



Soil water stable isotope based groundwater recharge estimations - examples from humid and semiarid areas

P. KOENIGER, M. GAJ, M. BEYER and T. HIMMELSBACH

BGR Federal Institute for Geosciences and Natural Resources, Stilleweg 2, 30655 Hannover, Germany
paul.koeniger@bgr.de

Groundwater recharge is an important key parameter for a sustainable management of groundwater resources. Among many approaches (Scanlon et al., 2002), soil water stable isotope methods were proposed for an estimation of groundwater recharge in arid and semiarid as well as for humid zones (e.g. Allison, 1998) and such investigations were already conducted since the 1960s. More recently advancements in soil water extraction and analytical methods allow a higher sampling resolution and an in-situ measurement of soil water stable isotopes. These advancements might strengthen and improve the applicability of stable isotope methods for recharge investigations in the unsaturated zone.

We compare and discuss field studies of unsaturated zone stable isotope profiles from Germany (Hartheim – Upper Rhine valley, Borkum and Langeoog – North Sea Islands) and the USA (Mica Creek, Idaho – Rocky Mountains forest sites) conducted within the last decade as well as results from ongoing studies in semiarid Northern Namibia (Cuvelai-Etoshia basin) to demonstrate and discuss necessary prerequisites, possibilities and shortcomings concerning this technique.

References

Allison, G.B. (1998): Stable isotopes in soil and water studies. Hydrology and Isotope Geochemistry - Proceedings of the International Symposium in Memory of Jean-Charles Fontes (Eds. Ch. Causse, F. Gasse), Paris, 23-38.

Scanlon, B.R., Healy, R.W., Cook P.G. (2002): Choosing appropriate techniques for quantifying groundwater recharge. Hydrogeology Journal 10: 18–39.