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Reconstruction of suspension fluxes from branches of Yangtze River using quartz in river sediments

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In Yangtze River basin, water and sediment discharges are routinely measured at water stations both in the main stream and in branches, and it is possible to reconstruct temporal and spatial variability of sediment discharges by using these data. However, since the observation of sediment discharges starts only in 1950s, the sediment discharge history before observation can't be known directly. To estimate sediment discharge from each branch before 1950s, we plan to utilize the sediment records recovered from the Yangtze delta, and utilize the proxy to distinguish suspended particle from each branches.

In this study, we conducted water and sediment sampling along the main stream of Yangtze River especially at junctions with main branches. We focused on ESR signal intensity and CI (Crystalinity Index) of quartz in suspended particles in order to 1) characterize suspended particles from each branch, 2) reconstruct the ratio of suspended particles derived from main stream and each branch, and compare it with the ratio calculated from observational data, and 3) establish the proxy to distinguish suspended particles from different branches.

First, we reconstructed the ratio of water discharge by using the hydrogen and oxygen isotope ratio of water. The product of water discharge and sediment concentration gives the suspended sediment flux. Second, based on suspended sediment fluxes and ESR signal intensity and CI values of suspended particles of the main stream and of the branch before the junction, we estimated ESR signal intensity and CI values of suspended particles after the junction. If these estimated values agree with the actual values, it means that the reconstruction method works well and we can reversely know the mixing ratio of sediments based on the values of quartz in sediments after the junction.

Keywords: Yangtze River, river sediments, sediment flux, ESR signal intensity, Crystalinity Index