



The fault-block structure at the Lower Yarmouk Gorge: pull-apart rim tectonics and groundwater flow path

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A new fault-block pattern was constructed across the Lower Yarmouk Gorge (LYG) area located at the eastern rim of the Kinnarot pull-apart basin, Dead Sea Transform. Our study was conducted by compiling and revising geological and geophysical data including borehole information, geological maps cross-sections and seismic data from the southern Golan and northern Ajlun. The LYG is the outlet of the 6 833 km² Yarmouk drainage basin and one of the largest natural contributors of the lower Jordan River and the Dead Sea. Although most of the runoff is collected upstream, still groundwater from three main sources, i.e. Hermon Mt., Ajlun Plateau and Jabel Druz, are feeding the Hammat- Gader hot springs and the artesian Mukheibeh - Meizar well fields. The mixing mechanism of those different sources as well as their flow paths is still unknown. Over the last few years several studies argued that groundwater flow paths in this area are controlled by geological features such as faults or dikes (Goretzki et al., 2016; Magri et al., 2016; Roded et al., 2013; Siebert et al., 2014), although the nature of such features as well as their exact locations remained elusive and speculative. We present a plausible solution for that question by suggesting a new fault-block pattern occurring in the area, providing constrains for future hydrological modeling. The presented pattern is composed of strike-slip and thrust faults which are associated with the Dead Sea Transform system and with the Kinnarot pull-apart basin. Compressional and tensional structures developed in different places forming a series of fault-blocks causing a non-uniform spatial hydraulic connection between them.

Goretzki, N. et al., 2016. Inverse Problem to Constrain Hydraulic and Thermal Parameters Inducing Anomalous Heat Flow in the Lower Yarmouk Gorge. *Energy Procedia*, 97: 419-426. DOI:<http://dx.doi.org/10.1016/j.egypro.2016.10.038>

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Roded, R., Shalev, E., Katoshevski, D., 2013. Basal heat-flow and hydrothermal regime at the Golan–Ajloun hydrological basins. *Journal of Hydrology*, 476: 200-211. DOI:<http://dx.doi.org/10.1016/j.jhydrol.2012.10.035>

Siebert, C. et al., 2014. Thermal waters in the Lower Yarmouk Gorge and their relation to surrounding aquifers. *Chemie der Erde - Geochemistry*, 74(3): 425-441. DOI:<http://dx.doi.org/10.1016/j.chemer.2014.04.002>