

Boron Isotope Systematics in Small Mountainous Rivers of Taiwan

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Boron (B) isotopes are a promising tracer for studying water-rock interactions and weathering processes in the river catchments, however, little information is available on the role of the B isotope fractionation in small mountainous river systems, and dissolved B fluxes from the continents to the oceans at such weathering and erosion regimes. A more comprehensive understanding of what sets the flux and isotopic compositions of dissolved B is thus required. Here solute chemistry and B isotopic compositions ($\delta^{11}\text{B}$) of 30 river waters were measured to conduct the first systematic survey of the B isotope variations in a tectonically active and small mountainous river catchments around Taiwan. The data show a rather large variation of B concentrations (from 21.6 - 511.1 $\mu\text{g/L}$) and the $\delta^{11}\text{B}$ (ranging from -7.7 to 16.48 ‰) in the dissolved load, suggesting multiple controls on riverine B isotope geochemistry in the study area. In the western Taiwan (floodplains and foothills), dissolved $\delta^{11}\text{B}$ are clearly controlled by three sources, i.e., silicate weathering, mud volcano fluids and anthropogenic inputs. In the eastern Taiwan (high relief region with steep slopes), other than silicate weathering, hot spring water also plays an important role in contributing the lighter $\delta^{11}\text{B}$ values observed in the watersheds. Main controls on riverine B isotope fractionations, dissolved B fluxes and potential B sources in small mountainous rivers of Taiwan will be further discussed in the presented work.