Geoscience Tools for Supporting Environmental Risk Assessment of Metal Mining
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Canada's North is undergoing significant change due to resource development and climate variability. This is particularly true in the mineral-rich Slave Geological Province (SGP). Using an integrative paleoecological-geochemical-modelling research methodology we will reconstruct variations in climate, geochemistry, permafrost, and ecology over the past ~1000 years along a north-south transect from Yellowknife, NWT, to Hope Bay, NU to assess the cumulative effects of natural and human-driven changes, particularly climate change, on the transport and fate of metals and health of regional ecosystems in areas of high resource potential in the Canadian North. Geochemical baselines represent the natural variation in the concentration of elements in the environment. Understanding natural variations of metal(loids) in the environment, both geographically and over time, are necessary to assess chemical change associated with resource development and climate change but are poorly characterized in the SGP. Geochemical baselines in sediments and soils will be established through the collection and analyses of sediment cores from lakes and permafrost peatlands and used to assess the impact of climate change and land disturbance on environmental metal fluxes. It is important that we build reliable radiocarbon-based age-depth models in order to relate the timing of geochemical variations to known climate phenomena and to provide accurate rates of geochemical fluxes so that we can apply this knowledge to future scenarios.