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Lithium isotope fractionation during the formation of secondary minerals in large rivers

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Weathering of rocks, especially silicate rocks, is a key process that regulates Earth's carbon cycle and stabilises the global climate on geological time-scales [1]. Lithium isotopes (δ^7Li) has been developed as an effective tracer of weathering process in the past decades.

Previous studies have reported that secondary minerals formed during weathering process (e.g. clays and oxides) preferentially incorporate the light isotope (^{6}Li) into their structural lattices, leaving a heavier signature in the dissolved phase [2]. Several attempts on understanding lithium fractionation in laboratory settings have been made for various secondary mineral phases [3,4,5,6]. In this study, we inspected the behaviour of lithium isotopes bound to ferromanganese oxides and those absorbed by the exchangeable sites of clays in natural river systems.

Here we present the initial Li isotope data (δ^7Li) on dissolved and suspended load across a global set of six large rivers. The isotopic composition of lithium varies significantly among different river and between exchangeable, ferromanganese oxides, and water. Our data provides important insights on lithium fractionation associated with various phases in river sediments and improves the interpretation of Li isotopes in weathering regimes.

[1] Garrels, R. M. (1983) *Am J Sci*, *283*, 641-683. [2]Pistiner, et al. (2003) *Earth and Planetary Science Letters*, *214*(1-2), 327-339. [3] Hindshaw, et al (2019). *Geochimica et Cosmochimica Acta*, *250*, 219-237. [4] Millot, R. et al.(2007). *Meeting* [5] Pistiner et al. (2003). *Earth and Planetary Science Letters,* 214(1-2), 327-339.[6] Wimpenny, J., et. al (2015). *Geochimica et Cosmochimica Acta,* 168, 133-150.