

IODP Expedition 351: Izu Bonin Mariana Arc Origins

Week 9 Report (20–26 July 2014)

Operations

Rotary core barrel (RCB) coring continued using non-magnetic core barrels and 30 ft knobby drilling joints through the guide horn. The last core from Hole U1438E was recovered at 0030 h on 21 July. Core U1438E-88R extended to 1611.0 mbsf and 150.1 m into basement. Two mud sweeps were then pumped to ensure that all cuttings were completely flushed from the hole and the bit was released. However, while pulling up, the sandline parted at ~3490 mbsf; the sinker bar assembly, the rotary shifting tool (RST), and ~125 m of sandline fell through the bottom of the drill string and were left in the hole. At 0230 h on 21 July, the driller began recovering the drill string, but tight hole conditions were immediately encountered. The top drive was used to back ream out of the hole up to 1591.1 mbsf over the next 45 min. During this time circulation was lost as well. The next 6.5 h were spent slowly back reaming with the top drive up to 1340.5 mbsf where circulation was restored. The trip then continued without incident up into the 10.75 inch casing shoe at 605 mbsf, and then up to 190 mbsf. At 1515 h on 21 July, the rig-up for wireline logging commenced with preparations to deploy the triple combo tool string. The nuclear source was not deployed due to poor hole condition. The triple combo was lowered into the hole but could not pass 1186 mbsf. Log data was obtained from that point up to 10.75 inch casing at 605 mbsf; the tool string was recovered at 0125 h on 22 July. As the triple combo caliper data indicated that borehole diameter was too large to allow running the FMS-sonic and Versatile Seismic Imager (VSI) tool strings, we deployed the experimental Göttingen tri-axial borehole magnetometer (GBM). This tool string also reached 1186 mbsf and the run was completed by 1235 h. We recovered the drill string and Hole U1438E ended at 2315 h on 22 July. The ship was offset 10 m north and 20 m west of Hole U1438A, and we assembled a 3-stand bottom-hole assembly (BHA) with a bit release and a 9.875 inch tri-cone drill bit. The drill string was tripped to the seafloor and Hole U1438F was spudded at 1203 h on 23 July. This hole was intended to be dedicated for wireline logging only. Hole U1438F was drilled to 700.0 mbsf by 1915 h on 24 July. A mud sweep was pumped to clean the hole of cuttings; however, circulation rates were held to a minimum so as to maintain hole quality and reduce borehole wall erosion. A wiper trip was also conducted from 109.0 mbsf to the total depth. The hole appeared to be in excellent condition with no overpull, drag, fill, or excessive torque. At 0200 h on 25 July, we attempted to release the bit. The sleeve appeared to shift and a loss of pump pressure appeared to confirm the release. By 0745 h, the drill string had been pulled back to 95 mbsf. While circulating the pipe to clear any possible blockage from the pipe tripping, it was discovered that the circulating pressure was higher than it should be. This led to the determination that the bit had apparently not come off the end of the pipe. As a result, a decision was made to run the pipe back to bottom and attempt a second release, which was successful. The drill string was raised up to 95 mbsf again by 1700 h on 25 July. Shortly thereafter, the triple

combo was prepared. The tool string was deployed at 1855 h and ran to 699 mbsf. At 0335 h on 26 July, the triple combo was recovered. At 0425 h 26 July, the VSI tool string was deployed to 691 mbsf (9 m off bottom). This tool string was recovered by 1210 h and the FMS-sonic tool string was deployed at 1400 h to 689 mbsf (11 m off bottom). The FMS-sonic was out by 2040 h and the rig floor was rigged down from wireline logging. At 2230 h, the last pipe trip of the expedition began.

Science Results

The last of the basement cores were described (Cores U1438E-84R to 88R). The cores contain more basalt with a few thin layers of tuffaceous limestone, and some alteration features, including chlorite, brown oxide, and carbonate coronas. The multiple veins of hematite and carbonate continued with oxide halos reaching 2 cm in width. Additionally, the core describers finalized the description of lithostratigraphic Unit IV (the final sedimentary section above basement), as well as the correlation between Holes U1438D and U1438E.

The remaining samples for radiolarian biostratigraphy from Unit IV were sieved, dried, and examined using reflected-light methods and identified using a scanning electron microscope (SEM). This technique requires more time than the standard identification using transmitted-light techniques, and will be completed onshore. The specimens are highly altered, which makes species or even genus identification challenging. However, since there are no calcareous microfossils, the radiolarians are the most promising for age determination.

The majority of the week was spent wireline logging. The logging group logged Hole U1438E from 600–1200 mbsf with the triple combo and the Göttingen tri-axial borehole magnetometer (GBM). The caliper on the triple combo indicated that the minimum diameter of the borehole was 18 inch. Therefore, the FMS-sonic and VSI tool strings were not deployed because the hole diameter is greater than the maximum limit for them to make good measurements. However, gamma ray, resistivity, magnetic susceptibility, and magnetic data seem to be reasonably good. Hole U1438F was also logged to 700 mbsf. Due to time constraints only the standard suite of tool strings were run. The triple combo caliper indicated a borehole diameter of ~10 inch. All of the tools strings reached close to the bottom of the hole and the data are of excellent quality. A correlation between the three different logged sites will be possible, and allow a comparison with the core data.

With the end of coring on 21 July, the science party spent the majority of the week finalizing shipboard measurements, sampling the remaining basement cores for post-expedition research, data input, and report writing in preparation for the end of the expedition. The core describers finalized DESClogik entries to produce clear and useful visual core descriptions (VCDs), and provided core summaries for sedimentary rocks and section summaries, including thin section descriptions, for igneous rocks. The micropaleontology team also completed the input of all data

into the DESClogik system, and generated range charts of the species found and the age-depth plot for Site U1438. The geochemists finished the analyses for major and trace elements in igneous basement samples. Significant drift and decreased data quality during the final ICP-AES runs was noticed. This was discovered to result from the nebulizer clogging. However, major element analyses were successful. The paleomagnetic team finished measuring and demagnetizing archive half core sections from Hole U1438E, and carried out thermal demagnetization of additional discrete samples from the sedimentary sequence (Unit IV) and basement (Unit 1) of Hole U1438E. The physical properties group completed all moisture and density (MAD) and sonic velocity analysis of the discrete samples from Unit IV.

Education and Outreach

Work continued to focus on finishing ship-based projects and deliverables. Final interviews were conducted with scientists, and filming scientific work continued. Additional work on an expedition-based video was completed, and one additional science party interview is near completion. Educational broadcasts have concluded for this expedition, with a total of 39 broadcasts reaching >1,000 individuals.

Social media outlets were updated (<http://joidesresolution.org>, Twitter [<https://twitter.com/TheJR>], Facebook [<https://www.facebook.com/joidesresolution>]), with a continued strong following on Facebook. New likes continued to trickle in on Facebook; final numbers will be in excess of 250 new likes for this expedition. Final preparations for departure are beginning, and include transferring files and preparing equipment for transport.

Technical Support and HSE Activities

The beginning of the week was spent handling and processing hard rock cores from Hole U1438E. The remainder of the week was occupied with preparing for the end of the expedition. Specific notes for the different laboratories include:

Core Laboratory

- Finished processing hard rock cores both for shipboard and post-expedition sampling.

Thin Section Laboratory

- All remaining thin sections were completed.

Paleomagnetism Laboratory

- The Kappabridge has an unresolvable motion error. It will be shipped back to IODP for repair.

Underway Geophysics Laboratory

- The seismic source for versatile seismic experiment was run successfully.

Application Developers and Information Technology

- Continued development on LIMS Reports III.
- Began end-of-expedition data management with all systems, except ICP-AES, SRM, DESClogik and the SEM, staged to “data1” and/or “Uservol” for backups.
- Handled routine ICP-AES data rejection requests.
- Provided some Kappabridge troubleshooting assistance with a motion control failure, but was unable to resolve.
- Upload whole round line-scan image surface composites.

Miscellaneous

- Off-going shipments are being assembled and shipping papers drawn up.
- Inventory has been updated.

Health and Safety Activities

- The eyewash and safety showers were tested.
- A boat and fire drill was completed on 24 July.