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Hydrological Drought Forecasts Using Markov Chains and Regression Models (Case Study: North-west of Algeria)

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Abstract :

An effective drought forecast is an important measure to mitigate some of its most damaging impacts. In this study we compare the effectiveness of two models: Markov Switching Model (MSM) and Robust Regression Model (RRM) with three different approaches to forecast hydrological drought events in the north-west of Algeria using Standardized Runoff Index (SRI). The validation of these models is carried out by hydro-climatic series of 41 stations for the period of 1968–2009. The values of SRI 3, SRI 6, and SRI 12 have been forecasted over lead times of 1 and 6 months. The performance of forecast results is measured using R2 and RMSE. For the lead time of 1 month, the results are quite similar for both models with slight superiority for the Markov chain process. The addition of the SPI or RDI indices as independent variables improves this performance for some stations while it decreases accuracy for other stations. However, forecast accuracy declines significantly as the lead time increases to 6 months particularly for regression results.

Keywords : Hydrological drought ; North-west Algeria ; Markov switching ; Robust regression ; fore cast

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