

**IODP Expedition 385T:
Panama Basin Crustal Architecture and Deep Biosphere: Revisiting Holes 504B and 896A**

Week 3 Report (1–7 September 2019)

Operations

Week 3 of International Ocean Discovery Program (IODP) Expedition 385T began with the completion of the second packer milling attempt in Hole 504B. We retrieved the drill string with the bit clearing the seafloor at 0018 h on 1 September and arriving on deck at 0615 h. The junk baskets were disassembled, emptied, and cleaned, yielding ~34 lb of metal debris mostly made up of steel baffling slats that were part of the central packer.

We made up the third milling bit assembly and began lowering it to the seafloor at 0815 h. The subsea camera was deployed and Hole 504B was reentered for the fourth time at 1537 h. At 1715 h, after installing the top drive and retrieving the camera, milling in Hole 504B resumed from 110 m below seafloor (mbsf). From 1930 to 2030 h the top drive was inspected for a perceived noise, but the investigation was inconclusive and the noise disappeared. At 0200 h on 2 September the bit had advanced to 134 mbsf within the casing. With ~8 h on the bit, we pulled out of the hole, set back the top drive, and cleared the seafloor at 0300 h. The bit cleared the rig floor at 0900 h. The junk baskets were disassembled, emptied, and cleaned, again yielding ~35 lb of packer debris mostly made up of steel slats.

We made up the fourth milling bit assembly, this time with an additional stand of drill collars for additional weight instead of the junk baskets. The drilling line was cut and slipped and additional rig maintenance was completed before the drill string was deployed to the seafloor. The subsea camera was deployed and Hole 504B was reentered for the fifth time at 2042 h. At 2245 h, after retrieving the camera and installing the top drive, milling in Hole 504B resumed from 133 mbsf. During the milling period, rotation was stopped several times and additional weight (up to 40 klb) was applied in an effort to move the packer down the casing. At 1200 h on 3 September we had advanced to 141 mbsf. With ~13 h on the bit, we pulled out of the hole, set back the top drive, and cleared the seafloor at 1225 h. The milling bit cleared the rig floor at 1910 h. The bit face showed severe wear with three concentric patterns thought to be caused by the packer's lower end cap (1½ inch central hole), remains of its casing (4¾–5¾ inch ring groove) and metal debris outside the bit (honed edge).

At this point, obtaining downhole measurements or fluid samples had become impossible in the remaining time. The goal was to keep trying to open Hole 504B for potential future use. We made up the fifth milling bit with the bottom-hole assembly, this time again with the junk baskets. At 2015 h we began to lower the drill string to the seafloor and deployed the subsea camera at 0200 h on 4 September, with the bit at 2730 m below rig floor (mbrf). As the camera

was lowered, a shorted circuit in the camera system's slip ring prevented it from being powered and the camera was retrieved (0305–0325 h). The milling bit was deployed to 3425 mbrf and the top drive was installed in anticipation of a successful and timely camera system repair. While troubleshooting on the camera continued at the surface, the coring line was deployed with sinker bars to coat it with wireline lubricant to slow corrosion.

At 1245 h we determined that the camera could not be repaired in time to allow for reentry into Hole 504B to continue milling operations. The camera was lowered to depth and retrieved once more to coat the cable for long-term storage (1315–1615 h) before optical fiber splicing work continued on the slip ring. The top drive was set back and the drill pipe was retrieved with the unused bit clearing the rig floor at 2245 h. The rig crew began breaking down the 5½ inch drill pipe stands for storing aboard and offloading in port for inspection. At 1200 h on 5 September, the lower guide horn was installed and the rig floor was secured for transit, which began at 1318 h.

By midnight on 7 September, we had completed 703 nmi of the 2779 nmi voyage from Site 504 to San Diego, California.

Science Results

The challenge to remove the packers and related cables in Hole 504B continued throughout Week 3. Operational time ran out before we were able to remove the packers and other junk from inside the Hole 504B casing, thus preventing any sample or data collecting activities. Operations in Holes 504B and 896A were concluded with no borehole temperature measurements, borehole water sampling, or Formation Microscanner logging accomplished.

Outreach

The Outreach team continued their activities by writing three blogs for the joidesresolution.org website, five posts for Twitter (<https://twitter.com/TheJR>), three posts for Instagram (http://instagram.com/joides_resolution), and three posts for Facebook (<https://www.facebook.com/joidesresolution>). The JR Academy students began composing blog posts, which will be added to joidesresolution.org once reviewed.

The third week of Watercolor Wednesday taught a perspective drawing technique to assist with stratigraphic illustrations. The students were joined by members of the science party, IODP JRSO technicians, and Entier staff. An interactive seminar was also given this week by the Outreach team, which examined 2-D design concepts to improve the messaging and template layout for conference poster presentations.

Additionally, the team continued the assessment of the Outreach position aboard the *JOIDES Resolution* by focusing on new recruitment avenues for the at-sea Outreach position and partnerships within the U.S. and globally.

JR Academy

JR Academy students made progress on their research projects now that their introduction to most of the laboratories had been completed. The student project topics focus on geology, marine geology, and oceanography, and include investigations of petrological, sedimentological, and ocean water samples, as well as magnetic and physical properties of the available samples. JRSO technicians continued to support the work of the students in the laboratories by helping with the equipment and answering questions. JRSO technicians also participated in a panel to talk with the students about their own pathways to IODP, career choices and experiences, and offered advice on ways to pursue STEM jobs and graduate programs. Progress on science communication projects supported by the Outreach Team included 2-D design, video editing, and ship-to-shore broadcasts. A skills development session led by the Outreach Team included design and messaging in the creation of posters for presentations at science meetings. Class topics included rock features and identification, surface processes, sea level cycles, coastal processes and effects of coastal armoring (hardscaping), formation of major erosional and depositional features on the seafloor, and waves and swells. The students also continued to learn about aspects of the ship, drilling, logging, and life at sea.

Technical Support and HSE Activities

IODP JRSO technical personnel engaged in supporting science, engineering, and JR Academy activities. In addition, staff members worked on special maintenance projects, documentation, laboratory cross-training, and end-of-expedition activities.

JR Academy

- Students worked with technical staff to complete their measurements and projects in the laboratories.
- A few students assisted with sea-surface towing magnetometer deployment.

Laboratory Activities

- Fantail:
 - Conducted tests and collected some magnetic data in international waters.
- Curation:
 - Organized and edited samples in SampleMaster for the JR Academy.

- Cleaned and painted the core catcher press.
- Thin Section:
 - Completed a suite of thin sections for microscope and imaging testing.
 - Rewrote the Thin Section Laboratory Wiki page to conform to electronic notebook standards.
 - Testing continued on the “LacCore” method for thin section impregnation. Looking at alternative epoxies.
- Magnetism:
 - After a thorough cleaning, we reinstalled the cryo-compressor that failed earlier in the expedition due to a clogged heat exchanger. The system appears to be superconducting after two days of cooling. Will discuss results with shore staff.
- Chemistry:
 - Optimized a workbook to track spectrophotometer QA/QC data.
 - Finalized the natural gas analyzer sample flowmeter configuration.
 - Refurbished the headspace sampling tools.
 - Ran the coulometer with the JR academy, and spent time troubleshooting an issue with the lamp.
- X-Ray and inductively coupled plasma spectroscopy preparation:
 - Installed foundation on bench for mounting the new X-ray diffractometer instrument.
- Physical Properties:
 - MAD: Organized and cleaned drawers.
 - Section Half Multisensor Logger: Continued testing with the new MS3 meter.
 - Velocity: Developing/testing an update to the Velocity application using the energy ratio method.

Logistics Activities

- Organized offgoing hazardous waste.
- Cleaned Flammable and Hazardous Chemical lockers.
- Biological Radiation (BRAD) van:
 - Freezers: One freezer is working, but with the temperature control incorrectly wired. Repaired and working without issue. The second freezer is not working. We suspect it needs a recharge and have requested a service call.
 - Incubators: All tested and working.
- LN2 generator is working with replacement gauge. All storage dewars have been filled.

Application Support Activities

- GEODESC:
 - Continued meetings to design software, focused on Data Capture and File Manager tools.

- Continued work to develop Excel and VBA prototypes; began work designing custom Ribbon Bar and tabs.
- Team members began writing test plan for Template Manager.
- IMS:
 - Continued work to redesign LabView code that retrieves section and sample information from LIMS database.
 - Conducted testing and debugging on Whole-Round Multisensor Logger track.
- Worked with physical properties technician to generate reports from QA/QC data.

I.T. Support Activities

- Installed remote camera to monitor fluids at the tracer pump housing.
- Created user accounts for the oncoming Expedition 385 personnel.

HSE Activities

- Held the weekly fire and boat drill as scheduled.
- Showers and eye washes were checked.
- Updated hazardous chemical storage lists.
- Moved Chemical Spill items to orange container on roof and added a chemical spill kit.