EGU22-4803
https://doi.org/10.5194/egusphere-egu22-4803
EGU General Assembly 2022

Separation of gravimetric and magnetic anomalies with different degrees of regionality in the Eastern Carpathians, Romania

Natalia-Silvia Asimopolos[1] and Laurentiu Asimopolos[2]
[1]Geological Institute of Romania, Regional Geology, BUCHAREST, Romania (asi_nata@yahoo.com)
[2]Geological Institute of Romania, Surlari Geomagnetic Observatory, BUCHAREST, Romania (asimopolos@gmail.com)

The gravity and magnetic anomalies separation operation consists in determining the number of sources, the characteristics of each (depth, density, shape, and dimensions) so as to result in cumulative total anomaly, measured at the Earth's surface. This separation has to be done in the context of the fundamental ambiguity of gravimetric and magnetic information, based on the cause-effect ratio. There are various methods for achieving this separation of anomalies. This paper presents some examples of the use of the moving average method and the polynomial trend surfaces. In particular, we presented the results of the mobile mediation with different windows compared to the tendency surfaces with different degrees, for a case study in Eastern Carpathians mountains area. For this study we used data available from several sources.

From the International Gravimetric Bureau we used gravimetric data for the WGM2012 geoglobal model: Bouguer anomaly for density 2.67 g / cm3, outdoor anomaly, isostatic anomaly, gravitational disturbance and altitude.

From the geophysics portal of the Geological Institute of Romania we used the magnetic data resulting both from the scanning of the national geomagnetic maps and from the catalogs of measurements from the archive. We also used the deep geological sections made on the basis of seismic data, corroborated with gravimetric and magnetic data that cross the Eastern Carpathians.

Other data used for depth correlations were the isobath map of the Moho surface, the Conrad surface, the geoid, and the quasigeoid.

For the study of deep tectonics based on all the data used we used the correlation coefficient between various parameters, calculated in movable windows of different sizes both in plan and in space. For this we have developed specific calculation programs. The moving average is a direct method for separating regional effects and local (residual) effects. Polynomial trend surfaces analysis contributes to the recognition, isolation and measurement of trends that can be calculated and represented by analytical equations, thus achieving a separation in regional and local variations. The analytical expressions of the polynomial trends based on the least squares method were calculated, highlighting the regional trend caused by the deep structures. Then, by calculating the residual values resulting from the difference between the initial values and the trend values from the network nodes used, we highlighted the superficial local effects. We also

obtained information about the regional trend caused by geological structures at medium and large depths, by calculating the difference between gravity parameters, obtained with different moving average windows or tendency surfaces with different degrees, interpolated in same network.