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GEOCHEMICAL DISTRIBUTION OF TRACE ELEMENTS IN AN ABANDONED WASTE MINE DUMP FROM GIUMALĂU MOUNTAINS, ROMANIA

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Abstract

Mining activity implies a series of environmental issues that can have short or long term consequences: deterioration of natural landscape, air, water and soil pollution, negative impact on aquatic and terrestrial ecosystems and on human health.

The present study was performed on a mine dump from the Giumalau Mountains, Eastern Carpathians, Romania. A number of 28 samples were collected and analysed by ICP-MS for 9 minor elements (As, Cd, Co, Cr, Cu, Mn, Ni, Pb and Zn) and also by XRD for the mineralogical composition. Results revealed a heterogeneous mixing of the mine waste, concentration for some of the elements varying several orders of magnitude: As concentration ranges between 1.02 - 48.21 mg·kg⁻¹, Cd 0.15 - 2.06 mg·kg⁻¹, Co 2.25 - 23.35 mg·kg⁻¹, Cr 6.44 - 257.67 mg·kg⁻¹, Cu 38.24 - 1081 mg·kg⁻¹, Mn 271.9 - 1783 mg·kg⁻¹, Ni 23.33 - 127.35 mg·kg⁻¹, Pb 13.25 - 4824 mg·kg⁻¹ and Zn 3.03 - 672.5 mg·kg⁻¹. All elements exceeded the normal values according to the Romanian legislation and the intervention threshold has been topped by Cu and Pb. The geochemistry of the sterile corresponds with the mineralogical results as the metal ores identified are pyrite, sphalerite, chalcopyrite and galena. The PCA analysis revealed 3 main components that influence the chemical data: the mineralization (mainly pyrite and sphalerite), the natural background concentration and the oxidation process.

Key words: geochemistry, GIS, ICP-MS, mine dump, PCA

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