

## The transient response of chemical weathering to hydrology: insights from river dissolved trace element concentrations and $\delta^7\text{Li}$

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Water flow exerts a strong control on weathering reactions in the Critical Zone (CZ) [1]. Solute export responds strongly to storm events [2], and investigating the concentration and isotope composition of trace elements in river catchments can advance our understanding of the processes governing water-rock interactions during these "hot moments". In particular, lithium (Li) and its isotopes are sensitive to the balance between mineral dissolution and precipitation in the subsurface [3].

This study focuses on the "Critical Zone observatory" (French research Infrastructure OZCAR) of the Sapine catchment (0.54 km<sup>2</sup>). This granitic catchment is located in the Cévennes National Park in southern France, on the southeastern edge of the Massif Central. In this catchment the changes in the water fluxes are the main control for solute export given the limited anthropogenic influence and the homogenous land cover (beech coppice).

The relationships between concentrations and discharge indicates differential responses of dissolved elements to hydrological forcing. In particular, systematic changes are observed for Li and its isotopes as a function of water discharge, indicating maximum secondary mineral formation at intermediate discharge. We suggest that Li dynamics are chiefly influenced by the depth at which water is flowing with, e.g. dissolution of primary minerals in deeper groundwater regime, and water – secondary mineral interaction at shallower depths. Evaluating the response of trace element concentrations, will help us to better understand the long-term controls on solute export from the CZ on short term scale and beyond steady state.

[1] Maher *et al.* (2011), *Earth and Planetary Science Letters* **312**, 48–58. [2] Kirchner *et al.* (2010), *Hydrological Processes* **24**, 1631-1645. [3] Liu *et al.* (2015), *Earth and Planetary Science Letters* **409**, 212-224.