

## **Cold loving methanotrophic communities in permafrost soils of the Lena Delta, Siberia**

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Wet tundra environments of the Siberian Arctic are considerable natural sources of methane, a climate relevant trace gas. The Arctic is observed to warm more rapidly and to a greater extent than the rest of the earth surface. It is suggested, that the tundra in Alaska and Russia has changed from a net sink to a net source of atmospheric carbon. The potential impact on the Arctic carbon reservoirs is highly influenced by changes in microbial processes like methanogenesis and methane oxidation.

The process of methane oxidation is mainly controlled by methane oxidising bacteria (MOB). These obligatory aerobic bacteria determine the amount of methane that is released from Siberian permafrost soils. In Arctic environments, biological processes are controlled by seasonal freezing and thawing, which leads to an extreme temperature regime in the upper active layer of the permafrost. Therefore, methane oxidation rates were determined in dependence of the temperature via the conversion of  $^{14}\text{CH}_4$  to  $^{14}\text{CO}_2$ . First results for samples of Samoylov Island (N 72°22, E 126°28, Lena Delta, Siberia) indicate a shift in the temperature optimum of the methanotrophic activity with soil depth. MOB in the upper soil layers appeared to have their highest activity at temperatures of 21 °C. Contrarily to that finding, in deeper horizons close to the permafrost table the maximum methane oxidation rates were determined at 4 °C. These results indicate the existence of specialised cold loving methanotrophic communities within the environment of Siberian permafrost soils.

Further research on the temperature-dependending activity, the phylogenetic diversity as well as the dynamic and stability of the methanotrophic communities will be undertaken.