

Assessing the elements mobility through the regolith and their potential as tracers for hydrological processes

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Regoliths encompass different materials from the fresh bedrock to the top of the organic horizons. The regolith is a major component of the critical zone where fluxes of water, energy, solutes and matter occur. Therefore, its biophysico-chemical properties drastically impact the water that percolates and/or stores in its different parts (organic and mineral soil horizons, and weathered and fractured bedrock). In order to better understand the critical zone functioning, we propose to assess the interaction between chemical elements from the regolith matrix and water during drainage infiltration. For this, we focus firstly on the potential mobility of different groups of major and trace elements according to a leaching experiment made on 10 different layers of a 7.5 m depth slate regolith, which covers a large part of the Rhenish Massif. Secondly, we carried out Sr-Nd-Pb-U-Th isotope analyses for 5 of these samples in both the untreated and leached samples. Given the specific chemical and mineralogical composition of each sampled material, our approach enables to trace the origin of major and trace elements and eventually assess their mobility. The results deliver valuable information on exchange processes at the water-mineral interface in the different zones of the regolith, which could improve the selection of tracers for the study of hydrological processes.