A day in the lithium cycle – or how big storm events affect the rivers' lithium content?

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Lithium (Li) isotopes are a powerful geochemical tool for tracking continental as well as marine weathering processes. The current view is that the interplay between denudation rates and silicate chemical weathering rates governs the Li riverine influx to the ocean. Li isotope studies on rivers so far exhibit one common perceptible feature – a sparse time-resolution. Recently, several studies have shown that the concentrations of different dissolved compounds (foremost dissolved organic matter) in river waters can significantly vary with time and discharge fluctuations over the course of major storm events [e.g., 1].

In order to explore the effect of low-frequency large precipitation events on the Li isotope signature of terrestrial fluxes to the ocean, we have analysed 135 filtered river samples for major and trace elements, and Li isotope composition. The samples were collected from five USGS stations in different watersheds along the Connecticut river during nine large precipitation events (large storms and snowmelt events) in 2016-2017. The results reveal that while some elements' concentrartions, iron for instance, pulse due to the large discharges, Li concentrations remain rather unaffected.

In encouraging news for using Li isotopes as a paleoproxy, we found small (<2‰) variability in the riverine Li isotopic composition during high-precipitation events. This suggests that riverine Li isotope values record an integrated signal of weathering processes and that near continuous monitoring is not needed to accurately estimate the average Li isotope composition of a river. Therefore, this work bolsters the case that we have a relatively sound understanding of the global Li isotope mass balance and that Li isotopes are a promising tool for reconstructing weathering processes in the Earth's history.

[1] Raymond *et al*. (2016) *Ecology* **97**, 5-16.