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## Assessment of contamination levels and dispersion in a mining impacted area by INAA and $\mu$ -PIXE analysis

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Assessment of contamination levels and dispersion in a mining impacted area by INAA and Micro-PIXE analysis

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Past mining activities, random disposal without poorly precautionary and rehabilitation measures, erosion, leaching, and atmospheric dispersal of mine soils, tailings and waste may contaminate the surrounding environment and nearby locality with highly toxic trace elements, and natural radionuclides in the vicinity of Sao Domingos mine, Portugal, a copper-sulphide open pit mine. Toxic trace elements, rare earth elements and natural radionuclide were measured in mining soils, plants, lichen and moss samples by using instrumental neutron activation analysis (INAA) and  $\mu$ -PIXE. This study has carried out the assessment of magnitude of contamination levels and dispersion of above contaminants in and around the mining area. The levels of the elements were very high in all types of samples including the soils, lichens, moss and plant: the highest levels were recorded in the samples collected close to ore processing sites and diluted with distance. The concentrations of As, Sb and other elements in the soils, plant, lichen and moss samples were much higher than the regional background levels reflecting the high magnitude of contamination in and around the mining area and the possible health risk for the inhabitants living nearby the mining affected area. Patterns of bioaccumulation of elements throughout the study area were quite similar for widespread pollutants such as As, Sb, Cu, Zn, Fe, Br, Co, La, and Cr. The lichen, moss and plant samples are important biomonitors of terrestrial and atmospheric pollution in mining affected areas. Some of the plant species with high biomass and extensive root systems, grown abundantly and spontaneously in the area, are suggested as the suitable candidate for the phytoremediation of the mining contaminated soils.

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