Project acronym: EMOM

Project title: Enhanced mobilization of organic matter in a warming tundra

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Discipline: Earth Sciences & Environment: Other - Environment

Station(s): Toolik Field Station (USA)

Rapidly increasing arctic temperatures have important implications for permafrost stability and biogeochemical cycling in tundra ecosystems. Warming and increased vegetative inputs may cause a priming of decomposition in arctic soils, and potentially lead to increased export of labile organic matter to the aquatic network. This project aims to address how changing hydrology, increasing temperatures, and shifts in vegetation following ice wedge degradation influence nutrient dynamics and organic matter decomposition in a region experiencing enhanced ice wedge degradation. This study will be conducted on the North Slope of Alaska at a snow fence experiment, simulating winter warming, set up in 2014 (69.05N, -148.84W). Soil and pore water samples will be taken from warmed active layers, water tracks, and degraded ice wedges behind snow fence, and in non warmed and non degraded areas from adjacent control plots. Following extraction, samples will be frozen and shipped to Uppsala University for analysis and incubation experiments. Seasonal nutrient dynamics, enzyme kinetics, biodegradation rates, and organic matter quality will be assessed for surface soils in all landscape features. Soil pore water samples will be used in an incubation study to assess its biodegradability under in situ conditions and upon export to the aquatic network. Respiration measurements will be taken weekly during the incubation. The results from this study will greatly improve our understanding of how increasing temperatures and shifting vegetation dynamics will impact biogeochemical cycling of both terrestrial and aquatic tundra ecosystems.