

IODP Expedition 403: Fram Strait Paleo-Archive

Week 1 Report (4–9 June 2024)

Operations

International Ocean Discovery Program (IODP) Expedition 403, Eastern Fram Strait Paleo-Archive, began at 0800 h on 4 June 2024 with the vessel tied up in Berth 4 at Damen Shipyards in Amsterdam, Netherlands. All scientists, staff, and crew members underwent COVID testing on 6 June. The final air freight containing two sonar heads for use on the vibration isolated television (VIT) system arrived on 6 June, and one of the sonar heads was installed on the VIT and tested. The vessel was readied for departure for proposed Site VRE-03 (Site U1618).

The pilot boarded the vessel at 0730 h on 7 June and the last line was away at 0810 h. The vessel transited the North Sea Canal from Amsterdam, clearing the lock at Ijmuiden and entering the North Sea at 1029 h. The pilot was away at 1100 h and the vessel began the transit to proposed Site VRE-03. The vessel speed was reduced on 8 and 9 June due to weather and sea state during the transit. At the end of the week, the vessel completed 625 nmi of the 1677 nmi journey to proposed Site VRE-03.

Science Objectives

Expedition 403 aims to investigate the Eastern Fram Strait, the only deepwater passage connecting the central Arctic Ocean with the Northern Atlantic and lower latitudes.

The main objectives of the expedition are to:

1. Understand and reconstruct the West Spitzbergen Current (WSC).
2. Develop high-resolution, Late Miocene–Quaternary chronostratigraphic records.
3. Generate multiproxy records to constrain mechanisms for Late Miocene–Quaternary climate transitions.
4. Identify climate variations such as Heinrich events and associated meltwater discharge.
5. Evaluate impact of meltwater events on paleoceanography, paleoenvironment, and paleoclimate.
6. Reconstruct paleo-Svalbard Barents Sea Ice Sheet (SBSIS) dynamics in relation to the WSC and as an analogue for the West Antarctic Ice Sheet (WAIS).
7. Investigate influence of the WSC, sea ice, and climate on microbial populations.

In Fram Strait, six primary sites are planned, ranging in water depth from 1201 to 1681 meters below sea level (mbsl). Targeted drill depths range from 258 to 738 meters below seafloor (mbsf). Given that the ice situation above 79°N remains favorable, the first site to be occupied during Expedition 403 is proposed Site VRE-03A at the Eastern Vestnesa Ridge. As of the end of this week, the ship is scheduled to arrive at proposed Site VRE-03A the morning of 14 June.

Science Results

The Co-Chief Scientists, 23 JRSO staff members, and two ice navigators boarded the vessel on 4 June at 1015 h. In the early afternoon, the Co-Chief Scientists and Expedition Project Manager (EPM) received their first briefing on the sea ice situation north of 79°N, the area of proposed primary Sites VRE-03A and VRW-03A. The following day, the 22 science party members plus three Outreach Officers went through immigration and boarded the vessel. The scientists met in the conference room for a welcome and orientation, life at sea, and safety presentations. In the early afternoon everyone attended ship safety orientation tours led by the Laboratory Officer and the two Assistant Laboratory Officers (ALOs). On 6 June, the final two JRSO staff members boarded the vessel. Throughout the rest of the week, all scientists attended ship and laboratory safety trainings, as well as presentations by the Ship's Captain, Ship's Doctor, ALOs, Publications Specialist, Curator, Operations Superintendent, and EPM. JRSO technicians provided each laboratory group shift with in-depth training for their work areas and equipment. Sediment cores from previous expeditions that were designated for training and educational purposes were used to familiarize the physical properties and core description groups with the operation of their laboratory-specific logging tracks. All laboratory groups worked on their methods chapters.

Outreach

For the Co-Chief Scientists, Outreach Officers, and EPM, the outreach activities began two days before the official start of the expedition, with filming at the Rotterdam Maeslantkering storm surge barrier (2 June) and media interviews aboard the *JOIDES Resolution* (3 June). The first week on board was spent largely on getting coverage of the departure for the film and outreach, and on preparing for future posts and stories. The Outreach Officers gave a presentation to the science party about outreach and the planned documentary. We developed routines and schedules for outreach tasks, including blogs, reports, and social media, and the coordination between Outreach Officers and different research groups. We posted original video content across socials and continued to build a consistent visual language for the expedition.

Technical Support and HSE Activities

Laboratory Activities

- Conducted training for life at sea, laboratory safety, and hazard communication. Offered presentations on ship safety, curation, IT, and publications. Led a laboratory safety tour.
- Conducted laboratory-specific training in all of the laboratories.
- Conducted a dry run for the ancient DNA sampling procedure on the catwalk and in the splitting room.
- Tested the nonhydrofluoric acid (HF) method for palynology processing in the Paleo Prep Laboratory.
- Performed an inventory check for the highest priority laboratory items.
- Arranged D-tube boxes in the reefer to create initial core storage space.
- Set up the GI gun and microbiology tracer pump.
- Set up the third-party Anelastic Strain Recovery (ASR) tool and reviewed the sampling and analysis method.
- Conducted general core flow tours for the science party.

Application Support Activities

- Set up GEODESC for the expedition.
- Assisted the correlators with the use of software.
- Set up for iRIS testing.
- Worked on the Hyperscan project.

IT Support Activities

- Configured devices and laptops for the shipboard networks.
- Applied Windows Server updates.
- Deployed updates for Chrome and Firefox to address security vulnerabilities.
- Performed routine maintenance.

HSE Activities

- Emergency shower and eye wash stations were tested.
- COPE Protocol is being followed.
- COVID testing conducted on June 6
 - One science party member and one SEA1 crew member tested positive and are currently in quarantine.
- A lifeboat drill was conducted on 7 June.