



**François Chabaux at Yaoundé University, Cameroon
EAG-GS Outreach Program 2015**



**Lecture 1 (1h + questions and discussions):
U Activity Ratios in Surface Waters as Tracers and Chronometers of Water
Transfers in the Critical zone**

The development, over the last three decades, of analytical methods for measuring very precisely U-series nuclides (especially, ^{234}U , ^{230}Th and ^{226}Ra) in environmental samples, has opened up new scientific applications in Earth Surface Sciences. François Chabaux will present the potential of U activity ratios in surface waters as geochemical tracer and chronometer of water transfers at a watershed scale. This will be illustrated by studies performed at different scales: with the analysis of U activity ratios in surface waters from small watersheds (especially from environmental observatories in the Vosges Mountain, France) but also from watersheds of much more regional extension (e.g., the Upper Rhine basin, the Ganges basin, the Mount Cameroun Hydrologic system, Siberian rivers...).

**Short course (master level – 2x2h):
Principle of functioning and use of U-series nuclides in Earth Sciences**

The objective is to familiarize people working in Earth Sciences about the interest of radioactive series nuclides as chronometers but also as tracers of geological processes. This course will recall the equations describing the time evolution of the radioactive series nuclides, and the main dating methods used in earth sciences, including the dating methods of carbonate and volcanic rocks. This course will end with a presentation of the methods recently developed to constrain the time constants of weathering and sedimentary transfer processes, as an introduction to the second lecture.

**Lecture 2 (1h + questions and discussions):
Interest of U-series nuclides for dating soils and weathering profiles: Principles,
applications and limitations**

The analytical improvement made over the last decades in measuring the ^{238}U series with intermediate half-lives (i.e. ^{234}U - ^{230}Th - ^{226}Ra) has also significantly stimulated the development of U-series nuclides for investigating weathering processes. The aim of the seminar is to present this new developments, i.e. the principles and methods that are now being developed to determine weathering rates from the study of U-series nuclides in soils and weathering profiles. Mathematical approaches, developed to calculate such rates, are based on some implicit assumptions that are also presented and must be kept in mind if one wants to correctly interpret the obtained ages.