Seasonality effects on DOM quality in permafrost thermokarst lakes

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Permafrost thaw has implications for the functioning of aquatic ecosystems, including on their biogeochemistry and their role in the global carbon (C) cycling. As a whole, permafrost thaw has been documented to alter hydrologic pathways, increasing inputs to groundwaters and changing water chemistry. Increases in dissolved organic matter (DOM) in surface waters, a process known as "browning", induces shifts to physical and chemical characteristics of thaw lakes. There are profound consequences arising from the Browning effect for Northern Communities, namely regarding the quality of drinking water.

Water quality is of great concern in the North as many communities still struggle to access potable drinking water supply systems in northern communities are particularly vulnerable to microbiological or chemical contamination. To secure water safety until the point of use, disinfection with chlorine is typically used to inactivate pathogens. However, chlorine treatment of waters containing high dissolved organic carbon (DOC) inputs and increased aromaticity of DOM, produce harmful disinfection by-products (DBP), namely trihaloacetic acids.

We focused on UV-Visible and Fluorescence spectroscopy to probe DOM quality in thaw lakes as well as in sediment porewaters in three thaw lakes in a sporadic permafrost region, in an attempt to better understand seasonality impact on DOM quality, lake biogeochemical processes, and anticipate their potential for DBP formation upon chlorination treatment.