Geophysical Research Abstracts,
Vol. 11, EGU2009-6743, 2009
EGU General Assembly 2009

Lessivage as a major pedogenetic process: an experimental approach

A. Samouëlian (1), L. Quénard (1), S. Cornu (2), and I. Cousin (1)

(1) Centre de Recherche INRA d'Orléans, Unité de Science du Sol, 2163 Av. de la Pomme de Pin, CS 40001 ARDON, 45075 ORLEANS Cedex 2, France (anatja.samouelian@orleans.inra.fr), (2) INRA Europôle de l'Arbois, Unité géochimie des sols et des eaux, BP 80, 13 545 Aix en Provence Cedex 04, France

Understanding soil evolution requires characterising, quantifying, and modelling the major processes that govern pedogenesis. We proposed to study one of the most widespread process in soils: the lessivage. Lessivage has to be understood as the translocation of fine particles from a horizon, called eluviated horizon, to another horizon, called illuviated. This process is responsible for the redistribution of matter with depth. However, lessivage fluxes were never measured to our knowledge due to obvious technical difficulties. In addition, despite its description in many soil types, the existence of this process is somewhat controversial. Recent theoretical works argue that lessivage, as defined previously, does not exist and that the higher clay content of the illuviated horizon results from in situ weathering (Legros, 2007).

The aim of this paper is to propose a laboratory experimental device to mimic the lessivage process. By this way, we want to simulate the first stage of this process on undisturbed soil monoliths and to test the impact of i) the rainfall intensity and ii) the structure on the eluviated horizon. To achieve this project we will use the rainfall generator - that allows the examination of the effect of rainfall on soil under controlled conditions. Two rainfall modalities will be tested: storm and small intensity rainfalls.

Eluviation will be simulated on a loamy decimetric sample laid on a quartz bed. Two modalities of structure will be tested: an undisturbed sample and a remoulded sample after sieving, both having the same bulk density. Departure of clay particles from the loamy material will be monitored along time. Free drainage will be applied at the basis of the quartz bed that must be thick enough to avoid waterlogged condition at the base of the loamy material. A second experiment will be designed to follow illuviation. The loamy material used in the previous experiment will be laid on a second loamy material of different nature (especially concerning the clay minerals). We will follow the incorporation of the clay particles released by the upper loamy material into the second loamy material located at its base.

Numerical simulations of water transfer are actually performed with the Hydrus 1D model in order to determine the height of the quartz bed, the intensity and duration of the two rainfall events modalities. The poster will present the results of the simulations and the design of the two experiments.

Legros J.P., 2007. Les Grands Sols du Monde. Presses Polytechniques et Universitaires Romandes, 592 p.