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# Distribution of Boron Isotopes in a Mountainous River Catchment, Southern Taiwan

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Recently boron (B) isotope has been used as a powerful geochemical tracer for constraining water/rock interaction due to its large isotopic fractionation and high mobility on surface natural environments. The Kao-ping River (KPR) is the largest river drainage system in southern Taiwan, characterized by high denudation rate (530 ton/km2/year) and weathering rates. Seasonal river waters and stream sediments were systematically sampled along a transect from the headwater to the estuary, as well as the main tributaries (Cishan and Laonong Rivers) in the upstream, in order to evaluate the relative source contribution that controlling the dissolved B and B isotopes in the KPR, as well as the degree of isotopic fractionation associated with chemical weathering process. Due to the low B content in river waters, a revised micro-sublimation technique with low chemical blank was developed for chemical purification. Precise B isotope compositions in specimens were obtained by MC-ICP-MS (Neptune, Thermo-Fisher Scientific) and applied standard-sample bracketing (SSB) procedure for fractionation correction. The long-term external reproducibility for the standards (IAEA-B-1, IAEA-B-2, IAEA-B-3) are all better than $\pm$0.26‰ (2SD).

The chemical compositions in river waters provides information on potential weathering or other anthropogenic sources. The B/Cl and other major/trace elements indicate that excess B presented in the Cishan tributary. Since no evaporite in the region, the observed correlation between B and Cl in the Laonong River implies that rainwater was one of the important B sources in river water. Also the silicate chemical weathering has occurred in the Cishan and Laonong Rivers, plus minor anthropogenic inputs. The B and B isotopic compositions vary in the ranges of 2.6-138.6 ppb and from +11.36 to +22.56‰ respectively, in the upstream KPR. Of special interest is that the Baolai River, a tributary of the Laonong River, showed much high dissolved B and heavy $\delta$11B. In contrast, the downstream specimens were predominantly affected by industrial activities. The associated anomaly high NO3- suggests addition of anthropogenic B in the downstream KPR. In this region, the B contents and $\delta$11B values range from 21.2 ppb to 197 ppb and +11.59 to +31.85‰ respectively. The estuary samples were strongly influenced by seawater component and shows the heaviest $\delta$11B value (close to the seawater end-member, 39.5‰. Several important sources, such as silicate weathering, atmospheric deposition, groundwater input, human activities, were identified in a mountainous river catchment, Southern Taiwan.