Project acronym: MackSed

Project title: Mobilizing sediment and associated carbon, nutrients and phytoplankton of Arctic Great Rivers deltaic surface waters – potential impact of permafrost thaw

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Discipline: Earth Sciences & Environment: Global change & Climate observation

Station(s): Western Arctic Research Centre (WARC) (Canada)

Arctic rivers are susceptible to increased nutrient loading and climate change. The concentrations of suspended sediments (SSC), dissolved carbon and chlorophyll in deltas of Great Arctic Rivers are spatially and seasonally variable due to nutrient-rich effluent supply by permafrost thaw. Also significant is the changing magnitude of floodplain lake-river hydrological connectivity (open, semi-open and close type), the time and intensity of which varies with climate change. Based on the in-situ data set, this project will assess the feasibility of monitoring SSC, dissolved carbon and chlorophyll concentration using remote sensing data. Our study will focus on a few river cross profiles of the Mackenzie Delta rivers between Tsiigehtchic village and Inuvik town around the WARC station in Northwest Territories. The proposed work will be implemented in more than one location (previously on the Siberian Arctic River) for generating comparative studies. The proposed research will apply Landsat images and in-situ investigations to study the spatio-temporal variation of suspended sediment transport and total organic carbon (objective no. 1) and chlorophyll (objective no. 2) over Mackenzie Delta channels and lakes.
The first objective, we aim at (1) identifying typically suspended sediment variations along the studied delta, (2) identifying environmental drivers of sediment transport changes within the delta and possible changes of the existing patterns, and (3) providing a comparative study of suspended sediment patterns between Siberian and North American Arctic deltas. The standardized methodology published by project authors and TA/RA observations (sampling in selected places for accurate sediment and DOC/CDOM flux assessment, velocity/discharge measurement, and bathymetry mapping), both with applied remote sensing model

verification, enable the provision of a novel comparative study. The second objective of this project is to evaluate the feasibility of retrieving chlorophyll concentrations of leading groups of phytoplankton in delta-floodplain lakes using high-resolution remote sensing data. TA/RA observations of chlorophyll concentration (sampling campaign in selected places) on the Mackenzie Delta.