IODP Expedition 329: South Pacific Gyre Microbiology

Week 5 Report (7-13 November 2010)

OPERATIONS

Operations this week consisted of completing coring at Site U1367 (SPG-4A) and starting coring and drilling operations at Site U1368 (SPG-6A).

Site U1367: Week 5 began while drilling from the seafloor to 17 mbsf In Hole U1367F. At 17 mbsf, drilling stopped. The center bit was retrieved and RCB coring In Hole U1367F began. RCB coring continued from 17 mbsf to 55.5 mbsf with poor recovery. A total of 38.5 meters were cored with a recovery of only 4.33 meters. At 55.5 mbsf, after Core U1367F-6R, hole conditions prevented the coring assembly from returning to total depth to continue coring. After 6 hours of high variable torque, variable RPM and a seemingly endless supply of fill from the hole above, we decicded to abandon Hole U1367F short of the original objective. Logging, which was originally scheduled for this hole, was unable to be completed because of hole depth and hole conditions. The drill string was then tripped back to the rig floor and secured for transit to the next site, ending Hole U1367F and Site U1367 at 0545 hours (UTC-10h) on 9 November.

Site U1368: after an 80.75 hour transit from Site U1367, covering 793 nm, averaging 9.8 knots, a sonar survey was initiated over Site U1368. The survey essentially replicated the lines of the original site survey to confirm depth to bottom and hard returns under bottom. Hole U1368A was spudded at 0130 hours on 13 November and drilled down without recovery to determine depth of basement. Mudline was established as 4302.0 mbrf by tagging with the bit. Basement was established at 13.6 mbsf. The bit was pulled back above the seafloor, clearing the seafloor at 0200 hours and ending the hole.

Hole U1368B was offset 20 meters to the west and spudded at 0330 hours. Seafloor depth was established at 3750 mbrf with a mudline core. APC coring continued to 16.0 mbsf. A total of 3 cores were taken with a total recovery of 15.84 m (99%).

Hole U1368C was offset 20 meters north of Hole U1368B and spudded at 0730 hours on 13 November. Seafloor depth was established at 3749.5 mbrf with a mudline core. A total of 2 cores were taken with a total recovery of 16.34 m (100.2%).

Hole U1368D was offset 20 meters east of Hole U1368C and spudded at 1000 hours on 13 November. Two APC cores to 15.0 mbsf with 15.04 m recovery (100.3%) were taken. Seafloor was established at 3750 mbrf.

Hole U1368E was spudded at 1210 hours on 13 November. Seafloor depth was established with a mudline core at 3751.9 mbrf. Two APC cores to 10.6 mbsf with a 10.58 m recovery (99.8%) were taken.

PFT was mixed in with the drilling fluid (sea water) and pumped on all cores at Site U1368 for contamination testing.

Hole U1368F was offset 20 meter south of Hole U1368E. Week 5 ended running the RCB BHA down into the hole and preparing to rotary core Hole U1368F.

SCIENCE RESULTS

During Week 5 of Expedition 329, scientists processed, described and analyzed core samples and data from Sites U1367 (SPG-4A) and U1368 (SPG-6A). They presented the highlights of the scientific results from Site U1367 at a science meeting and discussed them in the shipboard reports. Subsequently, the chief scientists presented the scientific objectives for Site U1368.

The primary objectives at Site U1368 complement those for Sites U1365 to U1367, which are to determine the habitability of organic-poor sediment and the underlying basalt for subseafloor microbial communities, and how microbial activity and community composition vary from gyre margin (Site U1365) to gyre center (Site U1368).

The coring operations plan for Site U1368 was the same as for the previous sites: to drill a pilot hole to determine basement depth, and then core the site's sedimentary section in four holes: one to build the stratigraphic framework for the site, one for geochemical analyses and one for microbiological experiments. A fourth hole was cored to provide additional material if needed to duplicate important geochemical experiments and to provide a complete duplicate record for general postexpedition research. A fifth hole at this site is being drilled and will be cored to about 100 m into basement to sample the underlying basalt. After coring activities are completed, the hole will be logged using standard downhole logging (triple combo and FMS sonic) tools.

The sedimentary record at Site U1367 consisted mainly of pelagic clay overlying Oligocene carbonate ooze. The principal components of the clay are smectite and mica-group members, phillipsite (a zeolite), and red-brown to yellow-brown semi-opaque oxide (RSO). The ooze is composed mainly of coccolithophores and RSO, accompanied by planktic foraminifers. The short drilled sequence of basement rock sampled is composed of pillow basalt.

A wide range of microbiology experiments was initiated onboard the drill ship. Experiments on major microbial processes and experiments for enumeration of viable microbes were initiated at selected depths ranging from near the sediment/water interface to ~30 m into the basaltic basement.

At Site U1368, Cores from Holes U1368B and U1368E were taken to the Cold Laboratory for measuring oxygen concentration immediately after catwalk processing. Cores from Hole U1368C were sampled on the catwalk after the sections were cut for microbial cell counts, hydrogen measurements and safety methane, then, taken to the core reefer in the hold deck were they were further sampled for a broad range of geochemical measurements. Cores from Hole U1368D were taken immediately after catwalk processing to the core reefer where they were sampled for a broad range of microbiological and biogeochemical studies.

By week's end, Site U1368 cores were being run through the Core Laboratory track systems for routine core flow measurements and the ship's crew was preparing to start drilling and coring Hole U1368F into basement.

TECHNICAL SUPPORT AND HSE ACTIVITIES

This week the technical staff supported the processing and data collection for the cores from Sites U1367 and U1368. A fire and boat drill was held on Sunday 14 November.