

# Antarctica's coasts are becoming less icy, researchers find

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Antarctica. Credit: Ceridwen Fraser

An increase in pockets of open water in Antarctica's sea ice (polynyas) may mean coastal plants and animals could one day establish on the continent, University of Otago-led research suggests.

The research, published in *Proceedings of the National Academy of Science*, aimed at understanding where open water might allow coastal species to settle in the future.

Led by Research Fellow Dr. Grant Duffy from Otago's Department of Marine Science, the team found unexpected evidence the area of polynyas around Antarctica is increasing dramatically, and it follows an intriguing cycle, growing and shrinking roughly every 16 years.

"These trends are fascinating—and we haven't noticed them before," Dr. Duffy says. "We're not completely sure what is driving the cyclical pattern, but the ecological implications could be huge."

Co-author Dr. Ariaan Purich, a scientist at Monash University in Australia who studies ocean-atmosphere interactions, says the cyclical patterns appear to line up with atmospheric drivers including the Southern Annular Mode, a climate phenomenon that circles Antarctica and influences weather in New Zealand and Australia.

"Recent record low Antarctic sea ice coverage has been linked with ocean warming," Dr. Purich says.

"In coastal environments, large-scale atmospheric variability and trends can interact with changing ocean conditions to shape the extent of sea ice. These findings give us exciting insights that will help us predict coastal sea ice coverage in the future."

The senior author on the study, Professor Ceridwen Fraser, also of the Department of Marine Science, says the results are also critically important for predicting what will happen to coastal ecosystems in Antarctica as the climate warms.

"We know that many non-native plants and animals can reach

Antarctica, for example by rafting on floating kelp," Professor Fraser says.

"At the moment, most of them can't settle because of coastal ice scour. Less ice could create opportunities for some coastal plants and animals to establish—with big implications for native Antarctic coastal ecosystems."

Dr. Duffy agrees. "Our research shows that areas of [open water](#) along Antarctic coasts, in particular, are growing in area as the climate warms," he says. "These changing coastal environments will mean ecosystems have to adapt and change."

Researchers involved in the work are part of the major national Antarctic programs Securing Antarctica's Environmental Future, Australia and Antarctic Science Platform, New Zealand.

**More information:** Duffy, Grant A., Emerging long-term trends and interdecadal cycles in Antarctic polynyas, *Proceedings of the National Academy of Sciences* (2024). [DOI: 10.1073/pnas.2321595121](https://doi.org/10.1073/pnas.2321595121).  
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