

## **Non-traditional isotopes as tracers of water-rock interactions in a complex karst aquifer: Case study of Ljubljana, Slovenia**

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Karst aquifers are increasingly getting attention since they represent a drinking water reservoir for roughly 20 – 25 % of global population. While the hydrological characteristics of karst systems are conceptually relatively well known, the role of particular hydrological and geochemical processes during different hydrological conditions are often difficult to quantify. The water – rock interactions, i.e. the dissolution and precipitation of authigenic mineral phases within aquifer generally affect the groundwater quality; they depend upon the uptake of CO<sub>2</sub> during infiltration of precipitation, mineralogical and structural characteristics of the host rock, and physicochemical conditions within the aquifer.

The aim of our study was to explore the suitability of “non-traditional” isotopes (i.e. U and its decay products, Sr and Mg) in surface stream to identify the sources of water and dissolved elements and quantify the authigenic carbonate precipitation within the karstic limestone/dolostone aquifer of the Ljubljana river. For this purpose, seasonal precipitation, water at consecutive springs, surface flows and sinks were analysed for elemental concentrations, traditional (O, H, dissolved inorganic C) isotopes and isotopic composition of dissolved U, Mg and Sr.

While the O and H isotopes of water provided consistent information on the origin of water and relative fraction of “young” (< 3 month) water and the base flow, the concentration and isotopic composition of dissolved inorganic C showed no apparent correlations with water sources and alkalinity. However, just like non-traditional isotopes, they showed conspicuous variations for some sampling sites and between sampling campaigns, which can be interpreted in terms of variable contributions of base flow and surface run-off, as well as in-aquifer processes and contributions of groundwater from host rocks with different lithology.