

INVESTIGATING THE GEOTHERMAL STRUCTURES OF ÖMER-GECEK BASIN (AFYONKARAHİSAR) USING MAGNETOTELLURIC AND DIRECT CURRENT RESISTIVITY METHODS

**Erhan Erdoğan^{1,2}, Ahmet Yıldız¹, Mehmet Emin Candansayar², Metin Bağcı¹,
Can Başaran¹, Yusuf Ulutürk³, Ergün Türker¹ and Feyzullah Çonkar¹**

¹ JUAM, Research Center of Geothermal-Mineral Waters and Ore Deposits, Afyon Kocatepe University, 03200 Campus of A.N.Sezer, Afyonkarahisar, Turkey, eedogan@eng.ankara.edu.tr,

² Ankara University, Engineering Faculty, Department of Geophysical Engineering, 06100, Ankara, Turkey,

³ AFJET, Afyon Geothermal and Tourism Incorporated Company, Afyonkarahisar, Turkey.

Ömer-Gecek basin is one of the most important geothermal area in the Western-Anatolia and it is located 18 km north-west to Afyonkarahisar. There are a lot of wells around the area which are drilled by General Directorate of Mineral Research and Exploration (MTA) and the other commercial companies. The geothermal waters from these wells are used in heating of greenhouses and also about 7000 houses in the city centre and for the purpose of tourism and health in hotels. The investments for geothermal resources are increasing day by day in Afyonkarahisar so investigating the geothermal structure of Ömer-Gecek basin come into prominence every day.

The geothermal model of the area consists of Miocene aged volcanic rocks as heating rock, Paleozoic aged calcschist and marbles as reservoir rock and Miocene aged sedimentary rocks as cover rock. The extensional regime prevailing in the region has resulted in the formation of NW-SE trending normal faults and a number of secondary faults cutting across them. Meteoric waters flow through these faults to the deep levels of earth, get warm and rise through these faults issuing at the surface as geothermal springs.

The aim of this work is to reveal the geothermal structure of the Ömer-Gecek basin. With this purpose, magnetotelluric (MT) and direct current resistivity (DCR) measurements are acquired along NW-SE profile based on geological properties and tectonic structures of investigated area. Also transient electromagnetic (TEM) measurements are acquired on the each MT station for static shift correction. All of this work is conducted by Afyon Kocatepe University, the directory of JUAM and supported by AFJET Company. After the pre-process of the measured MT and DCR data, 2D inversion is applied to these data sets individually. Geothermal structure of the Ömer-Gecek basin, up to 10 km depth, is determined using 2D resistivity models of the basin. The various drilling locations are also proposed using the 2D resistivity models. The preliminary results from these drilling activities are in conformity with the findings from 2D resistivity models. In the further studies, MT and DCR measurements will be acquired on the parallel lines to the completed profile to determine the three dimensional (3D) resistivity model of the area.

Key Words: Afyonkarahisar, Ömer-Gecek, Geothermal, Magnetotelluric, Direct Current Resistivity.