



MSc thesis in Aquatic Biogeochemistry/Environmental Geosciences

Past and present importance of CH₄ as source of carbon in the food web of an alpine lake

Methane is as a source of carbon for heterotrophic plankton. The isotopic composition of zooplankton remains and dormant eggs in the sediments is used to reconstruct past changes in climate and CH₄ concentrations in lakes. However, calibration of paleoecological models requires the understanding of mechanisms controlling the isotopic composition of planktonic herbivores. Differences in zooplankton ability to exploit bacterial food can affect their isotopic signatures in the sediments, and result in biased conclusions on lacustrine CH₄ availability in the past. These differences may result from changes in zooplankton community composition and lake trophic status. In the past half century, Lake Lugano has undergone eutrophication and re-oligotrophication, and has experienced effects of global climate change. Lake sediments likely recorded these changes and fossils therein can be used to assess the accuracy of paleoecological models predicting carbon and CH₄ cycling.

The aim of the MSc thesis will be to evaluate the past and present importance of CH₄ as source of carbon in the food web of Lake Lugano in the context of environmental change. The main task will be to test whether, and to what extent, changes in trophic status and plankton community structure have affected the carbon isotopic composition of different zooplankton taxa in the sediments of the lake.

Results from this thesis will be integrated with data from a plankton and nutrient monitoring program in Lake Lugano, and data on vertical distribution of plankton in the water column. Organic biomarkers and changes in the isotopic carbon composition of organic matter in the water column will allow us to evaluate contributions of different carbon sources in the pelagic foodweb.

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