

## **Estimation of lacustrine groundwater discharge using heat as a tracer and vertical hydraulic gradients – a comparison**

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**Abstract** Lacustrine groundwater discharge (LGD) can play a major role in water and nutrient balances of lakes. Unfortunately, studies often neglect this input path due to methodological difficulties in the determination. In a previous study we described a method which allows the estimation of LGD and groundwater recharge using hydraulic head data and groundwater net balances based on meteorological data. The aim of this study is to compare these results with discharge rates estimated by inverse modelling of heat transport using temperature profiles measured in lake bed sediments. We were able to show a correlation between the fluxes obtained with the different methods, although the time scales of the methods differ substantially. As a consequence, we conclude that the use of hydraulic head data and meteorologically-based groundwater net balances to estimate LGD is limited to time scales similar to the calibration period.

**Key words** lacustrine groundwater discharge; heat as a tracer; groundwater–surface water interaction; lakes; hydraulic heads