Inversion for the conductance distribution within the West and Ukrainian Carpathians

S. Kovacikova (1), V. Cerv (1), I. Logvinov (2), O. Praus (1), V. Tarasov (2)

(1) Geophysical Institute, Prague, Czech Republic, (2) Institute of Geophysics, Kiev, Ukraine

Magnetic variation data recorded at 172 sites in the eastern part of the Czech Republic, Carpathian region of Poland, Slovakia and Ukraine in the period range of 1000 - 6000 seconds were used to model the conductance distribution in the West and Ukrainian Carpathians. Carpathian conductivity anomaly is a quasi-linear anomalous structure indicated by reversals of the geomagnetic induction vectors at all periods of the applied period range. It is located approximately along the boundary of the Tertiary Alpine-Carpathian orogenic system with the Paleozoic Hercynian structures in the west and the East-European Plate in the north and east. We inverted the observed geomagnetic data for the conductance in a thin sheet embedded at a specific depth in a layered medium. The inversion algorithm minimises the parametric functional that sums the squared norm of the misfit and the stabilising functional, and employed conjugate gradient optimisation. To express the sharp tectonic boundaries, we employ a minimum gradient support functional, applied in areas with strong variations of the model parameters. This approach has proved to be a powerful tool for stable inversion of our data. The inversion results suggest the geoelectrical structure within the region under study, indicate an area with anomalous conductivity, confirm the quasi-linear character of the Carpathian anomaly and suggest possible influence of the neighbouring regions.