Atmospheric Chemistry and Physics
An Interactive Open Access Journal of the European Geosciences Union

Atmos. Chem. Phys., 10, 1417-1426, 2010
www.atmos-chem-phys.net/10/1417/2010/

A laboratory based experimental study of mercury emission from contaminated soils in the River Idrijca catchment

D. Kocman and M. Horvat
Jožef Stefan Institute, Department of Environmental Sciences, Jamova 39, 1000 Ljubljana, Slovenia

Abstract. Results obtained by a laboratory flux measurement system (LFMS) focused on investigating the kinetics of the mercury emission flux (MEF) from contaminated soils of the Idrija Hg-mine region, Slovenia are presented. Representative soil samples with respect to total Hg concentrations (4–417 μg g^{-1}) and land cover (forest, meadow and alluvial soil) alongside the River Idrijca were analysed to determine the variation in MEF versus distance from the source, regulating three major environmental parameters comprising soil temperature, soil moisture and solar radiation. MEFs ranged from less than 2 to 530 ng m^{-2} h^{-1}, with the highest emissions from contaminated alluvial soils and soils near the mining district in the town of Idrija. A significant decrease of MEF was then observed with increasing distance from these sites. The results revealed a strong positive effect of all three parameters investigated on momentum MEF. The light-induced flux was shown to be independent of the soil temperature, while the soil aqueous phase seems to be responsible for recharging the pool of mercury in the soil available for both the light- and thermally-induced flux. The overall flux response to simulated environmental conditions depends greatly on the form of Hg in the soil. Higher activation energies are required for the overall process to occur in soils where insoluble cinnabar prevails compared to soils where more mobile Hg forms and forms available for transformation processes are dominant.

Final Revised Paper (PDF, 1112 KB) Discussion Paper (ACPD)

Citation: Kocman, D. and Horvat, M.: A laboratory based experimental study of mercury emission from contaminated soils in the River Idrijca catchment, Atmos. Chem. Phys., 10, 1417-1426, 2010. Bibtex EndNote Reference Manager