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Silicon isotopes in the Congo river and tributaries: biogeochemical controlling factors

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Beside their major use so far in (paleo-)oceanography, silicon isotopes have been recently applied to freshwater environments, plants and soils, erosion and weathering studies highlighting their potential as tracers of continental processes. The Congo river is the second silicon supplier to the ocean and has been already comprehensively investigated in terms of its basin's rivers geochemistry, weathering and erosion rates. However, with only two data available its Si isotopic signatures are poorly constrained despite its importance and interest for the silicon cycle at both the global and basin scales.

We analysed silicon isotopic compositions of the waters ($<0.2\mu$m fraction) on a transect from Bangui to Kinshasa and in some of its main tributaries. Preliminary results, expressed as d29Si relative to NBS28, of the Oubangui and Congo waters are quite homogeneous ($+0.52 \pm 0.06$ pmil) along the 1000-km long transect studied. The Kasai (southeast basin) and Sangha (northwest basin) rivers, respectively the second and third tributaries to the Congo after Oubangui, exhibit slightly lighter isotopic compositions but are not significantly different from this main river average. These rivers drain mainly ferralitic soils. In contrast, the Alima river (a small tributary on the eastern part of the Congo basin) with a d29Si close to 0, the lightest isotopic composition ever measured on low-temperature fresh and marine waters, differs strongly from other signatures. Alima is a "Black River", draining exclusively homogeneous rainforest areas and juvenile soils on alluvium, characterised by high dissolved organic carbon content and low pH. On a d29Si vs. dissolved Si content plot, all data but Alima lay in the global trend observed on the few data reported for other rivers (excluding Yantzee), supporting the general view of heavier water Si isotopic composition with increasing dissolved Si content. Previously published data from tributaries

to the Lake Tanganyika, connected to the Congo river via the Lukuga, display heavier and more variable isotopic compositions (0.82 $\pm$ 0.28 pmil) but follow a similar, though parallel, trend too. Differences in this d29Si - Si relationship as observed for Lake Tanganyika tributaries and Alima could therefore be related to the type of soils drained by the rivers. These results will be discussed also in relation with other biogeochemical properties such as phytoliths signatures, water chemistry, erosion and weathering rates.