Cave-Hydrochemistry - a contribution to investigate the unsaturated zone in hard-rock areas

[1]HEINRICHS, G., [2]TIMER, P., [3]STICHLER, W., [3]TURBERG, P., [3]MÜLLER, J., [4]TRAPPE, M. and [5]MICHEL, U. [1]Hydroisotop GmbH, Schweitenkirchen, Germany; [2]IHF, Ingolstadt, Germany; [3]GSF-Institute of Hydrology, Neuherberg, Germany; [4]Cath. University Eichstätt, Germany; [5]University Erlangen-Nuernberg, Germany.

The underground is hydrogeologically divided into the water unsaturated and the water saturated zone. For the observation of the saturated zone springwater and wellwater is used. Observation in the unsaturated zone is more difficult. Artificial field lysimeter or shaft constructions are small, disturbed and expansive sampling sites and they are not usable in hard rocks. Normally they reach only a few meters of depth. Caves, especially in hard-rock areas, are a technical and economical alternative.

The polyproject Arndt-Cave in the southgerman Karst is an interdisciplinary approach, to describe groundwater recharge, flowpaths and water-rock interaction in the unsaturated zone. Results to the unsaturated flow in multiporous media of karstified dolomites are obtained. A weekly sampling and measurement of the quantity and quality of rainwater, soilwater and dropping water at 11 sampling locations is preformed. Even the cave is only in a depth of 8 meter, no indication for an influence of rainfall on the dropping is observed.

From the dropping water in the cave we summarize a groundwater recharge of only 0,2 L/s*km^2, when the regional groundwater recharge measured at springs is 7-9 L/s*km^2. The differences in the waterchemistry between rain-, soil-, cave-, and springwater is possibly a result of different recharge areas.