

Application of magnetometry for monitoring and ecological assessment of soils of areas influenced by industrial emissions

Summary

The aim of the present investigation was to determine soil environment condition of parks and urban forests in the Upper Silesian Industrial District (USIR) and its neighborhood. These areas have been used as recreation places for their inhabitants. On the other hand, in these areas huge amounts of pollutants are accumulated, and, consequently, the assessment of direct ecological hazards was also the purpose of the research.

Magnetic susceptibility of soil was measured directly in the field. Heavy metal contents as well as contents of polycyclic aromatic hydrocarbons (PAH's) were determined on samples collected from forests soils. Regarding a special function of investigated objects, the samples of mushrooms and raspberries were subjected to heavy metal analysis. The soils of investigated parks and forests are characterized by high values of magnetic susceptibility (often above 100×10^{-5} SI) as well as heavy metal and PAH's contents exceeding limit values. The obtained results indicate a considerable ecological threat for plants, animals and human beings. High contamination of mushrooms and forest fruits by heavy metals confirmed the thesis that heavy metals from dust deposition get into the trophic chain. That the reason is why, it is inadvisable to collect them from researched areas, especially for consumption.

Previous experiences and present results provided the basis of guidelines for safe recreation usage of USIR forests and for their development plans. Soil magnetometry once again proved to be a useful monitoring method and a proxy for the accumulation of heavy metals in soil. Within the scope of this work the principles of permanent monitoring of forest and agricultural soils were determined. Application of quick and cost-effective magnetic susceptibility mapping enables to decrease traditional soil monitoring expenses.