

Theme: Geology and Soils

Oral presentation

Title: Climatic influence on pedogenesis and element availability in alpine soils on serpentinite (Aosta Valley, Italy).

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Abstract

The climatic influence on soil properties is important on ophiolites: large quantities of toxic metals can be released, mobilized or immobilized in relation with different climates. A different leaching intensity also influences the available Ca/Mg ratio, an important factor in serpentine ecology.

In the Aosta Valley, north-western Italian Alps, different climates are found at short distances, due to specific orography. Mediterranean air masses increase rainfall throughout the year in the south-eastern sector: in Champorcher (1427 m a.s.l.), the average rainfall is 1185mm/y; 83 mm normally fall in July (the driest summer month). Rain-shadow effects influence the drier central sector: in Torgnon (1500 m a.s.l.), normally, precipitation is 620 mm/y; 40 mm fall in summer months (inner-alpine climate).

The temperature decrease (0.65°C/100m) and the precipitation increase with elevation are further sources of variability.

We compared the active pedogenetic processes the chemical properties (available Ca, Mg, Ni) and the speciation of heavy metals in soils formed on serpentinite in areas with a different rainfall amount and seasonal pattern.

Soil development is highest under subalpine forests: in the south-eastern valleys, soils are dominated by podzolization, they are extremely acidic and Mg and heavy metals are strongly leached. In the inner-alpine area, weathering exists but leaching is inhibited; soil pH is close to neutrality, Mg dominates the exchange complex and heavy metals are concentrated.

At lower altitudes, leached and acidic Cambisols are found in the “humid areas”, while weakly developed, alkaline Regosols are found in the inner-alpine valleys.