IODP Expeditions 367 and 368: South China Sea Rifted Margin

Expedition 367 Week 1 Report (7–11 February 2017)

The first week of the IODP South China Sea Expedition (367) consisted entirely of port call activities in Hong Kong.

Operations

The South China Sea Rifted Margin Expedition 367 started at 0812 h on 7 February with the first line ashore at the China Merchants Wharf in Hong Kong. The Co-Chief Scientists and IODP staff moved onto the ship and started crossover with their Expedition 366 counterparts. Initial loading of incoming shipments began. The Expedition 367 scientists boarded the ship in the morning of 8 February, got settled in their rooms, were introduced to life on board the *JOIDES Resolution*, and participated in an initial laboratory and ship safety tour. The scientists were then introduced to the information technology on board the ship, started to connect their computers to the shipboard network, and half of the science party went on a core flow tour. Transfer of incoming and outgoing shipments continued throughout the day. This included loading 40 short tons of barite. Arriving sea freight was partially loaded, along with fresh and refrigerated food products and 300 metric tons of potable water. All departing freight was moved to the pier. On 9 February, the day began with introductions of the Expedition 367 scientists and JRSO shipboard staff followed by a presentation of the expedition scientific objectives by the Co-Chief Scientists. The rest of the day's meetings had to be postponed until the next day so that seven scientists could address issues with their travel documents. Major port call activities on 9 February included loading of 40 short tons of drilling mud, 987.3 metric tons of marine gas oil, sea freight, and frozen food, as well as offloading of frozen shipments from the previous expedition. Because of a missed boat transfer in Shanghai, a shipment of essential hardware (reentry cones, casing, and mud motors) was delayed until 10 February. Due to the time required to load this essential hardware, our departure was delayed by 1 d to 13 February.

On 10 February, scientists were introduced to shipboard deliverables, met in laboratory groups with their JRSO Technical Staff team members, underwent the Captain's introduction and safety orientation, and the other half of the science party went on a core flow tour. A Texas A&M University System film crew spent the day filming some promotional video, and they were escorted around the ship. In addition to routine loading/offloading, the trucks with our delayed shipment of essential hardware (casing, reentry cones, etc.) started arriving in the late afternoon of 10 February. After carefully calculating the remaining work, arrangements were made with the agent and immigration authorities for a departure at 1200 h on 13 February.

On 11 February, the scientists were introduced to drilling/coring/logging operations, our shipboard Educator and Journalist gave an overview of their plans for the expedition, and the Captain held the first fire and boat safety drill. In the afternoon, the scientists shared their individual research interests for the expedition with each other. Loading of the essential hardware (casing, reentry cones, etc.) continued throughout the day, and by the end of the day all casing had been secured in the riser hold. All that remained of port call activities was loading five flats of drill pipe and final securing of cargo prior to departure.

Science Results

International Ocean Discovery Program (IODP) Expeditions 367 and 368 will address the mechanisms of lithosphere extension during continental breakup. State of the art deep reflection seismic data show that the northern South China Sea (SCS) margin offers excellent drilling opportunities that can address the process of plate rupture at a magma-poor rifted margin. The SCS margin shows similarities to the hyperextended Iberia-Newfoundland margins, possibly including exhumed and serpentinized mantle within the continent-ocean transition (COT). However, recent modeling studies suggest that mechanisms of plate weakening other than serpentinization of the subcontinental lithospheric mantle exist. Two competing models for plate rupture (in the absence of excessively hot asthenospheric mantle) have widely different predictions for (1) the crustal structure across the COT, (2) the time lag between breakup and formation of igneous ocean crust, (3) the rates of extension, and (4) the subsidence and thermal history. Proposed drilling will core through thick sedimentary sections and into the underlying basement to firmly discriminate between these models. We plan to occupy four sites across a 150–200 km wide zone of highly extended seaward-thinning crust with a well-imaged COT zone. Three sites will determine the nature of critical crustal entities within the COT, constrain postbreakup crustal subsidence, and constrain how soon after breakup igneous crust started to form. A fourth site on the continental margin landward of the COT will constrain the timing of rifting, rate of extension, and crustal subsidence. If serpentinized mantle is found within the COT, this will lend support to the notion that the Iberia-type margin is not unique, and hence that weakening of the lithosphere by introducing water into the mantle may be a common process during continental breakup. If serpentinite is not found, and alternatively, scientific drilling results for the first time are gained in support of an alternative model, this would be an equally important accomplishment. Constraints on SCS formation and stratigraphy, including industry drilling, Ocean Drilling Program Leg 184 and IODP Expedition 349 drilling, the young (Paleogene) rifting of the margin, and absence of excessively thick postrift sediment allow us to effectively address these key topics by drilling within a well-constrained setting. An initial spreading rate of ~2 cm/y half-rate reduces the potential complexity of magma-starved, slow-spreading crust forming after breakup. Drilling, coring, and logging to address these SCS rifted margin science objectives will be undertaken during Expeditions 367 and 368, which will be implemented as a single science program.

Education and Outreach

We have two specialists sailing on this expedition; one is an educator from Italy and the other is a journalist from China. They both presented their planned E&O efforts for the expedition to the science party. The educator spent the week preparing for upcoming live outreach events including setting up the videoconferencing tools, maintaining contacts with the schools, arranging scientists for next week's events, collecting images for blogging and educational activities, posting initial blogs at http://joidesresolution.org, and assisting the Chinese journalist with an event to a school in China. The journalist has already posted several reports that have had wide distribution.

Technical Support and HSE Activities

Primary activities focused on loading/unloading freight, conducting laboratory crossover with disembarking staff, and providing safety and laboratory orientations for the expedition scientists.

Laboratory Activities

- Laboratories were readied for coring.
- The science party members were given safety training tours and were introduced to their respective laboratories and assigned marine laboratory specialists.

IT and Application Support Activities

- Completed crossover activities.
- Gave scientists presentation of ship IT resources.
- Assisted scientists with personal laptop integration.
- Established laboratory data management accounts for participants and new staff.
- Continued with routine setup and preparations for beginning of expedition.

Logistical Activities

- Freight offloaded:
    - Two 40 ft flats of reentry hardware, two mud motors, and core tech hardware.
    - One container IODP miscellaneous.
    - 85 boxes of frozen and refrigerated shipments.
    - Air freight.
- Freight received:
    - IODP air shipment.
    - 2 IODP containers of D-Tubes and miscellaneous science supplies.

- 2 IODP flats with 2 boxes of core liner, reentry hardware, and mud motors.
- 8 IODP flats of casing.
- 7 IODP flats of drill pipe.
- 40 tons of sepiolite and 40 tons of barite drilling mud.

HSE Activities

- Safety tours were provided for all scientists.
- Safety awareness sheets were completed for laboratory teams (chemistry, petrophysics, and paleomagnetism).