Clay Li-Nd isotope variations in the Changjiang basin over the past 14,000 years

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Chemical weathering plays an important role in regulating biogeochemical cycle and global climate. However, how fast chemical weathering responds to paleoclimate evolution in large river systems is still detated. The Changjiang (Yangtze River) catchment is characterized by complex lithologies representative of Upper Continental Crust (UCC), and monsoon climate regimes. Core CM97 was drilled from the Changjiang Delta, with the depositional age back to ~14 ka. We present clay Li and Nd isotope compositions and elemental concentrations of CM97, in combination with published sedimentary and paleo-environmental records, and aim to investigate the changes in sediment provenance, chemical weathering fluctuation and their possible relationship with hydroclimate.

The variations of clay Li and Nd isotope compositions show no major correlation with the in-situ environment parameters (i.e. sedimentary facies, sea-level changes and sediment flux). The overall minor variation of clay εNd value indicates relatively stable sediment source and/or a large buffering effect due to long residence time in the Changjiang floodplain. Clay δ^7Li isotope displays several plateaus with rather constant values punctuated by several significant short-term disturbances between 2 and 14 ka, and then fluctuates strongly during the last 2 ka. We infer that clay δ^7Li was primarily controlled by the hydrological cycle. Rapid changes of clay δ^7Li values during several large scale climate events are best explained by strong disturbance of chemical erosion rate. In contrast, the impact of precession-forced insolation changes is more difficult to highlight in the CM97 sedimentary record. One plausible explanation is that only climate events inducing large kinetic Li isotope fractionations can be observed at the continental scale. More high-temporal resolution work will need to be performed in order to better apprehend the impact of these particular climate events on the UCC alteration.