



Using MODIS to estimate fluxes of dissolved organic carbon in major Arctic rivers

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Estimates of riverine dissolved organic carbon (DOC) export to the Arctic Ocean are constrained by the limited accessibility of sampling sites at the outlets of great Arctic rivers. In particular, the highest DOC fluxes are observed throughout the ice breakup period that occurs over a short two to three-week period in late May or early June during the snowmelt-generated peak flow. The optical properties of Chromophoric Dissolved Organic Matter (CDOM), facilitates the acquisition of time series of multispectral satellite imagery with a high revisit capacity like MODIS. These time series are relevant to monitor DOC fluxes in large Arctic rivers, especially during spring freshet event. Moreover, MODIS data gives an opportunity to re-visit temporal dynamics of DOC fluxes since 2000 which were computed from in situ data only. Here we propose and evaluate an alternative method to retrieve seasonal DOC export in the six major Arctic rivers over the past ca. 15 years. The results demonstrate that this method significantly improves DOC fluxes estimates in three of out six rivers. An average total amount of DOC export computed from this method is 20.9 ± 11.51 Tg yr⁻¹ which is about 2 Tg yr⁻¹ than the most recent estimates.