

## **IODP Expedition 317: Canterbury Basin Sea Level**

### **Week 5 Report (29 November - 5 December 2009)**

7 December 2009

#### **Operations**

The week began with the triple combo logging string stuck in Hole U1351C at ~700 m WSF. The logging tools were eventually recovered after tripping over the wireline until the tools could be pulled up into the drill string. The logging line was pulled up onto the rig floor using T-bars until sufficient length was recovered to attach the line to the coring winch, which was used to recover the logging tools. The hole was cemented with 10 barrels of 14 ppg cement. The drill string was then tripped back to the rig floor and secured for the 8-nm, 3-h transit to the next site, ending Hole U1351C at 0200 h on November 30th.

Operations at Hole U1352A (proposed site CB-04B) in 344 m water depth commenced at 0500 h on 30 November. Five APC cores were taken in Hole U1352A to a depth of 42.2 m DSF (recovery: 43.9 m; 104%) to provide sufficient whole-round samples for microbiology, chemistry, and geotechnical studies. Microspheres and PFT's were deployed on all cores. Hole U1352A ended at 1530 h on 30 November when the bit cleared the seafloor.

Operations at Hole U1352B, offset 20 m south of Hole U1352A, began at 1600 h on 30 November. APC cores were recovered to a depth of 297.0 m DSF with a total recovery of 299.3 m (100.8%). The XCB coring system was deployed for Cores U1352B-37X to 94X (297.0-830.9 m DSF). A total of 533.9 m was cored and 315.0 m (59%) was recovered. Coring was terminated at 830.9 m CSF after a number of short recovery cores, overheating of the XCB cutting shoe and excessive torque. A 50-barrel high viscosity mud sweep was pumped to clean the hole in preparation for logging. The triple combo logging tool was rigged up and run into the hole. The first logging run failed to pass 487.6 WSF suggesting the lower part of the hole had collapsed during logging preparations. Two passes were successfully recorded. The caliper readings indicated excessive borehole size that would not permit an adequate clamp for the VSI tool needed to obtain reliable data and the Vertical Seismic Profile was canceled. The FMS/sonic tool string was subsequently deployed and also encountered a borehole obstruction, now somewhat higher in the hole. FMS/sonic logs were recorded from a depth of 442 m WSF. After logging was rigged down a 12-barrel cement plug was pumped at 154.4 m DSF.

The drill string was tripped back to surface and a new bottom hole assembly was made up for the rotary coring system, fitted with a mechanical bit release to facilitate logging after RCB coring is complete. Drilling in Hole U1351C began at 2015 h. The week ended with drilling to a depth of ~162 m DSF.

## Science Results

Cores opened for description to date (Cores U1352B-1H to 74X) contain mainly mud and sandy mud. Beds of very fine sand occur in the upper 112 m CSF, then decrease downhole to 145 m CSF where extensive sand beds occur. Sand content is subsequently variable downcore. Some of the thicker sandy beds have sharp, burrowed basal contacts and can be correlated tentatively with sequence boundaries interpreted on seismic profiles. Others, for example those in Core U1352B-56X (475.5-485.1 m CSF), do not correlate with sequence boundaries, but fall in intervals of high seismic amplitudes. Alternations of greenish gray, calcareous, upward fining sandy mud beds and gray mud beds are common. Cemented intervals, 3-5 cm thick, occur in Core U1352B-42X (341-351 m CSF) and in numerous cores below this interval.

The Pleistocene/Pliocene boundary probably occurs between Cores U1352B-59X and 60X (514-524 m CSF). Below Core U1352B-74X (648.6 m CFS), preservation of microfossils is poor, but a nannofossil datum of 2.7–3.7 Ma is found in Core U1352B-83X. Therefore, age at the bottom of Hole U1352B is almost certainly late Pliocene. Microfossil preservation is best in greenish gray muds, which also indicate warmer water conditions. Gray muds contain cooler water assemblages. Some cores yield fresh water and coastal species of diatom.

Continuous laboratory measurements of magnetic susceptibility, natural gamma radiation, bulk density and colorimetry were supplemented with discrete measurements of thermal conductivity, sediment strength, density and porosity. Core logging data, particularly natural gamma ray data, can be tentatively correlated with ODP Site 1119 records, which were dated and interpreted in terms of MIS stratigraphy. Thermal conductivity increases with depth, while porosity is constant above ~400 m CFS. The thermal gradient is 4.5°/100 m.

Natural remanent magnetization (NRM) was measured on archive section halves from Holes U1352A and U1352B to ~365 m CSF. Routine demagnetization was performed with alternating field at 10 and 20 mT steps. Although shifts in inclination are observed for cores retrieved in non-magnetic core barrels, the use of magnetic core barrels leads to a drilling overprint that cannot be removed by shipboard demagnetization. Core orientation using the Flexit tool has been valuable in correcting declinations.

Geochemistry measurements show that alkalinity increases abruptly from the seafloor to 18 m CSF and then gradually decreases with depth. Calcium content of the pore water increases from 60 to 100 m CSF. HS methane contents increase from 10 to 20 m CSF and remain constant to 100 m CSF. TOC measurements of samples from the upper part of Hole U1352B indicate relatively high organic carbon content.

Caliper, gamma ray, density, porosity and resistivity logs (triple combo) were run in the interval between 80 and 487 m WSF in Hole U1352B. The FMS/sonic tool was run in approximately the same interval. The tools were unable to reach total depth (831 m DSF). Caliper measurements showed that the hole was too wide for a VSP to be effective. Logging data processing is continuing.

**Technical Support and HSE Activities**

The shipboard labs were processing cores and samples from Hole U1352B. The G-gun cluster was set up for VSP operations but the logs had to be canceled because the borehole was too large. Flow rates were checked and the alarms on HF hoods were calibrated. A small drain leak on the HF hood in the chemistry lab was fixed in preparation of HF use on the next expedition. A fire and boat drill was held on 29 November for the entire ship's complement.