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Unravelling Chemical Weathering in the European Alps: Insights from Li and Sr

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Chemical weathering, which involves the breakdown of primary minerals in rocks and the formation of secondary minerals like clay and iron oxides, is a crucial process in the Critical Zone (CZ). It contributes to soil formation, nutrient supply to ecosystems, and the regulation of the long-term carbon cycle. Despite its importance, understanding the complex interplay of climatic, geological, and human-driven factors influencing chemical erosion remains a challenge. To gain insights, we must discern the origins, distribution, and magnitude of chemical weathering fluxes, as they shape the evolution of the CZ and influence soil erosion dynamics amid changing climate conditions and human activities. Two trace elements, Lithium (Li) and Strontium (Sr), serve as potent proxies for weathering. Li is a tracer of the extent of weathering, while Sr trace the signature of weathering sources. We employed these proxies in studying small catchments in the highly eroding European Alps, characterized by varying lithologies, vegetation cover, and physical erosion patterns. Interestingly, we found that Li concentrations in these catchments are more closely linked to hydrological factors than physical erosion processes.

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