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

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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 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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