

Application of Absorption Spectrophotometry to Study the Seasonal Dynamics of Dissolved Organic Matter in Arctic Streams

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Climate change is impacting numerous aspects of the Arctic, influencing the contemporary carbon cycle as well as the fate of ancient carbon contained in permafrost. Through hydrologic connections, changes on land are propagated to aquatic and eventually marine ecosystems. Dissolved organic matter (DOM) fluxes are a primary link between the terrestrial-aquatic-marine carbon cycles. We used absorption spectrophotometry (UV-VIS scans from 200-800 nm) to investigate seasonality, quality, and quantity of DOM in tributaries of the Kolyma River in the Siberian Arctic during spring and summer of 2009. Spectral slopes as well as absorbances at specific wavelengths were compared to DOC concentrations, with particular emphasis on seasonal variability of organic matter quantity and quality. Incubation experiments were also conducted to examine photodegradation and microbial consumption of DOM on waters collected in 2009 from the Kolyma watershed and from the Kuparuk and Atigun rivers on the North Slope of Alaska. In contrast to chemical methods to quantify and characterize DOC or its constituents, absorption spectrophotometry provides a relatively simple means of characterizing a large number of samples, even at remote Arctic locations.