

Isotopic and modeling approaches for deciphering weathering processes in elementary granitic catchments: The Strengbach (OHGE) and the Ringelbach CZO cases.

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Abstract

The characterization of the diversity of flow paths and of associated water-rock interactions in critical zone, is a prerequisite for correctly describing, modeling and predicting its evolution in response to environmental modification due to natural and anthropogenic forcing. This requires first the recognition and the investigation of the different hydrological compartments involved in the water circulations, especially in the deeper part of the Critical zone.

The equipment of critical zone observatories with boreholes of several ten to hundred meters depth has opened a new step in the understanding of the hydro-geochemical transfers within the critical zone substratum. This is well illustrated in the case of the Strengbach and Ringelbach experimental watersheds, located in eastern France, which has been equipped with semi-deep boreholes up to 100-150m depth. Hydrogeological and hydrogeochemical investigations, including isotopic tracing and modeling approaches, performed on these watersheds have made it possible to constrain the nature of weathering processes involved in the critical zone and their relationships with the water circulation contexts. These studies have especially demonstrated the clear geochemical typology of waters in these two granitic catchments, according to the nature of water circulations (deep vs. hypodermic) within the substratum. They have also confirmed the existence of relatively deep alteration processes, whose role in the functioning of the critical zone will have to be properly taken into account in future studies. These different results will be presented at the conference.