

Soil Science Unit at the Institute of Geography

Short Introduction and Current Research

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Unit Soil Science Bern

Members



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UNIVERSITÄT
BERN

https://www.geography.unibe.ch/research/soil_science_group/group_portrait/index_eng.html



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Unit Soil Science Bern

Mission Statement

The Soil Science Group studies the biogeochemistry of soils under global change to improve environmental health and food production.

We use advanced analytical approaches to understand soil pollution and soil organic matter dynamics in response to land management and climate change.

We investigate matter fluxes between soils and atmosphere, biota, ground and surface water from nano to field scale

Unit Soil Science Bern

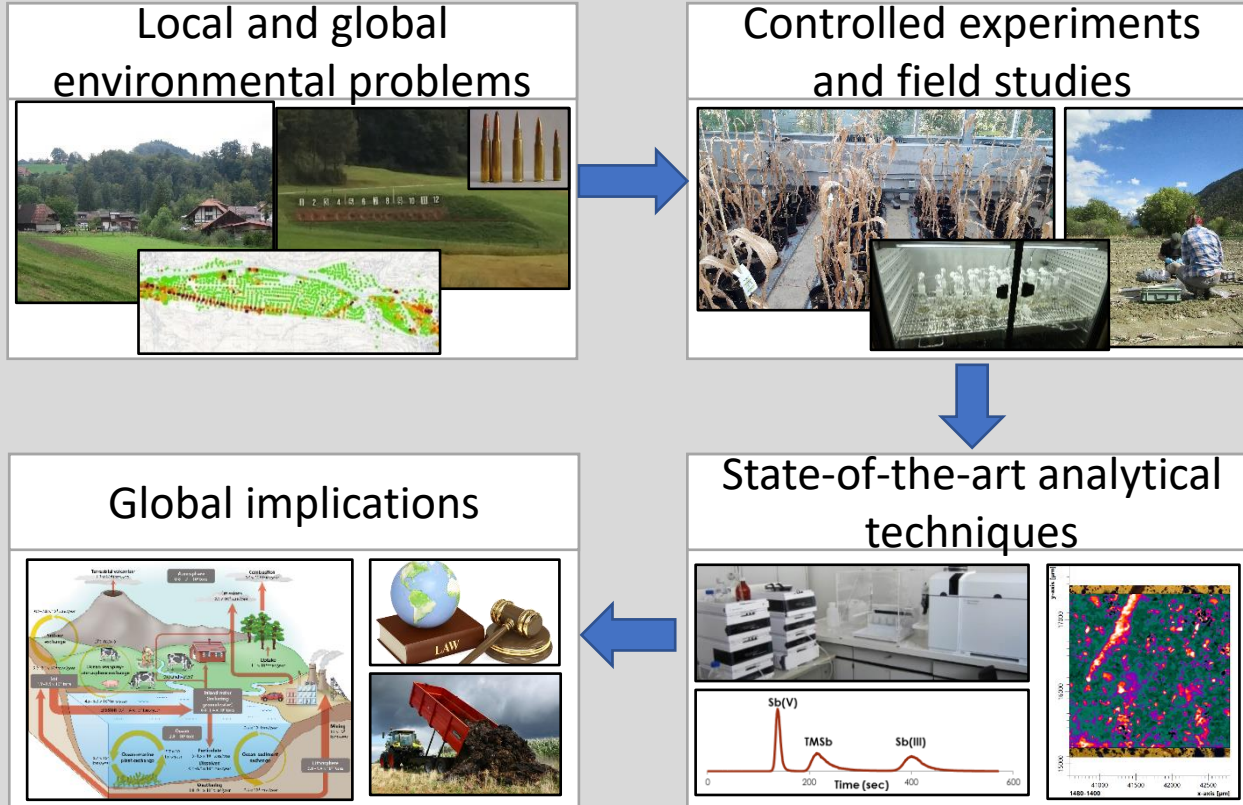
Research Topics

How do soil processes, global changes and agricultural practices influence:

- The cycle of nutrients/pollutants in soils?
- The transfers between soils and:
 - Biota (plants, animals)?
 - Atmosphere?
 - Waters?



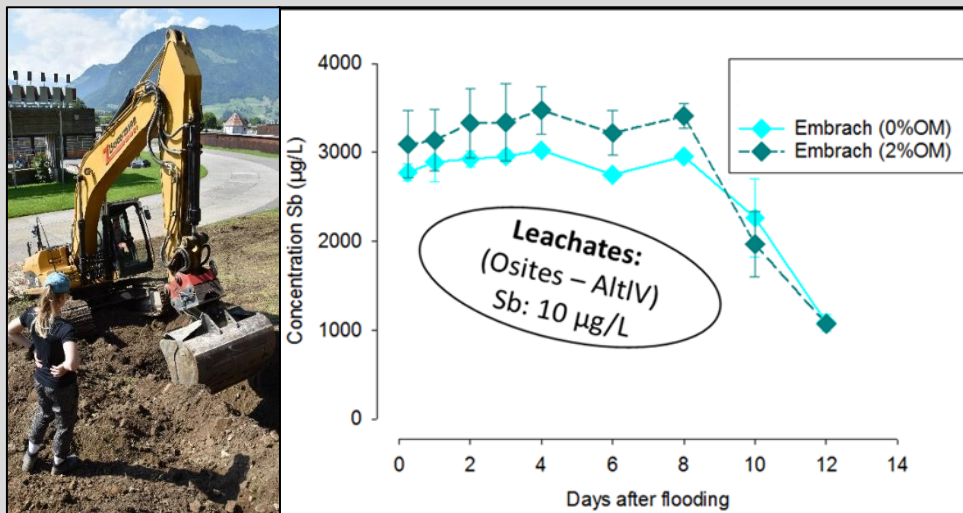
Conceptual overview of our work



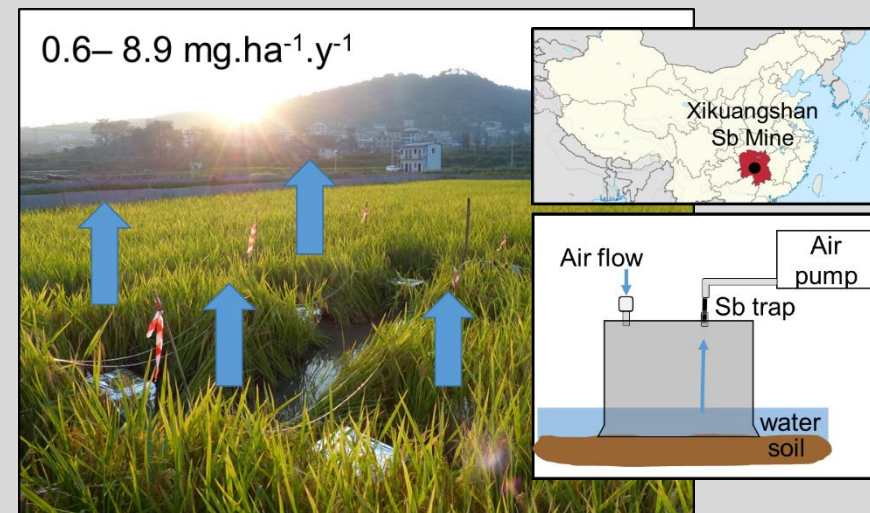
Antimony (Sb) projects

Release and biovolatilisation of Sb from soils

- **Vast release of Sb** upon flooding in the pore water of shooting range soils



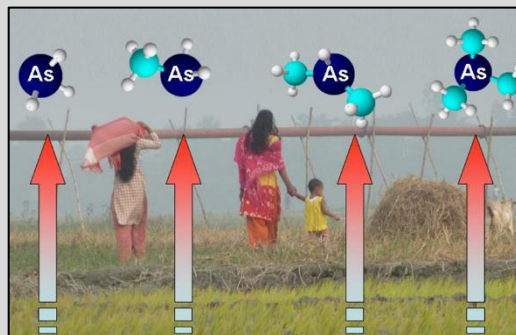
- **1st measurements of volatile Sb** in soils (mining impacted Chinese rice paddies)



Arsenic (As) transformations in soils

Biomethylation and biovolatilisation of As

- Field sampling in remote area of the alps (also: Bolivia, Cambodia, Bangladesh..), field experiments, soil incubations
- Understanding the effects of climate change on As mobility and toxicity
- Exploring biovolatilisation as a remediation technique
- *Contact: Adrien Mestrot*



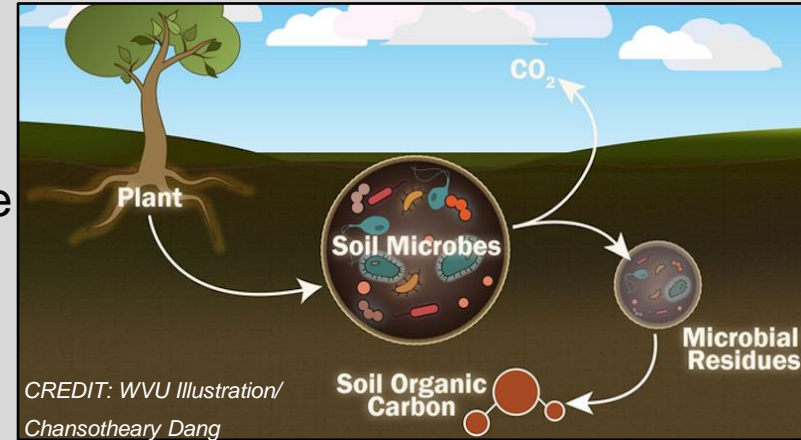
Arsenic in soil microorganisms: Method development and application

Background:

- There is no method yet to determine the arsenic pool within the soil microbial biomass.

Project aims:

- To develop a method to determine arsenic in the soil microbial biomass
- Apply this method to different soils in Switzerland



Contact: Karen Viacava

Assessing Soil Pollution in Ukraine

Trace element pollution in missile impacted soils

- Work in collaboration with the NGO Environment People Law
- Explosions pollutes air, water and soil with cadmium, vanadium or titanium
- What other toxic trace elements are an issue?
- Are they mobile?
- *Contact: Adrien Mestrot*



How to promote a Sustainable Plant Protection Transition?

Contact: Abdallah Alaoui

European project with case study sites (CSS) in 11 countries

Assessing the effect of PPP on EPAH health

- Analysis of data collected at the CSS in Switzerland and/or Europe.
- Identifying the major exposure pathways for PPP for EPAH.
- Linking measured [PPP] with health indicators and (eco)toxicological thresholds.

Identification of sustainable agriculture practice to reduce PPP application

- Identifying the major exposure pathways of animal, human and environment to PPP.
- Linking measured [PPP] with health indicators and (eco)toxicological thresholds.

For more info: <https://sprint-h2020.eu/>



Carbon storage in soils

With FiBL and Grün Stadt Zürich

Project Black Goes Green

Biochar: a promising way to stabilise carbon and store it in soils

What is the effect of this biochar on soil water budget? Soil structure? Soil chemical quality?

Contact: Markus Steffens



Other possible topics:
Own topics also welcome!

Microplastics (MP) and Nanoplastics (NP) in agricultural soils

MP/NP concentrations in soils under different land use, depth transport and decomposition of MP/NP in soils, fate of MP/NP as a carrier for a number of pollutants as well as the transfer of MP/NP from soil into the human food chain.

Contact: Adrien Mestrot/Abdallah Allaoui



Other possible topics: Own topics also welcome!

Contact: Adrien Mestrot

Trace elements in soils

Mobility and transformations of arsenic, antimony and mercury in polluted soils:

- rice paddies
- agricultural soils
- **forest soils**

Arsenic pollution in groundwater

Switzerland, China, Australia, Bangladesh, Cambodia, Bolivia...



More topics on our website!

- Detailed, concrete projects as PDFs
- List updated throughout the year
- https://www.geography.unibe.ch/research/soil_science_group/final_theses/index_eng.html



Thank you!

Questions?

