Poster: Linking bioaccessibility and solid-phase distribution of heavy metals in soils and extractive waste from abandoned mine site: A case study from Campello Monti, NW Italy


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Linking bioaccessibility and solid-phase distribution of heavy metals in soils and extractive waste from abandoned mine site: A case study from Campello Monti, NW Italy

Mining activities have led to the introduction of high levels of heavy metal (HM) concentrations in soils. This has attracted governmental and public attention due to their non-biodegradable nature and hazards posed to human health and the environment. However, total concentrations of HM are poor indicators of actual risk hazard to human health and can lead to overestimation of risk. In this study, oral bioaccessibility (the fraction available for absorption via oral ingestion), was used to refine human health risk assessment. Solid phase distribution of the HM was also investigated to characterize HM distribution and behavior in the extractive waste streams and impacted soil. The study was undertaken at an abandoned mine site from Campello Monti, in the Southern Italian Alps used for Ni exploitation from 1863 to 1940s. The results showed that total concentrations of HM were high and reached upto 7400 mg/kg for Ni due to parent material, however, only 11% was bioaccessible. Detailed analysis showed that the bioaccessible fraction (BAF) of Ni, Cu and As varied from 0.5 to 21%, 2 to 47%, and 7 to 28%, respectively. The variation can be attributed to the difference in pH, organic matter content and mineralogical composition of the samples. Results of non-specific sequential extraction showed that non-mobile forms of the elements were associated with the residual and Fe-oxides components of the matrix. The present study highlights that including bioaccessibility and solid phase distribution can refine and inform risk assessment of abandoned mine sites.