Does climate warming reduce 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. The resulting enhanced nutrient inputs and more extensive open water conditions are expected to support higher primary productivity, enhanced organic carbon (OC) export to the seafloor, and ultimately higher carbon burial rates into the sediments.

In relation to this hypothesis, our study seeks to provide a deeper understanding of how future alterations in the OC transfer to the Arctic seafloor will change long-term carbon sequestration. In particular, we focus on the preservation of OC associated with inorganic iron phases (OC-Fe) in Barents Sea sediments, as recent findings indicate that this OC-Fe coupling mechanism could substantially enhance OC burial.

Here we present OC-Fe data from 16 surface sediment samples and two short sediment cores from seasonally sea ice-covered areas in the northern and the sea-ice free southern Barents Sea. Preliminary results show that in the southern Barents Sea, reactive iron phases and OC-Fe contents are twice as high as in surface sediments from the north. This finding may indicate that carbon burial in a future sea-ice free Arctic may be less efficient. But, the comparison of OC-Fe in sediment cores from the northern and southern Barents Sea shows that even though concentrations of reactive iron is two-three times higher in the north, the OC-Fe fraction of the total OC content is very similar in both cores. Moreover, very iron-rich sediment layers seem to have no influence on OC-Fe content.