

# Historic carbon dioxide decline could hold clues for future climate

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A new study led by researchers at The Australian National University (ANU) provides a clearer snapshot of conditions during the last ice age—when global ice sheets were at their peak—and could even lead to better models for future climate projections.

The study demonstrates a new way of recreating [ocean conditions](#) in the

Atlantic during the Last Glacial Maximum (LGM)—around 20,000 years ago.

Lead author Dr. Jimin Yu says scientists have been trying to reconstruct ocean circulation for this [time period](#) for decades, because of the clues it offers about past CO<sub>2</sub> levels and changes in climate.

"The LGM was a time of much lower CO<sub>2</sub> levels, lower global temperature and lower sea levels," Dr. Yu said.

The researchers say old ocean models cannot explain recently published data on the LGM, meaning a change in thinking was needed.

Using [marine sediments](#) to reconstruct deep-water carbonate ion—which traces reflecting seawater acidity—the group generated a first-of-its kind map showing [water conditions](#) for the last glacial Atlantic.

This map reveals a new glacial deep Atlantic circulation [model](#).

"We found that carbon-rich Pacific Deep Water extended northward up to about 20° S in the South Atlantic at three to four kilometers depth during the Last Glacial Maximum," Dr. Yu said.

"This may have contributed critically to the decline in atmospheric CO<sub>2</sub>, thereby helping to initiate the glacial maximum."

According to Dr. Yu, ocean circulation is a key regulator of climate, storing and transporting heat, carbon and nutrients.

"This study suggests as waters shifted during the LGM, carbon was stored in the deep ocean, lowering atmospheric CO<sub>2</sub> levels," Dr. Yu said.

This information could also help improve or test the performance of

various climate models.

"If a model is able to reproduce the data—a method known as hindcasting or backtesting—it might give us confidence in the model's ability to map out future [climate](#) conditions," Dr. Yu said.

The research has been published in *Nature Geoscience*.

**More information:** J. Yu et al. Last glacial atmospheric CO<sub>2</sub> decline due to widespread Pacific deep-water expansion, *Nature Geoscience* (2020). [DOI: 10.1038/s41561-020-0610-5](https://doi.org/10.1038/s41561-020-0610-5)

Provided by Australian National University

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