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Embryonic pedogenesis in the Otemma glacier forefield

Context:

Ice masses worldwide are retreating at an unprecedented rate. At the margins of ice sheets and in glacial forefields, new surfaces are colonized by vegetation and new soils are being formed. These processes greatly enhance chemical weathering rates, which in turn provide a negative feedback towards rising atmospheric CO_2 concentrations.

Goals:

The objective of this project is to characterize the carbon sink function of an Alpine proglacial margin. Recent scientific studies have shown that high-latitude glacial margins are currenly consuming large amounts of atmospheric CO_2, contributing to the 'missing CO_2 sink' which is currently puzzling climate modellers. The contribution of mountain glacial forefieds and the exact mechanisms controlling weathering and CO_2 consumption rates remain however unexplored.

The successful candidate will combine watershed-scale monitoring of drainage water composition with detailed characterization of incipient pedogenesis processes to reach an integrated understanding of the interplay between plant colonization, mineral weathering and watershed biogeochemistry.

Knowledge and skill required:

Broad interest in ecosystem biogeochemistry.
Aptitude for field work in high altitude environments.
Interest in critical research design.
Good laboratory skills.

Collaboration:

This project will be co-supervised by Xavier Dupla (xavier.dupla@unil.ch) and Stephanie Grand (stephanie.grand@unil.ch) in collaboration with Stuart Lane, Institute of Earth Surface Dynamics.

Keywords:

Climate change, carbon sequestration, chemical weathering, pedogenesis, plant colonization, cryptogamic crusts, selective dissolution, electron microscopy

Working place: Géopolis and Otemma (Val de Bagnes)