

## **IODP Expedition 361: Southern African Climates**

### **Week 9 Report (21–27 March 2016)**

#### **Operations**

The vessel ended the 1196 nmi transit to Site U1479 at 0342 h on 24 March and the thrusters were lowered at 0354 h. The APC/XCB bottom-hole assembly (BHA) and drill string were made up and deployed to 2610.0 mbsl. Hole U1479A began at 1150 h and recovered 1.0 m of sediment. The science team decided that a longer, more pristine mudline core was desired and Hole U1479A was abandoned.

The bit was lowered 5 m to 2615.0 mbsl to initiate Hole U1479B, which began at 1255 h on 24 March. Core U1479B-1H retrieved 6.25 m of sediment and the seafloor was calculated at 2618.3 mbsl. Cores U1479B-2H to 32H (6.2–300.7 m CSF-A) were retrieved with 99% core recovery. The drill string was pulled from the hole and the bit cleared the seafloor at 1920 h on 25 March.

The vessel was offset 20 m north of Hole U1479B and Hole U1479C began at 2100 h with a 1.0 m washed interval. Cores U1479C-2H to 32H (1.0–295.5 m CSF-A) were retrieved with 103% core recovery. The drill string was pulled out of the hole with the bit clearing the seafloor at 0250 h on 27 March.

The vessel was offset 20 m east of Hole U1479B and Hole U1479D began at 0450 h on 27 March. Cores U1479D-1H to 12H penetrated from the seafloor to 103.4 m; a single 2.0 m interval was advanced without coring (25.4–27.4 m) to adjust coring gaps between holes. At this point, deteriorating sea conditions forced us to pull the drill string out of Hole U1479D with the bit clearing the seafloor at 1510 h on 27 March. The week ended with the vessel waiting on weather.

#### **Science Results**

Cores from Holes U1479A, U1479B, and U1479C were described and one lithologic unit was identified. This unit (0–301.03 m CSF-A) consists of light greenish gray nannofossil ooze with variable abundance of foraminifers throughout the cores. Thin (cm scale) sand intervals are occasionally identified and may be contourite deposits. The sediments are moderately to strongly bioturbated.

Whole-round measurements of bulk density, *P*-wave velocity, magnetic susceptibility (MS), and natural gamma radiation (NGR), as well as half-round measurements of RGB color, color reflectance, and MS, were made for all cores from Holes U1479A, U1479B, and U1479C. Water content, porosity, void ratio, bulk density, dry density, and grain density were measured on 91

samples from Hole U1479B. Physical properties show marked cyclical pattern to the bottom of the site with similar trends among the different parameters. Thermal conductivity measurements were conducted on 15 cores from Hole U1479B and values range between 1.05 to 1.28 W/(m·K).

This week, the stratigraphic correlation specialists refined the affine and splice interval tables for Sites U1476 and U1478. At Site U1479, stratigraphic correlation is ongoing with real-time correlation taking place for Holes U1479C and U1479D. Thus far, initial indications suggest that a complete stratigraphic section has been recovered to the base of Site U1479 (301.03 m CSF-A).

Biostratigraphy of calcareous nannofossils, planktonic foraminifers, and diatoms indicate that Hole U1479B spans the Late Pleistocene to the late Miocene with a basal age of ~7 Ma. Planktonic foraminifers and calcareous nannofossils are abundant throughout Site U1479 while diatom occurrence is sporadic. Preservation is good to moderate for the calcareous taxa and moderate to poor for diatoms. The biochronology for calcareous nannofossil, planktonic foraminifers, and diatoms reveals sedimentation rates of ~5.2 cm/ky from 0 to 4.2 Ma and ~3.4 cm/ky from 4.2 to 7 Ma.

Paleomagnetic measurements have been made on Holes U1479A, U1479B, and U1479C. The MS and natural remanent magnetization is low and the directional data are relatively noisy. However, identifiable zones of normal and reverse polarity have been identified, which are tentatively interpreted as the Brunhes, Matuyama, and Gauss chrons.

At Site U1479, interstitial water chemistry and headspace gas concentrations indicate moderate early sediment diagenesis. Major element concentrations show some evidence of uptake into clay minerals and precipitation of authigenic carbonates. There is no clear sulfate-methane transition zone in Hole U1479B. Sulfate concentrations go to zero at ~185 m CSF-A, but methane concentrations never increase above ~50 ppmv. Other redox-sensitive elements, such as iron and barium, show more dramatic enrichments, with iron reaching ~15  $\mu\text{M}$  at ~60 m CSF-A and barium reaching ~600  $\mu\text{M}$  at ~150 m CSF-A. Preliminary carbonate data range from ~50 to 73 wt%, with an average value of 63 wt% and no distinct trend downhole.

## **Education and Outreach**

### *Interactions*

- Nine live broadcasts to: four classrooms in the USA, three classrooms in France, one classroom in the UK, and one classroom in China; 387 people reached (147 elementary students, 50 high school students, 190 university students).

## *Social Media*

- *JOIDES Resolution* blog (<http://joidesresolution.org/>): six posts, 918 reads so far.
- Facebook (<https://www.facebook.com/joidesresolution>): six posts, 9,120 people reached.
- Twitter (<https://twitter.com/TheJR>): six tweets, ~30–35 retweets, 2,722 followers, 3,449 impressions.
- Instagram ([http://instagram.com/joides\\_resolution](http://instagram.com/joides_resolution)): six posts, hundreds of likes.

## **Technical Support and HSE Activities**

### *Technical Activities*

- The technical staff has been fully engaged supporting the science laboratories for the past week. No major laboratory issues occurred over the past week and we continue planning for the end of the expedition.

### *Computing Activities*

- Integrated Measurement System (IMS) Software: We began writing programmer notes that details the program architecture and data structures that constitute the IMS system.
- LORE: The definition of the *P*-wave logger (PWL) Extended Report was corrected to show velocity waveform file information.

### *HSE Activities*

- The lifeboat drill scheduled for 27 March was canceled due to inclement weather.