**Anaerobic Methane Oxidation in the High-Arctic Lake Myrktiorna (Svalbard)**

Guangyi Su[1], Saskia Läubli[1], Maciej Bartosiewicz[2], Moritz Lehmann[1], Jakob Zopfi[1]

[1]University of Basel, Department of Environmental Sciences, Switzerland
[2]Polish Academy of Sciences, Institute of Geophysics, Poland

High Arctic oligotrophic lakes are not considered to be major contributors to the global atmospheric methane ($CH_4$) budget. However, environmental changes throughout the Arctic are leading to higher water temperatures, longer ice-free seasons, and increased export of organic matter from glaciers and permafrost soils. All these effects affect biomass production and organic matter deposition in lakes. In this context, understanding the drivers of $CH_4$ sources and sinks in high Arctic lakes is important to anticipate potential feedbacks to the global climate system. Lake Myrktiorna is a remote proglacial lake in southern Svalbard with sediments relatively poor in organic matter but rich in iron minerals derived from the surrounding Mesoproterozoic (1.6-1 Ga) metamorphic rocks. Detailed characterization of sediment porewater, solid phases, and gas concentrations and isotopes confirmed the ferruginous conditions and point to a significant biogenic $CH_4$ source in the sediment. Sequencing of 16S rRNA gene amplicons revealed the presence of the archaeal anaerobic methane oxidizer "Cand. Methanoperedens" in specific sediment layers. Despite their unusually high relative abundance, reaching up to 10% of total reads and greatly outnumbering canonical methanogens, anaerobic $CH_4$ oxidation appears to be inefficient. As a result, the $CH_4$ produced is not fully oxidized and diffuses to the sediment surface. Current research, involving $^{14}CH_4$ oxidation rate measurements and long-term $^{13}CH_4$ incubations with different potential electron acceptors, aims to identify the factors that control the efficiency of the sedimentary biological methane filter.