

## Mercury methylation in permafrost thaw ecosystems

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### Goal and Methods

Arctic permafrost contains twice the amount of mercury (Hg) present in the world ocean, atmosphere and soils combined [1]. This Hg can potentially be remobilized during permafrost thaw, methylated and released to ecosystems. To identify and quantify Hg and methylmercury (MeHg) levels and their transformation rates, permafrost soils, thaw lake waters and sediments were sampled in the Canadian Arctic and analyzed for Hg and MeHg content. Mercury methylation and MeHg demethylation rates were also calculated using Hg stable isotope techniques.

### Results and Discussion

Concentrations of both Hg and MeHg were in generally low ( $94 \pm 40$  ngHg/g;  $1.4 \pm 1.0$  ngMeHg/g), however the proportion of MeHg to the total Hg content was well above the expected levels, particularly in permafrost soils collected in coastal areas (up to 3.2%). Differences were also observed between samples from the active layer (up to 3.2%) and from permafrost soils (up to 1%), suggesting that the degradation of organic matter (OM) is also performed by Hg methylating bacteria. In all samples Hg methylation rates were considerable higher (up to 1.2%) than MeHg demethylation (up to 0.02%) resulting in the observed MeHg accumulation. These rates were higher than the ones observed in contaminated sites [2] indicating that the conditions for transformation of inorganic Hg to MeHg is extremely efficient in thawing permafrost.

[1] Schuster et al. (2018) *Geophys Res. Lett.* **45**, 1463-1471.

[2] Cesário et al. (2017) *Env. Poll.* **226**, 297-307.