



Moditored unsaturated soil transport processes as a support for large scale soil and water management

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The current societal demand for sustainable soil and water management is very large. The drivers of global and climate change exert many pressures on the soil and water ecosystems, endangering appropriate ecosystem functioning. The unsaturated soil transport processes play a key role in soil-water system functioning as it controls the fluxes of water and nutrients from the soil to plants (the pedo-biosphere link), the infiltration flux of precipitated water to groundwater and the evaporative flux, and hence the feed back from the soil to the climate system. Yet, unsaturated soil transport processes are difficult to quantify since they are affected by huge variability of the governing properties at different space-time scales and the intrinsic non-linearity of the transport processes. The incompatibility of the scales between the scale at which processes reasonably can be characterized, the scale at which the theoretical process correctly can be described and the scale at which the soil and water system need to be managed, calls for further development of scaling procedures in unsaturated zone science. It also calls for a better integration of theoretical and modelling approaches to elucidate transport processes at the appropriate scales, compatible with the sustainable soil and water management objective.

Moditoning science, i.e the interdisciplinary research domain where modelling and monitoring science are linked, is currently evolving significantly in the unsaturated zone hydrology area. In this presentation, a review of current moditoning strategies/techniques will be given and illustrated for solving large scale soil and water management problems. This will also allow identifying research needs in the interdisciplinary domain of modelling and monitoring and to improve the integration of unsaturated zone science in solving soil and water management issues. A focus will be given on examples of large scale soil and water management problems in Europe.