Seasonal variations of Sr and Ca isotopes of headwaters in the Yangtze River, China

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Continental chemical weathering transports a large amount of matter into the ocean through rivers. Seven large rivers, including the Yangtze River which is the third longest river in the world, originate from the Tibetan Plateau (TP). Therefore, weathering of the TP plays an important role in the geochemical cycle on Earth's surface. Calcium is the most abundant alkali metal elements in the crust and migrates easily among various reservoirs on Earth's surface, which makes Ca isotope a potential tracer of biogeochemical cycles [1]. Moreover, Ca is critical for making carbonate in the oceans, which removes CO_2 from atmosphere. Radiogenic Sr isotope is a good tracer of Ca sources, combined with Ca isotopes, could constrain both source and secondary processes [2]. In this study, hydrologically driven changes in regional geochemical cycles were identified through investigating the variation of Ca and Sr isotopes between different runoff in the headwater of the Yangtze River at a hydrological year.

The most interesting finding is that the two rivers have opposite Ca and Sr isotopic behaviors during one hydrological year. In the dry season, the $\delta^{44/40}$Ca values of the Jinsha River increase with increasing discharge, while the $\delta^{44/40}$Ca values of the Yalong River decrease. In the wet season, the $\delta^{44/40}$Ca value of the Jinsha River decreases with the increasing runoff, whereas the Ca isotopic composition of the Yalong River show an increasing trend. In addition, the ^{87}Sr/^{86}Sr values of the Jinsha River increase with the discharge during the dry season, while the Yalong River shows a decreasing trend. However, both the two rivers keep constant ^{87}Sr/^{86}Sr values during the wet season. These results are most likely to be related to the seasonal change of sources into rivers and secondary processes during river transportation.

[1] Griffith *et al*. (2020) *Chem Geol* **534**, 119445. [2] Hindshaw *et al.* (2013) *EPSL* **374**, 173-184.