



Investigation of Plutonic Rocks in Biga Peninsula, NW Turkey, using 3D Normalized Full Gradient of Magnetic Data

Y. L. Ekinci (1) and E. Yiğitbaş (2)

(1) Çanakkale Onsekiz Mart University, Geophysical Engineering Department, Çanakkale-Turkey (ylekinci@comu.edu.tr),

(2) Çanakkale Onsekiz Mart University, Geological Engineering Department, Çanakkale-Turkey (erdinc.yigitbas@gmail.com)

Airborne magnetic data of Biga Peninsula were investigated by using 3D Normalized Full Gradient (NFG) technique. The NFG procedure is based on the downward continuation of the potential field data and the NFG amplitude is calculated by dividing the Analytic Signal (AS) of downward continued magnetic data by the average of AS. Application of NFG technique usually enhances the anomalies by computing the anomaly to a level close to the source bodies and points to the boundaries of causative bodies. To that end, a MATLAB based code consisting of a series of linked functions was developed and used for analyses.

Study area covers an area of 120 km x 180 km and the data were collected with 1-2 km profile intervals and with about 70 m sampling from 625 m above the ground surface by MTA (General Directorate of Mineral Research and Exploration). 2 km sampling intervals for both north and east directions were used for gridding of the magnetic data. Regional anomalies were approximated by means of element shape functions used in finite element method and then residuals were computed. Prior to the application of 3D NFG, Reduction to the Pole (RTP) transformation was applied to residual data in order to remove the complexity due to the effects of the direction of magnetization and ambient field. RTP transformation process was performed using 55 and 4 degrees for inclination and declination angles, respectively. 3D NFG operation was performed to reduced to pole data for 6 different depth levels (-200, -400, -600, -800, -1000 and -1200 m). Analyzing the resulting anomaly maps of different depth levels together with the geological map (1/500.000) showed that the locations of maximum NFG amplitudes indicate the boundaries of plutonic rocks having high magnetization intensity. Additionally, horizontal and vertical extensions of plutonic rocks were also determined.

Keywords: Airborne magnetic data, normalized full gradient, plutonic rocks, Biga Peninsula-Turkey