

Life under the ice: Microbial ecology and biogeochemical cycling in the seasonally-covered Lake Onego, Russia

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The great lakes Ladoga and Onego are seasonally ice-covered, limiting studies to summer periods. Within the “life under the ice” research program, our objectives are to assess for Lake Onego, during winter, (i) the abundance and diversity of microbial communities in the water column and in the sediments, (ii) the importance of physical processes like under-ice convection on community structure, and (iii) the contribution of micro-organisms on biogeochemical processes. We aim to characterize the carbon cycle from primary production, transport and degradation in the water column, to its recycling back to CH₄ and CO₂ in the sediment. In March 2015, water samples were collected at 3 depths chosen according to convective cells, and a 1.30 m-long core was retrieved. Microbial diversity was investigated by high-throughput sequencing (HTS) of 16S rRNA genes and transcripts. Functional genes and transcripts involved in methane cycle were quantified both in sediment and water column. Core description and chemical proxies show a redox change 7 cm below the surface. At this depth, measurements of *in situ* ATP levels and transcripts of archaeal and bacterial 16S rRNA show a peak in microbial activity. Below this, *mcrA* gene and transcript copies increase, implying methanogenesis. Above this redox boundary, methanotrophs are abundant but their activity remains enigmatic. HTS data is being analyzed and will allow to characterize the main microbial actors in the sediment and the relationship between planktonic and benthic communities in the ice-covered lake.