Does sea ice reduction enhance preservation of organic carbon in Arctic marine sediments?

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Ongoing climate change leads to sea ice reduction and higher freshwater runoff into the Arctic Ocean. These factors could, in the future, sustain higher primary productivity due to enhanced nutrient input and more extensive open water conditions. An increase in primary productivity is likely to change the amount of organic carbon (OC) reaching the seafloor and might cause higher carbon burial rates. However, the mechanisms that control OC preservation in sediments are complex and poorly characterized. Recent findings show that OC burial in marine sediments can be substantially enhanced due to the association of OC with reactive iron minerals.

Our study seeks to provide a deeper understanding of how an increased flux of organic material to the Arctic seafloor will change biogeochemical processes, carbon sequestration, and the sorptive preservation of OC by iron oxides. In 2017, during the first of three planned annual cruises, we collected sediment and pore water samples from six stations along a S-N transect in the Barents Sea. We will present bulk elemental, OC and nitrogen composition for these sediments as well as the amount of OC associated with reactive iron oxides in relation to environmental parameters, e.g., sea ice cover.

Our findings will improve our understanding of how changes in the surface Arctic Ocean influence seafloor processes, and will test whether sea ice reduction results in more OC being preserved in these sediments.