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Confrontation of three rainfall-runoff models in assessment of hydrological drought in the upper Nitra river basin in Slovakia

Oliver Horvat (1), Andrej Machlica (2), Jacob Oosterwijk (3), and Miriam Fendekova (2)

(1) Department of Land and Water Resources Management, Faculty of Civil Engineering, Slovak University of Technology, Radlinského 11, 813 68 Bratislava, Slovak Republic, oliver.horvat@stuba.sk, (2) Department of Hydrogeology, Faculty of Natural Sciences, Comenius University, Mlynská dolina, 842 15 Bratislava, Slovak Republic, machlica@fns.uniba.sk, fendekova@fns.uniba.sk , (3) Hydrology and Quantitative Water Management Group, Centre for Water and Climate, Wageningen University, P.O. Box 47 6700 AA, Wageningen, The Netherlands, jacob.oosterwijk@wur.nl

This study is oriented on using rainfall-runoff models for assessment of hydrological drought and runoff simulations in the Upper Nitra River Basin. Three models were selected for this purpose: BILAN – lumped, conceptual model developed in Czech Republic, HBV – semi-distributed, conceptual model developed in Sweden and FRIER – physically based distributed model developed in Slovakia. The evaluation period last from from 1st of January 1981 to 31th of December 2007 in daily time step. Results show that models have a high Nash-Sutcliffe coefficient, which indicates a good agreement between observed and simulated discharge. In terms of droughts, BILAN model gave less but longer droughts because of a slow reaction of the model in each part of the hydrological cycle (surface, soil moisture, groundwater). FRIER outputs showed more, but shorter droughts, due to a faster reaction to precipitation than HBV and BILAN. Soil moisture drought was represented more realistic by FRIER than by BILAN. Small time-shift in the groundwater drought occurrence was found in some cases comparing BILAN and FRIER.

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