Melting Antarctic could impact oceans 'for centuries'

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Rapidly melting Antarctic ice threatens to dramatically slow deep-water currents in the world's oceans, scientists say, impacting the spread of fresh water, oxygen and life-sustaining nutrients for centuries.

New modeling points to faster Antarctic ice melts driving a "substantial slowdown" of water circulation in the ocean depths if global carbon emissions remain high, researchers said in a study published in *Nature* on Wednesday.

The "overturning circulation" of waters in the deepest reaches of the oceans would slow by 40 percent by 2050 in a high-emissions scenario, according to the study, which warned of impacts that would last "for centuries to come".

If the model holds true, the deep ocean current will be "on a trajectory that looks headed towards collapse", said University of New South Wales (UNSW) climate professor Matthew England, who coordinated the study.

Trillions of tons of cold, highly salty and oxygen-rich water sink around Antarctica each year, sending a deep-water current northwards to the Indian, Pacific and Atlantic oceans, scientists say.

The greater volumes of melting ice make the Antarctic waters less dense and salty, however, slowing the deep-water circulation with consequences for climate, sea level and marine ecosystems.

"If the oceans had lungs, this would be one of them," England said.

And if the oceans become stagnant below 4,000 meters, "this would trap nutrients in the deep ocean, reducing the nutrients available to support marine life near the ocean surface," he added.

UNSW emeritus professor John Church, who was not involved in the study, said there were many uncertainties about the impact of a declining deep ocean circulation.

"But it seems almost certain that continuing on a high greenhouse gas emission pathway will lead to even more profound effects on the ocean and the climate system," Church said.

"The world urgently needs to drastically reduce our emissions to get off the high-emission pathway we are currently following."

The study team included lead author Qian Li of the Massachusetts Institute of Technology and co-authors from the Australian National University and Australia's national research organization CSIRO.

More information: Matthew England et al, Abyssal ocean overturning slowdown and warming driven by Antarctic meltwater, *Nature* (2023). DOI: 10.1038/s41586-023-05762-w.
www.nature.com/articles/s41586-023-05762-w