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Comparative study of two distributed rainfall-runoff models

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Complex modeling of watershed hydrology is an efficient tool to provide information on the impact of natural and anthropogenic phenomena on the status of water and to facilitate decision-making in water management.

Two watershed models, WetSpa (Liu et al., 2004) and the hydrological module of SWAT (Neitsch et al., 2002), have been compared in the catchment of Zala River (1528 sq. km) located in Hungary for the period 1997-2001. Both models use similar approaches for calculating the main elements of the catchment hydrology. The sub-catchment delineation and the spatially distributed parameters are treated in a GIS frame.

Beside the structural similarity, the surface runoff and the evapotranspiration is calculated based on the same principle, while there are considerable differences in the applied methods for the estimation of recharge, overland flow routing, base flow and channel flow. WetSpa describes the hydrological system with less parameter. The spatial distribution is also different; WetSpa uses regular grid cells while SWAT works on the basis of homogeneous units according to land use and soil types. The differences are explained by the distinct main purpose of the two models, WetSpa is focusing on flood prediction while SWAT on the simulation of the characteristics of the water regime.

Parameters of both models have been calibrated based on the measured daily discharge at four monitoring sites and using the calibrated parameters the elements of the daily water balance have been calculated. Evaluating the differences, accuracy of the methods, advantages and disadvantages regarding the practical application of the two

models will be discussed.