

Using pedotransfer functions for modeling of soil water regime in the watershed

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This study is focused on modeling of soil water regime in the Nitra river watershed (Slovakia, Central Europe) with total area of 4501 km². There is a monitoring of soil moisture in the Nitra river watershed at the six sites up to 1 m soil depth using profile probe PR2 (Delta-T Devices Ltd.). Pedotransfer functions (PTFs) were processed for the studied watershed using regression analysis for determination of individual points of soil moisture retention curves (pF) of the studied area. Soil samples were collected from two horizons of soil profile (15-20 cm, 40-45 cm) in 111 locations. Input parameters to determine the PTFs were the grain size composition, % of humus and bulk density. The points of pF curves for selected sites from input sample file (validation set) were calculated, regression coefficients of six PTFs equations for predefined moisture potentials were estimated and shapes of measured and calculated points of soil moisture retention curves were compared. Average values of MD<0,01>, and RMSD<0,024> indicate high applicability of calculated PTFs to determine MRC of the mentioned river watershed. Obtained PTFs were subsequently used for modeling of soil moisture in the Nitra river watershed. HYDRUS-1D model was used for these purposes. The results of the simulated soil moisture were then compared with the measured values of soil moisture during years 2009-2011. A comparison of the simulated and measured soil moisture and water storage up to the depth of 1 m showed very good applicability of the obtained PTFs.

Biography

Dusan Igaz has completed his Ph.D at the age of 29 years at the Slovak University of Agriculture in Nitra, Slovakia. He is now head of the Department of Biometeorology and Hydrology and Vice-dean of Horticulture and Landscape Engineering Faculty at the Slovak University of Agriculture. He has published more than 40 papers in scientific journals, books and contributions.

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