Silicate vs carbonate weathering: isotopic co-variability in the Fraser River, Canada

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Constraining the chemical composition of paleo-oceans inherently informs paleoclimate models by elucidating changes in the atmospheric composition and geologic make-up of Earth's surface. Major ion and isotopic compositions of seawater have varied widely over geologic time, and often in synchronous fashion [1]. However, the underlying mechanisms are not well understood. To improve our understanding, we aim to quantify runoff contributions from silicate and carbonate weathering - two of the major input fluxes of solutes to the global ocean. This goal is being accomplished by examining isotopic co-variation in the dissolved load of the Fraser River (British Columbia, Canada) during periods of more silicate- vs. more carbonate-dominated runoff. The Fraser serves as a natural laboratory for the investigation of these two weathering contributions due to its seasonally-distinct sourcing of runoff, which shifts from predominantly young igneous rocks during base flow to radiogenic (Paleozoic-Precambrian) sediments during the freshet [*2*]. Five isotope systems relevant to weathering contributions were selected (δ^{7}Li, δ^{26}Mg, $\delta^{44/40C}$Ca, $^{87}Sr/^{86}Sr$, $\delta^{88/86}$Sr) and analyzed in samples from 2010 – 2012, which were collected as a part of an ongoing time series study of the river's main stem. The results will be used to construct an index of isotopic co-variation during periods of stronger contributions from young igneous bedrock vs. radiogenic sediments, including carbonates.

1. H. Vollstaedt *et al.*, *Geochim. Cosmochim. Acta*. **128**, 249–265 (2014).
2. B. M. Voss *et al.*, *Geochim. Cosmochim. Acta*. **124**, 283–308 (2014).