**IODP Expedition 395C: Reykjanes Mantle Convection and Climate: Crustal Objectives**

**Week 1 Report (5–12 June 2021)**

## Operations

International Ocean Discovery Program (IODP) Expedition 395C, Reykjanes Mantle Convection and Climate: Crustal Objectives, began at 0818 h (UTC + 0 h) on 5 June 2021, with the first line ashore at Berth 10 Scarfabakki, Reykjavík, Iceland. The crew and JRSO staff began port call activities with the offloading and onloading of freight, while the oncoming staff and crew continued to isolate in a hotel following the JRSO COVID-19 quarantine and testing procedures. JRSO staff crossovers took place virtually to minimize unnecessary in-person contact.

On 8 June the Expedition 395E staff and crew disembarked and the majority of the oncoming crew and staff boarded the vessel in the morning after testing negative for COVID-19. An additional 26 oncoming personnel, who arrived in Reykjavík a day later than planned, boarded the vessel on 9 June. All personnel observed shipboard COVID-19 safety protocols, which will be lifted after being at sea for two weeks. There are no scientists sailing on this expedition.

The JRSO staff began preparing the laboratories to receive core and water samples. The weather wall was constructed along the core receiving platform in anticipation of cold temperatures and inclement weather. The pre-site meeting for proposed Sites REYK-13A and 6A (Sites U1555 and U1554) took place on 10 June and the JRSO Staff, Co-Chief Scientists, Schlumberger engineer, and Siem Offshore crew reviewed the upcoming operations.

The final JRSO staff member boarded the ship at 0700 h on 11 June. At 0852 h the pilot boarded the ship and the crew began unmooring. This process was delayed when one of the mooring lines got caught in the tugboat propeller. The last line was away at 0948 h and the pilot disembarked the vessel at 1000 h. The ship began the sea passage to proposed Site REYK-13A (Site U1555).

After a 312 nmi transit averaging 11.6 kt, the ship arrived on site at 1225 h on 12 June. The thrusters were lowered and secured at 1254 h and Site U1555 operations began at 1300 h. The crew began to assemble the drill collars until the weather deteriorated with wind blowing up to 40 kt. From 1645 to 2045 h the vessel was waiting on weather. After the wind died down, the crew continued to assemble the drill collars and make up the drill bit.

## Science Objectives

IODP Expedition 395C set out to complete targeted operations for Expedition 395, which was postponed due to the COVID-19 pandemic. The Expedition 395 science objectives focus on drilling, coring, and downhole operations at five primary sites along the Reykjanes Ridge in the North Atlantic.

The intersection between the Mid-Atlantic Ridge and Iceland hotspot provides a natural laboratory where the composition and dynamics of Earth's upper mantle can be observed. Plume-ridge interaction drives variations in the melting regime, which result in a range of crustal types, including a series of V-shaped ridges (VSRs) and V-shaped troughs (VSTs) south of Iceland. Time-dependent mantle upwelling beneath Iceland dynamically supports regional bathymetry and leads to changes in the height of oceanic gateways, which in turn control the flow of deep water on geologic timescales.

Expedition 395 has three objectives: (1) to test contrasting hypotheses for the formation of VSRs, (2) to understand temporal changes in ocean circulation and explore connections with plume activity, and (3) to reconstruct the evolving chemistry of hydrothermal fluids with increasing crustal age and varying sediment thickness and crustal architecture. The operations during Expedition 395C will target objectives (1) and (3). Casing and reentry systems will be set at the sites supporting objective (2), with full coring and logging operations occurring at a later time. Operations at two primary sites (U1554 and U1555) occurred during Expedition 384 in 2020. At Site U1555 (proposed Site REYK-13A) basement was cored from the sediment-basement interface to 130 m into basement. Shallow sediment coring at Site U1554 (proposed Site REYK-6A), a sediment drift site, was used to test core orientation tools. Three holes were cored to ~75 meters below sea level (mbsl) and used to construct a stratigraphic splice.

This expedition will recover basaltic samples from crust that is blanketed by sediments and is thus inaccessible when using dredging. Major, trace, and isotope geochemistry of basalts will allow us to observe spatial and temporal variations in mantle melting processes. We will test the hypothesis that the Iceland plume thermally pulses on two timescales (5–10 and ~30 Ma), leading to fundamental changes in crustal architecture. This idea will be tested against alternative hypotheses involving propagating rifts and buoyant mantle upwelling.

Millennial-scale paleoclimate records are contained in rapidly accumulated sediments of contourite drifts in this region. The accumulation rate of these sediments is a proxy for ocean current strength, which is moderated by dynamic support of oceanic gateways such as the Greenland-Scotland Ridge. These sediments also provide constraints for climatic events including Pliocene warmth, the onset of Northern Hemisphere glaciation, and abrupt Late Pleistocene climate change. Recovered sediments and basalts will provide a major advance in our understanding of mantle dynamics and the linked nature of Earth's interior, oceans, and climate.

## Education and Outreach

Education and outreach for Expedition 395C is being led by shore-based Outreach Officer Jose Cuevas of Boston College. Social media duties are shared by Jose and shipboard Imaging Specialist Sarah Kachovich. Over the course of the cruise, there are plans for videos, shore-to-shore video conferences, and blog posts.

The first blog post was written by Expedition 395 scientist Boris Karatsolis.

*Social Media Posts*

Social media is spread across three platforms: Facebook, Twitter, and Instagram. The table below summarizes the metrics and impacts of original posts (retweets not included). This includes impressions, which are the number of times a post has been displayed, and engagements, which includes likes, shares, and comments.

Social media is a collaborative effort, with many of the Expedition 395 science party and Expedition 395C technical staff engaged in posting original content and sharing posts from the *JOIDES Resolution* accounts.

| Platform | Number of Posts | Impressions | Engagements |
|---|---|---|---|
| Facebook | 11 | 19079 | 1702 |
| Twitter | 25 | 58334 | 2006 |
| Instagram | 4 | | 289 likes |

**Technical Support and HSE Activities**

The JRSO technical staff were engaged in port call logistics, cruise planning, and safety training.

*Port Call and Laboratory Activities*

- The oncoming and offgoing freight was handled and distributed.
- Orientation and training were held for the new technical staff.
- Sample plans, laboratories, and instrumentation were prepared for coring operations.
- The cold weather wall was installed on the core receiving platform.
- The wiring in the Bathy 2010 system, which was run during the transit to the first site, was repaired.

*IT Support Activities*

- The Expedition 395C email distribution groups were set up.
- Oncoming staff were assisted in connecting devices to the ship network.
- The Samba service for receiving downhole logging data is being repaired.
- A new Zebra printer was installed at the smear slide station.
- Operating system updates were installed and tested.
- Updates were made to Confluence.

*Developer Support Activities*

- LIMS accounts were set up for the new technicians and passwords were reset for others.
- The Expedition 395E database information was archived and cleared.
- Work is continuing on the QCViewer project.

*Health and Safety Activities*

- A safety orientation was held for new technical staff.
- The safety shower and eye wash stations were tested.
- An abandon ship drill was held at 1300 h on 11 July.