

IODP Expedition 323: Bering Sea Paleoceanography

Week 7 Report (16-22 August 2009)

22 August 2009

OPERATIONS

Week 7 of Expedition 323 focused on APC/XCB coring and wireline logging operations at Site U1344 (GAT-3C), as well as starting coring operations with the APC system at Site U1345 (NAV-1B) on the northernmost region of the Aleutian Basin.

Site U1344 (3184 m DSF)

Five holes were cored at Site U1344 during a period of 8.3 days. Hole U1344A was APC/XCB cored to a total depth of 745 m DSF (Cores U1344A-1H to 79X). After coring operations ended, the hole was prepared for wireline logging. With the end of the pipe at ~100 m DSF, Hole U1344A was successfully logged with the triple combo string to the total hole depth of 745 m DSF and good quality logs were obtained. The FMS-sonic tool was deployed immediately after reaching total depth on the first pass but only ~728 m DSF on the second pass as hole conditions began to deteriorate. Good data were obtained on both passes. APC core recovery for Hole U1344A was 103.5% with 264 m of sediment recovered (Cores U1344A-1H to 27H). XCB core recovery for Hole U1344A was 78.4% with 384.10 m recovered (Cores U1344A-28X to 79X). Total core recovery for Hole U1344A was 87% with 648.10 m of sediment recovered.

Hole U1344B, a microbiology dedicated hole, was offset 20 m north of Hole U1344A. The hole was terminated after recovering the first core because the core liner returned damaged making the sediments in it unusable for microbiological sampling. Recovery in Core U1344B-1H was 100% with 4.80 m of sediment recovered. Hole U1344C was then started deploying both per-fluoro-methyl-cyclohexane (PFTs) and microspheres for contamination testing and recovering 7.12 m of sediment in Core U1344C-1H. A total of 4 APC cores were recovered to a depth of 35.6 m. Average core recovery for Hole U1344C was 94% with 33.51 m of sediment.

Hole U1344D, offset 20 m north from Hole U1344C, was APC cored to 286.5 m DSF recovering 286.1 m of sediment in 32 cores. Recovery was 100%. Hole U1344E, offset 20 m north from Hole U1344D, was APC cored through Core U1344E-23H using non-magnetic coring assemblies to a total depth of 200 m DSF. APC core recovery for Hole U1344E was 101.4% with 202.68 m recovered.

Site U1345 (1020.5 m DSF)

Site U1345 is located 67 nautical miles NW of Site U1344. Week 7 ended while spacing out to fire the first APC core at Hole U1345A.

SCIENCE RESULTS

The sedimentary section recovered at Site U1344 is primarily dark greenish gray diatom-bearing clayey silt to diatom-rich sandy silt, with numerous sand layers, pebble size

clasts, authigenic carbonate layers, and rare diatom ooze. The sand layers are clustered in three main stratigraphic intervals that seem to correlate with the previously drilled Site U1343.

At Site U1344, diatoms, radiolarians, and dinoflagellates are continuously present throughout the holes. Among the calcareous microfossils, planktic foraminifers are more commonly found in upper part of the section whereas benthic foraminifers occur continuously throughout the entire depth of the holes except for rare short barren intervals in the lower part. Calcareous nannofossils were observed intermittently at this site and when present were typically in rare or low abundance.

Biostratigraphic datum events were provided by siliceous microfossils and dinoflagellates, suggesting a maximum age of ~1.9 Ma at the bottom of Hole U1344A (745 m DSF) and a sedimentation rate of 45 cm/k.y. This is supported by the shipboard paleogeomagnetic measurements derived from Holes U1344A, U1344B and U1344D. Cores from Hole U1344E are currently been measured on the cryogenic magnetometer. The Brunhes/Matuyama boundary was identified at Holes U1344A and U1344D. The top and bottom of the Jaramillo and the Cobb Mountain subchrons, as well as the termination of the Olduvai subchron were identified at Hole U1344A.

Catwalk samples for interstitial water chemistry, bulk sediment geochemistry, and microbial cell counts were collected from cores retrieved from Holes U1344A and U1344C. All cores from Hole U1344C were sampled for postcruise microbiological analyses (i.e., cell abundance, RNA/DNA analysis, amino acid composition and community structure) at very high-resolution, whereas samples from Hole U1344A were collected at a much lower resolution to ~700 m CSF-A. Contamination testing with PFTs confirmed that the samples collected were not contaminated with drilling fluid although the cores in the lower part of the hole were recovered using the XCB system. Interstitial water (IW) samples were taken in Hole U1344A and in the microbiology-dedicated hole. We determined concentrations of alkalinity, dissolved inorganic carbon, sulfate, ammonium, sulfide, majors ions (i.e., Ca, Na, K) and minor ions (i.e., Fe, Mn). Analysis of solid phase fractions included total nitrogen, carbon and sulfur. An improved procedure was applied for methane sampling. Sediment plugs were collected on the catwalk using syringes through holes drilled in the core liner immediately after core retrieval. The plugs were then transferred to headspace vials. The improved procedure resulted in a significant increase and improvement in methane recovery.

Downhole logging operations in Hole U1344A were completed over 20 hr starting on midday, 18 August. Two tool strings were deployed: the triple combo (natural gamma ray, porosity, density, resistivity) and the FMS-sonic string (electrical images and sonic velocity). Operations proceeded smoothly, in calm sea conditions. The triple combo reached the bottom of the hole (745 m DSF), but the FMS-sonic could not pass below ~728 m DSF because of an obstruction. The caliper logs shows that the hole was in good conditions over most of the interval logged, and all the data are of good quality, providing already reliable core/log and seismic/log integration. All logging data were processed on site and transmitted to LDEO for quality control before online publication.

Preliminary data were distributed to the science party for integration with the ongoing shipboard site analysis.

By week's end we arrived at our last site of the expedition, Site U1345. Here we will core three holes using the APC system to a total depth of 150 m and one microbiology dedicated hole to ~35 m. If time permits, we may core an additional hole.

HSE AND TECHNICAL SUPPORT ACTIVITIES

During this week the technical staff was fully engaged processing cores from Sites U1344 and U1345, assisting scientists with laboratory instrumentation and software applications, data processing, and solving equipment issues as they arise. With recovery at 5200 m, our refrigerated core space is full. Depending on the final recovery, we expect that several pallets of core will have to be stored in air conditioned space.

Ship's crew completed additional painting in the science pallet stores. Work has begun on installing splash guards in the core splitting room. We are keeping a close watch on Typhon Vamco. By midnight on Monday the winds are forecast to moderate to storm force. The weekly fire and boat drill was held as scheduled.