Geophysical Research Abstracts
Vol. 12, EGU2010-10154, 2010
EGU General Assembly 2010

Evaluation of different field methods for measuring soil water infiltration

Ildefonso Pla-Sentís and Francisco Fonseca
Universitat de Lleida. Lleida. Spain(ipla@macs.udl.cat)

Soil infiltrability, together with rainfall characteristics, is the most important hydrological parameter for the evaluation and diagnosis of the soil water balance and soil moisture regime. Those balances and regimes are the main regulating factors of the on site water supply to plants and other soil organisms and of other important processes like runoff, surface and mass erosion, drainage, etc, affecting sedimentation, flooding, soil and water pollution, water supply for different purposes (population, agriculture, industries, hydroelectricity), etc. Therefore the direct measurement of water infiltration rates or its indirect deduction from other soil characteristics or properties has become indispensable for the evaluation and modelling of the previously mentioned processes. Indirect deductions from other soil characteristics measured under laboratory conditions in the same soils, or in other soils, through the so called "pedo-transfer" functions, have demonstrated to be of limited value in most of the cases. Direct "in situ" field evaluations have to be preferred in any case.
In this contribution we present the results of past experiences in the measurement of soil water infiltration rates in many different soils and land conditions, and their use for deducing soil water balances under variable climates. There are also presented and discussed recent results obtained in comparing different methods, using double and single ring infiltrometers, rainfall simulators, and disc permeameters, of different sizes, in soils with very contrasting surface and profile characteristics and conditions, including stony soils and very sloping lands. It is concluded that there are not methods universally applicable to any soil and land condition, and that in many cases the results are significantly influenced by the way we use a particular method or instrument, and by the alterations in the soil conditions by the land management, but also due to the manipulation of the surface soil before and during the measurement. Due to the commonly found high variability, natural or induced by land management, of the soil surface and subsurface hydrological properties, and to the limitations imposed by the requirements of water for the measurements, there is proposed a simple and handy method, which do not use high volumes of water, adaptable to very different soil and land conditions, and that allow many repeated measurements with acceptable accuracy for most of the purposes.

References

Pla, I., 1997. A soil water balance model for monitoring soil erosion processes and effects on steep lands in the tropics. Soil Technology. 11(1):17-30. Elsevier

Pla, I., 2006. Hydrological approach for assessing desertification processes in the Mediterranean region. In W.G. Kepner et al. (Editors), Desertification in the Mediterranean Region. A Security Issue. 579-600 Springer. Heidelberg (Germany)

Reynolds W.D., B.T. Bowman, R.R. Brunke, C.F. Drury and C.S. Tan. 2000. Comparison of Tension Infiltrometer, Pressure Infiltrometer, and Soil Core Estimates of Saturated Hydraulic Conductivity . Soil Science Society of America Journal 64:478-484

Segal, E., S.A.Bradford, P. Shouse; N. Lazarovich, and D. Corwin. 2008. Integration of Hard and Soft Data to Characterize Field-Scale Hydraulic Properties for Flow and Transport Studies. Vadose Zone J 7:878-889

Young, E. 1991. Infiltration measurements, a review. Hydrological processes 5: 309-320.