

## **IODP Expedition 369: Australia Cretaceous Climate and Tectonics**

### **Week 1 Report (26–30 September 2017)**

The first week of Expedition 369 consisted entirely of port call activities. The ship left Hobart on the morning of 1 October and is currently underway to the first primary site (Site U1512, proposed Site WCED-4A) in the Great Australian Bight.

### **Operations**

IODP Expedition 369 Australia Cretaceous Climate and Tectonics officially began at 0754 h on 26 September 2017 with the first line ashore at Macquarie Wharf, Berth 4, Hobart, Australia. The ship cleared immigration and customs, and the IODP staff sailing on Expedition 369 and the expedition's Co-Chief Scientists moved onto the ship at 0930 h. The IODP JRSO crew change and crossover took place, and the technical staff and science party from the previous expedition moved off the vessel. The following morning (27 September) the rest of the Expedition 369 science party boarded the ship; the ship's crew change and crossover also took place that morning.

Throughout the port call, the scientists received various introductions to the *JOIDES Resolution's* facilities: information for living at sea; laboratory and shipboard safety introductions from the JRSO Laboratory and Assistant Laboratory Officers and the Captain and senior SIEM Offshore personnel, respectively; laboratory safety tours; and IODP publications and curatorial practices. The scientists also met with their respective laboratory specialists and began working in their laboratory groups on Methods section drafts, workflow, and sampling plans for shipboard analyses. The logging scientists and stratigraphic correlators had preliminary meetings with the Schlumberger engineer and members of the drilling crew, respectively, on 29 September.

Public relations activities were conducted on 28 and 29 September, including numerous ship tours for the public, local University of Tasmania students, and government officials, as well as media interviews that focused on the science of the previous expedition. Additionally, a meeting of the Co-Chief Scientists, JRSO Expedition Project Manager/Staff Scientist, the JRSO Director of Science Services, and two scientists from Geoscience Australia occurred on 28 September, and a visiting scientist worked in the Paleomagnetism Laboratory on 28 and 29 September.

Logistical operations during the port call included: offloading of the previous expedition's cores, and other science-related supplies and freight; proper disposal of hazardous material; the loading of fresh and frozen local food, marine gas oil, and additional supplies and freight; and installation of a spare wireline logging cable.

After securing for a rough seas transit, we departed Hobart at 0710 h on 1 October after a short delay due to adverse weather conditions. We are currently underway to Site U1512 (proposed Site WCED-4A) in the Great Australian Bight. Our estimated arrival is 1300 h on 6 October.

## **Science Plan**

We will core and wireline log four sites, one in the Great Australian Bight (GAB), two in the Mentelle Basin (MB), and one on the Naturaliste Plateau (NP). One focus of this expedition is on generating records from the GAB and MB that span the rise and collapse of the Cretaceous hothouse climate (including Oceanic Anoxic Events) that will provide insight into resultant changes in deep and surface water circulation that can be used to test predictions from earth system models. Previous spot-core drilling at DSDP Site 258 in the western MB and dredge samples from the GAB demonstrated the presence of appropriate sequences, and paleotemperature proxies and other data will reveal the timing, magnitude, and duration of peak hothouse temperatures and whether there were any cold snaps that would have allowed growth of a polar ice sheet. Another focus in the MB and on the NP is on the Early Cretaceous volcanic rocks and underlying Jurassic(?) sediments. These will provide information on the timing of different stages of the Gondwana breakup and the nature of the various phases of volcanism, which will lead to an improved understanding of the evolution of the NP and MB. The high paleolatitude (60°–62°S) location of the sites is especially important because of the enhanced sensitivity to changes in vertical gradients and surface water temperatures. The sites are also well positioned to monitor the mid-Eocene–early Oligocene opening of the Tasman gateway and the Miocene–Pliocene restriction of the Indonesian gateway; both passages have important effects on global oceanography and climate.

The four primary objectives of the expedition are: (1) to investigate the timing and causes for the rise and collapse of the Cretaceous hothouse and how this climate mode affected the climate-ocean system and oceanic biota; (2) to determine the relative roles of productivity, ocean temperature, and ocean circulation at high southern latitudes during Cretaceous Oceanic Anoxic Events; (3) to identify the main source regions for deep and intermediate water masses in the southeast Indian Ocean and how these changed during Gondwana breakup; and (4) to characterize how oceanographic conditions changed at NP during the Cenozoic opening of the Tasman Passages and restriction of the Indonesian gateway.

## **Education and Outreach**

We have three Education and Outreach specialists sailing on this expedition: a museum educator from the USA, a photographer/videographer from the UK, and a videographer from Brazil.

They presented their planned E&O activities to the science party on 29 September and have been in discussions with science party members about collaboration during educational broadcasts, in addition to creating content to send to their home institutions. They also began to develop their workflow for producing photography and videos to post online, as well as their individual projects.

## **Technical Support and HSE Activities**

After the IODP JRSO staff boarded the vessel on 26 September, the following activities took place:

### *Port Call Activities*

- Crossover with offgoing staff.
- Laboratory orientations were begun with respective science party members.
- Offloading of previous expedition cores, and surface, air, and foreign air freight.
- Computer, email, and database accounts for the science party were created.
  - Updates to Microsoft Outlook were implemented from shore.
- Hazardous material was offloaded.
- Assisted with offgoing and received oncoming freight, which was then distributed to designated locations.
- Forwarded core supplies (d-tubes, boxes, and liners) to Fremantle.
- Updated checkout sheets and performed physical counts on critical items.
- Two technical staff members finally received Australian visas and boarded the ship on the evening of the 28 September.
- Technical support provided for visiting scientist working in the Paleomagnetism Laboratory.

### *HSE Activities*

- Laboratory safety introductions and safety tours were conducted with the Expedition 369 science party.
- Safety awareness sheets were completed for chemistry, physical properties, the Whole-Round Multisensor Track, and paleomagnetic areas.
- Sulfur dioxide (H<sub>2</sub>S) safety training was completed for technical staff; this is only a concern for the first site (proposed Site WCED-4A).