

Less ice in the Arctic ocean has complex effects on marine ecosystems and ocean productivity, study finds

March 4 2024



As the Arctic warms rapidly, cloudy meltwater pours into its numerous fjords, obscuring sunlight and posing uncertainties for marine life in the far north. This image, taken using an aerial drone in a remote fjord in northeast Greenland, shows scientists onboard a 10 m-long research vessel sampling a meltwater runoff plume. Credit: Karl Attard, University of Southern Denmark

Over the past 25 years, the amount of summer Arctic sea ice has

diminished by more than 1 million square kilometers. As a result, vast areas of the Arctic Ocean are now, on average, ice-free in summer. Scientists are closely monitoring how this impacts sunlight availability and marine ecosystems in the far north.

"Many questions arise when such large areas become [ice-free](#) and can receive sunlight. A prevailing paradigm suggests that the Arctic Ocean is rapidly becoming more productive as sunlight becomes more abundant in the [marine environment](#). However, it is unclear how ecosystems will evolve in response to increasing sunlight availability and how different components will be affected," says Karl Attard, a marine scientist and Assistant Professor at the Department of Biology, University of Southern Denmark.

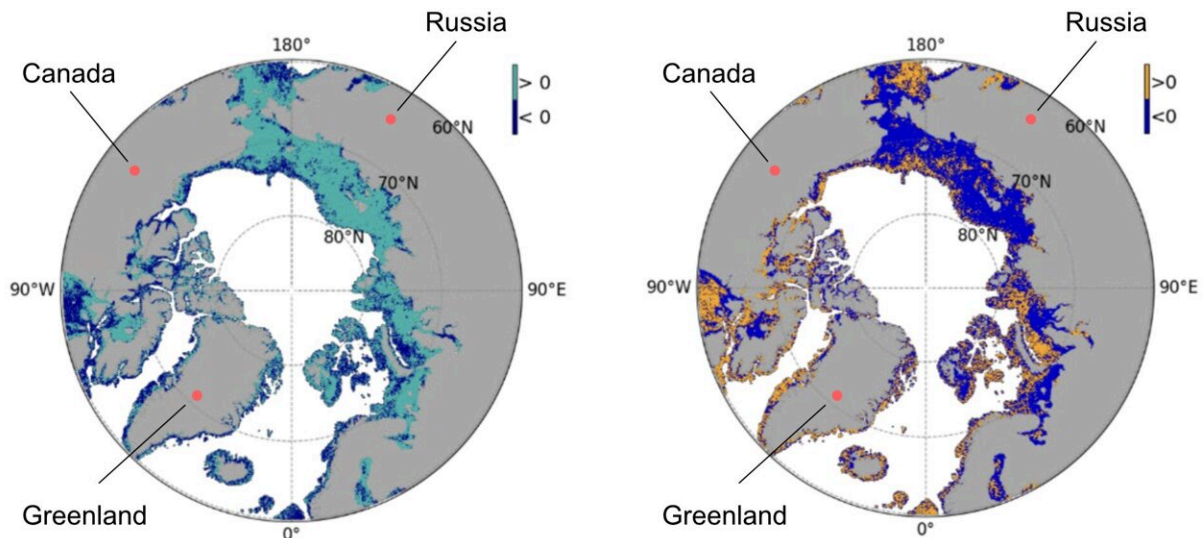
Attard has led an international research team investigating sunlight availability and photosynthetic production on the understudied Arctic [seafloor](#). Their study has been published in *Proceedings of the National Academy of Sciences*.

The research team focused on the vast shelf regions of the Arctic Ocean; portions of the seafloor that are relatively shallow, rarely exceeding 200 meters in depth. These vast regions, accounting for around half of the Arctic Ocean area, make it particularly interesting to study how seafloor ecosystems respond as sea ice continues to diminish.

Sunlight is a crucial energy source for life forms that grow through photosynthesis; they require water, carbon dioxide, nutrients, and sunlight. Scientists refer to these organisms as primary producers, and they thrive within the sea ice, within the [water column](#), and on the seafloor. These organisms serve as the foundation for a broader food web in the ocean, supporting commercially important fisheries and large predators like polar bears. The main primary producers on the seafloor are microalgae, seaweeds, and seagrasses.

"It might seem reasonable to assume that the abundance of [primary producers](#) on the seafloor in the shallower regions of the Arctic Ocean would increase as more sunlight reaches the bottom. In fact, our research suggests that since 2003, the seafloor area exposed to sunlight has been increasing rapidly at around 47,000 square kilometers per year. Curiously, however, we do not see an increase in the total amount of sunlight reaching the Arctic seafloor," says Karl Attard, referring to the research team's models based on 20 years of satellite data from the Arctic Ocean.

This surprising result is seemingly due to water transparency, which has decreased in many parts of the Arctic Ocean.



Left map: Positive trends (>0) indicate more cloudy waters. Negative trends (<0) indicate more seafloor primary production. Right map: Positive trends (>0) indicate more sunlight reaching the seafloor. Negative trends (<0) indicate more cloudy waters.

Citation: Less ice in the Arctic ocean has complex effects on marine ecosystems and ocean productivity, study finds (2024, March 4) retrieved 27 April 2024 from <https://phys.org/news/2024-03-ice-arctic-ocean-complex-effects.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.