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Lithium isotope systematic in the Strengbach catchment (Vosges, France)

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Lithium isotopic composition of rocks, soils and continental waters has recently been proposed as a proxy of continental weathering mechanisms. Several field studies have shown that isotopic composition of river waters is mainly controlled by the intensity of water-rock interactions rather than the nature of the weathered rocks. Actually, water/rock interactions lead to the enrichment of solution in heavy isotope (^{7}Li) whereas the light isotope (^{6}Li) is preferentially incorporated into secondary minerals. The aim of this study is to better constrain Li isotopes fractionations during weathering by studying variations of Li concentrations and Li isotopic compositions at the scale of a small (0.8 km^2) granitic watershed (Strengbach catchment, France, Vosges mountains- Observatoire Hydro-Géochimique de l'Environnement, http://ohge.u-strasbg.fr). Samples of precipitations, springs, stream waters and soil solution have been collected every 6 weeks during 2 years for Li concentration measurements. Li isotopic compositions have been measured i) in springs, stream waters and soil solutions of two sampling periods with very contrasted hydrological characteristics, and ii) at the outlet of the catchment for six varied water discharges. The first results show the following main points:

- At the scale of the watershed, Li concentrations in water samples exhibit a large range (20 to 5000 ppt), with the lowest content in rain water ($\sim$20 ppt) and the highest in soil solutions (up to 5000 ppt). Concentrations in springs and stream waters range between 400 to 1000 ppt. For each studied spring Li content and elemental ratios like Li/Ca and Li/Na significantly vary during the hydrological cycles. These variations can be explained by the contribution of two distinct Li fluxes to account for the lithium

budget of spring and stream waters.

- Isotopic ratios (δ^7Li) display also a great range of variations: from +5.3 per mil to +19.6 per mil in springs and stream waters, and -17.3 per mil to + 33.1 per mil in soil solutions. In addition δ^7Li of waters at the outlet of the watershed decreases when the discharge increases (from +16.8 per mil for the lowest water level to +12.4 per mil at high discharge). It can be calculated that rainwater does not contribute significantly to the Li budget of springs and stream waters. δ^7Li of Strengbach waters reflects a mixing between a deep and a surficial water of distinct Li isotopic compositions: the deep one originate from granite weathering and the other one from interaction with soil horizons.