

IODP Expedition 323: Bering Sea Paleoceanography Week 2 Report (12-18 July 2009)

19 July 2009

OPERATIONS

After a 6.5 day transit from Victoria, BC, averaging 11.5 nmi/hr, we initiated dynamic positioning over Site U1339 (UMK-4D) at 1603 hr (UTC-11h) on 16 July. The operations plan called for four holes to be drilled at Site U1339. Hole U1339A was spudded at 0430 hours on 17 July. The first core was shot with the bit at 1873 m DRF and recovered the mud line and 4.94 meters of core. The hole was terminated after Core U1339A-4H with a suspected Bottom Hole Assembly (BHA)/coring system problem resulting in almost 100,000 lbs of overpull on the last core. The drill string was tripped out of the hole, the coring system components were inspected and several parts were changed. There was no conclusive evidence found for the mechanical problem encountered. The BHA was run and the coring system was tested successfully in the water column. The vessel was offset 20 meters and the rest of the string was then tripped to the seafloor and Hole U1339B was spudded at 2315 hours on 17 July. The first 4 cores (U1339B-1H to 4H) were dedicated to microbiology with both PFTs and whirl packs deployed. The remainder of Hole U1339B recovered the sedimentary sequence from the total depth of Hole U1339A down to 196 mbsf with one short core (U1339B-13H) when the APC fired into an unknown object, most likely a glacial drop stone. Hole U1339B ended at 2010 hours on 18 July when the bit cleared the seafloor. The vessel was offset 28.3 meters and Hole U1339C was spudded at 2230 hours on 18 July.

SCIENCE RESULTS

The second week of IODP Expedition 323 to the Bering Sea continued with daily science meetings and laboratory training aimed for planning and preparing for coring and logging operations at our first site, U1339 (UMK-4D), located off Bristol Bay on the Umnak Plateau. The main scientific objectives at Site U1339 are to monitor the extent of glacial sea ice in the Bering Sea, the exchange of North Pacific and Bering Sea waters and evaluate microbial respiration, biomass and community composition in the subseafloor sediments. The operations plan for Site U1339 consists of coring 3 holes to 200 m, one hole to ~35 m and logging the last hole. Coring was carried out using non-magnetic core barrels and the Advanced Piston Coring (APC) system. The shallower hole was dedicated for microbiological sampling. Two holes were completed by the end of the week, including the microbiology dedicated cores and one complete hole to 196 m DSF.

Only four cores (1H-4H, 0 to 33.5 m DSF; recovery 103%) were recovered from Hole U1339A because of a mechanical problem with the coring system that forced us to terminate the hole prematurely. Once the problem was corrected, we cored Hole U1339B to a maximum depth of 196 m DSF (recovery 104%). The top four cores from Hole U1339B were dedicated for microbiological sampling and the data from the rest of the cores were appended to the data obtained from Hole U1339A cores. The sediments in Holes U1339A and U1339B are predominantly silty to clayey diatomaceous ooze, with

variable amounts of dispersed vitric ash, occasional thin ice rafted debris (IRD) layers and isolated pebbles, and numerous ash layers. The sediment color varies from different tones of dark green to gray, and the ash layers also show varying tones, suggesting a wide range of volcanoclastic sources.

All major microfossil groups have been found in the sediments, however, siliceous microfossils greatly exceed calcareous forms and provide a consistent and coherent biostratigraphic succession. The age interval recovered in Holes U1339A and U1339B is at least 0.5-0.6 Ma at 167 m CSF according to the diatom, radiolarian and silicoflagellate biostratigraphies. The estimated ages are supported by correlation of physical properties with previously recovered piston cores from the region.

The microbiology-dedicated cores (U1339B-1H to 4H) were sampled at a very high resolution and samples are being prepared for shipboard and post-expedition analyses. Preliminary results from geochemical analyses suggest elevated anaerobic oxidation of methane within the top 5 m and very high cell activity in the sediments. Alkalinity increases with sediment depth reaching maximum values (53 mM) at ~90 m CSF.

HSE AND TECHNICAL SUPPORT ACTIVITIES

HSE: Because of the cold temperatures and gas presence in the recovered cores, all technical and scientific staff involved in core processing in the catwalk are required to wear full face shields. All others on the catwalk are subject to routine catwalk eye protection policy. Working with ODL staff to install fall protection in science pallet area so that upper storage platform can be safely accessed once installed. Additional protection is being designed for the zero lift to prevent any hand pinch points.

Logistical activities: Work continues on the reorganization of the Science Pallet Storage area and Logistics Shop. A new work shop has been constructed on the raised platform in the Science Pallet Storage and equipment mounts are being fabricated for the sander, grinder, and vise. The new -86°C Freezer is now operational in the Science Pallet Storage.

Laboratory activities: As of the date of this report we have processed 26 out of the 69 cores recovered. Recovery has been near 100% with our highest coring rate at ~11m/hr. Continuing to update track and data upload programs for core flow efficiency.