Geophysical Research Abstracts
Vol. 15, EGU2013-8026, 2013
EGU General Assembly 2013

Taking into account the heterogeneity and the temporal variability of the soil structure to implement relevant soil hydraulic properties

Isabelle Cousin (1), Marion Tetegan (1,2), Abad Chabbi (3), and Nathalie Korboulewski (4)

(1) INRA, UR 0272 SOLS, Orléans, France (isabelle.cousin@orleans.inra.fr), (2) UQAM, Montreal, Canada (dtetegan@gmail.com), (3) INRA, UR0004 P3F, Lusignan, France (abad.Chabbi@lusignan.inra.fr), (4) IRSTEA, Nogent-sur-Vernisson, France, (nathalie.korboulewsky@irstea.fr)

Due to its position at the interface between the atmosphere and the vadose zone, the soil significantly contributes to the partitioning of rainfall into infiltration and overland flow, and, as a consequence, to the water feeding to plants and to the water aquifer level. The characteristics of the soil are usually described at the scale of the horizon, the latter being considered as the elementary component of the pedological maps and soil databases. As far as hydraulic properties are concerned – the water retention curve and the unsaturated hydraulic conductivity, the two essential soil characteristics for the description of soil water transfers -, their estimation at the horizon scale is then of major interest. Nevertheless, even at this scale, the horizon can usually not be considered neither as a homogeneous volume, nor as a time-stable system. As a consequence, methodologies have to be developed to characterize i) the degree of heterogeneity of the soil structure, ii) the evolution of the structure with time, and iii) if possible, the equivalent properties of such heterogeneous horizons. The surface horizons and the stony horizons can be considered as representative models of soil horizons to test these methodologies: the first ones because their fine structure evolves rapidly, under the effect of human agricultural activities – compaction by wheeling, fragmentation by tillage - of climate, or of faunal and vegetal actions; the second ones because the strong difference in material and in bulk density between fine earth and rock fragments lead to complex hydric behaviors. Based on several examples, the objectives of this presentation will then be i) to describe the temporal evolution of soil hydraulic properties in cultivated horizons, ii) to present methodologies for the estimation of equivalent soil hydraulic properties in stony horizons, and iii) to discuss the contribution of this new methodologies compared to old ones to better estimate the soil hydric functioning at the local or regional scales.