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# The hydrodynamic potential of eroding arctic permafrost coasts: fractionation of permafrost parent material in the Canadian Arctic to determine its fate in the marine system

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The Canadian Beaufort Sea coastline consists of permafrost, permanently frozen soils, that store large amounts of organic carbon (OC). Rising temperatures in the Arctic will lead to thaw of these permafrost soils as well as enhanced coastal erosion. The trajectory of thawing coastal carbon upon thaw will determine the degree of breakdown and greenhouse gas emission, impacting climate warming. However, we still have a poor understanding of the marine fate of sediments and OC from eroding arctic coastlines.

In order to obtain more insight into the fate of the eroding material, we will use hydrodynamic fractionation on a variety of actively eroding coastal cliffs (parent material). Hydrodynamic fractionation accounts for the sediment sorting of particles when exposed to different energy conditions such as waves. With this technique we will fractionate based on density and grainsize to mimic the route in the marine system. Current estimates of sediment and OC input from arctic coastal erosion are only based on bulk measurements.

Samples were collected from eight sites (n=5 at each site) with a wide spatial and geological variation across the Canadian Beaufort Sea. These sites range from peaty and flat islands to muddy slumps and sandy locations. For all sites, parent material was collected onshore, fractionated and separated in five fractions based on density (cut-off 1.8 g/mL) and grainsize (cut-offs 38, 63, and 200mm). All fractions will be analysed for geochemical properties (total OC, total nitrogen, $\delta^{13}C$, and $D^{14}C$, biomarkers and lipids) in order to determine the quantity and quality of the organic matter. Distribution of sediment fractions based on weight shows large variability between sites (e.g. low density fraction between 2-13% and high density between 9-50% with grainsize 63-200mm) as well as within sites, depending on the characteristics of the coast. Using the spatial variability of these fractions in combination with coastal characteristics assessed with GIS techniques we will attempt to upscale for the Canadian Beaufort Coast. This will hopefully improve our insights on the type and composition of parent material which is released into the marine system as a source of carbon.