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# Use of $^{238}$U-$^{234}$U activity ratio as an hydrological tracer: clues from the study of Upper Rhine watersheds

F. Chabaux1, M.-C. Pierret1, J. Prunier1, J. Riotte2, B. Ambroise3, Ph. Elsass4

(1) CGS-EOST, University of Strasbourg, France (2) LMTG-IRD, Toulouse, France (3) IMFS, University of Starsbourg, France (4) BRGM, Lingolsheim, France

(fchabaux@illite.u-strasbg.fr, pierret@illite.u-strasbg.fr)

The recognition of the different hydrological compartments controlling the chemical fluxes exported by rivers from watersheds and the determination of their respective contribution, require to define geochimical tracers specific of the chemical fluxes coming from these compartments. Here we show that ($^{234}$U/$^{238}$U) activity ratio might become in the future a very helpful tracer to quantify the input of deepwaters into the surface waters. This conclusion relies on the detailed study of U activity ratio variations in surface waters collected on different watersheds of the Upper-Rhine Hydrosystem: (1) study of U activity ratios in spring waters collected in two small experimental watersheds developed on granitic bedrocks, i.e., the Strengbach hydrogeochemical observatory (http://ohge.u-strasbg.fr) and the Ringelbach watershed (2) study of U activity ratios along some Rhine tributaries, flowing on the Vosges Massif (i.e., the Lauter , Sauer and Strengbach streams). All these studies point out that U activity ratios in spring waters of the experimental watersheds as well as in stream waters of Rhine tributaries, can be explained by mixing between surface waters with U activity ratios closed to one, and deeper waters with higher activity ratios. In addition, variations of U activity ratios in these watersheds allowed the quantification of the contribution of these waters fluxes.