

## 6 Oral Presentation

**Interaction of lakes with local groundwater systems – environmental isotopes as tool for water balance investigations**Till Harum<sup>1</sup>, A. Leis<sup>1</sup>, C. Reszler<sup>1</sup>, L. Schulz<sup>2</sup>, R. Fresner<sup>2</sup> & G. Santner<sup>2</sup><sup>1</sup>JOANNEUM RESEARCH, Institute for Water, Energy and Sustainability, Dep. Water Resources and Environmental Analytics, Elisabethstrasse 18/II, A-8010 Graz / Austria, Email: [till.harum@joanneum.at](mailto:till.harum@joanneum.at)<sup>2</sup>Carinthian Institute for Lake Research, Kirchengasse 43, 9020 Klagenfurt am Wörthersee / Austria

With the example of two small alpine lakes with totally different hydrogeological boundary conditions (Karst and pore groundwater) and circulation behaviour it is demonstrated that the stable isotopes oxygen-18 and deuterium can deliver relevant information concerning evaporation processes, in- and outflow of groundwater and the circulation conditions in lakes. Furthermore the analyses of the radioactive isotope tritium and its decay product helium enable the determination of the mean residence time of lake water in the deeper zones.

On the basis of long term isotope monitoring data the connection between a lake and a spring is proved (Fig. 1), the portion of lake water on spring discharge quantified and groundwater inflows in lakes detected.

This important information is used for the water balance calculations by means of a hydrological model which allows the estimation of past changes of water balance parameters as well as the development of future scenarios with changed climatic conditions.

The combination of isotopic investigations and hydrological water balance modelling delivers important parameters for the limnological assessment of lakes and their possible climate change induced changes.

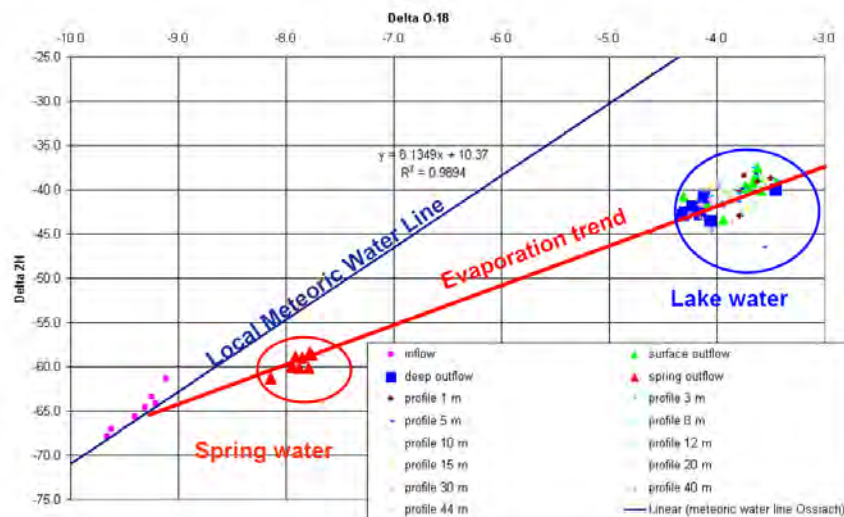


Fig. 1: Local Meteoric Water Line for precipitation and evaporation trend of lake water as natural tracer to prove the connection with a spring.