

# Melting sea ice may lead to more life in the sea

March 31 2017, by Birgitte Svennevig

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Six melt ponds in Young Sound in North-Eastern Greenland were selected: two natural and four artificial basins. Phosphorous and nitrogen (nutrients, which are also known from common garden fertilizer) were added in various combinations to four ponds, while two served as control ponds. For a period of up to 13 days Heidi Louise Sørensen measured many different parameters in the melt water, including the content of Chlorophyll a: a pigment that enables algae to absorb energy from light. The chlorophyll content of the phosphorus- and nitrogen-enriched ponds was 2 to 10 times higher than in the control ponds and testifies to an increased content of algae.

When spring arrives in the Arctic, both snow and sea ice melt, forming melt ponds on the surface of the sea ice. Every year, as global warming increases, there are more and larger melt ponds.

Melt ponds provide more light and heat for the ice and the underlying [water](#), but now it turns out that they may also have a more direct and potentially important influence on life in the Arctic waters.

Mats of algae and bacteria can evolve in the [melt ponds](#), which can provide food for marine creatures. This is the conclusion of researchers in the periodical, Polar Biology.

## **Own little ecosystems**

"The melt ponds can form their own little ecosystem. When all the sea ice melts during the summer, algae and other organisms from melt ponds are released into the surrounding seawater. Some of this food is immediately ingested by creatures living high up in the water column. Other food sinks to the bottom and gets eaten by seabed dwellers," explains Heidi Louise Sørensen, who is the principal author of the scientific article, continuing:

"Given that larger and larger areas of melt ponds are being formed in the Arctic, we can expect the release of more and more food for creatures in the polar sea."

Heidi Louise Sørensen studied the phenomenon in a number of melt ponds in North-Eastern Greenland as part of her PhD thesis at University of Southern Denmark (SDU). Bo Thamdrup and Ronnie Glud of SDU, and Erik Jeppesen and Søren Rysgaard of Aarhus University also contributed to the work.

## **Food for seals and sea cucumbers**

In the upper part of the [water column](#) it is mainly krill and copepods that benefit from the nutrient-rich algae and bacteria from melt ponds. These

creatures are eaten by various larger animals, ranging from amphipods to fish, seals and whales. Deeper down, it is seabed dwellers such as [sea cucumbers](#) and brittle stars that benefit from the algae that sink down.

For some time now, researchers have been aware that simple biological organisms can evolve in melt ponds – they may even support very diverse communities. But so far it has been unclear why sometimes there are many organisms in the ponds, and on other occasions virtually none.

According to the new study, 'nutrients' is the keyword. When nutrients such as phosphorus and nitrogen find their way into a melt pond, entire communities of algae and micro-organisms can flourish.

## **From the Siberian tundra**

Nutrients can find their way into a melt [pond](#) in a variety of ways, For example, they can be washed in with waves of sea water; they can be transported by dust storms from the mainland (for example, from the Siberian tundra); or they can be washed with earth from the coast out on the ice, when it rains.

Finally, migratory birds or other larger animals resting on the ice can leave behind sources of nutrient.

"Climate change is accompanied by more storms and more precipitation, and we must expect that more nutrients will be released from the surroundings into the melt ponds. These conditions, plus the fact that the distribution of areas of melt ponds is increasing, can contribute to increased productivity in plant and animal life in the Arctic seas," says Professor Ronnie N. Glud of the Department of Biology at SDU.

## **Warmer and more windy**

There are further factors that may potentially contribute to increased productivity in the Arctic seas:

- When the sea ice disappears, light can penetrate down into the water.
- When the sea ice disappears, wind and storms can stir the water up, bringing nutrients up to the surface from deep water. When it gets warmer on the mainland, this creates more melt water, which can flow out into the sea, carrying nutrients in its wake.

**More information:** Heidi Louise Sørensen et al. Nutrient availability limits biological production in Arctic sea ice melt ponds, *Polar Biology* (2017). [DOI: 10.1007/s00300-017-2082-7](https://doi.org/10.1007/s00300-017-2082-7)

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