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Assessing the behaviour of lithium and the distribution of Li isotopes during river weathering is of major importance for studying water/rock interactions at the surface of the Earth. Lithium (^{6}Li ~ 7.5% and ^{7}Li ~ 92.5%) is a fluid-mobile element and, due to the large relative mass difference between its two stable isotopes, it is subject to significant low temperature mass fractionation which provides key information on the nature of erosion processes.

The Loire River in central France is approximately 1010 km long and drains a surface area of 117 800 km^2. In the upper basin, the bedrock is old plutonic rock overlain by much younger volcanic rocks. In the intermediate basin, the Loire River drains the sedimentary series of the Paris Basin, mainly carbonate deposits. Then, the lower Loire basin drains pre-Mesozoic basement of the Armorican Massif and its overlying Mesozoic to Cenozoic sedimentary deposits.

In the rivers of the Loire Basin, Li isotopes were measured using the Neptune MC-ICP-MS, ^{7}Li/^{6}Li ratios were normalized to the L-SVEC standard solution (NIST SRM 8545) following the standard-sample bracketing method.

Lithium concentrations in river waters of the Loire River main stream and the main tributaries span a wide range from 2.0 to 46.5 µg/L, whereas δ^7Li are comprised between +5.0 and +13.3‰.

There is a clear contrast between the headwaters upstream and rivers located downstream in the lowlands, with a siginificant decrease of the δ^7Li with the distance from the source. This feature is observed for both low (summer time) and high water stages (spring time) . In addition, one of the major tributaries in the Massif Central (the Allier River) is clearly influenced by inputs from mineralized waters resulting of hydrothermal activities having lower δ^7Li values. More generally, the Li isotopic composition measured in the rivers of the Loire Basin shows that ^{7}Li is enriched in the dissolved load. On going analysis will focus on suspended sediments and the distribution of lithium and its isotopes between dissolved and solid products of erosion at the scale of the whole Loire River Basin.