

Development of a regional groundwater flow model along the western Dead Sea escarpment

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Abstract Water is a scarce resource in the semi-arid to arid regions around the Dead Sea where the precipitation events occur mostly in winter. Average precipitation values ranges between 50 and 600 mm/year. Because of the Dead Sea Graben structure the distribution of precipitation shows a sharp drop over a short distance from the mountainous area towards the Dead Sea. But the area around the Dead Sea is also characterized by a high population density. Therefore the present study deals with the investigation of the water budget of the western Dead Sea escarpment. A main goal is to understand the subsurface water balance of the western Dead Sea escarpment and the impact of the lowering of the Dead Sea water level. The study area is limited by the subsurface watersheds and has a size of ~4000 km². The region is characterized by the heterogeneous aquifer system of the Judea Group. The formations of the Judea Group are separated in two sub-aquifers, the Upper Cenomanian-Turonian aquifer and the Lower Cenomanian-Albian aquifer. The objective is to quantify the surface and subsurface inflow of the western escarpment into the Dead Sea basin. This paper gives an overview of the developed regional groundwater flow model of the western Dead Sea escarpment which was achieved by the scientific software OpenGeoSys (OGS), which is specialized in coupled hydro systems processes and calculates the groundwater flow in porous and fractured media of the aquifer system (OGS 2011). The advantage of OGS is the detailed processing of the geological formations and structures (e.g. faults).

Key words numerical modelling; structural model; 3D groundwater flow model; OpenGeoSys; arid region; Israel, West Bank