

Arctic sea ice helps remove CO₂ from the atmosphere

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Dorte Haubjerg Søgaard from University of Denmark/Grønlands Naturinstitut studies how sea ice removes CO₂ from the atmosphere. Credit: Søren Rysgaard

Climate change is a fact, and most of the warming is caused by human activity. The Arctic is now so warm that the extent of sea ice has decreased by about 30 pct. in summer and in winter, sea ice is getting thinner. New research has shown that sea ice removes CO₂ from the atmosphere. If Arctic sea ice is reduced, we may therefore be facing an

increase of atmospheric concentration of CO₂, researchers warn.

Due to [global warming](#), larger and larger areas of [sea ice](#) melt in the summer and when sea ice freezes over in the winter it is thinner and more reduced. As the Arctic summers are getting warmer we may see an acceleration of global warming, because reduced sea ice in the Arctic will remove less CO₂ from the atmosphere, Danish scientists report.

"If our results are representative, then sea ice plays a greater role than expected, and we should take this into account in future global CO₂ budgets", says Dorte Haubjerg Søgaaard, PhD Fellow, Nordic Center for Earth Evolution, University of Southern Denmark and the Greenland Institute of Natural Resources, Nuuk.

Only recently scientists have realized that sea ice has an impact on the planet's CO₂ balance.

"We have long known that the Earth's oceans are able to absorb huge amounts of CO₂. But we also thought that this did not apply to ocean areas covered by ice, because the ice was considered impenetrable. However, this is not true: New research shows that sea ice in the Arctic draws large amounts of CO₂ from the atmosphere into the ocean", says Dorte Haubjerg Søgaaard.



A frost flower was just created on new sea ice. Credit: David Barber

Dorte Haubjerg Søgaard has just completed her studies of sea ice in Greenland. The studies show that sea ice may have a major impact on the global carbon cycle, and that chemical processes have a much greater impact on the sea ice's ability to remove CO₂ than biological processes. The research is published as a series of articles in scientific journals.

"The chemical removal of CO₂ in sea ice occurs in two phases. First crystals of calcium carbonate are formed in sea ice in winter. During this

formation CO₂ splits off and is dissolved in a heavy cold brine, which gets squeezed out of the ice and sinks into the deeper parts of the ocean. Calcium carbonate cannot move as freely as CO₂ and therefore it stays in the sea ice. In summer, when the sea ice melts, calcium carbonate dissolves, and CO₂ is needed for this process. Thus, CO₂ gets drawn from the atmosphere into the ocean - and therefore CO₂ gets removed from the atmosphere", explains Dorte Haubjerg Søgaard.

The biological removal of CO₂ is done by algae binding of carbon in organic material.

Another important discovery is that every winter flower-like ice formations are formed on the surface of newly formed sea ice. They are called frost flowers. Dorte Haubjerg Søgaard has discovered that these frost flowers hold extremely high concentrations of [calcium carbonate](#), which can have a further significant impact on the potential CO₂ uptake in the Arctic.

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