

Chemical weathering of a granitic watershed: coupling Lithium isotopes and reactive transport modeling, preliminary results

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In the present study, we report lithium concentrations and Li isotopic compositions for different samples within a granitic watershed (Margeride, France). We investigate unweathered bedrock and samples displaying different stages of weathering in order to characterize Li isotopic fractionation. This was achieved by coupling lithium isotope geochemistry and reactive transport modeling during granite weathering at the scale of this watershed.

The first stages of this work were intended to building a robust alteration model considering the initial minerals within the bedrock (wt.% and Li concentration). This weathering model was developed using the PHREEQ-C code and simulates a weathering sequence in agreement with the products observed within the soils, saprolites and sediments for Li concentrations. This first stage was important in order to conserve the mass balance for lithium. The next step, we are working on now, is to implement Lithium isotope fractionation during weathering reactions. This model for coupled chemical and isotopic equilibration explicitly considers isotopic equilibration in the absence of bulk chemical disequilibrium by making use of a solid-solution model for the precipitating mineral phase (no isotopic fractionation is likely to occur during mineral dissolution).

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