Antarctic sea ice thickness affects algae populations

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In the waters off Antarctica, algae grow and live in the sea ice that surrounds the southern continent-a floating habitat sure to change as the planet warms. As with most aquatic ecosystems, microscopic algae form the base of the Southern Ocean food web. Distinct algae populations reside in the sea ice surface layers, on the ice's underside, and within the floating ice itself. The algae that reside on the floating ice's underside are particularly important for the region's krill population, while those on the interior or surface layers are less accessible. How changing sea ice properties will affect the regional biology, then, depends on understanding how algae populations interact with the ice.

Drawing together samples collected by previous researchers, and through their own efforts, Meiners et al. developed the Antarctic Sea Ice Processes and Climate-Biology database, a collection of 1,300 Antarctic sea ice core samples collected from 1983 to 2008. By melting core samples and measuring the concentration of chlorophyll a, researchers can estimate the amount of algae living in the ice, with vertical profiles indicating where ice algal biomass peaks.

Using their database, the authors find that algae populations vary seasonally, peaking in the spring and late summer. They find that though algal biomass is distributed evenly among surface, interior, and underside populations, there is a distinct relationship between sea ice thickness and the likelihood of biomass maxima in different layers. They find that on thin ice, less than 0.4 meters (1.3 feet) thick, algae live on both the surface and the underside. For ice from 0.4 to 1 m (1.3 to 3.3

feet) thick, however, the majority of the algae were on the ice's underside. Thick ice, often formed by rafting of ice floes, showed a more homogeneous distribution of ice algal biomass.

More information: Chlorophyll a in Antarctic sea ice from historical ice core data, *Geophysical Research Letters*, doi: 10.1029/2012GL053478 , 2012

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