

Characterization of a Coastal Aquifer Basin Using Gravity and Resistivity Methods: a Case Study from Aqaba in Jordan

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A b s t r a c t

The southern basin of Aqaba forms coastal aquifer and comprises an area of about 90 km². Alluviums and Pleistocene deposits fill the basin bounded by Precambrian Granite Basement to the east and north. Hydrogeophysical investigations were carried out to investigate its groundwater potentials and characteristics. Direct modeling on Bouger and residual gravity revealed some local subsurface faults that form sub-basins and sub-grabens in the body of the basin, each one of them is bounded by two to three faults. The spatial distribution of groundwater was found to be affected by the presence of the sub-basins and grabens. Geoelectrical layers have been vertically digitized and put in a four variable space-lattice, 2D slices of the different depths and 3D visualizations have been produced. The extents of seawater intrusion and zones of water qualities were delineated. The geoelectric inferred some local subsurface faults that were found in spatial correlation with those inferred from the gravity. A good combination was made between gravity and resistivity methods to confirm the 3D distribution of groundwater in the basin.

Key words: aquifer geometry, direct gravity modeling, seawater-freshwater configuration, Gulf of Aqaba.