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Comparison of Potential Evapotranspiration Estimation Methods in Stream flow Modeling Using SWAT in Taleghan Watershed

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Abstract

Evapotranspiration process is a key element in hydrological simulation of water supply, rainfall-runoff models, infiltration calculations and drought prediction models. Recently, several equations were used for estimating annual, monthly and daily evapotranspiration in the world. In this study, the potential evapotranspiration of Taleghan watershed was estimated by three methods in the SWAT model including Priestley Taylor, Penman-Montieth and Hargreaves methods. The influence of applying these methods were evaluated on simulated streamflow of the Taleghan watershed in the calibration (1998 - 2003) and validation (2003 - 2005) periods, using determination coefficient (R^2), root mean square error (RMSE), Nash–Sutcliffe performance coefficient (NS) and skew index (PBIAS). Results revealed that the maximum and minimum values of simulated evapotranspiration and consequently, simulated runoff were related to the Hargreaves and Priestley Taylor methods, respectively. Moreover, investigation of statistic coefficients showed that there is no much difference among the three methods. Results of ANOVA also confirmed that there was no statistically significant difference at the 99% level among the simulated mean monthly flow using the three methods. In conclusion, the Hargreaves method provided better results than the two other methods during calibration and validation periods.

Keywords: Evapotranspiration, Streamflow, Simulation, SWAT, Taleghan watershed.

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