



Concentration of trace elements, technogenic magnetic particles and charcoal in peat profiles as an evidence of thousands years of ore exploitation

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The aim of the research is the geochemical and magnetic characteristic of peat bog profiles covered with a thin layer of fluvioglacial deposits appearing in the valley of the upper Brynica river (Upper Silesia, Poland). The research was supported with radiometric dating. The upper part of the Brynica basin has been the area of human activities since the Mesolithic through the Neolithic up to now, including intensive mining-smelting activities connected with the exploitation of Fe, Pb and Ag. In order to determine the geochemical composition a method of X-ray fluorescence (EDXRF) was used. The study revealed a high concentration of such chemical elements as Ag (at a depth of 15, 70, 80 and 95 cm), Cu (at a depth of 15 and 55 cm) as well as Pb and Sn (at a depth of 15 cm). The chemical pollution corresponds to the presence of technogenic magnetic particles (TMPs) in the peat bog profiles. The TMPs occur mainly in the form of iron and hydroxides of ferro- and ferrimagnetic properties and they come into existence during different high temperature technological processes. Their presence in the peat bog profiles as well as corresponding pollution together with charcoal suggest application of fire techniques to acquire metals from ore a few thousand years ago. MS2 Bartington meter with MS2B sensor was used to detect the TMPs and the age of the pollution was determined by the application of the radiocarbon method (C-14). The radiometric research was carried out in peat bog samples taken from the most polluted horizons and in charcoal particles separated from the profiles. The results of the dating indicate the highest concentration of pollution in peat bog profiles for the periods of 500 AD and 1200, 5500 as well as 9500 BC. The connection of geochemical and magnetic analyses used in the research appeared as an effective methods to detect and interpretation a trace evidence of human activities from a many thousand years in the past.