# How deep in time do rivers integrate the effects of weathering?

J. BOUCHEZ[1,*], A. COGEZ[1], H. CAI[1,2], Y.KE[3], B. CHETELAT[2], D. CALMELS[3], J.-B. CHEN[2], J. GAILLARDET[1]

[1]Institut de Physique du Globe de Paris, Université de Paris, France (*bouchez@ipgp.fr)

[2]Institute of Surface and Earth System Science, Tianjin University, China

[3]GEOPS, Université Paris Sud, Orsay, France

River sediments are geochemically and isotopically marked by continental weathering. This forms the basis for the use of detrital archives to reconstruct weathering in the past. However, the use of the composition of these detrital sediments (be they "modern" and currently transported by rivers, or "ancient" and trapped in sedimentary deposits) as proxies for weathering is complicated by grain size, source rock, and anthropogenic imprint effects.

Here we evaluate and distinguish between these effects using the geochemical composition of sediments from the four largest rivers in China: from south to north the Zhujiang, Changjiang, Huanghe, and Heilongjiang rivers. These four rivers and their tributaries drain a variety of rock types, straddle a strong climate gradient, and are subjected to a range of anthropogenic pressure. Together, they thus constitute a perfect natural laboratory for testing novel geochemical approaches aiming at retrieving the message carried by river sediment on natural and anthropogenic processes.

We first demonstrate how the Al/Si ratio can be used as a proxy for grain size in these rivers, as already shown for other river systems (*e.g.* [1]). Using Sr and Nd isotopes, we then identify the rock types contributing to the sedimentary load of the rivers, and correct for the effect of "sedimentary recycling" on the composition of the river particulate load. Finally, using river geochemical mass budgets, we show how the effects of anthropogenic activities, such as damming or land use, might affect catchment-scale weathering and erosion rate estimates.

[1] Bouchez et al., *G*$^3$, 2011.