



Applicability of a 1D hypolimnetic oxygen depletion model to deep Swiss lakes

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The influence of climate change on bottom water hypoxia in Swiss lakes was investigated using an existing 1D hypolimnetic oxygen depletion model. The model was used to determine the past evolution of hypolimnetic oxygen depletion in Swiss lakes, in an effort to improve the quantification of future changes in the frequency and duration of lake hypoxia. Given a spring oxygen value (initial concentration), lake topography, and areal (sediment) and volumetric (water column) oxygen consumption rates, the model determines the oxygen profile prior to fall turnover. Validating the model with measured spring and fall profiles provides an estimate of summer oxygen consumption rates over a given time period.

The first application of the model used data from Lake Zurich, whose time series of measured oxygen water column profiles dates back to 1936. Model validation showed that, for this lake, using an initial oxygen concentration that varies with depth (i.e. the measured spring profile) provided a better fit than using a constant initial concentration.

The reasons for the improvement in fit along with other model modifications are analysed and discussed. As a result of this process, the authors gained a better understanding of the model, its applicability, and hypolimnetic oxygen consumption patterns in lakes.