

How wind helps Antarctic sea ice grow, even as the Arctic melts

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Breaking through the ice in Antarctica. Credit: Mark Brandon/Flickr, CC BY-NC-SA

Strong winds linked to climate change and the hole in the ozone layer are driving a steady increase in Antarctic sea ice, even as Arctic levels continue to shrink dramatically, a new report shows.

While ice in the Arctic now melts 2.9 months earlier than it did in 1980,

parts of the Antarctica have seen the [ice coverage](#) lasting for 2.6 months more.

Released in Hobart yesterday, [The Position Analysis: Antarctic Sea Ice and Climate Change 2014](#) report from the Antarctic Climate & Ecosystems Cooperative Research Centre has sought to clear up widespread confusion about the polar differences in sea ice.

What's driving the changes?

Sea ice is frozen seawater that forms when the surface of the ocean cools to the point of freezing (at approximately -1.8°C). Every winter, extensive freezing of the Southern Ocean forms a vast sea ice cover that surrounds the Antarctic continent.

Lead author of the report Jan Lieser, a marine glaciologist at the Antarctic Climate & Ecosystems centre, said researchers were confident of the physical driver behind the increase of ice: wind.

Dr Lieser said that global warming and, to a lesser extent, the ozone hole, had been found to be the main physical drivers of the increase in westerly winds over the Southern Ocean, what he dubbed a "double whammy from above and below".

He said sea ice is a highly sensitive, easily-movable substance, and if you have [strong winds](#), the sea ice will move around with the wind.

He explained that a warmer atmosphere increases [convection](#), producing greater wind speeds in certain bands of the world.

In the Southern Ocean surrounding Antarctica, this warmer atmosphere has manifested itself in stronger westerlies, which are pushing the ice out further than it would normally reach.

"We know the sea ice is growing because the westerly winds are intensifying around the continent, and that pushes the sea ice further into the southern ocean," said Dr Lieser.

Paradoxically, warmer sea temperatures are also helping to create more sea ice. The warmer water creates a thinner sheet of ice that is then more easily broken up and moved by the increased wind. This spreads the sheet further and actually results in more ice coverage.

Because it's so cold and the winds are so strong further south, there's rapid freezing all the time. Dr Lieser likened the conditions to "an ice factory".

Experts react

Professor Ian Simmonds, a [climate](#) scientist from the University of Melbourne's School of Earth Sciences, says the report is a helpful new resource for "the public at large" to really understand the confusing growth of Antarctic sea ice and how it is related to [climate change](#).

He said that this increase in Antarctic sea ice would have a significant impact on our climate in the future.

"Sea ice plays a central role in global climate through reflecting back much of the solar radiation that falls on it, rather than it being absorbed by the ocean. In addition ... the extent of Antarctic sea ice influences the occurrence of El Nino, which is known to significantly impact on Australian rainfall, particularly in the east," he said.

Dr Sharon Stammerjohn, a professor of ocean sciences from the University of Colorado, said the changes in [sea ice](#) were having a significant impact on marine life.

"For the southern ocean there is a huge seasonal change between the summer minimum and the winter maximum and the ecosystem has evolved to deal with that amazing phenomenal change," she said.

"It's the rate of change that is quite alarming in these regions, with particular regard to the ecosystems. We are seeing fundamental change in these marine ecosystems."

Professor Simmonds said he hoped that policy makers would use this research to understand the impacts that current levels of greenhouse gases are having on the [southern ocean](#).

"The planet is at present in uncharted waters with respect to carbon dioxide [and other greenhouse gas levels]. We are doing extraordinary things to the climate system, and the consequences will be felt downstream," he said.

"The ocean is intimately involved with all of this, it has an extremely long memory."

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