

EGU24-941, updated on 19 May 2024 https://doi.org/10.5194/egusphere-egu24-941 EGU General Assembly 2024 © Author(s) 2024. This work is distributed under the Creative Commons Attribution 4.0 License.



Investigating the groundwater contribution to the lakes and streams by environmental tracers in the catchment area of Lake Velence (Hungary)

Viktória Pénzes^{1,2}, Anita Erőss², Katalin Hegedűs-Csondor², Petra Baják², Ákos Horváth³, and György Czuppon⁴

¹ELTE Eötvös Loránd University, Institution of Geography and Earth Sciences, Department of Geophysics and Space Science, Budapest, Hungary

²ELTE Eötvös Loránd University, Institute of Geography and Earth Sciences, Department of Geology, József and Erzsébet Tóth Endowed Hydrogeology Chair, Budapest, Hungary

³ELTE Eötvös Loránd University, Institute of Atomic Physics and Astronomy, Department of Atomic Physics, Budapest, Hungary

⁴HUN-REN Research Center for Astronomy and Earth Sciences, Institute for Geological and Geochemical Research, Budapest, Hungary

Lake Velence is a shallow soda lake, the third largest natural lake in Hungary. The lake's water level has been decreasing and the water quality has been declining in recent years. The shallow depth of the lake makes it more susceptible to droughts and evaporation. Climate change in Hungary will likely cause these phenomena to be more common in the future. In the lake's water budget, only the surface water components and precipitation are considered. Revisiting the water management in the area is necessary for the local ecosystem and tourism industry. We intend to aid the efforts of the authorities and locals to stop the deterioration of the lake with exploring the surface water-groundwater interactions in the area using natural tracers. Groundwater may buffer the effects of climate change, which highlights the importance of the study.

Groundwater mapping in the area proved that the lake is at the discharge point of local groundwater flow systems. In this previous study, similar uranium activity concentrations were also measured in the lake water and in groundwater samples collected by the lake indicating a close interaction between the lake and the groundwater.

To further investigate this question, water samples were collected from different water sources in the catchment area of Lake Velence: from the lake, inflow streams, an artificial reservoir, and groundwater wells. The samples were analysed for stable isotopes δ^2 H and δ^{18} O. Furthermore, ²³⁴U, ²³⁸U, ²²⁶Ra, ²²⁸Ra and ²²²Rn activity were measured by an innovative technique: alpha spectrometry applied on selectively adsorbing Nucfilm discs. Both the stable and the radioisotopes function as environmental tracers in this study to collect thorough evidence about

the contribution of groundwater in the water budget of Lake Velence and in the inflowing streams. This will contribute to the sustainable water management of the whole catchment area of the Lake Velence by highlighting the role of groundwater.

The research was supported by the János Bolyai Research Scholarship of the Hungarian Academy of Sciences and the research was funded by the National Multidisciplinary Laboratory for Climate Change, RRF-2.3.1-21-2022-00014 project.