



Abstract

# A first insight into mercury distribution and speciation in soils from the Almadén mining district, Spain

P. Higuera<sup>a,\*</sup>, R. Oyarzun<sup>b</sup>, H. Biester<sup>c</sup>, J. Lillo<sup>d</sup>, S. Lorenzo<sup>a,e</sup>

<sup>a</sup>Departamento de Ingeniería Geológica y Minera, Escuela Universitaria Politécnica de Almadén, Universidad de Castilla-La Mancha, Plaza M. Meca 1, 13400 Almadén, Spain

<sup>b</sup>Departamento de Cristalografía y Mineralogía, Facultad de Ciencias Geológicas, Universidad Complutense, 28040 Madrid, Spain

<sup>c</sup>Institute of Environmental Geochemistry, INF 236, 69120 Heidelberg, Germany

<sup>d</sup>Escuela Superior de Ciencias Experimentales y Tecnología, Universidad Rey Juan Carlos, Tulipán s/n, 28933 Móstoles, Madrid, Spain

<sup>e</sup>Minas de Almadén y Arrayanes S.A. Cerco de San Teodoro s/n, 13400 Almadén, Spain

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## Abstract

Almost no environmental data on mercury distribution and speciation in soils have been published so far for the Almadén mining district (central Spain), despite its huge size and historic importance. The mercury distribution in soils of the district reveals the existence of high and extremely high mercury values (up to ~ 9000 ppm Hg). The Hg-thermodesorption curves for soils from a decommissioned metallurgical precinct (Almadenejos) and a phytoremediation site show that mercury occurs in the forms of cinnabar and as mercury bound to organic matter. The TEM-EDX study of the highly contaminated anthrosols from Almadenejos (samples with Hg >5000 ppm) shows the existence of cinnabar particles adsorbed to the surface of chlorite grains. Given the generally pyrite-poor character of the ores, and the presence of carbonates in the host rocks, cinnabar solubilization is limited, which in turn mitigates environmental hazards in the district. The only by-product of cinnabar leaching in the mineral dumps is schuetteite (Hg<sub>3</sub>SO<sub>4</sub>O<sub>2</sub>). Preliminary results on local plants (*Asparagus acutifolius*, *Dittrichia graveolens*, *Marrubium vulgare*) show that mercury gets incorporated to roots, stems and leaves, with values of up to about 300 ppm Hg.

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## 1. Introduction

The Almadén mercury mining district in central Spain (e.g., Hernández et al., 1999) (Fig. 1) can be regarded as the largest known geochemical anomaly of mercury on Earth, having produced one-third of the

total world production of the element. The district includes a series of deposits comprising a variety of structural and textural styles, having in common a rather simple paragenesis including dominant cinnabar and minor pyrite. The best known deposit of the district is Almadén, which, together with El Entredicho, represent the classic type of mineralization for which the district is generally known, i.e., stratabound mineralizations hosted by the so-called Criadero quartzite (Lower Silurian) (Fig. 1). However, other deposits are truly discordant and cannot be associated

\* Corresponding author. Tel.: +34-926-441-898; fax: +34-926-264-401.

E-mail address: [pablo.higuera@uclm.es](mailto:pablo.higuera@uclm.es) (P. Higuera).