**Geophysical Exploration for the Geothermal Resources, in the South Marginal Zone of the Erzurum Basin, Eastern Turkey.**

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The research area, covers the southern marginal zone of the Erzurum Basin, located in the middle segment of the Erzurum Fault zone, eastern Anatolia. The southern margin of this basin is defined by the Palandoken Faults. The late Miocene-Pliocene Palandoken volcanic complex thrust over the Pliocene–Quaternary sedimentary sequences of the basin – fill deposits, along the marginal faults. Formation of the geothermal resources is defined by the presence of deep fault zones which serve as thermal sources, associated with youngest volcanic and seismo-tectonic activity.

Vertical electric sounding (VES), transient electric sounding (TEM-FAST), Natural electric potential (NP), Magnetotelluric sounding (MTS) and Magnetometric survey have been performed along the N-S and E-W profiles, throughout the research area. The results of electric and magnetic survey, have been interpreted for geothermal sources. A reservoir controlled by active fault zones (marginal fault zone and other intersecting faults) was found to contain thermal fluid. There are ground water bearing layers starting at about 250 m. Water-bearing volcanic layers were also recorded at about 800-1300 m depth. At that horizon, hot water is expected have a form. Temperature of 45-50$^{o}$ C. The geothermal gradient being 40-60$^{o}$C per km. This value is observed at other geothermal fields around the basin, such as Ilica, Akdag, Kose Mehmet and Arziti geothermal fields. Two methods (TEM-FAST and NP) gave a location showing the existence of water and the NP results the existence of heat flow.