



Whole-lake mineralization of allochthonous and autochthonous organic carbon in a large humic lake (Örträsket, N. Sweden)

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ABSTRACT: Organic carbon mineralization was studied in a large humic lake (Lake Örträsket) in northern Sweden during a well-defined summer stratification period following high water flow during snowmelt. Several independent methods including plankton counts, measurements of bacterioplankton and phytoplankton production, stable isotope monitoring, sediment trapping, and mass balance calculations were used. Total organic carbon mineralization showed a summer mean of $0.3 \text{ g C m}^{-2} \text{ d}^{-1}$ and was partitioned about equally between water and sediment. In the water column, organic matter was mineralized by bacteria (60%) and protozoan and metazoan zooplankton (30%), as well as by photooxidation (10%). Most of the mineralized organic carbon was of allochthonous origin. Primary production in the lake contributed at most 5% of the total organic carbon input and about 20% of the total organic carbon mineralization. Total carbon mineralization in the epilimnion and metalimnion agreed well with an estimate of CO_2 evasion from the stratified lake, while CO_2 accumulation in the hypolimnion matched the O_2 consumption and resulted in a very negative $\delta^{13}\text{C}$ of DIC before autumn overturn (-23‰). Isotopic compositions of DIC and POC confirmed the dominant influence of terrestrial organic input on the cycling of both organic and inorganic carbon in the lake.

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