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United Arab Emirates University

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Entitled

TWO-DIMENSION MAGNETOTELLURIC DATA INVERSION OF AL-MUBAZZARAH AREA (AL-AIN, UAE)

by

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Abstract

Magnetotelluric (MT) is a geophysical technique that utilizes the naturally existing electromagnetic fields to study the electrical substructure of the Earth. The key role of MT in geothermal exploration is to detect and delineate geothermal resources and to locate the exploitable reservoirs through which hot fluids at depth can be extracted. A well-known hot spring in United Arab Emirates (UAE) is located in Al Mubazzarah area, Al Ain city. The MT method is used to study the electrical conductivity distribution beneath the Al Mubazzarah area. This study focuses on the characterization of the subsurface electrical features and the geological structures (faults) that control the geothermal fluids in Al Mubazzarah area. Eight MT sites were deployed in the Al Mubazzarah area. A remote reference site was installed about 17 km far from the study area for a better data quality. Dimensionality and strike analysis of Al Mubazzarah area are carried out using the phase tensor ellipse approach. The data shows that the 2D inversion is appropriate for the subsurface resistivity interpretation. The results from 2D inversion of the MT data demonstrates the 2D distribution of electrical resistivities beneath Al Mubazzarah area to the depth of 5 km bellow the Earth surface. This model estimates three electrical layers, from top to bottom of the study area. Firstly, a layer with relatively low resistivity of quaternary deposits (1 to 10 ohm.m) from ground surface to 0.3 km; secondly, a layer with high resistivity (50 to 500 ohm.m) composed of limestone (0.3 km to 2 km-3.3 km), and thirdly a deep layer (2 km-3.3 km to 4 km) of low resistivity (10 to 30 ohm.m) which may represents the top of geothermal reservoir beneath the Al Mubazzarah area.

Keywords: Magnetotelluric, inversion, Al-Mubazzarah, geothermal, Al Ain, United Arab Emirates.