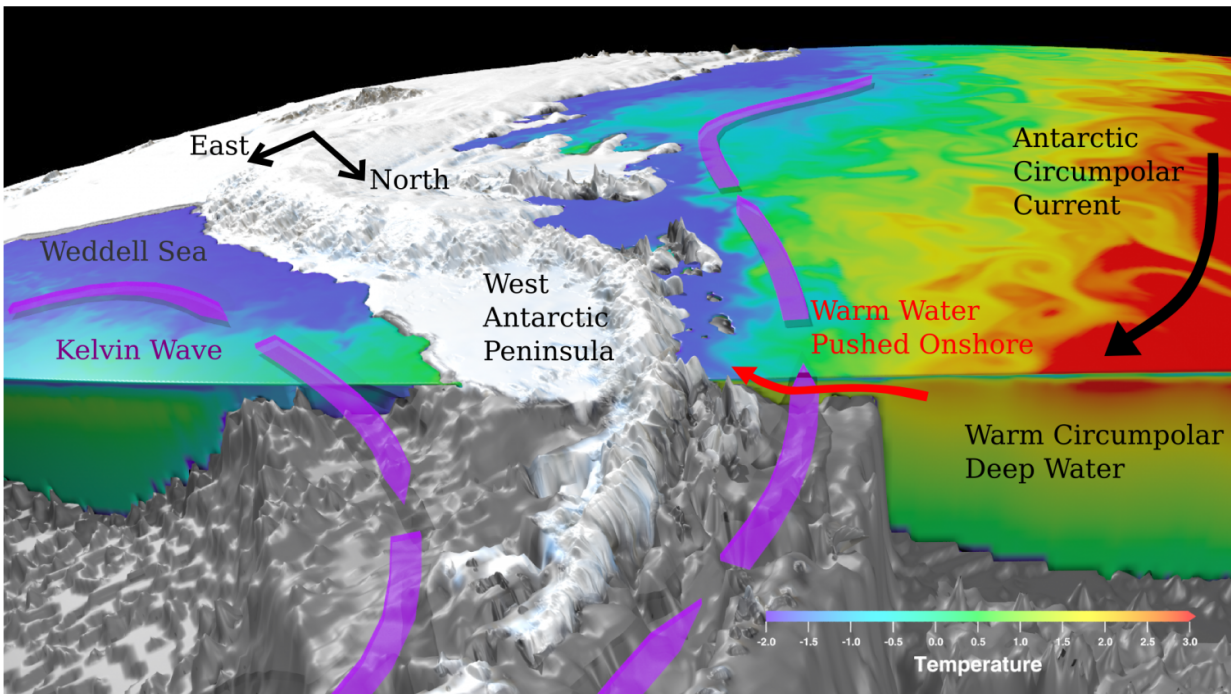


Stronger winds heat up West Antarctic ice melt

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The path of the Kelvin waves that interact with the Antarctic Circumpolar Current and push warmer waters under the ice shelves of the West Antarctic Peninsula. These waves are generated by strengthening winds, 6000km away, on the opposite side of the Antarctic. Credit: Ryan Holmes / NCI

New research published today in *Nature Climate Change* has revealed how strengthening winds on the opposite side of Antarctica, up to 6000kms away, drive the high rate of ice melt along the West Antarctic

Peninsula.

Researchers from the ARC Centre of Excellence for Climate System Science found that the winds in East Antarctica can generate sea-level disturbances that propagate around the continent at almost 700 kilometers per hour via a type of ocean wave known as a Kelvin wave.

When these waves encounter the steep underwater topography off the West Antarctic Peninsula they push warmer [water](#) towards the large ice shelves along the shoreline. The warm Antarctic Circumpolar Current passes quite close to the continental shelf in this region, providing a source for this warm water.

"It is this combination of available warm water offshore, and a transport of this warm water onto the shelf, that has seen rapid ice shelf melt along the West Antarctic sector over the past several decades," said lead researcher Dr Paul Spence.

"We always knew [warm water](#) was finding its way into this area but the precise mechanism has remained unclear. That remote winds on the opposite side of Antarctica can cause such a substantial subsurface warming is a worrying aspect of the circulation at the Antarctic margin."

The changes in the Antarctic coastal winds, particularly along East Antarctica, might themselves be related to climate change. This is because as the Earth warms the strong westerly winds associated with storms over the Southern Ocean contract toward the poles, in turn changing the winds near the Antarctic continent.

When the researchers modeled the impacts of these altered winds on Antarctica they found that they could drive warming of up to 1°C of the waters at the depth of floating ice shelves along the Western Antarctica Peninsula.

This could have significant implications for Antarctica's ice shelves and ice sheets, with previous research showing that even small increases in ocean temperatures can substantially increase melt rates around the Peninsula.

"For lack of precise estimates of future change, scientists have remained conservative in what this melting means for the globe, but recent estimates suggest Antarctica could contribute more than a metre to sea-level rise by 2100 and over 15 metres by 2500 under current emissions trajectories," Dr Spence said.

"This would be disastrous for coastal regions and displace hundreds of millions of people worldwide".

"If we do take rapid action to counter global warming and slow the rise in temperatures, southern storms tracks are likely to return to a more northerly position. That may slow the melting in Western Antarctica and bring more reliable autumn and winter rains back to the southern parts of Australia."

"It would also limit ocean warming and give some of the world's major marine-terminating ice sheets a chance to stabilize. It's vital we achieve this or we are likely to see more calving of large ice shelves, similar to the recent Larsen C event."

More information: Paul Spence et al, Localized rapid warming of West Antarctic subsurface waters by remote winds, *Nature Climate Change* (2017). [DOI: 10.1038/nclimate3335](https://doi.org/10.1038/nclimate3335)

Provided by University of New South Wales

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