

## **Role of vegetation on Rare Earth Elements mobilization in the regolith below forest ecosystems**

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Rare Earth Elements (REE), due to their chemical-physical features (ionic radii contraction, oxidation state, outer electron configuration), are useful tracers for studying bio-geo-chemical processes within the Critical Zone. Here, we shed new light on interactions occurring between trees, soil and aqueous solutions, which play a fundamental role in the weathering process of a regolith. For two nearby regolith profiles characterized by the same lithology, climate and hydrologic conditions, we hypothesize that the differences in chemical composition of aqueous solutions are linked to the different vegetation covers.

To test this hypothesis, we studied the REE distributions in two forested regolith profiles that differ only by their vegetative covers, which are beech (*Fagus sylvatica L.*) and douglas-fir (*Pseudotsugaa mienziesii*). The study has been conducted in the Weierbach experimental catchment, which is a 0.45 km<sup>2</sup> headwater catchment (located in the Luxembourg Ardennes Massif) characterised by a dystric cambisol developed on a polygenetic regolith.

We used different chemical extractions techniques (acetic and oxalic acids, ammonium acetate, HCl, HNO<sub>3</sub>) to identify the labile pools that control REE mobility at the tree-regolith interface. Moreover, rainfall, throughfall, soil solutions and groundwater were sampled in the two experimental plots. In these samples and in the leachates, we analysed additionally to REE also Ca, Si, Fe, Mn, Al, Mg, K, Na and DOC.

We were able to quantify to what extent the different tree species might affect the REE mobilisation from solid phases to solutions that infiltrate the regolith and, thus, REE re-distribution between the regolith functional pools.