

**Water residence time by
coupling anthropogenic gases
(CFC, SF₆) and isotopic ratios
(²³⁴U/²³⁸U, ⁸⁷Sr/⁸⁶Sr) in the
Strengbach catchment (Vosges
Massif, Eastern France)**

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Weathering processes are active in surface waters but groundwater also represents no negligible chemical fluxes. As residence-time in groundwater are high, silicate weathering might take place and control Si, Ca and C fluxes. Weathering processes can be deduced from U isotopic ratios but the kinetics of these processes remain relatively poorly constrained.

In order to better characterize these processes, residence-times deduced from anthropogenic gases (CFC and SF₆) analysis and ²³⁴U/²³⁸U isotopic ratios determination have been coupled. Water samples were collected in both springs and boreholes in the granitic Strengbach catchment (Hydro-geochemical Observatory OHGE, Vosges Massif, Eastern France). Two campaigns were carried out in May and August 2015 during highly contrasted hydro-climatic periods.

A very clear geochemical distinction is observed between groundwater from surface springs and deeper groundwater from boreholes. Springs show much lower residence time (few years) and specific chemical composition. Deeper groundwater has residence time of several decades and different geochemical composition.

The ²³⁴U/²³⁸U isotopic ratios confirm this vertical zonation in the boreholes, with much higher activity ratios in depth in the borehole than in the surface and spring waters; such high ratios are indicative of long water-rock interactions, which is consistent with the long residence times deduced from the CFC and SF₆ data.