



Use of geophysical mapping and laboratory magnetic studies for characterization of soil properties in an area, heavily affected by metallurgical industry in Bulgaria

Diana Jordanova (1), Neli Jordanova (1), Ulrike Werban (2), Anna Atanasova (1), and Petar Petrov (1)

(1) Geophysical Institute, Sofia, Bulgaria (jordanova_diana@hotmail.com), (2) Helmholtz Centre for Environmental Research - UFZ, Leipzig, Germany

The aim of the study is to reveal the potential of various geophysical methods and approaches to give fast, high-resolution lateral image of soil properties. Geophysical equipment on platforms, operated by UFZ (Leipzig) team and point measurements of field magnetic susceptibility have been carried out on a small test field close to the biggest metallurgical complex in Bulgaria near Sofia. Soil samples were taken from 33 grid points for laboratory magnetic measurements. Magnetic characterization was done both on bulk material, as well as on coarse ($d > 63$ microns) and fine ($d < 63$ microns) fractions in order to reveal the potential source of magnetic signature. Laboratory magnetic measurements include: dual frequency magnetic susceptibility measurements (X); isothermal remanent magnetization acquisition at DC field of 2T (IRM2T) and 0.23T (IRM0.23T); anhysteretic remanent magnetization (ARM). Ratios of magnetic parameters IRM/X , ARM/X , $Xarm/X$, $S = -IRM0.23T/IRM2T$ are calculated as well. Analysis of field data from magnetic measurements on platforms and their comparison with point measurements of magnetic susceptibility show some discrepancies. Systematically higher signal from field magnetic survey at SE part of Kremikovtzi test site is not fully compatible with surface variability of magnetic susceptibility measurements, which is probably due to the differences in penetration depth of the sensors. Laboratory magnetic measurements on soil samples taken at specific points from the surface profiles are used to resolve the questions raised.

This study is performed in the frame of FP7 collaborative project iSOIL – “Interactions between soil related sciences – Linking geophysics, soil science and digital soil mapping”, project No. 211386