

IODP Expedition 324: Shastky Rise Formation

Week 1 Report (6-12 September 2009)

14 September 09

OPERATIONS

Expedition 324 started on 4 September at the port of Yokohama. In addition to the routine resupply of expendables and the offloading of Expedition 323 cores and returning freight, some items of note were the loading of 1800 MT of marine gas oil, the overhaul of the passive heave compensator, and service visits by Novenco (air conditioning), RigNet (VSAT), and Hose-McCann (ship phone/intercom/alarm system) field engineers. This port call was also noteworthy for the extensive number of visitors that were treated to a tour of the vessel.

During this port call, we were not able to send or receive email or use the ship's phone system because of local electromagnetic interference, which prevented VSAT operation. Although some maintenance was possible on the aft antenna, the RigNet engineer was unable to perform a systems check and calibration to the VSAT system because of the interference.

Once the last line was released at 0950 hr on 9 September, the vessel was underway to the pilot station. The RigNet engineer stayed aboard and attempted last minute adjustments while working with rig-based technicians. The pilot and RigNet representative disembarked at the pilot station at ~1130 hr. A short time after this, VSAT operation was restored and remained until the first course change. At this time, the signal was lost and in spite of the best efforts of on-board technicians communicating with the RigNet engineer in the hotel via the Inmarsat GMDSS satellite phone, the VSAT system could not be restored to normal working order. After discussing the situation with the agent and the port call coordinator, the decision was made to reverse course, return to a convenient rendezvous point close to Yokohama, and bring the RigNet engineer back to work on the system.

The RigNet engineer was welcomed aboard shortly before 0600 hr on 10 September and remained for nearly two hours restoring the VSAT to operation. Once he departed at 0740 hr, the vessel began the voyage to Prospectus Site SRNH-2.

During the voyage the clocks were advanced one hour placing the vessel in the same time zone as Townsville. There will be no further adjustments to the clock during the expedition. By midnight on 12 September, the vessel has sailed 730 nmi at an average speed of 11.6 knots. The expected time of arrival at Prospectus Site SRNH-2 is slightly before noon on 14 September.

SCIENCE RESULTS

IODP Expedition 324 aims to contribute to the ongoing controversy about large igneous (oceanic) plateau formation by drilling at several sites on the Shatsky Rise, located ~1500 km east of Japan. Igneous oceanic plateaus, such as Shatsky, present one of the largest known volcanic episodes on Earth but can't be easily explained by conventional plate tectonic models.

One hypothesis for the origin of oceanic plateaus is that they reflect eruptions from a "mantle plume head". Despite the wide acceptance of this hypothesis, a convincing case for a plume head origin has not been made for any oceanic plateau. Some scientists therefore question the existence of deep (lower) mantle plumes and attribute the origin of oceanic plateaus and other large igneous provinces to shallow processes related to (shallow) plate tectonics. For example, oceanic plateaus

could form where mid-oceanic spreading ridges form a special geometry (a so called triple-junction).

One great difficulty for answering this question is that the original setting, relative to mid-ocean ridges and plate tectonics, is poorly known for most plateaus because they were formed during the mid-Cretaceous magnetic quiet zone. Shatsky Rise is unique in being the only large oceanic plateau formed during a time of frequent magnetic reversals, permitting its tectonic setting to be resolved. The magnetic lineations reveal that Shatsky Rise formed along the trace of a triple junction, intimately related to ridge tectonics. On the other hand, existing data demonstrate that several aspects of Shatsky Rise's history (e.g., massive, rapid initial growth; transition from large to small magma flux; capture of ridges) fit the plume head model. Its unique combination of features makes Shatsky Rise the best location on Earth to test plume versus plate-tectonic hypotheses of ocean plateau formation.

During IODP Expedition 324 we plan to penetrate ~800 m of igneous basement at five sites on Shatsky Rise to examine the history, magma source(s), and evolution of this plateau. From the results of this expedition, we hope to address the question of whether oceanic plateaus like Shatsky Rise were formed from deep-sourced mantle plumes or interaction of plate boundaries and the lithosphere with the shallow mantle.

At all drill sites only rotary core barrel (RCB) drilling and single penetration is planned. To further save operational time, sediment coring will not start until about ~50 m above expected igneous basement. Three holes with 100 m, one hole with 200 m and one hole with 300 m igneous penetration are anticipated. If hole conditions allow, each hole will be logged with the standard triple combo and the Formation Micro Scanner (FMS). Employment of an Ultrasonic Borehole Imager (UBI) is planned for the deepest hole.

The scientific party arrived on board on Sept. 5. They spent the first week of this expedition learning their laboratories, instrumentation, documenting methods, and practicing core flow and sampling procedures. Descriptive information will be entered into the database using the new DESClogik application. By the end of this week, each descriptive lab group (sedimentology, petrology, alteration, structure) and the biostratigraphers completed the set up of their specific templates in DESClogik, which are used to compile and enter any descriptive information. The igneous core describing groups used Leg 198 cores (igneous sections from Site 1213 are available on board) to practice core flow and description in DESClogik. In addition, each lab group submitted their first draft of the Methods chapter (explanatory notes) for the Proceedings volume.

All scientists met with the curator, co-chief scientists and staff scientists for a first sampling meeting for postcruise research. A procedure for developing a coordinated sampling plan was developed. It was agreed to defer all personal sampling of igneous cores until the transit to Townsville, where we will conduct coordinated sampling parties.

On September 12, the Japanese educator successfully broadcasted a live video interview from the ship to the National Museum of Nature and Science in Tokyo, which was screened before an audience of more than 30 museum visitors. The audience could ask questions to scientists on board of the vessel.

TECHNICAL SUPPORT AND H&S ACTIVITIES

The Expedition 324 technical staff boarded the vessel on September 4 at 1600 hrs. Crossover and training with the off going crew began the next day, September 5, and continued through the remainder of port call. Surface freight and airfreight were loaded. Off going freight was sent to

College Station. Cores were off loaded on September 7 and trucked to the repository in Kochi, Japan.

On September 6 an introduction meeting was held with the science crew. All trash was collected and offloaded before departure. Equipment and laboratory spaces were secured for sea.

During the transit to the first site the technical crew have been preparing the shipboard laboratories for the commencement of coring. The scientific staff was introduced to the labs and technical staff. The magnetometer on loan from WHOI was mounted and the magnetometer deployed successfully on September 10. Underway watches were started at this time.

A boat and fire drill was held for all hands on September 10.