



Employing hydrochemistry and stable isotopes in analyzing groundwater flow mechanism, dynamics in karst aquifer of the Lower Jordan Valley

Shadha Musallam (1), Martin Sauter (1), and Amer Marei (2)

(1) Geoscience Centre Göttingen, Georg-August-University, Göttingen, Germany, (shadhamusallam@gmail.com), (2) Faculty of Science and Technology, Al-Quds University, East Jerusalem, Occupied Palestinian territories (marei.amer@gmail.com)

Water is a valuable resource, especially in arid and semi arid areas. In order to do proper management of the water resources, studies on the aquifer system is essential. The study case is located in the lower part of the western Jordan Valley. This karstic area has different systems from which the upper and lower Mountain aquifer systems. Two representative springs were chosen for each aquifer, Sultan spring for the lower aquifer and Auja spring for the upper one. Sultan spring has a continuous and constant discharge rate through the year while Auja spring has high oscillation in discharge accompanied by frequent dry-out in summer months and fast response to precipitation events. The two systems have been thought to be separated by an aquiclude, however after frequent intensive sampling of both springs during the raining winter season, This study shows that with the exception of Na⁺ and Cl⁻ all other concentration of ions are very similar. The average of Sodium for Sultan spring is 33 mg/L, while the average Chloride for the same spring is 54.5 mg/L. As for Auja spring the average Sodium and Chloride are 24 mg/L and 39.4 mg/L respectively, therefore, the water of Sultan spring contains higher content of sodium and chloride than Auja, this could be related to the chemistry of the lower aquifer. The ratio of Na⁺/Cl⁻ for Sultan and Auja springs are 0.92 and 0.94 respectively, this indicates that Auja is close to the rain ratio of 0.86 while Sultan (although slightly higher) may be closer to the Halite ratio of 1. The isotopic signature of ¹⁸O for both springs has shown to be very similar with only a -0.5‰ of difference in most cases, with a range of -5.2‰ to -6.2‰ for Sultan and -5.4‰ to -6.2‰ for Auja spring. These results may indicate the same recharge elevation for both springs in the Mountain area. On the other hand, in some places east to the major fault system, the shallow aquifer's ¹⁸O content in Jericho is close to that of Sultan spring, which could indicate that the hydraulic connection between the Mountain and shallow aquifer is present across some windows.