IODP Expedition 391: Walvis Ridge Hotspot

Week 4 Report (26 December 2021–1 January 2022)

The fourth week of the International Ocean Discovery Program (IODP) Expedition 391, Walvis Ridge Hotspot, included resolving the shipboard medical situation while in Cape Town harbor, the transit to Site U1575 (proposed Site FR-01B), and onset of operations at this site. All times in this report are in ship local time (UTC + 2 h).

Operations

This week began with the vessel being tied up at Landing Wharf 2 in the port of Cape Town, South Africa, to continue alternating daily COVID-19 PCR and rapid (antigen) testing for all shipboard personnel while managing isolation of infected crew and quarantine of close contacts in a Cape Town hotel. On 26 December, PCR tests were administered for all personnel on the vessel, and all results were negative. One crew member returned to the ship upon completion of the hotel isolation period. On 27 December, an additional 16 crew members returned after their isolation period was completed. All 16 individuals tested negative for COVID-19 prior to their return. Antigen testing was performed on all vessel personnel, yielding solely negative results. On 28 December, PCR tests were administered for all personnel on the vessel. Three personnel returned to the ship upon completion of their hotel quarantine period. Surface freight was loaded, consisting of laboratory supplies. Pending COVID-19 testing results, the ship was scheduled to depart Cape Town the following day. On 29 December, antigen tests were administered for all personnel on the vessel and results from the previous PCR testing were received. All tests were negative for COVID-19, initiating the preparation for departure. Three personnel returned to the ship upon completion of their hotel isolation period. Also, fresh fruit and vegetables were loaded on board. The ship was secured for transit and the harbor pilot came aboard at 1301 h. Two harbor tugboats were then made fast by 1318 h and the vessel departed the Landing Wharf 2 with the last line released at 1330 h, proceeding to the pilot station. The pilot disembarked at 1354 h and our sea passage to proposed Site FR-01B (Site U1575) started at 1400 h on 29 December 2021. During the transit, antigen testing was implemented for all vessel personnel daily, and all results were negative. After a 967 nmi transit averaging 12.2 kt, the vessel arrived at Site U1575 at 2100 h on 1 January 2022. The thrusters were lowered and secured at 2138 h and the vessel shifted from cruise mode to dynamic positioning (DP) mode at 2140 h. The drill floor began operations at 2145 h. The rotary core barrel (RCB) bottom-hole assembly (BHA)—including the bit, mechanical bit release, outer core barrel, top sub, and head sub—was assembled and lowered to 161.1 m below sea level by midnight.

Science Results

Scientists spent the week completing setup of the laboratories. Each laboratory team also held a final preparation meeting with their laboratory technicians and the Expedition Project Manager in anticipation of the first core on deck. Enhanced shipboard COVID-19 mitigation protocols were being followed.

Core Description

The core description team continued to familiarize itself with the Core Laboratory instruments and techniques. The Methods chapter was revised. DESClogik core description software templates for macroscopic and microscopic core observations were further refined in preparation for the first dill site (Site U1575).

Biostratigraphy

The micropaleontologists continued with laboratory preparation. Methylene blue (methylthioninium chloride) was dissolved in water to obtain a blue solution that will be used to assess the cleanliness of the sieves during sample preparation. A visual inspection of the utensils that will be used for micropaleontological preparation was performed. Also, the micropaleontology and core description teams held a meeting to discuss relevant aspects for DESClogik and visual core description (VCD) sheets.

Paleomagnetism

The paleomagnetists used the transit time to the first site to implement measurements of four quality-control samples that were made by the paleomagnetics technician with a piece of magnetic recording tape glued inside a discrete sample cube and magnetized with an isothermal remanent magnetization. Each sample was measured 20× with the JR-6 spinner magnetometer to obtain the magnetization intensity with standard deviation, as well as inclination and declination values with Fisher statistics. These results can be used for cross-calibration of the two magnetometer instruments (JR6 and superconducting rock magnetometer [SRM]) and as a control for developments or software modifications that might take place during future expeditions.

Geochemistry

The interstitial water (IW)/organic geochemistry team received basic training on the laboratory instruments during the transit to Site U1575. The team performed tests on pH and alkalinity measurements using the Metrohm 794 Basic Titrino Autotitrator. The results of pH and alkalinity for the standard seawater (IAPSO) were within a 2% uncertainty range of the certified values. The team placed a portable clean bench for microbial sampling with the help of the technical staff, and its performance was examined using the particle counter. The team also conducted final checking of the IW extraction using Carver presses prior to arrival at Site U1575.

The igneous geochemistry team prepared for inductively coupled plasma–atomic emission spectroscopy (ICP-AES) measurements. Standard samples were ignited in a furnace at 950°C for 4 h, and loss of ignition (LOI) values were measured.

Physical Properties

The physical properties specialists continued to refine their methods and rehearse measurement and sampling workflow while in port and during transit to Site U1575. A play core was measured on all physical properties instruments to gain an understanding of procedures, software, and data sets. The physical properties technician assisted the physical properties specialists in devising a sampling and measurement protocol.

Outreach

This week, Expedition 391 had no live broadcast events to shore, as schools, universities, and other institutions were out of session for the holiday break. Eleven posts were made on Twitter, leading to 29,631 impressions, 1108 engagements, 342 likes, 56 retweets, and seven replies. Eight posts were made on Facebook, reaching 14,794 people, and leading to 1,430 engagements, 570 reactions, 25 shares, and 13 comments. Five posts were made to Instagram. These Instagram posts reached 3,783 people, elicited 445 reactions, eight shares, and six comments. Two new blog posts were written by the Outreach Officer for the *JOIDES Resolution* web page.

Technical Support and HSE Activities

This week, JRSO technical staff focused on continued laboratory orientations for the science party as well as assistance with completing preparation of the instruments.

Laboratory Activities

- Loaded IODP JRSO surface freight consisting of laboratory supplies.
- Coordinated daily COVID-19 testing for IODP JRSO staff and science party.
- Prepared the laboratories and instrumentation for coring operations and reviewed procedures with the science party.
- The Curatorial Specialist prepared new sampling plans for the revised operations plan.
- Inventoried library books in Paleontology and Physical Properties Laboratories.
- The X-ray technician performed analysis on clay separation samples with the Bruker and Malvern Panalytical AERIS X-ray diffractometers to compare results and document measurement parameters. The technician also organized the laboratory and continued to update laboratory documentation.

- Contacted EIVA company support about how the NaviPac Helmsman navigation and positioning software displays speed and distance because the displays are not accurate. The support ticket is still open.
- Investigated issues with the post-processing of images from the X-ray Imaging Logger.
- The Paleomagnetics technician and scientists ran measurements while in transit to compare the values of the two AGICO Kappabridge magnetometer instruments KLY-4 and MFK2. The technician continued work on a user guide for the MFK2 and started preparing a project charter for an uploader for the MFK2 data.
- Introduced the new Quality Control (QC) Viewer application that graphically displays Quality Assurance (QA)/QC data of standards. This prompted adding more standards to the database and discussions on future standards.
- Performed maintenance on the lever that closes the lid on the ShatterBox® ring and puck mill so that it closes properly and securely.
- Replaced the hinges on the door of the Laser Engraver instrument and realigned it so that the interlocks are engaged every time the door is closed.
- Updated several user guides and other documentation in the Confluence web space.
- Made a wood prototype of the mounting bracket designed for the new water sampling bottle and made improvements in the design.

IT Support Activities

- Configured the Microbiology Laboratory Microsoft workstation for Spot camera usage.
- Applied updates to all shipboard Microsoft workstations and rebooted these subsequently.
- Assisted the shipboard software developer with remediating permission issues on servers of an open source Java servlet and Java Server Page container that enables developers to implement Java applications.
- Encountered issues where various shipboard parties were not able to transmit or receive email traffic intermittently. Contacted Texas A&M University (TAMU) Helpdesk and was advised that the campus Exchange server SMTP queue was congested and TAMU support was investigating the matter. This issue is ongoing.

Application Support Activities

- The software developer assisted the paleomagnetics technician with drafting a plan to implement a Kappabridge MFK2 magnetometer uploader and how to report data, and helped the technician create and modify standard samples for the SRM.
- Implemented testing to see if the ImageCapture software can talk to ZEISS Cameras.

HSE Activities

- The safety shower and eye wash stations were tested.
- Hazardous materials handling orientation was given to laboratory staff.