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Impact of a Former Glasswork on Soil Magnetic and Geochemical Signals: A case Study of the Izery Mountains

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A b s t r a c t

The aim of this work was to determine impact of a former glasswork using magnetic methods, conductivity and electrical resistivity tomography (ERT) as well as to distinguish between soil pollution from long-range (LRTAPs) and local transport of atmospheric pollutants using soil magnetometry supported by geochemical analyses (i.e., content of the potentially toxic elements – PTEs). The study area was located in the Izery region of Poland – the Izery Mountains (within the "Black Triangle" region, which is the nickname for one of Europe's most polluted areas, where Germany, Poland, and the Czech Republic meet) and examined soils were developed from the Izera granite. The major site of the study area was situated in the Forest Glade and was exposed to the anthropogenic pressure from a former glasswork that was active here from 1754 until 1891. Whereas, the second site of the study area was located on a neighboring hill (Granicznik), whose western, north-western, and south-western parts of the slope were exposed to the long-range transport of atmospheric pollutants from the Czech Republic and Germany. Our results indicate that the Forest Glade site was characterized by many anthropogenic translocations and confirmed by a relatively high value (0.61) of the Topsoil Transformation Factor – TTF (Łukasik *et al*. 2015). Moreover, TTF and the initial study of ERT revealed existence of anthropogenic layer of wastes, dumping during the glasswork activity. The highest contents of Cu, Ni, Pb, Sn, and Zn in the Forest Glade site correspond to the local sources of pollutants and anthropogenic influence (i.e., former glasswork), whereas, the highest concentration of As, Cd, Hg, In, Mo, Sb, and Se on the Granicznik Hill site are likely a result of long-range transport of atmospheric pollutants. The principal component analyses (PCA) analysis showed that χ value is inversely correlated with the contents of Nb, Th, U, and Zr, indicating a natural origin of these elements.

Keywords: magnetic susceptibility, potentially toxic elements, soil pollution, anthropogenic impact.

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