



MSc thesis in Aquatic Biogeochemistry/Environmental Geosciences

Aerobic ammonium oxidation by methanotrophs in Lake Lugano

Ammonia and methane are structurally similar molecules. Microorganisms that obligately use methane as a sole energy source (methanotrophs) and microorganisms that use ammonia (nitrifiers) are capable of co-oxidizing ammonium and CH_4 , respectively. In nature, nitrifiers and methanotrophs occupy similar niches, but evidence for nitrification by methanotrophs (or methane oxidation by nitrifiers) in natural environments is rare. Previous studies have shown that in the Lake Lugano South Basin ammonium and methane are both consumed in close vicinity to the oxic-anoxic interface, but the microorganisms involved and the enzymatic pathways remain unconstrained.

The goal of the MSc thesis is to investigate the enzymatic pathway of aerobic ammonium oxidation in the Lake Lugano South Basin. Water samples from the oxic-anoxic interface will be collected to carry out incubation experiments with specific substrates and inhibitors, testing the potential of ammonium oxidation by methanotrophic bacteria. Nitrous oxide (N_2O) production by methanotrophic bacteria will also be verified. If methanotrophs indeed significantly contribute to ammonium oxidation and N_2O production, follow-up experiments will include bacterial enrichments for assessing the isotope signatures of N_2O production by methanotrophic nitrification in Lake Lugano.

Contact:

Prof. Dr. Moritz Lehmann (moritz.lehmann@unibas.ch)

Dr. Claudia Fray (claudia.frey@unibas.ch)

Dr. Jakob Zopfi (jakob.zopfi@unibas.ch)