



Application of soil magnetometry on peat-bogs and soils in areas affected by historical and prehistoric ore mining and smelting.

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The valleys of upper Brynica and Stoła located in northern part of Upper Silesia were areas of historical human activities since prehistoric times. Historically confirmed mining and smelting of iron, silver and lead ores on this areas has been dated back to early Middle Ages, however recently some geochemical and radiometric analyses suggest even prehistoric time of such activities. The aim of this study was to check if it is possible to find any magnetic signal suggesting such activities in peat-bogs and soils of this area. This magnetic properties would be a result of presence of historical Technogenic Magnetic Particles (TMPs) arisen during the primitive smelting processes in the past. Many different types of TMPs were separated from the depth of 15–30 cm of soil profiles and also were present in deeper parts of peat-bogs accompanied by fine charcoal particles. The peat-bog horizons dated by radiocarbon (C14) for 2000 BC were contaminated by some heavy metals (Cu, Zn, Cd, Ag, Pb, Mn, Fe, Sr, Sc) and slightly increased magnetic susceptibility signal was also observed. On the base of soil surface magnetic measurement using MS2D Bartington sensor complemented by magnetic gradiometer system Grad 601-02 for the deeper soil penetration, some local magnetic anomalies were detected. In areas of local ‘hot spots’, the vertical cores up to 30 cm in depth were collected using the HUMAX core sampler. Vertical distribution of magnetic susceptibility along the cores was measured in the laboratory using the MS2C Bartington core sensor. The core section with increased susceptibility values were analyzed and TMPs were separated using a hand magnet. The separation of fine fraction of TMPs was carried out in an ultrasonic bath from the fine soil material suspended in isopropanol to avoid their coagulation. Irregular ceramic particles, ash and ore particles, as well as strong magnetic particles of metallic iron; all with diameter up to 10 mm and almost regular shape and rounded edges were magnetically separated from the 15-30 cm of topsoil cores. In order to determinate the mineralogical composition of magnetic particles in soil samples a SEM-EDS technique was used. On the base of the magnetic prescreening the archeological excavations on the study area are planning.