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Atmospheric mercury data for the Coquimbo region, Chile: influence of mineral deposits and metal recovery practices

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Abstract

This work reports data of atmospheric mercury for northern Chile. The study was centered in the Coquimbo region, a realm rich in mineral deposits. Some of the mining districts have historic importance and have been exploited almost continuously since the Spanish colonial time (16–18th century). Two of these districts are particularly relevant: (1) Andacollo, initially exploited for gold, and then for copper and gold; and (2) Punitaqui, initially exploited for mercury, and then for copper and gold. The continuous mercury measurement procedures carried out during this survey, have proved to be an excellent tool to detect Hg signatures associated with the mining industrial activities. The combination of cumulative log-probability graphs and atmospheric mercury concentration profiles, allows clear differentiation between areas subjected to agriculture (2–3 ngHg m^{-3}), from those in which mining and metal concentration activities take place (>10 ngHg m^{-3}, most data well beyond this figure). Gold recovery involving milling and amalgamation appear as the most contaminant source of mercury, and yield concentrations in the order of 10^4–10^5 ngHg m^{-3} (Andacollo). Second in importance are the vein mercury deposits of Punitaqui, with concentrations above 100 ngHg m^{-3}, whereas the flotation tailings of the district yield concentrations near to 100 ngHg m^{-3}. The large and modern open pit operations of Andacollo (Carmen: Cu; Dayton: Au) do not show high concentrations of atmospheric mercury.

Keywords: Mercury; Atmosphere; Air geochemistry; Coquimbo; Chile

1. Introduction

The Coquimbo region in northern central Chile (Fig. 1) is one of the richest in terms of mineral deposits and mining activity. The mineral deposits are not only important in number and/or size, but also in terms of historical significance, because some of them have been almost continuously exploited since the Spanish colonial time (16–18th century) (e.g., Andacollo: copper and gold). Thus, in many ways one may infer that the Coquimbo region has a long-lasting record of environmental disturbances derived from its mining industry, particularly in old mining sites such as

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