Geophysical Research Abstracts
Vol. 17, EGU2015-7295-2, 2015
EGU General Assembly 2015

Assessing soil hydraulic characteristics using HYPROP and BEST: a comparison

Georg Leitinger (1,2), Nikolaus Obojes (2), and Laurent Lassabatère (3)

(1) Institute of Ecology, University of Innsbruck, Innsbruck, Austria (georg.leitinger@uibk.ac.at), (2) Institute of Alpine Environment, European Academy Bolzano (EURAC), Bozen, Italy, (3) Laboratoire d'Ecologie des Hydrosystèmes Naturels et Anthropisés, Ecole Nationale des Travaux Publics de l'Etat (ENTPE), CNRS, Vaulx-en-Velin, France

Knowledge of ecohydrological characteristics with high spatial resolution is a prerequisite for large-scale hydrological modelling. Data on soil hydraulic characteristics are of major importance, but measurements are often seen as time consuming and costly. In order to accurately model grassland productivity and in particular evapotranspiration, soil sampling and infiltration experiments at 25 grassland sites ranging from 900m to 2300m a.s.l. were conducted in the long term socio-ecological research (LTSER) site Stubai Valley, Tyrolean Alps, Austria, covering 265 km^2. Here we present a comparison of two methods to determine important hydrological properties of soils: (1) the evaporation method HYPROP (Hydraulic Property Analyzer; UMS Munich, 2010), and (2) the BEST-model (Beerkan Estimation of Soil Transfer Parameters; Lassabatère et al. (2006)), each determining the soil hydraulic characteristics and in particular the water retention curve. For the most abundant soil types we compared the pf-curves calculated from HYPROP data suing the Van Genuchten equation to the ones resulting from the comparatively time efficient BEST approach to find out if the latter is a suitable method to determine pf curves of alpine grassland soils.
Except for the soil type Rendzina, the comparison of HYPROP and BEST showed slightly variations in the pF curves and resulting hydraulic characteristics. At the starting point BEST curves presented a slower dehydration, HYPROP a fast and continuous water loss. HYPROP analyses showed the highest variability in the measured values of Rendzina. Regarding BEST, the Alluvial Soils showed the highest variability. To assess equivalence between HYPROP and BEST we deduced several hydraulic characteristics from the pF curves, e.g. saturated water content, field capacity, permanent wilting point, pore size distribution, and minimum water retention. The comparison of HYPROP and BEST revealed that the results of soil water characteristics may depend on the methodological Approach with differences in equivalence between selected soil types. Thus, the used method is crucial to derive soil hydraulic parameters right from pF curves for water balance models. The results further showed that the BEST model is a promising method to determine soil water characteristics with minimal field- and laboratory work in large-scale studies.

Reference:
Lassabatère L, Angulo-Jaramillo R, Soria Ugalde JM, Cuenca R, Braud I and Haverkamp R (2006) Beerkan Estimation of Soil Transfer Parameters through Infiltration Experiments-BEST. Soil Sci. Soc. Am. J., 70: 521–532, doi:10.2136/sssaj2005.0026.