IODP Expedition 374: Ross Sea West Antarctic Ice Sheet History

Week 1 Report (4–6 January 2018)

Operations

The Ross Sea West Antarctic Ice Sheet (WAIS) History Expedition 374 began with the first line ashore at Berth No. 2 in Lyttelton, New Zealand, at 0706 h (local ship time, UTC + 13 h) on 4 January 2018. After clearing immigration and customs, the IODP JRSO technical staff, Co-Chief Scientists, and Expedition Project Manager boarded the vessel. The Expedition 372 science party moved off the vessel and, after a 5 h crossover, the Expedition 372 IODP JRSO technical staff moved off the vessel. After conducting a press conference, holding VIP and media tours, and loading of IODP and Siem airfreight and some critical ocean freight, the vessel shifted from Berth No. 2 to Berth No. 7 to begin the remainder of port call operations. The following day the remainder of the science party moved aboard and the Siem Offshore crew change was completed. Local university faculty, staff, and students were given tours of the vessel. Most of the Schlumberger logging-while-drilling (LWD) tools were offloaded and bulk-loading operations began. We also received 41 short tons of barite and 135 short tons of sepiolite. On the third day of port call, the aft core line was removed in preparation for installation of new coring line. Frozen food and dry stores were loaded and the remaining Schlumberger LWD tools were offloaded. After completing loading operations on 6 January, the vessel was shifted from Berth No. 7 to the Oil Berth for fueling. The last mooring line was released at 1735 h and the first line ashore at the Oil Berth was secured at 1750 h, ending the very short passage. At the end of the first week we were moored at the Oil Berth taking on fuel (640 metric tons) for Expedition 374.

Science Results

The Ross Sea WAIS History Expedition (based on IODP Proposals 751-Full2, 751-Add, 751-Add2, and 751-Add3) will investigate the relationship between climatic/oceanic change and WAIS evolution through the Neogene and Quaternary. The expedition targets a latitudinal and depth transect of six sites from the outer continental shelf to rise in the eastern Ross Sea. Numerical models indicate that this region is highly sensitive to changes in ocean heat flux and sea level, making this a key target to understand past ice sheet variability under a range of climatic forcings. The proposed drilling is designed to optimize data-model integration for improved understanding of Antarctic Ice Sheet mass balance during climates warmer than present.

Sediments, rocks, and fluids recovered during this expedition will be used (1) to evaluate WAIS contribution to far-field ice volume and sea level estimates; (2) to reconstruct ice proximal atmospheric and oceanic temperatures to identify periods of past polar amplification and assess

forcings/feedbacks; (3) to assess the role of oceanic forcing (e.g., sea level, temperature) on WAIS instability; (4) to document WAIS sensitivity to Earth's orbital configuration under varying climate boundary conditions; and (5) to reconstruct eastern Ross Sea bathymetry to examine relationships among seafloor geometry, ice sheet instability, and global climate. These objectives will be achieved by single coring at four shelf sites with penetration depths of 500–950 m below seafloor (mbsf) in water depths of 480–680 m, as well as double or triple coring at two slope/rise sites with penetration depths of 500–1000 mbsf in 1500–2550 m of water.

The science party for Expedition 374 includes scientists of 14 nationalities from 13 IODP member countries, as well as educators from New Zealand and France, and an American science communicator/videographer. The first three days of the expedition were spent introducing the scientists to life aboard the *JOIDES Resolution* and what to expect during the expedition. The Captain welcomed the scientists to the ship and gave them an introduction to policies and procedures aboard the vessel. The scientists received instruction in shipboard safety from both the IODP JRSO technical staff and Ship's Doctor, and were given a tour to familiarize them with the ship. They also completed personal laptop setup and were introduced to the shipboard server structure.

Education and Outreach

Education and Outreach (E&O) activities included a press conference on the first day of port call, several ship tours, blogging, posts to social media, and collection of video footage. We conducted a media press conference in the afternoon of 4 January, with the Expedition 372 Co-Chief Scientists giving an overview of the results of their expedition, and the Expedition 374 Co-Chief Scientists giving an introduction to the expedition scientific objectives. We also conducted three tours for the attendees of the press conference, as well as three additional tours the following day for local university faculty, staff, and students.

We have had three Facebook posts (https://www.facebook.com/joidesresolution), two tweets (and several retweets) (https://twitter.com/TheJR), one Instagram post (http://instagram.com/joides_resolution), and two blogs posted to the *JOIDES Resolution* Expedition 374 page (http://joidesresolution.org/expedition/374/). These posts outlined the expedition objectives and activities during port call.

Additional E&O activities have focused on scheduling live broadcasts and video interviews with the Co-Chief Scientists and science party members.

Technical Support and HSE Activities

The following technical support activities took place during week 1.

Port Call Activities

- Crossover with offgoing IODP JRSO technical staff was completed on 4 January.
- Daily staff meetings were held during port call.
- Laboratory tours were conducted for two groups on 4 January and three groups on 5 January.
- Expedition 372 container (one 20 ft) and World Courier temperature-controlled shipment offloaded.
- Expedition 374 surface and air shipments were received.

Laboratory Activities

- Laboratories are being prepared for coring.
- Developers started beginning of expedition activities, including creating laboratory data management accounts for participants and new staff, as well as beginning routine setups.

HSE Activities

- Conducted life at sea and laboratory safety talk and tour for scientists.