



## **Lacustrine groundwater discharge: Combination of air-borne and ground-based studies**

Jörg Lewandowski (1), Karin Meinikmann (1), Thomas Ruhtz (2), Franziska Pöschke (1), and Georgiy Kirillin (1)

(1) Leibniz-Institute of Freshwater Ecology and Inland Fisheries, Dept. Ecohydrology, Berlin, Germany, (2) Free University Berlin, Institute for Space Sciences, Berlin, Germany

Lacustrine groundwater discharge (LGD) has often been neglected due to difficulties to measure LGD and the intense spatial heterogeneity of LGD. Therefore, fast, easily applicable methods to detect LGD pattern are required. We applied an airborne measurement of thermal infrared radiation (TIR) at Lake Arendsee. As a result of previous long-term field investigations based on ground-based methods, the LGD pattern of the study site is well established. A TIR image taken in April 2012 agrees with our previous findings and shows that warm groundwater entering the lake in some near-shore areas is visible as plume floating on top of the lake. Prerequisites for the application of TIR to detect LGD pattern are identified based on the balance between positive buoyancy of the groundwater and intensity of vertical mixing produced by heat and momentum fluxes at the lake surface. Our first application of the method in a lake yielded promising results and demonstrated TIR to be a powerful tool for identifying LGD pattern in lake-related studies. An ecologically relevant aspect of LGD is the import of nutrients into the lake. Due to intense spatial heterogeneity of nutrient concentrations in groundwater it is necessary to combine the spatial information of the groundwater exfiltration pattern and the spatial information of ground-based measurements of groundwater nutrient concentrations to localize the most relevant sites for water quality deterioration.