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The Antarctic Sun



Photo Credit: Eric Cravens/National Ice Core Lab

The shelves of the National Ice Core Lab in Lakewood, Colo., are filled with ice cores, including many from the GISP2 project. Many of the WAIS Divide cores will come here for storage. The WAIS core is the latest piece in understanding the planet's complex climate puzzle.

Connecting the pieces

Antarctic ice core to improve greenhouse gas climate record

BY PETER REJCEK, **ANTARCTIC SUN** EDITOR

Posted October 31, 2008

It's been about 20 years since the [National Science Foundation](#)'s [Office of Polar Programs](#) initiated a program to recover an ice core from the ice-covered island of Greenland.

The [Greenland Ice Sheet Project Two \(GISP2\)](#), which followed an earlier ice core drilling project with the Europeans in the 1970s and 1980s, recovered the longest core of ice at the time — 3,053.44 meters. Findings from the project showed abrupt changes in climate, extreme shifts in just a few years, among other revelations.

Now the [U.S. Antarctic Program](#) is in the midst of its most ambitious ice-coring project to date — the [West Antarctic Ice Sheet Divide Ice Core \(WAIS Divide\) program](#), a multi-year project funded by the NSF to improve the paleoclimate record of the last 100,000 years.

The 3,500-meter-long WAIS core, when compared and added to GISP2 data and other global climate records, will provide a fuller picture of climate change, particularly during the last glaciation, a generally colder period of time that lasted about 60,000 years and ended about 10,000 years ago. Today the planet is in what's called an interglacial, a warmer period that separates glaciations.

The WAIS core will help answer questions sparked by the results from GISP2, according to [Ed Brook](#), a professor of geosciences at [Oregon State University](#) who has several NSF-funded projects for studying the greenhouse gas concentrations in the WAIS core.

For instance, when climate change is abrupt in Greenland, what's happening with carbon dioxide levels in the atmosphere? How is temperature change in Greenland related to temperature change in Antarctica?

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The WAIS core, with the potential for scientists to read the climate history year by year for the last 40 millennia, will help resolve those questions, Brook said.

“This new core is going to let us get at questions like that: what is the connectedness of the Antarctic system to the rest of the world,” Brook said.



Photo Credit: Wikipedia Commons

A section of the GISP2 ice core from 1837 meters depth with clearly visible annual layers.

He recently co-authored with Jinho Ahn, also from Oregon State University, an article in the journal *Science* that provided additional evidence linking carbon dioxide levels and abrupt climate changes during a similar time period targeted by the WAIS core. That study compared previously drilled ice cores in Antarctica and sediment records in the northern hemisphere.

“There are sorts of global fingerprints out there of different kinds of processes changing [climate], and we’re going to be able to add to that a lot with this new core,” he said. “There are sequences of events, parts of cycles. We know one thing is driving another, and we really need to understand how those things are linked together to get the climate system right.”

The key driver, he suggested in the *Science* paper, is ocean currents and circulation patterns.

Ken Taylor, WAIS Divide chief scientist with the [Desert Research Institute](#) in Nevada, said the working hypothesis is that changes occur first in Antarctica and then propagate to the Arctic, though he added there is much uncertainty to that model and different interpretations of the data are possible.

“There are a lot of big global patterns that are standing out when you look at the time period this ice core is going to cover,” Taylor said. For example, Antarctica experiences a “muted” version of the abrupt warming and cooling recorded in Greenland, but the changes are flipped. So when one heats up the other cools down, according to Taylor.

“All of these specific questions rely on getting the ages [of the ice core layers] right,” he said.

One thing the scientists are certain of is that there was “a lot of action in the climate” during the past 100,000 years, Brook said. The WAIS core and its highly detailed greenhouse gas record should give them the best seat in the house to learn more about that action.

"The whole international community that works on ice coring, I think, is pretty excited about getting the results from this ice core," Brook said.

NSF funded research in this story: Ken Taylor, Desert Research Institute, Award Nos. [0440817](#), [0440819](#), [0230396](#) ; and Ed Brook, Oregon State University, Award Nos. [0739766](#), [0538578](#), [0440615](#) .



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