Boron isotopes in rivers from volcanic islands: a weathering proxy?

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Volcanic islands often are hot spots of weathering due to the higher weatherability of basaltic and andesitic rocks and to a generally wet oceanic climate. Thus, despite their small surface areas, their share in the global weathering budgets as well as riverine input to the oceans is far from negligeable. Compared to large rivers, monolithologic drainage basins offer the opportunity to more easily decipher the sources of the river dissolved loads and track the processes that made them available. Alltogether volcanic islands are an ideal playground for testing weathering proxies at different timescales (age, volcanic activity) and for a variety of climates and vegetation covers.

Here we study the boron isotopes in different rivers draining six different volcanic islands by analysing not only rivers by also by thermal springs, atmospheric and anthropogenic inputs as well as rock and vegetation samples.. The confrontation of the major and trace element compositions of these rivers with their boron isotope ratios (varying between -5 and 50‰ in $\delta^{11}B$ notation) allows us to quantify some of the sources and to point out some of the processes at play.

While boron isotopes clearly display a weathering signal, their interpretation in terms of chemical weathering regimes is complicated by the dominance of high-temperature weathering over low-temperature weathering and atmospheric boron inputs in drainage basins with hydrothermal activity, and by the very variable contribution of boron cycling through vegetation in the river's $\delta^{11}B$ signatures.