



Use of U-series nuclides to constrain sediments transfer-times in the alluvial plains: example of the Ganges and Bramaputra river system.

François Chabaux (1), Mathieu Granet (1), Estelle Blaes (1), Peter Stille (1), Christian France-Lanord (2), and Antony Dosseto (3)

(1) Laboratoire d'Hydrologie et de Géochimie de Strasbourg, Université de Strasbourg et CNRS, France
(fchabaux@illite.u-strasbg.fr), (2) CRPG-CNRS- Nancy France, (3) GeoQuEST Research Centre-University of Wollongong-Australia

U-series nuclides have the potential to bring important information on the transfer time of sediments in the alluvial plains. This is a consequence of the dual property of these nuclides 1) to be fractionated during physical denudation and chemical weathering processes and 2) to have radioactive decay periods of the same order of magnitude as the time-scales of these processes (e.g. Chabaux et al., 2003b, 2008). We have illustrated such a potential with the analysis of U-series disequilibria in sediments collected in the Ganges and Bramaputra river basin. The approach relies on the analysis of U-series in river sediments collected along the streams. Indeed, as illustrated in Granet et al. (2007), in large alluvial plains where sediments are only transferred and not affected by additional inputs of new weathering products from fresh rocks, the intensity of ^{238}U - ^{234}U - ^{230}Th disequilibria in river sediments will only depend on two parameters: (a) the duration of the transfer including the time spent in soils and in the river, and (b) the nature and the intensity of U-Th fractionations occurring in sediments during their transfer into alluvial plains. Recovering time information from the variation of U-Th disequilibria in such sediments requires therefore the use of realistic models accounting for the U-Th fractionation of sediments during their transfers into the plain. From the data, it is proposed for the Ganges and Bramaputra river sediments, that the main U-Th fractionation process is connected with the sediment weathering during their transit and storage in the plain. In this case the U-Th variation in sediments along the two main rivers lead to quite long sediment transfer time in the alluvial plains, of 100-150 ky for Bramaputra plain and of 400 or 500 ky for the Ganges river.

Chabaux F., Riotte J., Dequincey O. (2003) U-Th-Ra fractionation during weathering and river transport, *Rev Mineral. Geochem.* 52, 533-576.

Chabaux, F., Bourdon, B., Riotte, J., 2008. U-series Geochemistry in weathering profiles, river waters and lakes. In : S. Krishnaswami and J.K. Cochran (Eds.), *U/Th Series Radionuclides in Aquatic Systems*, Elsevier, Radioactivity in the Environment, 13, 49-104

M. Granet, F. Chabaux, C. France-Lanord, P. Stille, E. Pelt (2007). Time-scales of sedimentary transfer and weathering processes from U-series nuclides: Clues from the Himalayan rivers, *Earth and Planetary Science Letters*, 261, 389-406.