

Mercury dispersion patterns around the Sierra Gorda mineralized zone of Querétaro, Mexico.

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The Mercury Mineralized Zone in the Sierra Gorda in the state of Querétaro (SGQ) is currently a very worrying national mining asset. Its almost 1,000 km² surface area of rugged and mountainous territory involves numerous mines that, these days, are being exploited to the maximum. The exploitation of mercury in the SGQ has generated controversy in recent years due to the high levels of contamination generated when extracting the mineral, as well as the clandestine nature in which hundreds of mines operate in the region. Cinnabar (HgS) has been exploited for more than 2,000 years, affecting terrestrial systems (soil, water, air, and biota) and, of course, present and past human health. The area is made up of multiple Mesozoic marine formations, folded and deformed during the Laramide orogeny. The limits of the Mercury Mineralized Zone of the states of Querétaro and Guanajuato were established based on their characteristic geological formations and the concept of hydrological basin. The region is composed of Upper Jurassic volcano-sedimentary rocks, Lower Cretaceous calcareous banks, as well as Upper Cretaceous limestone, geologically divided into different Formations. The age of mineralization ranges from 43 to 35 thousand years. The objective of this work is focused on establishing the structure of the study area, transport mechanisms, dispersion, and deposition within the study area. To meet these objectives, samples were taken at 3 georeferenced sites of soils, sediments, representative soils of the region, according to their position in the landscape and proximity to the mines, rain samples were collected from 2015 to 2018. To build the Hg dispersion map, the GIS ArcView 8.1 was used. The results showed three polygons with more than 5000 mg/kg of total Hg, reaching a maximum of 10,000 mg/kg, the mercury concentrations in the insoluble fraction exceed the concentrations in the soluble phase, with values of 24.58 µg L⁻¹ for the soluble fraction and 77.08 µg L⁻¹ in the insoluble. The soil constitutes the interface between the atmosphere and the planet. As a consequence, a large number of toxic agents accumulate in the soil, especially in proximity to the mines.