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Source- and degradation-diagnostic of colloidal organic matter exported by rivers across the Eurasian Arctic margin

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Both models and in-situ observations indicate that the Arctic watersheds will experience a significant increase in temperature, resulting in higher runoff and remobilization of the vast carbon reservoirs currently held stable under frozen conditions. However, the sources and degradability of the dissolved organic carbon (DOC) released to this aquatic land-ocean conduit in high latitude regions is still poorly constrained. For example, there is a particular lack in our understanding of the fate of the DOC once it enters the Arctic Ocean. This study therefore investigated the compositional changes of the organic colloidal material along the Arctic land-ocean continuum. Large-volume samples of high-molecular weight DOC (colloids) were isolated as part of the International Siberian Shelf Study 2008 (ISSS-08) using 1000 D cross-flow ultrafiltration outside the mouths of Arctic rivers Ob, Yenisey, Lena, Indigirka and Kolyma as well as on the adjacent continental shelf seas Laptev Sea and the East Siberian Sea. The colloidal fraction was characterized by both bulk isotope parameters (δ13C and Δ14C) and with macromolecular biomarkers such as free lipids (n-alkanes, n-alkanoic acids, n-alkanols) and CuO reaction products (lignin phenols, cutin derived-products, protein and lipid products). In this presentation we will focus on regional differences between contrasting watersheds characterized by different climate and vegetation as well as permafrost conditions. Particular emphasis will be placed on origin, degradation, and dilution of the terrigenous colloidal material during its transport from land to the ocean. Finally, the comparison between the dissolved and particulate fractions will also be presented to highlight differences and similarities between these two pools of aquatic carbon.