

Comparison of Geothermal Conceptual and Resistivity Models Derived from the Magnetotelluric Data: Examples from West and Central Anatolia, Türkiye

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Abstract: We have acquired 6,300 magnetotelluric (MT) stations in western and central Anatolia, and have had the opportunity to compare low-resistivity anomalies with geological conceptual models. The geothermal fields in western Anatolia are associated with extensional tectonics that led to the formation of grabens as a consequence of the development of the Menderes metamorphic core complex. The intersection locations of the low-angle detachment fault, the main graben-bounding fault oriented in an approximately east-west direction, and the right-angle faults to the axis of the main graben faults permit the circulation of geothermal fluids, which cause a low-resistivity zone in the reservoir and clay caps. In contrast to these structurally controlled systems in western Anatolia, geothermal fields in central Anatolia are primarily associated with magmatic-hydrothermal processes. The heating source in the central Anatolian Volcanic Province is magma chambers, and geothermal fields are associated with magmatic-hydrothermal systems. The MT survey over Karadağ stratovolcano delineates a shallow low-resistivity zone caused by hydrothermal alteration and a large, deep low-resistivity zone, interpreted as a shallow-seated magma reservoir at a depth of 3 to 7 km. Another MT survey in the Cappadocia region reveals an unknown buried caldera with some upflowing hydrothermal fluids in the vicinity.

Keywords: 3D resistivity model , conceptual geothermal models , Magnetotellurics