Universität Basel

Departement
Umweltwissenschaften

D|U|W Departement Umweltwissenschaften

MSc thesis in Aquatic Biogeochemistry/Environmental Geosciences

Effects of nutrient availability on methane production in cyanobacteria

Despite intense methanotrophy in the hypo- and metalimnion, methane supersaturation in the upper water colum is a feature of many stratified lakes. The explanations for this paradox involve production of CH_4 in association with phytoplankton activity. Indeed, significant amounts of CH_4 are generated in the nutrient limited oxic oceanic waters from methylphosphonate (MPn) and dimethylsulfoniopropionate (DMSP) or produced by hydrogenotrophic methanogenes attached to phytoplankton. The exact control of trophic condtions (P, N, S) as well as phytoplankton activity and abundance on CH_4 generation in the epilimnion of lakes remains unclear.

This MSc thesis will provide insight into the relationship between CH_4 concentrations and phytoplankton biomass in different trophic and thermal conditions, and to assess the abundance of active methanogens attached to phytoplankton in the epilimnion of deep alpine Lake Lugano. The main task will be to test whether nutrient stress may induce significant CH_4 generation in freshwater cyanobacteria and to quatify *in situ* abundance of genes allowing cleavage of MPn and synthesis of DMSP in the epilimnion of a deep, stratified lake.

Results from this thesis will be reconciled with data on the isotopic composition of dissolved CH_4 in the water column of lake Lugano allowing to distinguish between different CH_4 production pathways, and to include potentially significant epilimnetic production in the CH_4 budget. The data on organic biomarkers, phytoplankton biomass as well as community composition and photosynthesis will allow to further exploit experimental observations and possibly provide a more comprehensive solution for the "methane paradox" in Lake Lugano.

If you have questions, please contact:

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