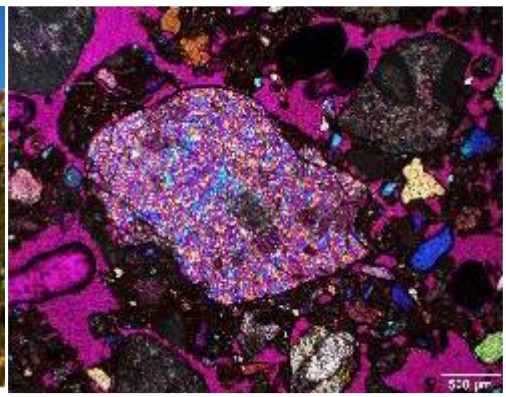
UNIL | Université de Lausanne
Faculté des géosciences et de l'environnement
Secrétariat du master en biogéosciences
bâtiment Géopolis
CH-1015 Lausanne

UNIVERSITÉ DE NEUCHÂTEL





Mineral transitions 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. CO_2 is sequestered during the reaction of basalt weatherable minerals with carbonic acid. Products of these reactions include:

1. Bicarbonate ions or carbonate salts
2. Dissolved cations
3. Secondary inorganic phases (pedogenic minerals and poorly crystalline phases).

The ERW technology is in its infancy and biogeochemical models of enhanced weathering generally assume complete congruent dissolution of weatherable minerals. The formation of secondary phases, their influence on weathering rates and on key soil functions (*e.g.,* cation and anion retention capacity, organic carbon sorption, *etc.*) is largely understudied.

Goals:
In this project, the student will investigate the formation of weathering products through transformations of primary minerals and precipitation of neoformed secondary phases. Study materials will include vineyard soils on which basalt powder has been applied in the past year and *weathering bags*. Through a combination of field work, routine mineralogical analyses and nanoscale techniques, the student will unravel the processes leading to the formation of crystalline and non-crystalline secondary phases and their interplay with soil biogeochemical function.

Knowledge and skill required:
General interest for geo-pedology research. Soil sampling experience. Strong base training in mineralogy. Affinity for advanced spectroscopic and microscopic analyses.

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

Keywords: petrography, micro-Xray diffraction analysis, scanning electron microscopy – wave dispersion spectrometry, secondary ion mass spectrometry, laser ablation mass spectrometry

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

Working place: Géopolis

Contact: stephanie.grand@unil.ch