JOINT INVERSION OF VES AND TEM DATA FOR INVESTIGATION OF GEOTHERMAL RESOURCES AND SEA WATER INTRUSION AT HAMMAM MOUSA HOT SPRING, SINAI, EGYPT

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Geoelectrical methods are pioneer in geothermal resources exploration. With the advent of computing technology, it has become convenient to apply sophisticated data analysis and joint inversion to different field data sets. Numerous studies have shown that, the joint interpretation of galvanic and inductive data, where a single model satisfies both data sets, will generally enhance the resolution of the subsurface resistivity structure. Thus, the inclusion of inductive data in the VES data set is expected to reduce problems with layer suppression, reduce the low and high resistivity equivalences that may be encountered with this method.
In this work, DC resistivity and transient electromagnetic surveys were conducted at Hammam Mousa area, Sinai, Egypt to explore the geothermal resources, groundwater aquifer and the effect of sea water invasion on this aquifer. The field survey comprises 19 DC resistivity soundings (VESes) with AB/2 up to 1000m and 27 transient electromagnetic (TEM) stations using a square loop of 25 m side length. Both data sets were firstly inverted in 1-D scheme using a nonlinear least-squares method and gave a layered-earth resistivity model. Besides, the joint interpretation of both VES and TEM data, using the available geological information as a constraining factor, could successfully enhance the inversion results. The geoelectrical cross section resulted from the inversion process shows the effect of the Suez Gulf water intrusion in the western part of the study area. Meanwhile, hot water reduces the resistivity values drastically near the hot spring.

VES-TEM soundings, Joint inversion, Sinai.

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