IODP Expedition 351: Izu Bonin Mariana Arc Origins

Week 2 Report (2–7 June 2014)

Operations

Port call logistical operations continued through 3 June. The total casing loaded for Expedition 351 included 62 joints of 10.75 inch casing and 32 joints of 16 inch casing. The total amount of borrowed 5 inch drill pipe loaded was 189 joints. One hundred thirty-five of these joints were made up into 45 stands and racked while the remaining 54 joints were secured. All of the bulk loading was completed, including a total of ~20 short tons of cement and ~160 short tons of Sepiolite sea gel. We also took on ~2200 metric tons of fuel. The installation of the new fiber optic subsea camera (VIT) cable was completed with full system testing, and then syntactic foam buoyancy blocks were installed on the frame. The Operations Superintendent conducted two ship tours for the science party, and a limited tour and discussions were held with CDEX/JAMSTEC personnel. Several VIP tours were given for the U.S. Ambassador to Japan, embassy staff, and other high-ranking officials from MEXT, including the Deputy-Director General. With logistics operations completed and all supplies and freight secured, we departed from Yokohama on 4 June with the last line away from Honmoku Jetty, Berth 3, at 0552 h. Once clear, the sea passage to the first site commenced at 0745 h.

The transit was uneventful until we were advised that there was an immigration issue involving several technicians and scientists. IODP logistics personnel and our local ship's agent were able to negotiate with Japanese immigration officials to avoid bringing the ship back into port and to allow the passengers to remain on the ship. At ~1800 h on 4 June, the ship reversed course and prepared for a rendezvous with a tug at 2308 h. Once documents were transferred to allow the revision of the passengers' visas, the ship headed back toward Site U1438 (IBM-1). The weather deteriorated on 5 June with the ship heading into heavy seas, high winds, and strong currents; this slowed the ship to 6.0 kt. However, by the early morning of 6 June, the weather had improved and the ship's speed was >11 kt. The transit to Site U1438 was completed at 0245 h on 7 June. The thrusters and hydrophones were lowered, the remaining 54 joints of borrowed 5 inch drill pipe were made up into stands and drill collars were made up and racked back in the derrick. The drill string was tripped to the seafloor by 2130 h. The subsea camera system was lowered at a slower rate because of the syntactic foam buoyancy blocks. Deployment was initially compromised because the winch brakes would not release, but the problem (air in the hydraulic lines) was quickly corrected and deployment of the subsea camera system resumed at a speed of ~30 m/min (typical deployment speed is ~50 m/min) to perform a seafloor survey.

Science Results

Over the week, the science party familiarized themselves with life aboard *JOIDES Resolution* from the day-to-day routine to the workings of the various laboratories.

IODP technical staff trained the core description team, which includes sedimentologists and igneous petrologists, in:

1. Scanning cores with the section half track systems.
2. How to enter core descriptions into DESClogik.
3. Procedures to view collected data.
4. Procedures for taking shipboard samples.
5. Demonstration of newly installed petrographic microscopes.

The two shifts held meetings and developed a scheme detailing primary and secondary responsibilities for each shift. Several days were spent reviewing and fine-tuning the methodology that will be used to describe and classify the recovered sediments, sedimentary rocks and igneous rocks. The group produced a comprehensive core description scheme that covers all types of sedimentary materials potentially recovered. The week culminated in the finalization and submission of a draft of the Core Description Methods section for the *Proceedings* volume. The team spent Saturday honing their core description skills in eager anticipation of "core on deck."

The micropaleontology team, consisting of two nannofossil, one foraminifer, and one radiolarian specialist, set up their microscopes by adjusting the type of objectives and checking the camera and software for image capturing. The microscopes and their cameras are functioning well. The team worked with technical staff to prepare the laboratory for the different microfossil processing procedures. A draft Methods section was completed, which modified the procedures used by the IBM Rear Arc Expedition 350 (ages, zones, abundances). The team assisted the core describers in identifying the major microfossil groups in smear slides (diatoms, silicoflagellates, nannofossils, radiolarians, palynomorphs and foraminifers), practiced DESClogik input, and discussed research plans for potential collaborations with the rest of the science party.

The geochemistry group was trained on the workflow and safety rules needed for the core sampling and onboard geochemical analyses. A whole-round sample for interstitial water (IW) will be taken in every core for as long as possible. Sediment samples for headspace gas and microbiological analyses will also be taken in each core for a representation of the biogeochemical conditions. The following analyses will be performed onboard: salinity, pH; alkalinity, oxidation/reduction potential (ORP), major and minor elements by inductively coupled plasma atomic emission spectroscopy (ICP-AES), ion chromatography (IC), salinity, chloride (titration), ammonium and phosphate. To meet the primary objectives of the expedition,

Ce and Nd will be added to the list of trace elements analyzed via ICP-AES on whole rock samples. We will perform two ICP-AES runs on each hard rock sample: (1) major and trace elements run with a solution-to-sample dilution factor of 4000, and (2) higher quality trace element data run with a solution-to-sample dilution factor of 500. The pH/alkalinity and ORP will be measured immediately after IW is taken, while the aliquots for IC, ICP-AES, chloride titration, and ammonium will be measured in batches. The following bulk chemical analyses will be performed using the sample residue after IW squeezing: carbonate, total organic carbon and total nitrogen. A draft Methods section for the *Proceedings* volume was prepared that also included a description of sediment fixation for microbiological fluorescent in situ hybridization (FISH) analysis.

The paleomagnetism team became familiar with laboratory equipment used to measure remanences on archive half cores and discrete samples. They also developed a protocol for efficient processing of cryogenic magnetometer data.

The team of physical property specialists was trained on the Whole-Round Multisensor Logger (WRMSL), including the gamma ray attenuation (GRA), magnetic susceptibility (MS), *P*–wave sonic velocity (PWL) instruments, and the Natural Gamma Radiation Logger (NGRL) and decided on a measurement resolution of 2.5 cm along the whole round sections. They also were trained in the use of the thermal conductivity system. For the bulk of the recovered core, they plan to make one spot measurement on every fifth section. They also plan to make in situ temperature measurements (APCT-3) on cores recovered with the advanced piston corer (APC). Finally, they were also trained in the use of the automated vane shear strength, *P*-wave velocity gantry, and the moisture and density (MAD). Unfortunately, the *P*-wave bayonet in the y-direction is not currently working and this will preclude our ability to infer anisotropy horizontally for the seismic velocity. We will make one measurement of each of these properties per section.

The logging group gave an introduction to borehole geophysics to the scientists followed by a tour to show the different tools that will be use during the Expedition. Logging runs are planned with the triple combo, FMS-sonic, and VSI tool strings. Additionally the third party tool, the Göttingen tri-axial borehole magnetometer (GBM), will be run. All of its components have been successfully tested and are functional.

Education and Outreach

This week the workflow was finalized between both education officers. Due to the volume of internet usage during the day, the majority of blasts were sent out between 2200–0400 h to optimize social media reach. The platforms updated this week were Facebook (https://www.facebook.com/joidesresolution), Twitter (https://twitter.com/TheJR), Instagram (http://instagram.com/joides_resolution), and the *JOIDES Resolution* website

(http://joidesresolution.org/). On the *JR* website, the ship's location, scientist profiles, blogs, and new stories were updated. The education officers have been working to keep up with the volume of spam posts in response to blogs. Facebook traffic has been very good with an increased reach of 73% this week and a 43% increase in generated "Likes." Fifty-two new "Likes" have been added this week through campaigns to the science party and their families, colleagues and friends.

The video broadcasting schedule is nearly complete for the month of June; however, participants continue to express a need for time slot changes, which are being accommodated as the schedule allows. The July schedule is beginning to be finalized and dates/times will be confirmed ~2–3 weeks ahead of the participant's selected date. A generic form was developed to streamline emails to participants for confirming broadcast dates/times. The goal is to decrease the volume of email exchanges required to facilitate a broadcast. Additionally, seven science party members have scheduled or expressed interest in setting up broadcasts with their colleagues or home institutions. To date, three have scheduled broadcasts or set tentative dates.

Technical Support and HSE Activities

Activities in the laboratories mainly included the distribution of freight loaded during the rest of port call and, once underway, preparations for coring. The science party was further acclimated to the laboratories, core flow, and given ship tours. Additionally, high-resolution sampling of cores from the previous IBM Rear Arc Expedition 350 was completed. Specific information for individual laboratories and technical support include:

Chemistry laboratory

- Due to the lack of the injectable calcium gluconate, which was to be supplied by Siem Offshore to the Ship's Doctor, the use of hydrofluoric (HF) acid has been denied.

X-ray diffraction (XRD) laboratory

- The service call (Bruker) was successful and the XRD, at present, is up and running.
- The training of the new technician continued.

Marine Computer Specialists (MCS)

- All systems are operational.
- The IT group gave a presentation to the science party on shipboard facilities and usage.

Application developers

- There was new development for the LIMS On-Line Reporting Environment.
- Assisted with and helped work around an interruption in service from one of the database servers (Etna).

- Troubleshoot via virtual private network (VPN) the use of SampleMaster from the Kochi Core Center (KCC) repository.
- A developer's meeting was held Friday (6 June).
- Revised the end-of-expedition processing to bring home LIME audit entries.
- Revised the Format2Mag utility used in paleomagnetic data analysis for changes in the report (WTR SRM) format.
- Reloaded Site U1436C info (IBM Rear Arc Expedition 350) to enable sampling. After sampling, the content was shipped home for loading into databases on shore and cleared from the ship.
- Recoded containers in ship, shore, and RTIF databases. These do not follow the same naming convention as other samples or standards.
- Provided ongoing support for Drill Report.

Health and Safety Activities

- Chemistry laboratory users were given HF acid safety and awareness training.
- A boat and fire drill took place at 1300 h on June 4.