Geophysical Research Abstracts
Vol. 12, EGU2010-12695, 2010
EGU General Assembly 2010

Laboratory-field scaling of soil hydraulic properties: numerical validation based on soil water content measurements

Antonello Bonfante (1), Antonio Coppola (2), and Angelo Basile (1)

(1) ISAFoM, National Research Council (CNR), Ercolano (NA), Italy (antonello.bonfante@gmail.com), (2) Dept. for Agro-Forestry Systems Management (DITEC), Hydraulics Division, University of Basilicata, Potenza, Italy

Hydraulic properties should be determined at the scale of the process modeled. The methods to hydraulically characterize a soil in situ remain extremely difficult to implement, needing measurements of water content and pressure head with adequate time-depth resolution. The authors recently proposed a method of scaling, physically based, that allows to obtain the field soil hydraulic parameters from the laboratory hydraulic characterization and the maximum water content in field.
The procedure is based on the hypothesis that the field retention curve represents a secondary internal curves of the hysteresis loop. Assuming the sample as the REV (Representative Elementary Volume) of the soil, the drying and wetting laboratory curve represent the primaries curves.
The procedure, recently validated on different soil samples, has been applied in four case studies (Cerese, Lodi, Scafati and Eboli). In each site, the soil water content was monitored at different depths along the soil profile with Time Domain Reflectometry technique (TDR)(years 2002-2003 for Cerese and Lodi, and years 2005-2006 for Scafati and Eboli).
The SWAP hydrological simulation model, based on the Richard's equation, was applied to test in a composite field water flow processes the goodness of the proposed procedure. In particular, we compared water content measured in field and estimated by SWAP in two different runs, applying the same boundary conditions and crop parameterization, using hydraulic parameters obtained from (i) trials and errors calibration procedure and (ii) proposed scaling procedure.
The agreement between observed and predicted values was expressed by the indexes RMSE (root mean squared error) and r (Pearson correlation).
In the preliminary analysis, the statistical indexes has shown that the results obtained from scaling procedure are very similar or better of those obtained from calibration procedure.
The main advantage arising from such scaling procedure rely on the significant reduction of the field measurement for the model calibration\validation.

Keyword: Scaling, SWAP,hysteresis.