IODP Expedition 351: Izu Bonin Mariana Arc Origins

Week 6 Report (29 June–5 July 2014)

Operations

Hole U1438E was reentered at 0115 h on 29 June. After the subsea camera system was recovered at 0545 h, we lowered the drill string to the bottom of the 10.75 inch casing (605 mbsf). After a mud sweep, drilling with the rotary core barrel (RCB) center bit began at 0945 h. Drilling continued to 867.3 mbsf at an average penetration rate of 18.0 m/hr. The hole then was swept with multiple high viscosity mud sweeps, the RCB center bit was recovered, and we started RCB coring in Hole U1438E at 0900 h on 30 June. Coring continued through Core U1438E-43R (1255 mbsf), after which knobby drilling joints were used at the top of the drill string through the guide horn in the moonpool, rather than joints of 5.5 inch drill pipe. This decision was based on a combination of water depth and coring penetration rate. RCB coring continued through Core U1438E-50R (1319.6 mbsf) when we had to stop coring at 1825 h on 5 July due to Typhoon "Neoguri" which had ~200 mph winds and was on a track that could have potentially placed the ship at risk. Therefore, the Captain decided to move the vessel ~200 nmi to the east. After laying out the knobby drilling joints, we began recovering the drill string at 2145 h on 5 July. We plan to stay east of the typhoon and then move southward, tracking back to Site U1438 to resume operations.

Science Results

New cores were recovered from Hole U1438E starting on 30 June, and the core description team recommenced core description activities. Forty-four cores had been described by the end of the week. Over the week, the core material has moved into generally finer-grained lithologies, such as tuffaceous siltstones and mudstones, with more evidence for diagenetic processes and more induration. Personal sampling of the cores also continued around the noon crossover each day. At the beginning of the week, the core description team submitted a draft of their Site U1438 Report, covering data and observations for Holes U1438A, U1438B, and U1438D. Also early in the week, they met with other laboratory groups to review and discuss lithostratigraphic unit designations and other findings from the core material.

The micropaleontology team analyzed the fossil content of core catcher samples from Hole U1438E. The foraminifer, nannofossil, and radiolarian content are very low. Calcareous nannofossils are present in only a few samples, and provide a lowest age estimate of Zone NP20–NP17 (~34.4–38.3 Ma) in Sample U1438E-36R-4W, 47–48 cm. All samples below this to U1438E-44R-CC are barren. Foraminifer analyses have been carried out up to Sample U1438E-42R-CC; all are barren except Sample U1438E-4R-CC that contains a deep-water benthic

foraminifer, and Sample U1438E-28R-CC that contains some non-diagnostic planktonic foraminifers. Radiolarian analyses have been carried out up to Sample U1438E-44R-CC. Occurrences are low, and radiolarians are poorly preserved such that species designation is not possible. A Site Report draft was also completed with data for all of Holes U1438A, U1438B, and U1438D.

From the newly recovered cores of Hole U1438E, the geochemistry group only managed to obtain four interstitial water (IW) samples from Sections U1438E-6R-4, 7R-5, 10R-3 and 12R-3. The concentrations of major elements in the water revealed a continuation of patterns observed in profiles of Hole U1438D. Sufficient quantitites of IW are not expected from the remaining cores of Hole U1438E, so the geochemistry team started preparations to analyze solid samples on the ICP-AES.

The paleomagnetic team began measuring and demagnetizing archive half core sections from Hole U1438E. Due to the nature of the sedimentary sections encountered, it has highlighted the need to defer using magnetostratigraphy to determine the age-depth model for Hole U1438E until the majority of core sections have been measured to match observed magnetozones robustly with the geomagnetic polarity timescale. Anisotropy of low field magnetic susceptibility was measured on a range of discrete samples from Hole U1438D, which generally show simple depositional fabrics.

The physical properties team measured the standard physical properties, including *P*-wave sonic velocity, thermal conductivity, density, porosity, magnetic susceptibility, and natural gamma radiation, from the core of Hole U1438E. In addition to measuring the *P*-wave velocity on the working half core sections, they also decided to take cube samples from the core to measure *P*-wave sonic velocities in three orthogonal directions. The same samples were used for moisture and density (MAD) analysis, but because the new analyses meant that the samples must first be saturated with seawater using a vacuum, this procedure lead to a backlog of samples. Thus, it was decided to reduce the sampling rate to, at most, three samples for detailed analysis per core. They also worked closely with the downhole measurements team to revise the correlation between the *P*-wave and density measurements on the cores from Holes U1438B, U1438D, and U1438E, and the seismic profiles. Revised estimates for depth to basement were computed with the available data.

Education and Outreach

The Education Officers continued work on their deliverables for the expedition. Scientist interviews were uploaded to YouTube, as were photographs depicting the science performed on board and shipboard life. Additional interviews were conducted with scientists in the ongoing "Story of a Scientist" video project. Social media outlets were continuously updated, including Facebook (https://www.facebook.com/joidesresolution), Twitter (https://twitter.com/TheJR), and

Instagram (http://instagram.com/joides_resolution). Facebook page "Likes" are up to 4,710, and the "Total Reach" increased by 25% this past week to 5,800 people, while 1,300 people were actively involved (clicking, liking, sharing, messaging). A Facebook contest was held for participants to guess the drill penetration depth with the winners receiving a free T-shirt. The contest ran for four days and reached at least 7,800 people. The Education Officers are considering resuming the contest once we return to Site U1438E.

Preparations for upcoming broadcasts continued with emails and test scheduling. Two Zoom sessions were held with oncoming Education Officers for Expedition 352 in preparation for their arrival. Broadcasts dropped off this week due to the July 4th holiday, but will pick up in the upcoming week.

Technical Support and HSE Activities

The technical group was mainly involved in core handling as well as setting up core sections for science party personal sampling and taking the requested samples. Specific activities of the laboratories and support groups included:

Core laboratory

- Shipboard and personal sampling is ongoing with daily sampling parties around the noon crossover meeting.
- There has been nominal duplication of sample records for several smear slides (SED) which has been rectified.

Paleontology laboratory

- There has been nominal duplication of sample records for several radiolarian (RADS), foraminifer (FORAM), and calcareous nannofossil (NANNO) slides, which has been rectified.

Chemistry laboratory

- Remove failed/incomplete carbon, hydrogen, nitrogen and sulfur (CHNS) runs from the elemental analyzer so they do not show up on the worklist.

Application developers/IT

- Continued development on the LIMS Reports III framework.
- The Section Half Imaging Logger (SHIL) experienced a camera sensor failure. A spare camera was swapped in, which led to a SHIL code change to address sensor noise with the earlier model camera swapped into place.
- Participated in miscellaneous data cleanups (see above in Paleontology and Chemistry laboratories).

Miscellaneous

- Installation of elevator door hold open magnets is ongoing.
- The ship's engineering department has eliminated the sewer odors in the laboratories on the core deck by installing an extension to the vent pipe.

Health and Safety Activities

- Eyewash and safety showers were tested.
- A boat and fire drill took place on June 30.
- A man overboard drill took place on July 2.