

## **IODP Expeditions 367 and 368: South China Sea Rifted Margin**

### **Expedition 368 Week 1 Report (9–15 April 2017)**

The first week of the IODP South China Sea Expedition (368) consisted of port call activities in Hong Kong and transit to Site U1501 (*Scientific Prospectus* site SCSII-41A).

#### **Operations**

The South China Sea Rifted Margin Expedition 368 started at 0754 h on 9 April with the first line ashore at the China Merchants Wharf in Hong Kong. After the ship cleared immigration and customs, the Expedition 368 Co-Chief Scientists, IODP staff, and a group of eleven scientists, each representing each ship laboratory, moved onto the ship and started crossover with their Expedition 367 counterparts. Loading and offloading operations began after clearance was issued. Sixty tons of barite were loaded. The rig crew began breaking down 68 stands of 5½ inch drill pipe and laying them out on the riser hold hatch. All life rafts were offloaded for inspection to be returned prior to sailing.

The rest of the Expedition 368 scientists boarded the ship on the morning of 10 April, got settled in their rooms, were introduced to life on board the *JOIDES Resolution*, and participated in an initial laboratory and ship safety tour. Loading and offloading operations continued with the loading of 40 short tons of sepiolite, the containerized science ocean freight, fresh and refrigerated food products, and 300 metric tons of potable water. Cores for shipment to the Gulf Coast Repository and the Kochi Core Center were offloaded from the vessel and loaded into refrigerated containers. Ninety joints of 5½ inch drill pipe were offloaded to the pier and another 72 were broken down and stowed on the riser hold hatch.

On 11 April, major port call activities included loading of 1212 metric tons of marine gas oil and 40 short tons of sepiolite mud (total ~80 short tons). All dry food for Expedition 368 was loaded. The rest of the 204 joints of 5½ inch drill pipe were broken down and offloaded to the pier to be returned for inspection and refurbishment. The vessel continued conducting annual class, radio, and lifeboat surveys. Tours were conducted for members of the Hong Kong Sea Cadet Corps and Hong Kong Baptist University.

On 12 April, casing loading operations were initiated, and tours were conducted for students and faculty from the Southern University of Science and Technology.

On 13 April, casing loading operations were completed. Mud motors, underreamers, and reentry equipment was all loaded and stowed for transit. Annual lifeboat inspections and all other certifications were completed. All equipment was secured for sailing.

At 0600 h on 14 April, immigration authorities boarded the ship and cleared the personnel and vessel for departure. The harbor pilot arrived on board shortly after 0900 h, and with assistance from two harbor tugs the *JOIDES Resolution* was underway, with the last line released at 0912 h. We proceeded to the pilot station, and after a 6 nmi transit the pilot disembarked the ship at 0954 h. The sea voyage continued for the next 24 h. During the transit, the Co-Chief Scientists gave a presentation on the scientific objectives for Site U1501 (proposed Site SCSII-41A), and the Captain held the first fire and boat safety drill. Afterward, the Co-Chief Scientists, key JRSO staff, and ship's crew met to review the coring and logging plan for Site U1501. The scientists moved to their working shifts, and the noon-to-midnight shift resumed laboratory activities.

After a 255 nmi transit from Hong Kong averaging 10.6 kt, we arrived at Site U1501 at 0837 h on 15 April. We lowered the thrusters, deployed a seafloor beacon, put together the advanced piston corer (APC)/extended core barrel (XCB) bottom-hole assembly, and started lowering it to the seafloor (2857 mbsl) in preparation for coring. The calculated precision depth recorder (PDR) depth for the seafloor at Site U1501 was 2873.4 mbrf, and we chose to place the bit at 2868 mbrf to take the first core. An APC core barrel was lowered to the bit and coring in Hole U1501A started at 2345 h on 15 April. The mud line core recovered 9.5 m of sediment and seafloor was calculated to be 2868 mbrf (2857.1 mbsl). Hole U1501A was terminated at 0025 h on 16 April to attempt to core a better mud line at this site.

## **Science Results**

International Ocean Discovery Program (IODP) Expeditions 367 and 368 will address the mechanisms of lithosphere extension during continental breakup along a drilling transect at the northern margin of the South China Sea (SCS). Both expeditions are implemented as a single science program with equal access to all cores by all participating scientists. No cores are sampled at sea for personal use. Expedition 367 cores have already been shipped to College Station for X-ray fluorescence (XRF) analysis.

A large seismic database suggests that the SCS margin shares crustal and tectonic features with the hyperextended and highly amagmatic Iberia-Newfoundland margins. This could include exhumed and serpentized mantle within the continent-ocean transition (COT). However, the SCS margin also shows features that, unlike the Iberia margin, would indicate the presence of regular igneous oceanic crust at the seaward end of the COT. This could suggest that hyperextension not always is associated with very limited magmatism (amagmatic margin). A first order comparison of the style of rifted margin formation between the Iberia-Newfoundland margin and the northern SCS margin therefore requires the sampling of the type of basement subcropping below the sedimentary overburden at select tectonic locations across the COT. Three distinct basement ridges—A, B, and C—were chosen for this purpose. Geodynamic modeling, however, shows that the rate of extension during and subsequent to breakup very much influences the capability of the rising, asthenospheric mantle to produce significant

amounts of melts that can form new igneous crust. In addition to the drilling strategy of sampling characteristic basement units at the three ridges (A, B, and C), a fourth primary drilling site targeting a prerift through synrift to postrift sequence is included in the drilling plan for Expeditions 367 and 368.

Two of the four primary drilling targets were already occupied by Expedition 367 (Sites U1499 and U1500) and cored to planned depth. Expedition 368 plans to occupy (at least) two other sites (proposed Sites SCSII-41A and SCSII-17A).

During this week, science activities centered in conducting crossover with the Expedition 367 scientists, familiarizing the scientists with the ship's laboratories and their instrumentation, shipboard deliverables, and safety orientations. Scientists also reviewed and updated the working methods used on Expedition 367, and developed sampling and measuring plans for shipboard analyses for Expedition 368.

### **Education and Outreach**

We have one Education/Outreach Officer from the United States and two journalists from China sailing on this expedition. All three presented their education and outreach plans for the expedition to the science party. The E/O Officer spent the week learning the social media outlets for the *JOIDES Resolution*, preparing for upcoming live outreach events, including setting up the videoconferencing tools, scheduling next week's events, collecting images for blogging and educational activities, and posting initial blogs at the *JOIDES Resolution* website (<http://joidesresolution.org>), Facebook (<https://www.facebook.com/joidesresolution>), and Instagram ([http://instagram.com/joides\\_resolution](http://instagram.com/joides_resolution)). Similarly, the journalists spent the week familiarizing themselves with the ship's communications systems and writing blogs and articles about life at sea, the expedition scientific objectives, and their societal relevance for various Chinese media outlets (e.g., SMG News, Science and Technology Daily). They also posted blogs and news on the Chinese Twitter, Weibo, and produced and broadcast several videos, including short TV news reports for SMG News in China.

### **Technical Support and HSE Activities**

Primary activities focused on loading and unloading freight, conducting laboratory crossover with disembarking staff, and providing safety and laboratory orientations for the expedition scientists and technical support during the initiation of coring operations at Site U1501.

#### *Port Call Activities*

Crew crossover and freight logistics were completed without issue. In addition to normal port call activities, a service call and several repairs were made and are described below.

### *Laboratory Activities*

- Natural Gamma Radiation (NGR) logger: Replacement of the failed #7 NaI detector required a significant dismantling of the shields and fast plastic detectors. Replacement was completed in two days and the NGR was ready for energy calibration on the third day.
- Superconducting Rock Magnetometer (SRM)-2G Service Call: a representative from Applied Physics (2G Enterprises) worked with the staff to verify that the new SRM was installed and set up correctly. He also took the time to provide additional training for our staff on the calibration process and how to identify radio frequency interference issues.
- Bead Maker: While running routine tests, the repairs made during the last expedition failed. Spare components were purchased in Hong Kong just prior to the ship's departure and repairs were made during transit to the first site. The system is up and running including the automated mode.
- Icefield Tool: New parts have been installed in the tool assembly. We'll soon have results to determine if that has corrected the orientation problem.
- *P*-wave logger: We found that the delay line caps were loose and not making contact with the piezoelectric element, which would have significantly affected velocity measurements on the previous expedition.
- Scanning electron microscope (SEM): On the first day of operations the SEM failed. We found a loose cable lying in the bottom of the vacuum chamber. The cable was reconnected and the SEM is fully operational and in use. We assumed the cable was snagged on the stage and was pulled out when the stage was opened.

### *Application and IT Support Activities*

- Completed beginning-of-expedition activities for Expedition 368.
- Provided scientists with IT information and connected computers to the network.
- Created method for generating image thumbnails for the LIVE application.
- Fixed bugs with whole-round image scanning on the Section Half Imaging Logger (SHIL).
- Deployed new versions of MUT and web services to support features in LIVE.

### *HSE Activities*

- Conducted both the Siem Offshore and IODP safety orientations for the science party and new staff.
- Conducted the safety tours for science party.
- Technical staff completed the audit of hazardous storage areas, and the weekly check of safety showers and eyewash stations.
- Held the weekly fire and boat drill as scheduled.