



Estimation of the average crustal density and its contrast to the mantle in the Eastern Anatolia, Turkey

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Large regional gravity response are effects of both topography and crustal structure. Within the measured gravity data, the topography component is scale-independent while the density component is scale-dependent. The aim of this study was to find the Bouguer correction density that minimizes the topographic effects for Eastern Anatolia (EA). Fractal dimensions have been estimated from Bouguer corrected gravity anomalies derived from different densities in a range of 2 gr/cc to 3 gr/cc by using spectral density approach. The minimum point of the plot of fractal dimensions versus trend of the fractal dimensions corresponds to the density, which minimize the topographic effect and as well as to the crustal density at atmosphere-crust interface for continental-scale gravity data sets. This value was obtained to be 2.43 gr/cc for EA and is lower than the generally accepted average density value of 2.67 gr/cc for the earth crust. A Bouguer versus elevation cross-plot of the land grid nodes of EA has been performed to obtain the density contrast of the mantle-lower crustal interface. Least-squares fit to the actual data shows a contrast of 1.17 gr/cc. This is also more than the accepted average density value of 0.6 gr/cc for the mantle-crustal interface.

In previous works, a large number of models have been proposed for the genesis of the crustal structure in the Eastern Anatolia. However, recent geophysical studies have revealed that a mantle lithosphere is almost completely absent beneath a greater portion in EA region. It is related with a break-off of a northward subducted slab of the Arabian plate under Eurasia. The atmosphere-crust interface density obtained in this study is correlated with the the subduction-accretion prism materials. Furthermore, the high value of the density contrast obtained for the mantle-crustal interface in this study is interpreted as to be the high density contrast between the asthenospheric mantle and the accretionary complex, which are in directly contact and no mantle lithosphere among them.

Key Words: Gravity, Bouguer density, Fractal analysis, Eastern Anatolia