The global riverine Li budget to the ocean

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Lithium isotopes are more and more used to serve as a proxy of continental weathering. Li is a partly soluble element, partitionned between a dissolved phase and a solid phase in rivers. In order to explain the isotopic variations of Li that have been reported in the ocean though geological time, a better understanding of the factors that control, nowadays, its behavior and the behavior of the two Li isotopes (^{6}Li and ^{7}Li) is necessary. We have analysed Li isotopes in the largest rivers of the Earth in both the solid (suspended and sandy) and dissolved fractions. Large rivers integrate (and smooth) the diversity of rocks and weathering processes at the surface of the Earth, but they provide first order information on the global input to the ocean and its control. Isotopic composition of solids transported by large rivers have been already published by our group [1]. We focus here on the dissolved load.

We analysed about 30 large rivers providing a reasonable estimate of the water discharge to the ocean and covering both weathering-limited and transport-limited regimes.

These data allow us to calculate a new estimation of the global riverine input to the ocean. Our estimate is 20‰, only slightly different from that of Huh et al. [2], based on a limited number of rivers. We also analysed monthly time series for the Siberian, Alaskan, Canadian and African rivers allowing us to estimate the temporal variability of large rivers. Our data show moreover interesting relationships with elemental ratios, in particular the Li/Mg ratio in the dissolved load or rivers, that we interpret as reflecting the main fractionating process of Li isotopes, *i.e.* the neoformation of secondary minerals in soils or floodplain systems. World rivers data therefore support the conclusions inferred from the Amazon basin [3].

These data are used in a simple model of ocean to show that, in order to explain the secular isotopic evolution of the ocean, the riverine dissolved Li released from the continents should have evolved towards a more important role of floodplains or pedogenetic processes at the global scale.

[1] Dellinger et al., *EPSL* **401**: 2014, [2] Huh et al., *GCA*. **62**: 1998, [3] Dellinger et al., *GCA*. **164**: 2015