A NOTE ON SOIL AND WATER MERCURY LEVELS IN ISRAEL AND THE SINAI

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Abstract. Mercury analyses were carried out on 25 soil samples and 6 water samples collected during visits to 21 sites in Israel and the Sinai in December 1972 and February to June 1974. Water samples all yielded less than 1 μg kg⁻¹ of Hg although mineral scale from municipal water in Rehovot contained 220 μg kg⁻¹ and Dead Sea salt crystals contained 1000 μg kg⁻¹.

In the Israel series, coastal plain sites were low in Hg but high levels were found eastward toward the Golan-Lake Kinneret area and at Ein Gedi near the Dead Sea. In the Sinai, low coastal plain levels contrasted with high levels on the interior toward the mountains.

The data suggest that higher Hg levels are associated with the thermal and tectonic history of the area.

1. Introduction

Recent investigations have established a relationship between geothermal activity and high Hg levels in Iceland and Hawaii (Eshleman et al., 1971, Siegel et al, 1973a, b). Although emphasis was placed upon proximity of vegetation to active volcanic sites, high thermal regions and aerometry, the presence in substrata of 'available' Hg and of a large reservoir of matrix Hg capable of release on weathering was also recognized (Siegel et al., 1973c).

The geological history of Israel provides a record of massive basaltic eruptions and sheet lavas as recently as the mid-Pleistocene, particularly in the Golan and Galilee (Schattner, 1973), and in the Sinai, faulting and uplift since the upper Tertiary have exposed basement Pre-Cambrian rocks including granites, tuffs and lavas (Picard, 1973).

The relative abundance of hot springs and frequent earthquakes along the Jordan Valley rift zone indicates that tectonic and thermal processes have subsided rather than ceased.

Accordingly, the Hg sampling program was extended to Israel and the Sinai. The present note summarizes the results of a preliminary survey of soils and waters at 21 sites visited during December 1972 and February to June 1974.

2. Experimental

2.1. Sampling

The Israel and Sinai sites sampled were based both upon geological considerations and access. Consequently they are peripheral, especially those in Israel itself (Figure 1a).
Coastal Plain, Galilee and Jordan Valley locations were included. The Sinai samples cut across the Mediterranean coastal-interior transition to the Suez coast and into the exposed Pre-Cambrian basement rock at Mt. Moses (Sinai) (Figure 1b).

Water samples of 100 ml volume were collected in polyethylene tubes containing 1 ml of concentrated HNO₃ to stabilize Hg present and destroy organized cellular material. The tubes were supplied with threaded polyethylene caps lined with parafilm to tighten closures and then wrapped in parafilm.

Soil samples were generally handled in the same manner. Coarser samples were collected in 10 ml polyethylene bags twisted shut and the closure heat-sealed well away from the collected matter. In general the upper 5 cm of material at any site were discarded before collection was made.

Samples were stored at 5°C until analysis.

2.2. ANALYSIS

Replicate soil samples of ca. 10 g and aqueous samples of 50 ml were analyzed.

Because of the focus here on 'available' Hg as described previously (Siegel et al., 1973c), standard nitric-perchloric acid-hydrogen peroxide digestion was carried out without prior HCl extraction or subsequent dissolution with HF.

Analyses were carried out using Beckman 1301 atomic absorption spectrophotometer and Coleman-Perkin Elmer flameless Hg analyzer. All procedures used are