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From: The Earth Institute at Columbia University via EurekAlert!
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Wind-blown Antarctic sea ice helps drive ocean circulation

Antarctic sea ice is constantly on the move as powerful winds blow it away from the coast and out toward the open ocean. A new study shows how that ice migration may be more important for the global ocean circulation than anyone realized.

A team of scientists used a computer model to synthesize millions of ocean and ice observations collected over six years near Antarctica, and estimated, for the first time, the influence of sea ice, glacier ice, precipitation and heating on ocean overturning circulation. Overturning circulation brings deep water and nutrients up to the surface, carries surface water down, and distributes heat and helps store carbon dioxide as it flows through the world's oceans, making it an important force in the global climate system. The scientists found that freshwater played the most powerful role in changing water density, which drives circulation, and that melting of wind-blown sea ice contributed 10 times more freshwater than melting of land-based glaciers did.

A vital contributor to the process, the scientists discovered, was the seasonal migration of the ice, which is largely driven by winds. If the sea ice were instead forming and melting in the same place, there would be no net effect.

"If you were to turn off these winds and eliminate that pathway for moving sea ice away from Antarctica, you would probably significantly reduce the strength of the overturning circulation," said lead author Ryan Abernathey, an oceanographer at Columbia University's Lamont-Doherty Earth Observatory.

The study, published this week in the journal Nature Geoscience, uses a sophisticated approach to examine on the complex problem of what is happening down under the ice, where direct observations are hard to come by. It provides new insight into the basic physics of the ocean that may be critical for answering future questions about climate change, such as how loss of sea ice or changing winds could affect global ocean circulation, said Abernathey.

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Antarctic Sea Ice Image: Jane Peterson via [NASA](#)



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