

The future of Arctic sea-ice biogeochemistry and ice-associated ecosystems

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Abstract: The Arctic sea-ice-scape is rapidly transforming. Increasing light penetration will initiate earlier seasonal primary production. This earlier growing season may be accompanied by an increase in ice algae and phytoplankton biomass, augmenting the emission of dimethylsulfide and capture of carbon dioxide. Secondary production may also increase on the shelves, although the loss of sea ice exacerbates the demise of sea-ice fauna, endemic fish and megafauna. Sea-ice loss may also deliver more methane to the atmosphere, but warmer ice may release fewer halogens, resulting in fewer ozone depletion events. The net changes in carbon drawdown are still highly uncertain. Despite large uncertainties in these assessments, we expect disruptive changes that warrant intensified long-term observations and modelling efforts.