Preliminary study of Cu isotopic composition in the Yangtze river and its significance

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Copper isotopic composition for the main channel of Yangtze river, from Chongqing to Nanjing, ranges from a minimum of 0.6‰ to a maximum of 1.46‰, which is higher than that of the global average value (0.68‰)[1]. There are resolvable differences of the δ^{65}Cu of the dissolved load between upper and middle-downstream reaches, and the middle-downstream reaches is characterized by the lower values of δ^{65}Cu from Jiujiang to Nanjing, in contrast, that of the upper reaches with a greater values from Chongqing to Yichang, and a increasing trend of δ^{65}Cu before the Three Gorges Dam. The possibility of reasons are: a) The intercept of the Three Gorges Dam leads to the accumulation of sediment in upper reaches, the uptake of Cu incorporated/adsorbed in/onto secondary minerals favors the lighter isotopes, which causes the residual Cu in dissolved load to accumulate the heavier isotopes; b) The uptake of light Cu isotope by phytoplankton and the release of organic ligands which can complex heavy Cu by phytoplankton such as cyanobacteria can make the dissolved phase with heavier isotopic composition, consistent with the increasing trend of phytoplankton's amount in the upstream of the Three Gorges Dam[2]. In the lower reach, δ^{65}Cu is between 0.60‰ ~ 0.62‰ during Jiujiang to Tongling, the possibility for light value of δ^{65}Cu is relate to the contribution of nearby mineral deposits which have lighter copper isotopic composition (Tongling: 0.09‰ ~ 0.83‰[3]; Dexing: -0.6‰ ~ 0.36‰[4]).

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