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Edited by: Karin A. Koinig, Tobias Schneider
Claudia Breitschopf, Leopold Füreder, Martin Kainz,
Markus Möst, Georg H. Niedrist, Caroline Pichler,
Ruben Sommaruga, Barbara Tartarotti.

Cover photo by Paul Hörtnagl

Diversity and recurring seasonal transitions in the bacterial community in a large and deep perialpine lake (Lake Garda)

Nico Salmaso, Davide Albanese, Camilla Capelli, Adriano Boscaini, Massimo Pindo, Claudio Donati

Fondazione Mach-Istituto Agrario di S. Michele all'Adige

Compared with the other levels of the trophic web, bacterial communities have been far less studied in the group of large and deep lakes south of the Alps. In this work, High-Throughput Sequencing (HTS) was used to analyze the seasonal variations in the bacterioplankton community composition (BCC) in the euphotic layer of a large and deep lake south of the Alps (Lake Garda). The BCC was analyzed between 2014 and 2015 by monthly samplings using the amplification and sequencing of the V3-V4 hypervariable region of the 16S rRNA gene by the MiSeq Illumina platform. The dominant bacterioplankton phyla were among the more frequent reported in freshwater ecosystems, i.e. Proteobacteria, Cyanobacteria, Bacteroidetes, Verrucomicrobia, Actinobacteria and Planctomycetes. The development of the BCC showed a comparable annual cyclical pattern in the two analyzed years. This distinctive recurring temporal development was regulated by the strong seasonality in water temperature, thermal stratification, nutrients and, possibly, by the remarkable annual cyclical development of cyanobacteria and eukaryotic phytoplankton hosting bacterioplankton. Additional analyses of cyanobacterial OTUs confirmed the presence of the most abundant species identified by microscopy and culture dependent approaches as well as new taxa belonging to small Synechococcales/Chroococcales and rare Nostocales. The high diversity and strong seasonality in the BCC found in large lakes is relevant, opening perspectives for the definition of discriminating patterns characterizing the temporal and spatial distribution of the BCC in different lake typologies, and for the application of next generation sequencing technologies in the monitoring of water quality.

Benthic macroinvertebrates as indicators of lakeshore modifications at Lake Constance

Ioanna Salvarina, Christian Fiek, Karl-Otto Rothhaupt

Limnological Institute, University of Konstanz, Mainaustrasse 252, Konstanz, 78464, Germany

Benthic macroinvertebrates are used as indicators of lake habitat morphological modifications. To explore whether they can successfully indicate lakeshore habitat quality at a large, deep, oligotrophic lake, Lake Constance, we collected samples from 6 locations on the littoral zone of Lake Constance, ranging from natural shores to shores with anthropogenic modifications, in three seasons. Benthic macroinvertebrate metrics were calculated (e.g. Diversity indices, Littoral Invertebrate Metric Composite samples –LIMCO)].

Preliminary data do not show clear relationships between the benthic macroinvertebrate metrics and the lakeshore habitat quality, however there is a tendency for less invasive species and higher diversity indices in the reference station. Further exploration of the data is expected to indicate the macroinvertebrate indices and metrics that are suitable as biological indicators of the lakeshore quality.