

Mercury isotope compositions in Upper Mekong and Salween rivers on the Tibetan Plateau

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Glaciers in Tibetan Plateau (TP), known as the “Third Pole”, are melting dramatically due to climate change. Contaminants stored in glaciers like mercury (Hg) are released to aquatic systems, which supply water resources to people living downstream. Thus, it’s crucial to constrain source and transformation of Hg in TP glacierized mountain rivers. However, few studies in TP were carried out. Hg isotopes would help for tracing Hg in the high plateau aquatic systems.

Here we reported Hg isotope compositions in waters of two adjacent high TP rivers, the Upper Salween River and Upper Mekong River, of which the glaciers cover different area (of 1.3% and 0.2% over the whole catchment, respectively). Significantly positive $\Delta^{199}\text{Hg}$ (0.45‰ to 3.12 ‰) were determined in Upper Salween River, while the Upper Mekong River samples showed negative to slightly positive $\Delta^{199}\text{Hg}$ (-0.42‰ to 0.61‰). Both rivers displayed a $\Delta^{199}\text{Hg} / \Delta^{201}\text{Hg}$ slope close to 1, indicating odd-MIF was produced by photoreduction of inorganic Hg (II). Considering the significantly positive odd-MIF found in TP glacier and different glacierized areas of two watersheds, we suggest Hg released from glacier could be an important source for stream waters in glacierized mountain area, explaining the higher $\Delta^{199}\text{Hg}$ values (up to 3‰) in the Salween River. In addition, the geological and atmospheric deposition would also contribute to Hg budgets in these rivers. Therefore, our finding reveals dissolved Hg released from glacier plays a critical role in the biogeochemical cycle of Hg in TP mountain regions, and emphasizes the importance of studying the impact of climate change on Hg budget in glacierized areas.