IODP Expedition 350: Izu Bonin Mariana Rear Arc

Week 1 Report (30 March–5 April 2014)

Operations

The Izu Bonin Mariana (IBM) Rear Arc Expedition began with the first line ashore at Berth E4 of the Passenger Terminal in Keelung, Taiwan at 0710 h on 30 March 2014. This also ended the South China Sea Tectonics Expedition.

The first week of Expedition 350 consisted almost entirely of port call activities in Keelung, Taiwan, including repairs to the incinerator exhaust, annual inspection of the life rafts, bulk transfer, and loading fresh food and all routine surface and air freight. Expedition 349 freight was offloaded, and all Expedition 349 core samples were transferred to refrigerated containers and dispatched to the Kochi Core Center in Kochi, Japan. All microbiological samples were offloaded and dispatched to the Expedition 349 scientists' home institutions. Five trucks of barite and five of sea gel were loaded. The beginning bulk totals for Expedition 350 are 122.5 short tons of barite, 207.7 short tons of sea gel, and 74.6 short tons of cement. The crew had to mix mud in port to make room for oncoming bulk. A 40 ft container had to be landed on the bridge deck to load food after which the empty container was cleaned and returned to the dock.

With all port call activities completed, the *JOIDES Resolution* departed Keelung for Site U1436 (proposed site IBM-4GT) at 0753 h on 4 April. The average transit speed during the first two days was ~11.4 kt.

Science Results

The goal of IODP Expedition 350 is to core and log one site on the Izu Bonin Mariana rear arc to test three pairs of alternative hypotheses about crustal genesis and mantle evolution:

1. Geochemically asymmetric crust, which is most like "average continent" in the rear arc, is either (a) a fundamental trait of crust in oceanic arcs that is produced in a steady state throughout arc history since Paleogene inception or (b) a secondary trait that develops only after back-arc spreading;
2. Intracrustal differentiation amplifies this asymmetry (a) continuously as a steady-state process or (b) mostly during non-steady-state events such as arc rifting; and
3. After or near the cessation of the Shikoku back-arc basin opening, rear-arc magmatism either (a) started from the western end of the rear-arc seamount chains and migrated eastward or (b) started at the same time along the length of the rear-arc seamount chains but ended from west to east.

Testing these hypotheses requires a temporal record of across-arc variation in magma composition from Eocene to Neogene time. This information is in hand for the volcanic front but missing for the rear arc, which overlies the majority of "continental type" crust. Specifically, our objectives are to establish the temporal history of across-arc variations during five time periods that stand out in the rear arc evolution: 0–3 Ma, 3–9 Ma, 9–17 Ma, 17–25 Ma, and >25 Ma. We will determine whether there were across-arc variations even at the initial stage of arc development. The rear arc contains the record of the "other half" of the subduction factory output, and recovering that record is essential to the IBM drilling strategy.

A secondary goal of Expedition 350 is to obtain a geotechnical core for a potential future deep (5500 mbsf) drilling program at proposed Site IBM-4 with the *Chikyu*. This one-day operation is carried out at the beginning of the expedition for practical reasons.

During the first week of Expedition 350, scientists started to become familiarized with the ship's laboratories, and the sampling and measurement procedures used on the ship. Scientists and new USIO personnel received safety training and information by the Captain and key crew members of the *JOIDES Resolution*. The scientific party started to converge on a sampling plan for shipboard and shore-based analyses. They also started to work on the methods sections of the expedition reports.

Education and Outreach

This week we prepared the iPads that will be used to connect with school groups and communicate via social media. This included installing the videoconferencing software (Zoom; Skype) as well as Instagram software so images and short videos of ship activities can be instantly uploaded. We have also been contacting the schools and colleges that signed up for video sessions to set up some test transmissions. We have also spent time with the Science Party so we understand what each person will be doing while on board. We provided the video-conference schedule to the Science Party so they can decide which session they want to participate in. We are actively working with members of the Science Party to identify additional school groups that we might connect with during the trip. We started populating the *JOIDES Resolution* website blog (http://joidesresolution.org/blog), and posting images/film clips to Instagram, as well as some tweets. We have recorded footage of activities onboard and one episode has already been uploaded to the *JOIDES Resolution* website while the rest are prepared for posting.

Technical Support and HSE Activities

The USIO staff completed a full crossover during port call. The IODP Manager of Science Operations gave the staff an update on the plans for implementing scientific drilling operations

following the end of Fiscal Year 2013 (30 September 2014). Technical staff helped the catering staff load food supplies due to port logistical delays.

The laboratories were handed over in good condition with no major outstanding issues. Off-going staff replaced a faulty board in the bathymetric system and systems tests were successful. We are waiting on a reply from the vendor before putting the system into full survey operations. The magnetometer will not be used during Expedition 350 per agreement with Japanese authorities.

All hands completed the standard Introduction and Safety Meetings. The first weekly fire and boat drill was completed. The new safety policy was distributed to staff. A new emergency number was posted around the ship.

Staff have been working with the science party to train them in the various shipboard laboratory systems.