

New Antarctic Drilling Record to Yield Major Climate Data

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The Antarctic Geological Drilling (ANDRILL) Program drilled to a new record depth of 1,000 meters below the seafloor from the site on the Ross Ice Shelf near Scott Base in Antarctica on Dec. 16, making ANDRILL the most successful Antarctic drilling program in terms of depth and rock core recovered. The crew hopes to reach 1,200 meters by Christmas, as they seek data that will illuminate how the Antarctic has responded to and shaped 35 million years of climate.

The University of Massachusetts Amherst is one of several universities involved in ANDRILL, a multinational collaboration of more than 200 scientists, students, and educators. The program aims to drill into the past to better understand how fast, how large, and how frequently glacial and interglacial changes occurred in the Antarctic. A critical part of the research involves modeling these changes, which allows scientists to explore how vulnerable the region may be to climate changes in the future. Robert DeConto of UMass Amherst is heading the modeling component of the program.

“Obviously, we’re thrilled with the quality and quantity of data coming from the drilling,” says DeConto. “We’re anxious to begin incorporating this new information into our climate and ice sheet models.”

The information coming from the drill core will be used to test numerical models developed by DeConto’s research group and colleagues at the Pennsylvania State University, which predict ice sheet and ice shelf behavior under various conditions.

This first season of drilling is aimed at learning about the long-term behavior of the Ross Ice Shelf, a huge floating glacier about the size of France, sitting between the West and East Antarctic Ice Sheets. Ice shelves are important because they impede the flow of glacial ice into the ocean, explains DeConto. Because the ice covering Antarctica contains about 70 meters of equivalent sea level, even modest changes can have a big impact on the world's coastal areas.

“Hopefully, knowing something about how the ice shelf has responded to past climate changes will warn us about possible surprises in the future,” he says.

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 million years. Some of the disappearances of the ice shelf were probably during past times when our planet was 2 to 3 degrees Centigrade warmer than it is today—“much like it will be in the next 50 to 100 years,” noted Tim Naish of Victoria University, the other co-chief scientist on the McMurdo Ice Shelf Project.

The operations team of 25 drillers, engineers and support staff are justifiably thrilled about reaching 1,000 meters, ANDRILL Project Manager Jim Cowie said. The previous record of 999.1 meters was set in 2000 by the Ocean Drilling Program's drill ship, the Joides Resolution.

Much of the technical success of the project can be attributed to Alex Pyne, who has overseen the design and fabrication of the drilling system, said Lou Sanson chief executive of Antarctic New Zealand, which is managing the on-ice drilling operations and logistics on behalf of the ANDRILL partner nations.

Pyne, from Victoria University of Wellington, New Zealand, is a veteran of 30 years of scientific drilling in the McMurdo Sound region. He

acknowledged that much of the present success is due to lessons learned from previous drilling projects and a dedicated team who have brought to the project a wide range of expertise and experience.

“The key to scientific drilling is delivering high-quality core to the scientists, and we have consistently had better than 98 percent core recovery,” said Pyne, who was also the technical expert behind the Cape Roberts Project that drilled to a depth of 939.4 meters below the sea floor. Pyne said reaching 1,000 meters is “great for the drilling team who take a lot of pride in their work, but our eyes are still firmly focused on the target depth of 1,200 meters.”

Source: University of Massachusetts Amherst

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