.
- The Core Description Technician trained on using the Thin Section Report Builder and creating LIVE templates. Daily general core description training of new technicians continued.
- The Paleomagnetism Technician ran measurements to compare the values of the two Kappabridge instruments, AGICO KLY-4 and MFK2, and experimented with shielding for these Kappabridge instruments. They worked on a user guide for the MFK2 magnetic susceptibility meter.
- Performed physical counts of supplies and updated inventory. This activity included training new staff on inventory control.
- Completed integration of the CryoWatch BuzzBox (CWBB) 5000, a unit that will deliver a visual light and audible alarm when any of the environmental variables of the cryogenic compressor monitored by the CryoWatch software are in an alarm state.
- The Publications Specialist prepared documentation for onboarding and training of a new Publications Specialist scheduled to sail the next expedition.
- Designed and 3D printed a mount for the Malvern Panalytical AERIS X-ray diffractometer barcode reader.
- Designed a mounting bracket for the novel water sampling bottle. New materials will be ordered to complete the project.
- Updated various user guides and other documentation.

IT Support Activities

- Finished configuration settings on the previously updated software environment monitoring workstation and ensured its proper functioning.
- Searched ship's computers for digital asset management installs, and found and removed two installations to prevent possible exploit.
- Performed Microsoft operating system updates on all spare laptops.
- Temporary satellite outage on 22 December prompted interaction with Marlink to remediate the issue.

Application Support Activities

- Continued to solve the vulnerability security issue on several applications using a popular Java library service, such as ThinSectionReport and CorrDownloader.
- Held preliminary discussions with the paleomagnetism technician on writing a data uploader for the new AGICO MFK2 magnetic susceptibility meter.
- Deployed the latest version of Quality Control (QC) Viewer, now ready for use by the technical staff.

HSE Activities

- The safety shower and eye wash stations were tested.