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Lithium at the top of the world - analyses and modelling of Li mobility in the Salar de Uyuni

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Lithium is a fundamental metal used in modern and future technologies, the demand for which will only increase in the near future. However, the behavior of Li in terms of its mobilization, transportation, and deposition are still poorly understood. Half of the world's Li comes from the so-called "Lithium Triangle" of South America, crossing between Argentina, Bolivia, and Chile. This is why in this study, we have analyzed a suite of samples from the catchment of the Salar de Uyuni, in Bolivia.

Chemical separation following a modification of the methods of Zhu et al. (2019, Journal of Analytical Atomic Spectrometry) are used for the analyses of Li isotopes. This two-column method involves the elution from the first column dripping directly on the second, allowing two columns worth of purification to be performed in a single session. The method has been tested for igneous rocks, sediments, leachates, and water samples. Final Li analyses are performed on a Nu Plasma 2.

These data have been coupled with leaching experiments, in order to constrain the mobility of Li. We have used a diverse range of methods, including REE sequential batch extractions, sequential BCR-extraction, and alternate leaching methods to capture the relevant fractionation behaviors of the salar catchment. By coupling the analyses of natural samples with experiments, the goal is to trace the relevant fractionation factors required for the isotopic signatures and element abundances found within the salar's catchment. This, in turn, allows us to understand the fundamental mechanisms behind this key resource and its distribution.