

IODP Expedition 329: South Pacific Gyre Microbiology

Week 2 Report (17-24 October 2010)

OPERATIONS

Week 2 of Expedition 329, the South Pacific Gyre Microbiology, began with the completion of a wash down hole to determine depth of basement at Site U1365 (Scientific Prospectus Site SPG-1A). The center bit was pulled by wireline, the vessel was offset 20 m to the west and Hole U1365A was initiated at 0530 hours on 17 October 2010. Seafloor depth was established with a mud line core at 5706.3 mbsl. Non-magnetic core barrels and the FLEXIT tool were used for the first 4 cores and APCT-3 temperature measurements were taken on Cores U1365A-1H, 3H and 4H. APC coring continued until basement was reached at 75.5 mbsf. A total of 26 cores were taken with a total recovery of 74.06 m (98% recovery). All cores after Core U1365A-4H were incomplete strokes and recovery was slowed by a very thick layer of chert from approximately 42 to 63.5 mbsf. After offsetting the vessel 20 m north, operations at Hole U1365B began at 1010 hours. The mudline core established seafloor depth at 5705.4 mbsl and hole was piston-cored to 42.5 mbsf. Contamination testing was done on all cores with per-fluoro-methyl-cyclohexane (PFTs). Temperature measurements were taken on Cores U1365B-3H, 4H and 5H, although, the data on Core U1365B-3H was lost trying to download the tool. The center bit was then deployed and the formation was drilled from 42.5 to 63.5 mbsf to avoid coring the chert horizon. APC coring continued until basement at 75.6 mbsf. A total of 8 cores were taken with a total recovery of 55.79 m (102% recovery). All piston cores after Core U1365B-5H were incomplete strokes. Operations at Hole U1365C started at 0940 hours on 20 October and the hole was piston cored to 37.5 mbsf before encountering the first hard chert layer. PFT contamination testing was done on all cores. Temperature measurements were taken on Cores U1365C-3H and 4H. Piston coring continued from 63.5 mbsf until basement (74.8 mbsf). A total of 8 cores were taken with a total recovery of 48.8 m (81% recovery). All cores after Core U1365C-4H were incomplete strokes. Operations at Hole U1365D (20 m east of Hole U1365C) started at 0540 hours on 21 October and advanced with the APC coring system for 2 cores to 19 mbsf and recovering 18.9 m (81% recovery). PFT contamination testing was done on both cores

After a 20 meter offset, Hole U1365E began on 21 October at 2030 hours. The BHS was set back, the APC/XCB bit was removed and the rotary bit and rotary coring system were assembled in preparation for running the new RCB BHA. The BHA was in the process of being assembled when a concerning noise was noticed on the rig floor. Subsequent investigation revealed a failed crown block sheave bearing on the number 2 sheave. After discussions on board and with Transocean management, Transocean engineering, and the vendor, a decision was reached to restring the blocks to a 10 part configuration, removing the damaged sheave from the system. Modification and repair work was completed at 0600 hours on 23 October. Operations at Hole U1365E started at 2210 hours and the week ended drilling at 51 mbsf.

SCIENCE RESULTS

Week 2 of Expedition 329 started upon arrival on Site U1365. Site U1365 is located in the western portion of the gyre, near DSDP Sites 595 and 596, in a water depth of ~5700 m. The primary scientific objectives at Site U1365 are to (1) document the habitats, metabolic activities, genetic composition, and biomass of microbial communities in subseafloor sediments with very low total activity; (2) test how

oceanographic factors (such as surface ocean productivity) control variation in sedimentary habitats, activities, and communities from gyre center to gyre margin; (3) quantify the extent to which these sedimentary communities may be supplied with electron donors by water radiolysis, a process independent of the surface photosynthetic world; and (4) determine how the basement habitats, potential activities, and communities vary with crust age and hydrologic regime (from ridge crest to abyssal plain). To meet the sediment objectives 4 holes (U1365A through U1365D) were cored and each hole was assigned for different types of analyses. A fifth hole (U1365E), not yet drilled, will target the basement objectives.

Hole U1365A was designated for sedimentological, petrological, petrophysical and paleomagnetic studies. Cores from this hole were measured immediately after recovery for oxygen concentration, and then fully processed through the Core Laboratory. Core sections were measured for natural gamma radiation, density, magnetic susceptibility, thermal conductivity, and P-wave velocity using the ship's wholeround loggers. Then, core sections were split into working and archive halves. The archive half of each section was imaged, measured for color reflectance and point susceptibility, paleomagnetic properties, and visually described. Working halves were sample for shipboard analyses and shore-based studies. Hole U1365B was designated for interstitial water chemistry and solid phase geochemistry and were sampled in the Hold deck's Cold Laboratory at very high resolution for a wide range of chemical analyses and PFT measurements. Holes U1365C and U1365D were designated for microbiological studies and the cores from these holes were sampled aseptically in the Hold deck's Cold Laboratory for microbiological experiments, including shipboard microbial cell counting and inoculations. Samples were then prepared for cell enumeration, cultivation and shore-based molecular analyses.

Sediments at Site U1365 are predominantly dark brown pelagic clay with pale-orange zeolitic and porcelanite layers, occasional metalliferous intervals, and chert gravel. The Bruhnes/Matuyama, the Gauss/Matuyama, and the Gauss/Gilbert boundaries were identified in Core U1365A-1H.

TECHNICAL SUPPORT AND HSE ACTIVITIES

Technical support staff processed cores and samples from Site U1365 and helped expedition scientists to prepare the laboratories and process samples and data collection. A fire and boat drill was held for all expedition participants on October 17.