

Study reveals 'two faces' of phytoplankton

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Credit: Tiago Fioreze / Wikipedia

Phytoplankton, commonly known as plant plankton that remove carbon dioxide from the atmosphere through photosynthesis, are potentially a key driver of Arctic warming under greenhouse warming, a study reveals.

Scientists with Pohang University of Science and Technology (POSTECH), Max Planck Institute for Meteorology (MPI-M), and Korea Institute of Ocean Science and Technology (KIOST), presented

on Monday, April 20, in *Proceedings of the National Academy of Sciences (PNAS)* Online, the geophysical impact of [phytoplankton](#) that triggers positive feedbacks in the Arctic warming when the warming-induced melting of sea ice stimulates phytoplankton growth. The paper is titled "Amplified Arctic warming by phytoplankton under [greenhouse warming](#)."

When the Arctic sea ice melts away due to greenhouse warming, the ocean surface albedo inevitably decreases, reducing the amount of solar energy reflected back from the earth and ultimately resulting in warmer ocean surface. As phytoplankton growth is subject to factors such as temperature, light, and nutrients, the explosive growth of phytoplankton follow when both the warming-induced melting and shortwave radiation penetrating the ocean increase.

The new study has confirmed that it is the beginning of the geophysical feedback by which chlorophyll and the related pigments in phytoplankton absorb solar radiation and in turn raise the sea surface temperature even further. Using a coupled ocean-atmosphere model, the authors have revealed that the additional positive feedback in the Arctic can amplify Arctic warming by as much as 20%.

"We believe that, given the inseparable connection of the Arctic and global climate, the positive feedback in Arctic warming triggered by phytoplankton and their biological heating is a crucial factor that must be taken into consideration when projecting future climate changes," says Jong-Seong Kug, a professor at POSTECH's School of Environmental Science and Engineering and one of the leaders of this study.

Featured in "This Week in PNAS," this study is drawing significant attention from the academic community as the results presented by Kug et al. overturn the previous understanding of phytoplankton and their impacts on climate systems.

More information: Amplified Arctic warming by phytoplankton under greenhouse warming, Jong-Yeon Park, [DOI: 10.1073/pnas.1416884112](https://doi.org/10.1073/pnas.1416884112)

Provided by Pohang University of Science & Technology

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