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Magnetotelluric and Audio-magnetotelluric measurements in Alasehir Graben for geothermal exploration purposes

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In this study, we present the results of Magnetotelluric (MT) and Audio-magnetotelluric (AMT) soundings over a potential geothermal field. Study area is located in the northeasternmost part of the Alasehir (or Gediz) Graben, Western Anatolia, which is delimited by NW-SE trending fault systems and is filled by Miocene to Recent sediments. Study area is also very close to the Kula Quaternary volcanic region, a possible geothermal heat source for the region, last eruption of which was 12.000 years ago. Relatively thin crust, high heat flow values and intense tectonic activity of the Western Anatolia possibly refers to the high geothermal potential. In fact, along the southern and central part of the graben there are many productive areas reaching up to 300 degrees Celsius. By this motivation, to determine the geothermal potential of the study area MT and AMT measurements had been carried out on a total of 45 stations covering about 8 km2 area. All profiles shows higher resistivity values (>140 ohm.m) at greater depths, possibly indicating a metamorphic basement covered by Miocene to Recent sediments. This metamorphic basement gets shallower towards the North where the geothermally weathered schists and marbles crop out. Furthermore, a normal fault interface between metamorphic basement and Neogene sediments shows high resistivity contrast. Results indicate that the metamorphic basement is a less conductive block located at a depth of 1500 - 2000 m at the south and gets shallower towards the north as normal fault blocks.