

Review on manuscript submitted to ACP

Title: Mercury emission from contaminated soils in the River Idrijca catchment

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## Review

Seven soil samples were collected at 3 different sites in the River Idrijca catchment close to the old Idrija Hg-mine. The mercury flux from the soil samples as function of temperature, UV-radiation and humidity was investigated using a laboratory flux chamber system. The aim of the present work was to study some characteristics of mercury flux from contaminated soil during simulated environmental conditions in the laboratory.

The measurement result is discussed in terms of chemical and physical processes promoting flux of elemental mercury from soil. The result is mostly of qualitative nature but gives some insight into the complicated nature of these processes. The paper merits publications after revision according to the comments made below.

## Major comment

Regarding Figure 3, activation energies ( $E_a$ -values) are plotted as function of total mercury in soil samples. In the text it is explained that the mercury flux from the different soils are due to different chemical and physical processes. The question is how relevant it is to compare activation energies if the involved kinetics is of different kind. The conclusion made in the paper is that in contrast to earlier investigations an increase in activation energies with increasing mercury concentration in soil is observed. I think that this conclusion is wrong. Hence, when looking at the  $E_a$ -values corresponding to the samples I-1, I-2 and T-3 (which are said to be soils with high cinnabar content) a weak declining trend with concentration is actually seen. Activation values obtained from sample T-1 and T-3, corresponding to soil enriched with  $Hg^{2+}$ , yields a very strong declining trend with concentration. In other words, when considering these circumstances the conclusion is that the findings actually fit with earlier investigations.

## Minor comments

First paragraph in chapter 3 on page 8 it is stated: "In general, similar trends were observed for all samples under investigation. The strong influence of all three parameters investigated, namely soil surface temperature, radiation and soil moisture, on the momentum MEF was observed"

However this is not true regarding influence on soil surface temperature for the R-1 and R-2 samples. Also in the rest of the manuscript the results from these samples are not much commented. Maybe the reason for this should be explained.

The statements in 3.2 on page 11 beginning with "Moreover, after simulated precipitation, MEFs remained up to 22% higher ....." and so forth is quite difficult to understand.

Second paragraph in 3.3, page 12. It is stated: "After defrosting when the samples reached room temperature, soil water started to percolate through the soil column". But in 2.2.2 it is said that the experiments were initiated by cooling the soil samples to about 2 °C.