

IODP Expedition 330: Louisville Seamount Trail

Week 1 Report (13-19 December 2010)

OPERATIONS

Expedition 329 ended on schedule when the first line was passed ashore at Wynyard Wharf in Auckland, New Zealand at 0636 hr on 13 December, which also marked the beginning of Expedition 330 (Louisville Seamount Trail). Both ODL and IODP crews were changed subsequent to the conclusion of immigration and custom formalities.

In addition to the usual routine of loading and unloading supplies, there were extensive tours of the vessel for visiting dignitaries and VIPs, scientist interviews with reporters from the local media, and interaction with senior representatives from the Auckland Museum. There were several outstanding maintenance items addressed during this port call including replacing defective field coils in Propulsion Motors 14A, 14B, and 18A and the damaged aft piston rod on the passive heave compensator.

The scheduled departure to the first site was delayed 1.5 hours when the tug boats were diverted to assist an arriving cruise ship. The last line was released at 0806 hr on 18 December. Once the pilot disembarked at 0912 hr, the vessel began the 820 nmi transit to Site U1372 (Prospectus Site LOUI-1C, the second northernmost seamount of the Louisville chain). As of midnight on 19 December, the JR has transited 422.0 nmi at an average speed of 10.9 knots. The estimated time of arrival at Site U1372 is 1600 hr on 21 December.

SCIENCE RESULTS

IODP Expedition 330 aims to contribute to our understanding of mantle plumes and geodynamic Earth models. Hotspot volcanism is generally considered as the surface expression of mantle plumes and hotspots that are assumed to be geographically fixed in relation to each other (thereby forming linear, age-

progressive hotspot tracks on the overriding plates). However, drilling on the Hawaiian-Emperor seamount chain during ODP Leg 197 documented a large $\sim 15^\circ$ southward motion of the Hawaiian hotspot prior to 50 Ma, calling into question whether hotspots constitute a fixed frame of reference.

The Louisville seamount trail is a 4,300 km long volcanic chain that is inferred to have been built in the past 80 m.y. as the Pacific plate moved over a persistent mantle melting anomaly or hotspot. Because of its linear morphology and its long-lived age progressive volcanism, Louisville is the South Pacific counterpart of the much better studied Hawaiian-Emperor seamount trail in the North Pacific. IODP Expedition 330 aims to core similar age seamounts as drilled during Leg 197, to constrain if the Hawaiian and Louisville hotspots have moved in concert or independently from each other. The results will show if both hotspots can still be used as a (moving) reference frame for modeling plate motion in the Pacific or if the textbook idea of relatively-fixed hotspots is further challenged. Additional objectives of this expedition include investigating the geochemical evolution of individual Louisville seamounts including subsidence history, determination of their magma source composition and temperature as well as magma fractionation and eruption history. In addition, any intervals that are recovered from the thin pelagic sediment cover will provide a valuable contribution to high-latitude southern ocean climate reconstruction. This expedition also sails a microbiologist who will investigate the microbial activity in the basement rocks.

The scientific party arrived on board on 14 December. They spent the first week of this expedition familiarizing themselves with the laboratories, instrumentation, documenting methods, and practicing core flow and sampling procedures. They also received a comprehensive training using DESClogik, the new application for entering descriptive data into the ships database via specific templates (excel-like spreadsheets). By the end of this week, the respective templates for each descriptive lab group (sedimentology, petrology, alteration, structure) and the biostratigraphers are largely set up or are in an advanced state of preparation.

The core describing groups used core sections from ODP Leg 197 that are available on board to practice core flow and description in DESClogik. In addition, shipboard sampling strategies and core flow were discussed and approved by the curator. By the end of this week, most laboratory groups submitted their first draft of the Methods chapter for the cruise report. All scientists met with the curator, co-chief scientists and the expedition manager for a first meeting to discuss post-cruise research. A coordinated sampling and research plan was hammered out and is supposed to be agreed on during an upcoming meeting. All personal sampling of igneous and sedimentary cores will happen during two or three sampling parties, which will be conducted during the expedition.

The expeditions education officer started blogging and posting pictures and the expedition videographer took footage of departure and preparation procedures and conducted interviews.

TECHNICAL SUPPORT AND HSE ACTIVITES

During the Auckland portcall, technical staff offloaded science materials from the previous expedition and resupplied the shipboard laboratories. While on transit to our first site, the following activities were completed.

1. Setup the portable XRF equipment
2. Converted the auxiliary table into a third description table
3. Distributed supplies and updated inventories
4. Prepared the laboratories for hard rock coring operations
5. Started assembly of the new core liner engraving system
6. Collected transit magnetometer data

The science party and new technical staff attended the Captain's safety indoctrination and participated in the laboratory safety tour per TAMU Hazardous Communication policy. The weekly fire and boat drill was held as scheduled on 18 December.