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Hydrological Evaluation of Satellite Precipitation Products Using IHACRES Rainfall-Runoff Model over a Basin in Iran

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Abstract : The objective of this research is to hydrological evaluation of four widely-used satellite precipitation products named PERSIANN, TMPA-3B42V7, TMPA-3B42RT, and CMORPH over Zarinehrood basin in Iran. For this aim, at first, daily streamflow of Sarough-cahy river of Zarinehrood basin was simulated using IHACRES rainfall-runoff model with daily rain gauge and temperature as input data from 1988 to 2008. Then, the model was calibrated in two different periods through comparison the simulated discharge with the observed one at hydrometric stations. Moreover, in order to evaluate the performance of satellite precipitation products in streamflow simulation, the calibrated model was validated using daily satellite rainfall estimates from the period of 2003 to 2008. The obtained results indicated that TMPA-3B42V7 with CC of 0.69, RMSE of 5.93 mm/day, MAE of 4.76 mm/day, and RBias of -5.39% performs better simulation of streamflow than those PERSIANN and CMORPH over the study area. It is noteworthy that in Iran, the availability of ground measuring station data is very limited because of the sparse density of hydro-meteorological networks. On the other hand, large spatial and temporal variability of precipitations and lack of a reliable and extensive observing system are the most important challenges to rainfall analysis, flood prediction, and other hydrological applications in this country.

Keywords : hydrological evaluation, IHACRES, satellite precipitation product, streamflow simulation
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