THE CONTRIBUTION OF MERCURY FROM THERMAL SPRINGS TO THE ENVIRONMENTAL CONTAMINATION OF MT. AMIATA

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Abstract. Historically Mt. Amiata has served as an important source of Hg in the Mediterranean basin. In spite of more than a decade without mining or smelting operations, the area remains heavily contaminated. Many old mine sites as well as geothermal plumes still exist. A common belief is, however, that the many thermal springs which carry their contents over the mountainous area, constitute a significant source of Hg. A 1987–88 study of the Hg distribution in air, soil and vegetation at the Bagno Vignoni and Bagni S. Filippo thermal springs, and at the mining town of Abbadia S. Salvatore has demonstrated that Hg content around the springs was comparable to reported values in areas of little or no contamination, whereas those values found at Abbadia S. Salvatore compare well with high levels reported in the mining community of Fort St. James, British Columbia.

1. Introduction

Many cinnabar deposits are located in geothermal areas (Jonasson and Boyle, 1971), and it is known that a relationship exists between genesis of the mineral and geothermal activity. However, independently of local geochemical anomalies, many geothermal areas contain high levels of environmental Hg (Siegel and Siegel, 1975, 1987).

The Mt. Amiata area is known for one of the most important Hg deposits of the Mediterranean basin, although mining activities ended more than 10 yr ago. Nevertheless recent investigations show that Hg levels in the environment are still high (Breder and Flucht, 1984; Barghigiani and Bargagli, 1985; Bargagli et al., 1986, 1987), presumably because geothermal plumes and spoil banks of roasted cinnabar continue to release the metal into the atmosphere. However, in addition to those Hg sources remaining as a result of human activities, Mt. Amiata is also endowed with many hot springs and

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streams which distribute their contents widely over the mountain. The aim of the present work is to examine the contribution of these geothermal springs to the environmental levels of Hg in this area.

2. Materials and Methods

2.1. Study sites

In August 1987 and January 1988, sampling of vegetation, soil and atmosphere for Hg was carried out at the thermal springs of Bagno Vignoni and Bagni S. Filippo on Mt. Amiata (Figure 1). The water of the former contains a bicarbonate-sulfate-alkaline-earth solute composition emerging at 50 °C at a flow of 1.73 m$^3$ day$^{-1}$; water from the second spring has similar physical-chemical characteristics with a temperature of 43.7 °C at the source and a flow of 40 m$^3$ day$^{-1}$ (Francalanci, 1958).