Geochemical insights of the alteration of soils and the transfer of sediments in a lowland catchment

L. LEDIEU[1], A. SIMONNEAU[1], O. CERDAN[2], P. NEGREL[2], V. LAPERCHE[2], C. GROSBOIS[3], F. LAGGOUN[4]

[1]Institut des Sciences de la Terre d'Orléans, 1a rue de la Ferollerie, 45100 Orléans, France (lauriane.ledieu@cnrs-orleans.fr, anaelle.simonneau@univ-orleans.fr)
[2]BRGM, 3 avenue Claude Guillemin, 45060 Orléans, France
[3]GéHCO, University of Tours, 37200 Tours, France
[4]INSU, 4 avenue de Neptune, 94100 Saint-Maur-des-Fossés

The transfer and storage of chemical elements are controlled by physical, chemical and biological processes [1]. Different studies have highlighted the dynamics and correlations that exist between these different processes, especially in environments that show strong tectonic and/or geomorphic activities. Generally, the issue was to reconstruct them over centuries or decades to evaluate the climate change effects. High resolution studies, both in terms of spatial and temporal scales are less common, and this is even more true in lowland areas. In this context, this study focus on the transfer of selected chemical elements (Ca, K, Ti, Fe, Mn, Rb and Sr) induced by alteration and erosion of soils, through the analysis of hydromorphic sandy-clay soils and bed load sediments of the Egoutier catchment (Loiret, France). The small size of this watershed (8 km²) permits a detailed description of these processes. The soils are developped on ancient alluvium as evidenced by their properties, which clearly show the impacts of alteration. Contrary to some elements like Ca, Fe and Rb that show a migration to the subsoils, Mn appears immobilized in the topsoils. Even the mobile character of K and Sr, those are present in same ranges in the profiles. The enrichments of all the investigated elements increase in bed load sediments. Mn and Rb enrichments are linked to the source of sediments. The topsoils are the main source of it, but according to the rain amount, the subsoils can also be one. K and Sr enrichments are correlated with the quantity of inputs, like Fe and Ca but the variability of these latter is correlated to others processes. Thus, the source and the quantity of contributions to bed load sediments directly control the enrichment of the studied element. This study allow a better undestanding of the critical zone by combining pedology, geochemistry and hydrology.

[1] Négrel, Pauwels & Chabaux (2018), *Applied Geochemistry 93*, 102-112