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Abstract : The northeastern of Algeria is the rainiest region of the country, where regional catchments are often subject to devastating floods. To improve the management of water resources, there is a need to develop rainfall–runoff models. This study was conducted to propose an event-based flood prediction model adapted to the region. Thereby, available rainfall–runoff data were used in several models to find the best one able to reproduce the flood hydrographs in three catchments. These models are based on the coupling of both production and transfer functions. For this purpose, five production functions were tested: the Soil Conservation Service–Curve Number (SCS-CN) model, including three antecedent moisture conditions, and four modified Mishra and Singh models, incorporating antecedent moisture amounts. Three transfer functions were also tested: the Nash, Clark, and Weibull models. The tested models were all calibrated through a multi-objective optimisation using the genetic algorithms method. It was found that the MMS models were better than the SCS-CN method according to the performance criteria. Moreover, the proposed modified empirical equation (M4) improved runoff prediction. Furthermore, combined with the Nash model as a transfer function, the coupled model was found to be the best performing model, giving satisfactory results.

Keywords: Antecedent moisture ; event-based ; flood prediction ; genetic algorithms ; modified Mishra ; Singhmodel rainfall–runoff model ; SCS-CN

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