Using multiple isotopes to trace silicate weathering and sediment routing processes in small mountainous catchments

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East Asia is featured by two major types of fluvial sediment routing systems: the mega-rivers in Eurasian continent, e.g. the Changjiang (Yangtze) River, and the small mountainous rivers in Taiwan Island and SE China, e.g. the Zhuoshui River and Mulanxi River. Among which, the small mountainous rivers are relatively less investigated although they play a disproportionate role in sediment discharge and greatly influence the terrestrial material cycle in the West Pacific. Here, we use multiple isotopic proxies (radiogenic and stable Sr, Nd, Li and Si) to trace the silicate weathering and sediment source-to-sink processes in the small mountainous catchments (Zhuoshui and Mulanxi Rivers) in the East Asian continental margin, and particularly the weathering mechanisms and environmental signal propagation in the catchments will be discussed.

The systematic observations from a granodiorite weathering profile and Mulanxi River sediments suggest strong fractionations in Li, Si and radiogenic and stable Sr isotopes during weathering and sediment recycling processes. The small dynamic mountains rivers in Taiwan exhibit large sedimentary geochemical and provenance heterogeneity despite their fast sediment transfer from land to sea. The Si and Sr isotopes clearly indicate the quick response of sediment weathering to typhoon impact. Our study will provide more constraints on the earth surface processes in East Asia continental margin.