Distributed hydrologic modeling of the Huai River Basin with high density of dams and floodgates

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Abstract: Huai River basin is a unique area in China with highest density of both water projects (dams and floodgates) and population. The construction of dams & floodgates substantially changed the basin's natural hydrological cycle. In this study, the dams & floodgates discharge simulation module of the Soil and Water Assessment Tool (SWAT) was extended to incorporate the dams & floodgates' dispatch rules. This upgraded version of SWAT model was applied to simulate the monthly flow at twenty-three dams & floodgates and four hydrologic stations for 1991 - 2000. Observed flow data from a total of 27 monitoring cross-sections were used to calibrate and validate the distributed hydrologic parameters. The evaluation coefficients (i.e. relative volume error, correlation coefficient, and efficiency coefficient) are used to elevate the modeling performance in the SWAT of Haihe River Basin. In the calibration period, the volume error coefficients at 18 monitoring stations are within ±0.15. The average correlation coefficient and efficiency coefficient are 0.75 and 0.41, respectively. In the verification period, there are 13 stations with volume error within ±0.15. The average correlation coefficient and efficiency coefficient are 0.82 and 0.53, respectively. These results show that the modified model can be used as the hydrologic modeling tool to provide technical support for the integrated management of the Huai River Basin.

Key words water projects; Hydrological Simulation; SWAT; Huai River Basin