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ABSTRACT: Determining the link between rainfall and flow for a watershed is one of the most imperative problems and challenging tasks faced by hydrologists and engineers. Conceptual and Box-Jenkins hydrological models represent suitable tools for this purpose in circumstance of data Scarce and climate complexity. This research consists in a comparative study between conceptual models and Box-Jenkins model, namely, GR2M, ABCD, and the autoregressive moving average (ARIMA) which has a numerical design. The three models were applied to three catchments located in the north-west of Algeria. Basins have been selected according to the availability of long-time series of hydrological and climatic data (more than 30 years) to calibrate parsimonious models, taking into account the climatic variables and the stochastic behavior of the natural stream flow. Overall, the conceptual models perform similarly; whereas the results show that the GR2M model performed better than the ABCD in the validation stage, the stochastic model shows better results as opposed to conceptual models in the case of the Mellah Wadi which presents high permeability in its behavior. This is due to the simplicity of the model needed for data (only runoff data) and the ability of the stochastic model to produce stream flow in complex catchments. Such circumstance could be caused by different motivations. On the one hand, the diverse number of model parameters that make the ABCD the less parsimonious approach, with four parameters to be calibrated. On the other hand, the inability of the ABCD and the ARIMA model to capture and describe the groundwater processes, important for the cases study. Moreover, the validation period includes a large drought period, started in the late 1980s, which makes difficult model adaptation to different hydrological regimes.

Keywords: Statistical comparison , GR2M , ABCD , ARIMA

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