**IODP Expedition 345: Hess Deep Plutonic Crust**

**Week 1 Report (11–15 December 2012)**

The first week of IODP Hess Deep Expedition (345) consisted entirely of port call activities in Puntarenas, Costa Rica.

## Operations

IODP Hess Deep Expedition (345) officially began when the ship arrived Puntarenas at 0500 h on 11 December. We started our port call activities including customs and immigration, IODP-USIO crew change and crossover, boarding of chief scientists, and loading of airfreight. Due to shared dock space with cruise ships for the first three days of port call, most port call activities were limited to evening hours.

Activities on 12 December included the ship's crew change, offloading of temperature-controlled sample shipments and all departing sea freight, loading of three containers of freight for the ship's crew and a hydraulic pump required to repair a crane.

Early in the morning of 13 December, we moved to anchorage due to the arrival of two cruise ships. Key USIO staff met with the chief scientists to plan initial Expedition 345 operations. Expedition 345 scientists boarded the ship via water taxi and then underwent safety orientation. In the evening the cruise ships departed, so we were returned to the dock and resumed normal port call activities that included loading of arriving shipments and preparing for tomorrow's loading of drilling mud.

Following the introductions of Hess Deep scientist and technical staff on 14 December, the chief scientists presented an overview of the expedition science objectives. Scientists were given a tour of the laboratories and also underwent an orientation to shipboard computing and communications technology. Loading and storing of supplies continued, including drilling mud.

On 15 December, the Hess Deep scientists were given a presentation covering the expedition science expectations, procedures, deliverables, and obligations. Following this, the final tours of the laboratories and personal computer setup were conducted. Loading of the final drilling supplies and drilling mud were completed.

## Science Results

Expedition 345 will be the second drilling program at the Hess Deep Rift to study crustal accretion processes at the fast-spreading East Pacific Rise (EPR). The expedition will take advantage of well-surveyed crustal exposures to recover the first cores of young, primitive plutonic rocks that comprise the lowermost ocean crust. The principal objective for drilling at Hess Deep is to test competing hypotheses of magmatic accretion and hydrothermal processes at fast-spreading mid-ocean ridges. These hypotheses make predictions that can only be tested with drill core, including the presence or absence of modally layered gabbro, the presence or absence of systematic variations in mineral and bulk rock compositions, and the extent and nature of hydrothermal alteration and deformation. With detailed petrological, chemical, and structural data for cores of deep, primitive gabbros, we will be able to address fundamental questions, such

as: What proportion of the plutonic lower crust is constructed through crystal subsidence, and what proportion is constructed through in situ crystallization? How is melt transported from the mantle through the crust? What is the origin and significance of layering? How, and how fast, is heat extracted from the lower plutonic crust? What are the fluid and geochemical fluxes in the EPR lower plutonic crust?

The highest priority for drilling at the Hess Deep Rift will be to sample one or more, 100 to 250 m long sections of primitive gabbroic rocks. Three primary drill sites have been identified; however, if coring is proceeding well in the first or second of these sites, it will be continued as long as possible in order to obtain the longest possible continuous sample. Drilling and coring operations are anticipated to be challenging during the Hess Deep expedition because of water depths >4800 m, a thin sediment cover, and, potentially, unstable basement formations.

**Education and Outreach**

The education team had a busy first few days and are beginning to work efficiently as a team. The group has a range of skills, Jean-Luc is a teacher of geology, Nicole is a scientific illustrator and Susan is a marine biologist and lecturer. Collectively we have been contacting all the schools that have signed up for a broadcast for the next two weeks and arranging dates for a test of Skype connectivity. Individually Jean-Luc has posted several enigma questions, Nicole has set up the first of her art projects and Susan has been in contact with the seven schools in the UK that are doing extended projects based around the *JOIDES Resolution* and Expedition 345.

We have posted several items on Twitter, Facebook and the *JOIDES Resolution* Blog at joidesresolution.org/blog, prepared a presentation to give to the science party and produced a poster that provides information about the broadcast schedules. The team held their first broadcast to 200 Girl Guides in three separate states yesterday and received very positive feedback from the leaders. During the coming week we have eight broadcasts scheduled.

**Technical Support**

Logistics:

- Technical crew cross-over completed
- All science logistic activities was completed

Laboratory:

- Installed new floor tiles in Underway Lab
- Completed transfer of ET bulk supplies to Underway Lab
- Installed new Bead Maker in the XRD lab
- Installation of the 3.5 transducer on VIT frame in progress

Other:

- Mid-year staff evaluations completed
- Held meeting with Siem staff regarding upcoming maintenance projects for tie-up and dry dock periods.

The following HSE activities took place:

- All hands completed the IODP and Siem Introduction and Safety Meetings
- All hazardous waste from previous expedition offloaded