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Suitability and potential of environmental tracers for base-flow determination in streams

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The temporal and spatial distribution of the proportion of groundwater discharge into gaining rivers can be estimated with conventional geochemical parameters and 222Rn measurements (COOK et al., 2006). However, the quantification of the age of the discharging groundwater requires either groundwater sampling from boreholes in the vicinity of the river e.g. (FETTE et al., 2005) or tracer measurements in the river water itself. A promising tracer for age dating of base flow in streams is 85Kr. Its chemically inertness and the relatively low diffusion coefficient (long exchange time with the atmosphere) favours 85Kr in comparison to e.g. 3H/3He (STOLP et al., 2010). In this paper, measurements of 85Kr, 3H/3Hetrit and SF6 from a small scale system in the southern Vienna basin (STOLP et al., 2010) are presented and discussed. In combination with completing parameters (stable isotopes, geochemistry, flux measurements) and model calculations the gas exchange dynamic between stream water and the atmosphere is estimated. This is a key factor for the age characterization of the discharging groundwater. The sensitivity of the individual methods to origin and amount of excess air is also discussed.

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