

**Equilibrium between river water chemistry and the sediment exchange pool in some of the world's largest rivers?**

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Chemical weathering mediates Earth's carbon cycle and hence global climate over geological time-scales. Ca and Mg from silicate minerals are released to the solute phase during dissolution with carbonic acid and subsequently buried as marine carbonate. This mechanism is thought to provide the climatic feedback that has maintained Earth's climate equable over geological history. Quantitative models of contemporary silicate weathering processes coupled to estimates of modern day carbon fluxes associated with silicate weathering are therefore fundamental to understanding Earth's carbon cycle, and the feedbacks between the carbon cycle, climate and chemical weathering.

In regions where suspended sediment fluxes are high (typically weathering limited regions with high erosion) there is potential for significant exchange between negatively charged particulate mineral surfaces (such as clays or organic matter) and the river water itself. Depending on the origin of the exchange pool, either it may impart a significant influence on the water chemistry, or the exchange pool may carry a significant fraction of the modern weathering flux.

Here, a comparison will be presented between the particulate exchange pool (ammonium chloride extractions) and water chemistry for several of the world's largest rivers and their tributaries. The total elemental flux in the exchange pool will be compared to the total dissolved fluxes. There is a clear relationship between Sr and Mg isotopes in the exchange pool and dissolved load constraining the relative provenance of both the dissolved load and the exchange pool enabling the relative influence of the exchange pool on the water chemistry to be determined. The significance of the exchange pool for silicate weathering fluxes will be discussed.