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Biogeochemistry linked to microbial community composition: Insights into manganese cycling in a drinking water reservoir

LEA HAHN[1], GABRIELE PACKROFF[2], WERNER MANZ[1] AND **JUTTA MEIER**[1]

[1]University of Koblenz
[2]Wahnbach Reservoir Association (WTV)
Presenting Author: jmeier@uni-koblenz.de

The water quality of reservoirs, especially with respect to Mn and Fe concentrations, is closely tied to oxygen availability which in turn is influenced by thermal stratification. Warmer surface temperatures and elongated stratification periods have been demonstrated for bodies of standing waters, including the Wahnbach Reservoir (Germany). This may lead to increasing levels of dissolved Mn causing problems for raw water treatment. Sediments may function as a sink or source for Mn. As microorganisms play a crucial role in Mn redox cycling, we investigated the sediments of the Wahnbach Reservoir for Mn compounds as well as Mn-oxidizing and Mn-reducing microorganisms. Mn-reducing activities were more pronounced and selective cultures enriched phylogenetically highly diverse microorganisms including members of the genera *Azospira*, *Rhodoferax*, *Bacillus*, *Aeromonas*, *Anaeromyxobacter*, *Geothrix*, and *Methanosarcina*. Extensive long-term monitoring allows to qualify and quantify biogeochemical processes in the water column. In order to link these processes to key microorganisms and their metabolisms, water column and surface sediment were sampled at three sites in the reservoir on a monthly basis during one year and 16S rRNA amplicon sequencing was performed. Data analysis will primarily focus on Mn dynamics and putative Mn metabolizing microorganisms in relation to the availability of O_2, organic carbon, N and P nutrients. In addition, the interplay with other anaerobic respiration processes such as Fe(III) reduction, sulfate reduction, and methanogenesis will be investigated. The results may offer valuable insights for future guidelines in water quality management.