Lithium isotopes in geothermal systems and rivers

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This study focuses on characterizing the effect of continental hot springs on the Lithium (Li) isotope composition of rivers. The stable isotopic composition of Li (δ^7Li) is increasingly used as a proxy for weathering intensity both in the present day and in the geologic past, on the basis that riverine composition is related to weathering conditions. Continental hydrothermal systems are known to be highly concentrated in Li and to have unique isotopic composition, thought to be related to source temperature [1]. However, little attention has considered whether discharge from these geothermal systems may complicate understanding of the Li isotopic composition of rivers in the present day, and of continental fluxes to the oceans in the past. Our results from geothermally active areas in Taiwan show that hot springs have the potential to dominate the δ^7Li signal in rivers. δ^7Li of hot spring and river samples was measured using a Thermo-Scientific Neptune Plus (MC-ICP-MS) at Caltech. Major and minor elements and anions were measured using an Thermo-Scientific iCap ICP-OES and a Dionex Ion Chromatograph (IC) respectively at National Cheng Kung University.

δ^7Li of hot springs in Taiwan shows a relationship to temperature at depth derived from chemical geothermometers. This signal is then imparted on nearby rivers and dominates the river isotope signal, suggesting that hot spring inputs should be considered carefully when interpreting δ^7Li in rivers. Further work on rivers in geothermally active areas in Japan and the Western United States will examine the role hot springs play in setting the δ^7Li composition of rivers.

[1]Millot and Négrel 2007. *Chemical Geology* **244.3**: 664-678.