Geophysical Research Abstracts
Vol. 19, EGU2017-7136, 2017
EGU General Assembly 2017

Oxygen depletion in a large perialpine lake

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Hypoxic conditions in lakes are an ongoing global concern due to anthropogenic nutrient inputs and climate change. While climate-induced increased stratification lowers the oxygen supply in the deep hypolimnion of many lakes, oxygen depletion rates often remain high despite a significant reduction in nutrient inputs. Here we present results from oxygen microprofile and sediment core measurements in a deep perialpine lake (Lake Geneva). The results allowed estimating the spatial variability of sediment oxygen uptake and the dominant pathways of organic matter mineralization as well as its relative importance for the total oxygen budget. Sediment oxygen uptake was responsible for approximately 30% of the total oxygen depletion and showed a strong decrease with depth. The experimental results were used to set up a one-dimensional oxygen depletion model coupled to the hydrodynamic model SIMSTRAT. Finally, the results were compared to long-term monitoring data from Lake Geneva and other large lakes.