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Home / Science / CO2 Leads the Way



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A scientist cuts an ice core extracted from West Antarctica during the 2008-09 field season. Research on the climate record contained in the ice will help scientists refine their understanding of the relationship between temperature and CO2. A new study suggests that temperature changes follow increases in CO2.

CO2 leads the way

New study complements ongoing research on WAIS Divide ice core

BY PETER REJCEK, *ANTARCTIC SUN* EDITOR

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A new study, funded by the [National Science Foundation](#) and published in the journal *Nature* this month, suggests that rises in global temperature follow increases in atmospheric carbon dioxide.

The researchers constructed a record of global surface temperature from 80 temperature reconstructions spanning more than 20,000 years since just before the end of the last ice age, which scientists refer to as a glacial period. The reconstruction found that average temperatures around the Earth correlated with — and generally lagged behind — rising levels of CO₂.

“Carbon dioxide has been suspected as an important factor in ending the last ice age, but its exact role has always been unclear because rising temperatures reflected in Antarctic ice cores came before rising levels of CO₂,” [Jeremy Shakun](#), lead author of the paper and a [NOAA Postdoctoral Fellow](#) at [Harvard University](#) and [Columbia University](#), said in a [press release](#) from [Oregon State University \(OSU\)](#).

“But if you reconstruct temperatures on a global scale — and not just examine Antarctic temperatures — it becomes apparent that the CO₂ change slightly preceded much of the global warming, and this means the global greenhouse effect had an important role in driving up global temperatures and bringing the planet out of the last Ice Age,” added Shakun, who conducted much of the research as a doctoral student at OSU.

That’s big news, because previous research had suggested that CO₂ followed temperature change in Antarctica. The authors suggest that Antarctica actually warms slightly earlier than other places.

For the last several years, scientists have been drilling a new ice core in West Antarctica to better understand the relationship between CO₂ and temperature. The thick annual layers of snowfall found in the WAIS Divide ice core will offer a highly detailed view of past climate that hasn’t been available in previous ice cores. [See recent articles — [The last core: WAIS Divide deepens borehole for research into climate change](#) and [Deep core complete: WAIS Divide project finishes five-year effort to retrieve 3,331 meters of ice.](#)]

[Ed Brook](#) , one of the principal investigators on the [WAIS Divide project](#) whose lab at OSU is one of several analyzing the trapped gases in the ice core, said the Shakun et al. study is “highly relevant” to the research underway on the West Antarctic ice core.

“They did something pretty ambitious, which was to compile all the data from around the world that could be used as indirect measures of temperature from the last deglaciation, and did a statistical analysis to combine them all to get an average,” said Brook, who was not directly involved in the research. “I say this is ambitious because there are not that many datasets, and there are a number of potential biases. Nonetheless, they did a really good job examining possible bias.”

Brook said data from the WAIS Divide ice core, which reached a final depth of 3,405 meters (a record for a U.S. drilled ice core in Antarctica) during the 2011-12 field season), for the period covered in the *Nature* study is nearly finished. However, he and colleagues are still making measurements to improve the time resolution and precision.

“The WAIS Divide record will be better dated and will also show much more structure, because it will not be as heavily smoothed by transport of air in the snowpack as previous data,” he said.

“That does not discount the value of the Shakun et al. data at all,” Brook added. “It is just that WAIS Divide will provide a better CO2 dataset that then can be compared to the Shakun et al. temperature record.”



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