

IODP Expedition 344: Costa Rica Seismogenesis Project (CRISP-A2)

Week 1 Report (23–27 October 2012)

Operations

Week 1 of Expedition 344 (Costa Rica Seismogenesis Project, Program A Stage 2; CRISP-A2) began with the first line ashore at Rodman Pier 2 North, Balboa, Panama, at 1732 h on 23 October 2012. The science party and remaining IODP technical staff boarded the vessel upon arrival. Two technical staff departed the vessel. The other main port call activity was taking on fuel. All fuel tanks were sounded and preparations were made to begin receiving fuel. Fuelling operations began at 2326 h on 23 October. Fuelling was completed by 1215 h the following day after receiving 2101 metric tons of marine gas oil. The vessel was secured for sailing with final maintenance checks performed prior to departure. On the afternoon of 24 October, two tugs and the harbour pilot arrived at our location. The last line was released from shore at 1800 h, beginning the 403-nmi transit to Site U1381. The vessel arrived at Site U1381 (CRIS-1A) at 0620 h (UTC-6 time zone) on 26 October, and stabilized over the position of Hole U1381B (8°25.7149'N, 84°9.4805'W). The vessel was then repositioned 20 m south of those coordinates. The position reference used for dynamic positioning (DP) was a combination of GPS signals, as no positioning beacon was deployed at this site.

Rig floor operations commenced at 0620 h on 26 October 2012. The Advanced Piston Core (APC)/Extended Core Barrel (XCB) bottom-hole assembly (BHA) was made up with an APC/XCB C-3 bit. The trip to the seafloor was uneventful. The top drive was picked up, the drill string was spaced out, and the hole was eventually spudded at 2015 h on 26 October. The first attempt at spudding Hole U1381C failed when the APC core barrel contacted something unknown inside the seal bore assembly. After trying twice to pressure up and shear, the core barrel was pulled back to surface and examined. Damage was noted on the leading edge of the cutting shoe, indicating hard contact with an unknown object. An XCB core barrel was picked up and pumped down the hole at 50 strokes per minute. This successfully cleared the BHA of whatever was preventing the APC core barrel from landing properly. The APC core barrel was then run back into the hole and the hole was spudded. APC coring continued until ~0730 h on 27 October when basement was reached. The FlexIt orientation tool was deployed for Cores U1381C-1H through 9H and non-magnetic core barrels were used for all APC cores. The APCT-3 temperature measurement tool was deployed with Cores 3H, 5H, 6H, and 7H and four good temperature curves were recorded. After reaching basement, the APC system was changed to the XCB system and a single short core was cut to confirm and recover basement material. The hole was then terminated, the top drive was set back, and the drill string was tripped from the hole. The seafloor was cleared at 1020 h. The BHA was secured on the rig floor at 1545 h ending Hole U1381C and Site U1381.

The total cored interval on Hole U1381C was 103.8 m with 103.5 m cored with the APC system and 0.3 m cored with the XCB system. Recovery with the APC system was 108.7 m of core. The XCB system recovered 0.3 meters of core. The APC system recovery percentage was 105%. The XCB recovery percentage was 110%. Last core on deck for Hole U1381C was at 0855 h on 27 October 2012.

After raising the thrusters, the vessel transited 11 nmi to Site U1380 in 1.25 h. The thrusters and hydrophones were lowered and the vessel was switched to DP control at 1715 h. Upon arrival, the upper guidehorn was removed and the jet-in BHA was assembled with a 14¾ inch bit. The BHA was assembled and lowered to 312.75 m below rig floor. The vibration-isolated television (VIT) frame with subsea camera was then installed but the signal from the camera was lost almost immediately. The problem was found and fixed and the VIT with camera was run to bottom. The seafloor was then tagged to verify water depth and the VIT was pulled back to the surface and set back. Week 1 ended while spacing out to perform the jet-in test at Site U1380.

Science Results

The science party boarded the *JOIDES Resolution* the evening of 23 October 2012 after the vessel had crossed the Panama Canal. The science party includes individuals from 12 IODP member countries and 17 nationalities, including the first scientists from Brazil.

The first two days were spent becoming familiar with the laboratory, core flow, sampling, and publication procedures used on the ship. Scientists spent the first few days becoming familiar with the labs and the geochemistry team started setting up and calibrating instruments immediately. The core description and paleontology teams were trained to use DESClogik for entering descriptive data into the database and all scientists with sampling shifts were trained to use SampleMaster. Because all personal samples for postexpedition research will be taken on the ship, all sample requests were reviewed and modified as needed. All groups are finalizing their lab procedures, which will be included in the “Methods” chapter of the Expedition Reports.

Coring at Site U1381 (CRIS-1A) started on 26 October 2012 with Hole U1381C (8°25.7027'N, 84°9.4800'W, 2065 m water depth) because this site had already been cored during Expedition 334 in 2011. Cores U1381C-1H to 13X advanced to 103.8 m below seafloor (mbsf) with 109.0 m of material recovered for 105% recovery. Cores were taken with non-magnetic core barrels and the FlexIt orientation tool was deployed with Cores 1H-9H. Advanced Piston Corer Temperature (APCT-3) formation measurements were taken with Cores 3H, 5H, 6H, and 7H with good results. Coring was completed within ~12 h after reaching the basement, which was the objective at this site.

The first three cores of Hole U1381C contain hemipelagic sediments that are typical of an incoming plate location near a terrigenous source. The clayey to silty clayey sediments are monotonous but also contain three distinctive 1 to 7 cm ash layers with a high amount of volcanic detritus characterized by magmatic minerals and glass. Biogenic components are dominated by nannofossils and foraminifers but occasionally radiolarians and diatoms are observed as well.

We examined the microfossils of core catcher Samples U1381C-1H-CC to 11H-CC. Benthic foraminifers are present throughout the core, ranging from 1% to 5% of the total 125 m fraction. Preservation is good with little evidence of dissolution or breakage. Benthic foraminiferal assemblages in combination with the high abundance of planktonic foraminifers are typical of deep-sea environments with high organic carbon input. Preliminary results on benthic foraminiferal assemblages indicate a substantial downhole change in benthic assemblages.

Radiolarian assemblages from Samples U1381C-3H-CC and 4H-CC indicate a depositional age <1.1 Ma, due to the presence of *A. ypsilon*. Calcareous nannofossils are found throughout the section. The presence of *Discoaster sp.* in Sample U1381C-2H-CC indicates a depositional age <2.6 Ma, which combined with the radiolarian biostratigraphic constraints suggests reworking of older sediments.

We collected and processed 28 whole-round (WR) core samples for interstitial water analyses and an additional 3 WR samples for helium analyses. In all cases enough fluid was collected for shipboard and shore-based requests with 10-cm-long WRs. Alkalinity has been measured and it agrees well with results from Expedition 334. Other analyses are in progress. For organic geochemistry, we collected and analyzed 29 headspace samples. Methane and ethane were detected in small concentrations in a few samples.

Whole-round multisensor logger measurements have been completed on all cores and discrete measurements on split cores are ongoing. A decrease in gamma-ray attenuation density was observed between 55 and 56 mbsf.

The natural remanent magnetization of the sediments displays a steep, downward-pointing, drilling-induced overprint. Upon alternating-field demagnetization to 30 mT, we observed a significant decrease in intensity and an inclination shift toward the shallower values expected for the latitude of this site. No clear reversed polarity zone has been identified so far.

Education and Outreach

The education officer and videographer participated in science orientations at the start of the expedition. Blogs and posts were added to joidesresolution.org, Facebook and Twitter. A Skype conference was held with high school honor students at Ocean Camp in Oaxaca, Mexico. Video footage was collected and interviews with the science party have started.

Technical Support and HSE Activities

The following technical support activities took place:

- The magnetometer was deployed on the transit from Panama to the first site.
- Technicians prepared labs for receiving cores and training on laboratory systems.
- Labs started processing cores from Hole U1381C.

The following HSE activities took place:

- Lab safety tours were given to scientists on Wednesday, October 24.
- The first fire and boat drill was held on Thursday, October 25.