Hg in African tropical soils: origin, stocks and fate

Master's/Bachelor's thesis with the Soil Chemistry Group





1. Global Hg deposition through litterfall



2. Artisanal gold mining in Africa

Background

Hg is a toxic trace element of global environmental concern released into the environment from natural processes (e.g. volcanic emissions) and anthropogenic sources (e.g. coal burning). Since the beginning of the industrial revolution, concentrations of Hg have increased in all environmental compartments, including soils, sediments, water, atmosphere, and biota, but soils are probably one of the largest and most important Hg reservoir globally. However, the spatial distribution of Hg concentration in soils across the globe, and especially in the tropical zone, remains largely uncertain to date while it is critical for a better understanding of the Hg cycle, including better predictions of Hg emissions from soils to the atmosphere, Hg runoff to aquatic ecosystems, and thus overall a better assessment of potential risks with respect to human and wildlife exposure to Hg.

Tropical soils are critically understudied while they probably host large amounts of Hg due to large inputs by (1) litterfal (tropical tree leaves capture atmospheric Hg and transfer it to soils following senescence) and (2) intense anthropogenic activities, e.g. artisanal gold mining. Tropical soils are also largely affected by modifications in land-use affecting the carbon cycling and thus also the Hg cycling, especially its export to aquatic systems.

The thesis project:

Samples:	soil collection from the eastern part of the Congo basin (available from the TropSOC project, Pr. Dr. Sebastian Dötterl)
Objectives:	- measure Hg and other element concentrations in soil samples
	 investigate relationships between Hg concentrations and soil parameters (geology, SOC, land-use, vegetation, etc) to uncover the most influential factors for Hg biogeochemistry
	- compare Hg stocks for soils differing in land-use (e.g. forest vs crop)
	- build a regional map of Hg stocks
Approach:	With our help, you will define your target questions, plan and conduct appropriate laboratory and statistical analyses.
Timing:	Start as soon as Autumn 2020

Are you interested in mercury biogeochemistry in African soils? Contact us!

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