



Arctic Shelf Seas: What drives the distribution of terrestrial dissolved organic matter in the Siberian Laptev Sea?

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The acceleration of permafrost degradation in northern Siberia combined with higher precipitation in a warming climate has the potential to increase the flux of dissolved organic matter (DOM) along the land to ocean-pathway. The Laptev Sea (LS) receives enormous volumes of DOM-rich freshwater from the Lena as well as from Ob and Yenisei through the Kara Sea opening, and is hence a key shelf region to study the transport and fate of terrestrial DOM in the Arctic. One of the specific characteristics of the LS is that a significant portion of the DOM-rich river water undergoes one freeze-thaw cycle within the extensive coastal fast ice region, which significantly influences the Arctic DOM cycle.

To gain a better understanding of how fast ice formation and melt affect the transport and fate of DOM in the Laptev Sea, we sampled the fast ice, as well as river and marine waters for their dissolved organic carbon concentration and the colored fraction of DOM in different seasons over a 5-year period (2010-2014). This effort resulted in one of the most comprehensive data sets on the distribution and characteristics of DOM in Siberian Shelf Seas.

Our results show that DOM-poor fast ice meltwater mixes with high-DOM river water from the spring freshet to form a water mass that resembles the DOM characteristics of the “normal” summer discharge of the Lena. This may misleadingly appear as if the water masses of the LS are a result of the mixing between marine waters and a single terrestrial DOM source instead of three sources with distinctly different DOM characteristics. Consequently, deviations from the linear mixing line, which imply a non-conservative behavior of DOM along the salinity gradient, might not be a result of biogeochemical processes but simply a consequence of different mixing ratios of the three endmembers.