O10-5 USAGE OF CURIE DEPTHS FOR THE DETERMINATION OF GEOTHERMAL AREAS IN THE IZMIR BAY

ERDENIZ OZEL, **HAKAN KECECI** and CEM GUNAY
D.E. Universitesi Deniz Bilimleri ve Teknolojisi Enstitusu Inciralti, Izmir, Turkey

As it is known that ferromagnetic minerals loose their magnetic properties and become paramagnetic at the Curie point. These points where magnetism is lost or changes take place, are known as the Curie points depths. Many workers have carried out theoretical studies on aeromagnetic data in order to determine Curie points depths. Applications have been carried out on the known areas for the determination of geothermal fields. In our studies we have tried to obtain some approach for the probable geothermal area of the Izmir Bay. The aeromagnetic map of the area was used for this purpose.

The geothermal areas in western Turkey are placed at the cross-section of the grabens produced along the N-S and NNE-SSW trending faults initiated by the N-S trending compression before the Miocene and the undergoing S-W trending faulting and rifting. The area of Izmir Bay is the cross-section of Midilli-Karaburun system produced by the N-S the compresison and the Gediz graben which is under the extensional regime.

Also rock densities vary unreciprocally with heat flow coefficients. Crustal thicking is observed over the areas where the Bouguer gravity anomalies are lowered. Therefore the Curie points depth can be controlled by the magnetic and Bouguer gravity anomalies. In order to determine the Curie points depths in the Izmir Bay area from the total magnetic anomaly map, bodies were assumed to be dikes and prismatic structures accordingly modelling was carried out using the least-squares statistical approach.

The purpose of inserve solution technique in geophysics is to determine the model parameters suiting the observation values. As it is known that if the data points are more than the parameter number, the generalised least-squares approach is given below;

$$\Delta P = (A^T \cdot A)^{-1} \cdot A^T \cdot \Delta G$$

Here, ΔP is the parameter increase, A is the Jacobien matris pertaining partical derivatives, and ΔG is the difference between observed and calculated anomalies.The Curie points depths were determined from the bottom depths of the prismatic bodies in the area after the modelling studies. These depths are rather shallow, in the range of 4-6 km indicating high heat flow rates.

Also high resolution seismic investigation was carried out using 5 kjoule energy source along the profiles for the whole Bay in order to determine the neotectonics. Accordingly dominant fault zones were determined in the Bay. Aegean region, however k=2.1 W/m^0C (heat flow coefficient) can be used. The heat flow equation is given below as;

$$q=k\, dT/dz$$

Here, k is the heat flow coefficient, dT/dZ is the heat gradient. The Curie point was assumed to be 580 ^0C during our studies and the heat gradients were determined accordingly.

The Curie points depth map was compared with gravity, magnetic and geological maps and a good correlation was observed between them. Also the heat flow values determined from the Curie points depths were found to be comperable in around the survey area.