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Evaluating Dissolved Organic Carbon Retrieval in the Lena River Delta using Sentinel 3 OLCI Data

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As air temperatures in the Arctic continue to rise, permafrost thaw intensifies, and discharge from the Arctic rivers increases. These drastic changes are likely to accelerate mobilization of organic matter and its export through rivers into the Arctic Ocean. Therefore, thorough monitoring of these processes becomes increasingly important. The Lena River with its large catchment area is one of the major sources of the organic carbon in the Arctic Ocean and, therefore, plays a crucial role in the Arctic carbon cycle.

To observe current and future changes of carbon transport via the Lena River, a new monitoring program has been initiated in 2018. In situ water samples are collected from the one of the Lena Delta branches every several days. Since generally the in situ sampling in the Arctic is challenging and costly, in this study, we test the potential of remote sensing to complement the field observations. Remote sensing provides synoptic spatial coverages and high temporal resolution at high latitudes.

We test the retrieval of dissolved organic carbon (DOC) from satellite-derived chromophoric dissolved organic matter (CDOM). For this, we use measurements of the Ocean & Land Colour Instrument (OLCI) on board the Sentinel-3 satellites in combination with beforehand tested atmospheric correction algorithms and CDOM retrieval algorithms. The quality of the satellite retrieved DOC of the Lena River water is assessed by DOC, measured in the in situ samples. Remotely sensed DOC contributes to an improvement of DOC fluxes monitoring, which can potentially be extended to all big Arctic rivers.