Geophysical Research Abstracts
Vol. 17, EGU2015-1982, 2015
EGU General Assembly 2015

Using stable isotopes and multi-spatial variable parameters in characterising the karstic aquifer of the Ajloun area, NW-Jordan - A case study of the Tanour and Rasoun springs

Ibraheem Hamdan (0,1), Bettina Wiegand (1), Thomas Ptak (1), Tobias Licha (1), Mathias Toll (2), Armin Margane (2), and Martin Sauter (1)

(0) Corresponding author: ihamdan@gwdg.de, ibraheem_geo@yahoo.com, (1) Geoscience Centre, Department of Applied Geology, Georg August University- Göttingen, Goldschmidtstrasse 3, 37077 Göttingen, Germany., (2) Federal Institute for Geosciences and Natural Resources (BGR), Geozentrum Hannover, Stilleweg 2, 30655 Hannover, Germany.

Key words: Karst systems, Groundwater vulnerability, Stable isotopes, Jordan.

Water resources are extremely scarce in Jordan, which is considered as one of the poorest countries in the world with respect to water resources availability (UNDP 2014), with more than 90% of the country receiving less than 200 mm/year of rainfall (Al Kharadsheh et al. 2012).
The most important aquifer for drinking-water purposes in Jordan is the upper Cretaceous limestone aquifer. The karstic springs of Tanour and Rasoun, located in the Ajloun governorate around 75 kilometres northwest of the capital of Amman, have been selected for this study. These springs are the main source for the local domestic water supply, with an average discharge between the years 2000 and 2012 of 200 m^3/h and 60 m^3/h, respectively (MWI, 2013).
During the past few years, the water supply from these two springs had to be discontinued due to high contamination of the groundwater either by microbiological contaminants or by wastewater from local olive oil presses. This wastewater is locally called “Zeebar”. Understanding of the karst aquifer system, the pathways and movement within the epikarst, and estimation of the travel and residence time within the aquifer is important for managing and evaluating the pollution risk, which affects the usability of groundwater for drinking purposes.

For a better understanding of the karstic system and its behaviour, different methods are applied:
1. Analysis of the stable isotope composition of δ^2H and δ^{18}O during the winter season for both (a) Tanour and Rasoun groundwater, and (b) rainfall samples collected from several locations at different elevations within the catchment.
2. Analysis of major ion concentrations in groundwater of the Tanour and Rasoun springs.
3. Long-term measurements of different physico-chemical parameters from the Tanour and Rasoun springs (temperature, conductivity, turbidity, TOC, etc.) using multiparameter probes with telemetric data transfer.
4. Application of a travel time-based groundwater vulnerability method, and other different groundwater vulnerability methods for karst systems.

The resulting data will be processed and used as spatially variable parameters for determining the karst aquifer characteristics within the study area. The springs show a rapid response to rainfall events which reflects a fast travel time and short residence time in the karst aquifer.

References

• Al Kharadsheh E, Akroush S and Mazahreh S (2012) Land Degradation in Jordan – Review of Knowledge Resources, International Center for Agricultural Research in the Dry Areas (ICARDA), OASIS Country Report 1.
• MWI – Ministry of Water and Irrigation (2013) Discharge Data for Tanour and Rasoun Springs, Water Information System, National Master Plan Directorate, Amman, Jordan.
• UNDP (United Nations Development Programme) (2014, September) About Jordan,
http://www.jo.undp.org/content/jordan/en/home/countryinfo/