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Distribution of potentially toxic elements in the soil of a decommissioned lead mining area.

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Spain has been an important producer of lead and related base metals, particularly in Romans times, as well as in the 19th and 20th Centuries. All that mining, carried out during periods of poor environmental conscientiousness, and of weak administrative attention to these questions, has left, in many areas of our country, a legacy of abandoned areas, with huge volumes of mining residua subjected to weathering and subsequent dispersion of lixiviation processes. San Quintín old mine area, located in the Ciudad Real province, South Central Spain, is a good example of this abandonment, strongly affecting the soils and landscape of two separated areas (San Quintín West and San Quintín East). San Quintín East is the most extensive area (0.4 km2), and we have carried out the present geochemical study on this site.

The content in major elements (Al, Si, P, S, K, Ca, Ti, Fe y Mn) and trace elements (Cu, Cl, V, Cr, Zn, Sb, Hg, Pb, Rb, Sr, Zr, Nb, Sn, Te, Ba, Th and Ga) have been studied in twenty-three soil samples. Samples were taken from a wide, regular grid, aimed to sample the different types of substrates present in the area: original soils from the surrounding areas; contaminated soils in areas not affected by the presence of mining residua; and soils developed on mining residua.

The soil samples were dried, splitted and milled in order to analyze them using the X-ray fluorescence (XRF) technique. We have used a Panalytical XRF device, mod. Epsilon 1.

The results have been compared with published data, for both regional and worldwide levels; also, the data has been used to obtain maps showing the spatial distribution of the elements in the studied area.

As a main conclusion, Pb and Zn have been identified as the most important elements producing pollution in the area affected by mining activity. Other elements also report interesting data on the history of the area: for instance, Hg is also present at severe contamination levels, due to the failed intent to use the old mineral processing plant to concentrate cinnabar from Almadén; also interesting is to note the relationship of the elements K and Rb with the presence of an illegal disposal of olive-milling residua covering part of the mining area since year 2000.

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