Geophysical Research Abstracts
Vol. 19, EGU2017-14088, 2017
EGU General Assembly 2017

Methanotrophy in surface sediments of streams

Alexandre Bagnoud (1,2), Paraskevi Pramateftaki (1), Hannes Peter (1), and Tom Battin (1)

(1) Archaea Biology and Ecogenomics Division, University of Vienna, Austria, (2) Stream Biofilm and Ecosystem Research Laboratory, École Polytechnique Fédérale de Lausanne, Swizterland

Because streams are often found to be supersaturated in methane (CH_4), they are considered as atmospheric sources of this greenhouse gas. However, little is known about the processes driving CH_4 cycling in these environments, i.e. production, consumption and fluxes. CH_4 is thought to be produced in deeper anoxic sediments, before it migrates up to reach the oxic stream water, where it can be oxidized by methanotrophs. In order to gain insights into this process, we investigated 14 different streams across Switzerland. We characterized the chemistry of surface and sediment waters by measuring dissolved chemical profiles. We also sampled surface sediments and determined methanotrophic rates with laboratory incubations and Michaelis-Menten modeling. Interestingly, rates were strongly correlated with the CH_4 concentrations in stream waters, rather than in sediment waters. This indicates that methantrophic populations feed on CH_4 from the surface streamwater, even though CH_4 concentrations are higher in the sediment waters. Methanotrophy rates were also correlated with *Crenothrix* counts (based on 16S rRNA sequencing), a strict methanotroph, while this latter was correlated with *pmoA* counts (based on quantitative PCR), a gene involved in methanotrophy. These results show that *Crenothrix* genera are the most active methanotrophs in surface sediments of streams, and can represent more than 2% of microbial communities. Remarkably, the dominating *Crenothrix* species was detected in all 14 samples. This work allows the assessment of *in situ* methanotrophic rates, of the environmental parameters driving this process, and of the microbial populations carrying it out, and thus brings useful insights about carbon cycling in streams.