IODP Expedition 351: Izu Bonin Mariana Arc Origins

Week 5 Report (22–28 June 2014)

Operations

After recovering the reentry cone jet-in bottom-hole assembly (BHA) used to land the 16 inch conductor casing that extended to 60.1 mbsf, the drilling line was slipped and cut and the casing running tool was de-torqued and laid out. After the bit cleared and was back on the rig floor (1200 h on 22 June), preparations immediately began for drilling the 14.75 inch borehole to install the 10.75 inch casing. On 23 June, the subsea camera system was deployed and Hole U1438E was reentered at 0450 h. The subsea camera system was recovered, the drill string was lowered to the bottom of the 16 inch conductor casing (60.1 mbsf), and drilling of the 14.75 inch hole began at 0930 h. Drilling concluded at a total depth of 613.0 mbsf at 1445 h on 24 June and the hole appeared to be in excellent condition. The hole was swept multiple times with high viscosity sepiolite mud and only one wiper trip was needed due to the good borehole condition. No overpull or drag was present during the wiper trip and there was no fill identified on the bottom. The drill string was recovered by 1250 h on 25 June after which preparations began for deploying the 10.75 inch casing string. The casing running tool was made up and a mud motor was picked up along with an underreamer. Both the mud motor and underreamer were tested in the moonpool to ensure proper functionality. At 1800 h (25 June) we started assembling the casing. By 0030 h on 26 June, a total 44 joints casing had been assembled and hung off in the moonpool. In a little over 6 h, the internal "stinger" assembly was made up that included the mud motor, underreamer, and a 9.875 inch tri-cone pilot bit. At 0645 h on 26 June, the subsea camera system was deployed to visually confirm that the underreamer arms were spaced out correctly below the 10.75 inch casing shoe. The subsea camera system was back on board by 0830 h and at 1030 h deployment of the drill string and casing commenced. The subsea camera system was deployed again once the drill string was at the seafloor and Hole U1438E was reentered at 2235 h on 26 June. At 0145 h on 27 June, the casing string was lowered into the hole and by 1225 h the casing hanger was landed at the seafloor; the casing shoe was at a depth of 605 mbsf. After 30 min, the casing running tool was successfully released.

The drill pipe was raised up to 577.38 mbsf while the subsea camera system was recovered. The bit cleared the reentry cone at 1805 h on 27 June and the drill string was recovered. At 1045 h on 28 June, we began assembling a rotary core barrel (RCB) coring BHA. As of midnight on 28 June, the drill string with the RCB BHA had been deployed to a depth of 4643 mbsl. The subsea camera system was in the process of being lowered to assist in reentering Hole U1438E.

Science Results

The core description team submitted the first draft of a report summarizing findings for Holes U1438A and U1438B, and worked on synthesizing findings for Hole U1438D. The method used for the personal sampling of Cores U1438D-13R to 72R enabled them to briefly reexamine the cores and request additional thin sections and smear slides. The team discussed at crossover meetings the designation of Site U1438 units and facies, correlation between Holes U1438B and U1438D, and assignment of duties for writing their Site U1438 reports. Late in the week, the team met with the Co-chief Scientists, the Staff Scientist and the Publications Specialist to review their initial site report draft and finalize plans for the final site report.

Additional strewn slides for radiolarian identification have confirmed a late Early–early Middle Miocene age for Sample U1438B-14H-CC. All samples from Sample U1438D-48R-CC to the bottom of Hole U1438D have been analyzed for foraminifer content, which includes many barren samples with only occasional fossils. The micropaleontology group has been updating and improving the age-model and depositional environmental interpretation of Holes U1438A, U1438B, and U1438D, as well as entering data into DESClogik. The first draft of the site report thus far for all microfossil groups was completed and reviewed.

The geochemistry group measured the major/minor elements in all of the interstitial water (IW) samples (Holes U1438B and U1438D) using inductively coupled plasma–atomic emission spectroscopy (ICP-AES). Selected dilutions of IAPSO (International Association for the Physical Sciences of the Oceans) seawater standards were run repeatedly and intercalated with the IW samples to calculate the precision and accuracy of the method. Regarding the major elements, calcium replaces sodium as the major cation at about 700 mbsf. The depth profiles of the analytical results of IW samples indicate a neutral pH from the sediment-seawater interface until the first major lithological change at about 157 mbsf. Below this depth, pH progresses towards clearly alkaline values. Redox potential (E_h) measurements revealed oxidizing interstitial water, even in the deeper sections of Site U1438. This is in agreement with the relatively high sulfate concentration found in the deepest sections of Hole U1438D (~18 mmol/L of sulfate at about 879 mbsf).

The paleomagnetic team completed SRM archive half core measurements of sections from Hole U1438D, and analyzed the resulting remanence data in order to construct a complete magnetostratigraphy for this hole. They conducted thermal demagnetization experiments on a suite of samples from the hole to determine unblocking temperature characteristics of the sediment samples.

The physical properties team worked on the analysis of *P*-wave sonic velocity, densities, porosities, magnetic susceptibility, and natural gamma radiation measurements from Holes U1438B and U1438D. They worked closely with the downhole logging team to better estimate the depth to basement through the creation of synthetic seismograms by correlating the major reflectors in velocity measured on cores with the seismic data. They constructed seismic travel

time-depth relations and compared these results obtained with the two crossing multichannel seismic lines. Their estimates, primarily based on the *P*-wave velocities from the core, vary substantially, but fall within the range originally estimated precruise. Based on the consolidation of samples from Hole U1438D, they explored the possibility of switching to the procedure used to measure sonic velocities in basement rocks. In preparation for new samples from Hole U1438E, the team selected samples from near the base of Hole U1438D and had these cut into cubes with square faces, saturated the samples with seawater with a vacuum system, and then performed discrete analyses in three orthogonal directions. The sonic velocities were judged to be of higher quality but within the range measured with the half sections. Also during the week, the logging data acquired via the triple combination tool string from Hole U1438D were processed and interpreted. The log and core data show good agreement throughout the measured interval, particularly with the magnetic susceptibility. Ash layers identified on cores were also precisely correlated with spectral gamma ray measurements.

Education and Outreach

Social media outlets (Facebook [https://www.facebook.com/joidesresolution], Twitter [https://twitter.com/TheJR], and Instagram [http://instagram.com/joides_resolution]) were routinely updated. Facebook page "Likes" have increased 0.3% and we have surpassed 4700, although engagement continues to fall. We are succeeding in retaining those following the *JOIDES Resolution* page as there have been far fewer people "unliking" our page than in previous periods. Coring operations have not recommenced so the contest for the Facebook page is on hold for the time being.

Science party interviews are underway and will be posted to media outlets when completed and as bandwidth allows. Time has been spent coordinating shipboard events both with the crew and Publications Specialist. Broadcasts continued throughout the week and requests for more broadcasts were sent out via social media and the the *JOIDES Resolution* website (http://joidesresolution.org/). Additional broadcast requests are coming though and we are trying to fill in the remaining time slots.

Technical Support and HSE Activities

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

Core laboratory

- Personal sampling of all cores from Holes U1438A, U1438B, and U1438D was completed.

Application developers/IT

- Continued development on LORE (LIMS On-line Reporting Environment) and supporting LIMS Reports (III) improvements.
- Re-established the data sync of DESC content for shore-based publications group use.
- Repaired Report Overview display in shore test facility.
- Tracked down GeoMapApp, a Generic Mapping Tools (GMT) application, for future shipboard use if requested.
- Tracked down MATLAB sources for the Temperature Fit tool.
- Miscellaneous data revisions with daily DrillReport, DESC content, and empty experiment comments.
- Undertook preparations for the fall password refresh in the shipboard environment.

Health and Safety Activities

- Eyewash and safety showers were tested.
- A boat and fire drill took place on June 22.