Chikyu Successfully Tested by Scientists and Industry

The Japan Agency for Marine-Earth Science and Technology's (JAMSTEC) deep-water riser vessel *Chikyu* successfully passed full-scale deep-water drilling tests off Japan and off the coast of Kenya. All aspects of drilling, downhole logging, and coring except rotary coring in riser mode operation have been tested.

The *Chikyu* shakedown cruise was carried out off the Shimokita area, northern Japan. The coring operation test was conducted by riserless drilling with the HPCS (Hydraulic Piston Coring System) and ESCS (Extended Shoe Coring System) at a pilot hole, C9001C, in 1180 m water depth, penetrating to 365 mbsf and recovering forty cores (386 m in total length). The riser drilling test at the main hole, C9001D, finished at a depth of 647 mbsf; cuttings samples were obtained from twenty-five intervals between 527–647 mbsf. In the laboratory, we conducted a wide array of experiments related to processing, curating, and measuring cores, as well as discrete sample data collection and processing, using real cores and cuttings samples in order to demonstrate the ability to meet IODP operation standards. In order to assist in evaluation of laboratory operations, twenty-seven technical and scientific advisors from Japan and abroad were invited onboard to work with cores in the laboratories and report their findings of laboratory functionality, procedure or core handling etc. Part of the test drilling was conducted under very severe weather conditions, which proved *Chikyu* to be a very stable and powerful platform.

A number of useful observations were made regarding core and laboratory functions. The onboard measurement results also provided several interesting scientific findings. Recovered cores, as well as cuttings samples, are chiefly composed of diatomaceous silty clay, with common intercalations of tephra and sand layers as subordinate components in the upper and lowermost parts. The age for the bottom of Hole C9001C is estimated to around 650 ka. The lithofacies of the lower part are almost lacking in tephra and sand layers, which suggests limited volcanic activity in the hinterland during this period, presumably 400 – 600 ka. Based on the relative abundance of diatoms and terrigenous clastic material, the silty clay can be divided into two types that interchange periodically, probably reflecting climate change influenced by the Milankovich Cycle.

On the *Chikyu's* drill floor.

Chikyu operating offshore about 300 km northeast of Mombasa, Kenya. Photo credit Woodside Energy (Kenya) PTY LTD.

After completing the Shimokita shakedown drilling in 1200 m of water, *Chikyu* began the Overseas Drilling Shakedown (ODS) cruise on 1 November 2006. Actual drilling operations off Kenya, East Africa began in early December 2006. *Chikyu* has successfully set the BOP and riser pipe at a water depth of 2200 m under more than 2 knots (kt) of strong sea current, and the drilling depth reached about 2700 mbsf (about 4900 m below the rotary table). These are some of the ODS System Integration Tests (SIT) of *Chikyu*'s drilling systems. After completing riser drilling off Kenya, *Chikyu* shifted to Australian waters for more deep water riser drilling. The ODS tests are done in a collaboration with the hydrocarbon exploration industry and include full-scale deep-water industry riser drilling including geophysical downhole logging. Coring is not routinely done.

Visual core description (VCD) lab work onboard the *Chikyu*.

ANDRILL Project Reaches 1284.87 meters at McMurdo Sound

The Antarctic Geological Drilling (ANDRILL) Program drilled to a new record depth of 1284.87 meters below the seafloor from the site on the Ross Ice Shelf (McMurdo Sound) near Scott Base in Antarctica on 26 December. The operations team of twenty-five drillers, engineers, and support staff started preparing in mid-October, and began drilling in early November. The target depth was 1200 meters, which they had hoped to reach before Christmas. The final depth broke the previous record of 999.1 meters set in 2000 in Prydz Bay by the Ocean Drilling Program's drill ship, the *JOIDES Resolution*.

The drilling had a core recovery of 98 percent. The cores contain alternations of clastic glacial and marine, biogenic, and volcangenic sediments. Diatoms and abundant ashes in combination with magnetostratigraphy will allow precise dating. It is estimated that the bottom of the hole is well within the upper Miocene or older. So far, the drill cores tell a story of a dynamic Antarctic ice sheet advancing and retreating more than 50 times during the last 5 My. Some of the disappearances of the ice shelf were probably during times when our planet was 2–3°C warmer than it is today.

The ANDRILL Project is a multinational collaboration comprised of more

ANDRILL camp and Mount Erebus.

ANDRILL drilling rig in low sun.

than 200 scientists, students, and educators from four nations (Germany, Italy, New Zealand, and the United States). Following-up on the Cape Roberts Drilling Project, ANDRILL strives to recover stratigraphic records from the Antarctic margin using advanced developments of Cape Roberts Project technology. The chief objective is to drill back in time to recover a history of paleoenvironmental changes that will guide our understanding of how fast, how large, and how frequent were glacial and interglacial changes in the Antarctica region. Future scenarios of global warming require guidance and constraint from past history that will reveal potential timing, frequency, and site of future changes.

Operations and logistics for ANDRILL are managed by Antarctica New Zealand. The scientific research is administered and coordinated through the ANDRILL Science Management Office, located at the University of Nebraska-Lincoln (UNL). The U.S. part of the project is funded in large part by a $12.9 million National Science Foundation grant to a consortium of five universities headed by UNL and Northern Illinois and also including Florida State, Massachusetts-Amherst, and Ohio State. More information about ANDRILL as well as a complete description of the recent drilling project is available at www.andrill.org.

ANDRILL is now planning for the second drilling project in southern McMurdo Sound later this year (October to December 2007). The stratigraphic objective will be to recover a middle Miocene to Recent core record that will detail a proximal history of Antarctic ice sheet behavior back through the mid-Miocene Climatic Optimum.

New Jersey Shallow Shelf - Expedition 313

Expedition 313 is planned for the summer of 2007. This expedition, co-funded by ICDP and part of a major margin transect with previously drilled land- and deep-water sites, will focus on Early to mid-Miocene (~24–14 Myr old) siliciclastic sequences to estimate the timing and magnitudes of eustatic sea-level changes, and determine the relationship between sea-level change and sedimentary architecture (See www.ecord.org/exp/new-jersey/313). Intense Antarctic glaciation at the beginning of the Early Miocene and a mid-Miocene 'Climatic Optimum' when ice sheets were at a relative minimum likely have forced short-term sea-level changes. In addition, the New Jersey margin offers rapid depositional rates, tectonic stability, and well-preserved fossils for age control. In addition, there exists a large set of seismic and borehole data constraining the geologic setting from the coastal plain across the shelf to the slope and rise. Expedition 313 is different from these previous missions in that it targets the shallow shelf which is very sensitive to sea-level change, and the technology aboard the mission specific platform of choice is well-suited for recovering sand-prone shelf sediments.

HSDP Reached 3519.5 m Final Depth

On 10 February 2007, coring operations in the Hawaii Science Drilling Project, HSDP have been completed at a total depth of 3519.5 m. In the final phase of the HSDP drilling from December 2006 on, 177 m have been drilled.

Core from 3507.6 m depth with pillow breccia clasts surrounded by a matrix of blue-green clay; beneath the breccia (left) is a layer composed almost entirely of clay.

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