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Abstract

Large amounts of mercury are widely spread out in ecosystems due to anthropogenic activities (from chlor-alkali plants for instance). Understanding the mechanisms of mercury vapor transport (which is mainly in its elemental form) from soil to the atmosphere and aquifer is necessary, principally, for assessing health potential effects on the environment following by an effective emergency response and removal program.

In this study, a theoretical model, taking into account non-isothermal conditions for transport of mercury vapor in unsaturated zone covered by a concrete slab is developed. The simulation of the mercury vapor transport from a pollution source zone shows a large difference on the soil vapor distribution between winter and summer. The mercury vapor emission changes in winter mainly because of onset of natural convection in the vadose zone. We also found that the diurnal variations of the atmospheric temperature affect strongly the transport of the mercury vapor in a thin layer of subsurface zone.

Finally, theoretical results are compared with the ongoing real case in-situ measurements obtained using dynamic flux chamber.