Reduced sea ice disturbs balance of greenhouse gases

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(Phys.org)—The widespread reduction in Arctic sea ice is causing significant changes to the balance of greenhouse gases in the atmosphere. This is shown in a new study conducted by researchers from Lund University in Sweden, among others.

According to the study, the melting of sea ice in the Arctic has a tangible impact on the balance of greenhouse gases in this region, both in terms of uptake and release. The researchers have studied the greenhouse gases carbon dioxide and methane both in the tundra and in the Arctic Ocean.

"Changes in the balance of greenhouse gases can have major consequences because, globally, plants and the oceans absorb around half of the carbon dioxide that humans release into the air through the use of fossil fuels. If the Arctic component of this buffer changes, so will the amount of greenhouse gases in the atmosphere", says Dr Frans-Jan Parmentier, a researcher at Lund University, Sweden.

He has carried out the research study together with a number of colleagues both from Lund University and from Denmark, Greenland, Canada and the USA. The researchers observed that a vicious circle is formed when the sea ice melts. Normally, the white ice reflects sunlight, which then bounces out into space, but when the sea-ice cover shrinks, the amount of sunlight reflected is also reduced. Instead, a larger proportion is absorbed by the surface of the ocean, which causes warming that contributes to the rise in air temperatures around the Arctic.

On the one hand, the rising temperatures make vegetation grow more vigorously and therefore more carbon dioxide is taken up, which is a positive effect. On the other hand, the same temperature rise means that more carbon dioxide and methane are released from the soil, which has a strong negative impact on the climate, according to Dr Frans-Jan Parmentier.

In addition to the changes on land, the present study shows that there are a number of uncertainties surrounding the effects of the melting ice on the amount of greenhouse gases exchanged by the ocean through natural processes. Many of these marine processes are poorly understood in this context.

"We know very little about how the shrinking sea ice cover disturbs the balance of greenhouse gases in the sea in the long term", says Dr Parmentier.

The article has been published in the journal *Nature Climate Change*.

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Provided by Lund University