



Biological processes in an enhanced weathering field trial

Context:

Terrestrial enhanced rock weathering (ERW) is a carbon dioxide removal technology that aims at accelerating one of the most powerful negative feedbacks on Earth's climate, the chemical weathering of silicates. Terrestrial ERW involves the spreading of ground basaltic rock on agricultural soils. CO₂ is sequestered during the reaction of basalt weatherable minerals with carbonic acid.

Compared to abiotic settings, biological activity is known to enhance weathering rates by order(s) of magnitude. The application of basalt powder, by changing the chemical and physical attributes of the edaphic environment in the topsoil layer, also has the potential to affect soil biota. These complex interactions between soil biota and enhanced weathering processes have thus far received very little attention.

Goals:

In this project, the student will investigate the influence of basalt applications on soil invertebrates and micro-organisms. Depending on interest, cutting-edge approaches in metagenomics might be considered. Feedbacks between potential changes in the soil edaphon and microbial communities and weathering processes will be discussed.

Knowledge and skill required:

Interest in soil biology. Experience with soil ecology fieldwork. Strong skills in statistical and quantitative analyses, or high motivation to acquire them.

Collaboration: Xavier Dupla; Stéphanie Grand; Pierre Lambert, winegrower

Keywords: biological weathering, earthworms, arthropods, bacteria, fungi, soil microbial biomass, metagenomic sequencing, biodiversity, inorganic nitrogen, extractable phosphorus

References :

Andrews GM & Taylor LL (2019) Combating climate change through enhanced weathering of agricultural soils. *Elements* 15 : 253-258. doi : [10.2138/gselements.15.4.253](https://doi.org/10.2138/gselements.15.4.253)

Working place: Géopolis

Contact: stephanie.grand@unil.ch