Abstract
The possibility to adapt chemometrics approaches for the quantitative estimation of heavy metals in soils polluted by a mining accident was explored. In April 1998, the dam of a mine tailings pond in Aznalcólar (Spain) collapsed and flooded an area of more than 400 ha with pyritic sludge contaminated with high levels of heavy metals. Six months after the end of the first remediation campaign, soil samples were collected for chemical analysis and measurement of visible to near-infrared reflectance (0.3 - 2.4 µm). Concentrations for As, Cd, Cu, Fe, Hg, Pb, S, Sb and Zn were well above background values. Prediction of heavy metals was achieved by stepwise multiple linear regression analysis (MLR) and an artificial neural network (ANN) approach. It was possible to predict six out of nine elements with high accuracy. Results for Cd, Cu and Zn were not significant. MLR and ANN both achieved similar results. Correlation analysis revealed that most wavelengths important for prediction could be attributed to absorptions features of iron and iron oxides. These results indicate that it is feasible to predict heavy metals in soils contaminated by mining residuals using the rapid and cost-effective reflectance spectroscopy.

Additional information
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