Geomorphic controls on dissolved Li isotope compositions of small rivers in Eastern Taiwan

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This work presents δ^7Li data for rivers in southern Taiwan, where the dramatic geomorphic gradient provides an opportunity to test hypotheses about the effects of erosion and weathering on the dissolved δ^7Li delivered to the oceans. Lithium isotope ratios (δ^7Li) are a promising proxy for understanding changes in silicate weathering through time. Continental weathering processes result in a large range of dissolved riverine δ^7Li compositions. Variations in silicate weathering intensity (the ratio of chemical weathering to physical erosion) have been suggested as a first-order control on dissolved riverine δ^7Li [1], but more data are needed to test this model.

This work explores the dissolved Li isotopes composition of rivers along a transect from the southern tip of Taiwan, where topography is subdued and erosion rates are low, to the high topography and rapid erosion rates of the Central Range. Samples were collected over three seasons (Spring 2007, Fall 2009, Summer 2014) from small catchments along the coast of southeastern Taiwan. Dissolved δ^7Li of the rivers ranges from 5‰ to 23‰ and is correlated with the slopes of the catchments that the rivers drain. For catchments with steep slopes, dissolved riverine δ^7Li values are similar to bedrock compositions suggesting near-congruent weathering regimes. In contrast, at low catchment slopes, the riverine δ^7Li compositions are more fractionated, reflecting the formation of secondary mineral phases. Our results are in agreement with previous studies investigating the influence of geomorphic and tectonic settings on riverine δ^7Li compositions [1, 2].

[1] Dellinger *et al.* (2015) *GCA* 164, 71
[2] P. A. E. Pogge von Strandmann and G. M. Henderson (2015) *Geology* 43, 67.