The interplay between atmospheric deposition and soil dynamics of mercury in Swiss and Chinese boreal forests: A comparison study

JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)

ID 4660234
Author(s) Chen, Chaoyue; Huang, Jen-How; Meusburger, Katrin; Li, Kai; Fu, Xuewu; Rinklebe, Jorg; Alewell, Christine; Feng, Xinbin
Author(s) at UniBasel Alewell, Christine ;
Year 2022
Title The interplay between atmospheric deposition and soil dynamics of mercury in Swiss and Chinese boreal forests: A comparison study
Journal Environmental Pollution
Volume 307
Number 307
Pages / **Article-Number** 119483
Mesh terms China; Environmental Monitoring; Forests; Mercury, analysis; Soil, chemistry; Soil Pollutants, analysis; Switzerland; Taiga; Trees
Taking advantage of the different histories of Hg deposition in Davos Seehornwald in E-Switzerland and Changbai Mountain in NE-China, the influence of atmospheric deposition on Hg soil dynamics in forest soil profiles was investigated. Today, Hg fluxes in bulk precipitation were similar, and soil profiles were generally sinks for atmospherically deposited Hg at both sites. Noticeably, a net release of 2.07 mu g Hg m(-2) yr(-1) from the Bs horizon (Podzol) in Seehornwald was highlighted, where Hg concentration (up to 73.9 mu g kg(-1)) and soil storage (100 mg m(-3)) peaked. Sequential extraction revealed that organic matter and crystalline Fe and Al hydr (oxide) associated Hg decreased in the E horizon but increased in the Bs horizon as compared to the Ah horizon, demonstrating the coupling of Hg dynamics with the podzolisation process and accumulation of legacy Hg deposited last century in the Bs horizon. The mor humus in Seehornwald allowed Hg enrichment in the forest floor (182-269 mu g kg(-1)). In Changbai Mountain, the Hg concentrations in the Cambisol surface layer with mull humus were markedly lower (< 148 mu g kg(-1)), but with much higher Hg soil storage (54-120 mg m(-3)) than in the Seehornwald forest floor (18-27 mg m(-3)). Thus, the vertical distribution pattern of Hg was influenced by humus form and soil type. The concentrations of Hg in soil porewater in Seehornwald (3.4-101 ng L-1) and in runoff of Changbai Mountain (1.26-5.62 ng (-1)) were all low. Moreover, the pools of readily extractable Hg in the soils at both sites were all < 2% of total Hg. Therefore, the potential of Hg release from the forest soil profile to the adjacent aquatic environment is currently low at both sites.
Publisher Elsevier
ISSN/ISBN 0269-7491 ; 1873-6424
edoc-URL https://edoc.unibas.ch/93020/
Full Text on edoc No;
Digital Object Identifier DOI 10.1016/j.envpol.2022.119483
PubMed ID http://www.ncbi.nlm.nih.gov/pubmed/35595001
ISI-Number 000804993600006
Document type (ISI) Journal Article