Geophysical Research Abstracts
Vol. 18, EGU2016-422, 2016
EGU General Assembly 2016

The magnetic low of central Europe: analysis and interpretation by a multi scale approach.

Maurizio Milano and Maurizio Fedi

Department of Earth, Environment and Resources Sciences, University of Naples Federico II, Naples, Italy (maurizio.milano@unina.it; fedi@unina.it)

The objective of this work is an interpretation of the European magnetic low (EML) which is the main magnetic anomaly characterizing the magnetic field of central Europe at high-altitude, extending from the eastern France to Poland and placed above the main geological boundary of Europe, the Trans European Suture Zone (TESZ), that separates the western and thinner Paleozoic platform from the eastern and thicker Precambrian platform. In particular, the EML has a relative magnetic high north-east of it, showing a reverse dipolar behavior that many authors tried to interpret in past also by high-altitude satellite exploration. We used an aeromagnetic dataset and employed a level-to-level upward continuation from 1 km up to 200 km, following a multiscale approach thanks to which the anomalies generated by sources placed at different depths can be discriminated. Low-altitude magnetic maps show a complex pattern of high-frequency anomalies up to an altitude of 50 km; then, increasing the altitude up to 200 km, the field simplifies gradually. In order to interpret the anomalies we generated the maps of the total gradient (|T|) of the field at each upward continued altitude, thanks to its property in localizing in a very simple way the edges of the sources and their horizontal position without specifying a priori information about source parameters. From the total gradient maps at low altitude we obtained information about the position of shallow and localized sources producing patterns of small anomalies. In central Europe, most of them have a reverse dipolar behavior, being related probably to metasedimentary rocks in the upper crust containing pyrrhotite and a strong remament component. At higher altitude the total gradient maps has been useful to give a more complex explanation of the EML taking in consideration the results obtained in previous studies. The maps at 150-200 km show that the maximum amplitude of |T| is exactly localized along the TESZ in the NW-SE direction. So, a simple contact model was performed in order to demonstrate that the main source that generates the EML is the complex fault system of the TESZ. However, the |T| maxima are positioned not only along the suture zone, but also in Central Europe, showing that the contributions to the EML derive also from sources placed in the Paleozoic platform with a reverse dipolar aspect. From these results it appears that the contributions responsible for the nature of this anomaly are to be reconnected first to the presence of the TESZ, which puts in contact two different platforms with different thicknesses, and also to the presence of bodies with a strong remanent component, which characterize part of the Central European crust.