



Seasonal Prediction of drought classes by Markov chains coupled with atmospheric regime transitions

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Drought is a well known phenomenon of uncertain occurrence, which gives it stochastic and probabilistic characteristics. For this purpose, two forecast statistical formulations are implemented and compared. Firstly a Markov chain model is tested, by using monthly-mean precipitation data alone transformed into the monthly-Standard Precipitation Index (monthly-SPI). Then, the previous Markov chain is coupled with an independent Markov chain governing atmospheric regime transitions, taking profit of the precipitation dependence of weather regimes. Tests are performed using the dominant weather regimes in the Euro-Atlantic region for forecasts of the monthly-SPI at 1, 2 and 3 months of forecast lag. The probabilistic character of the Markov chain allowed also to compute useful items such as: 2) expected residence time in each class of drought severity, 3) expected first passage time, 3) recurrence time in each severity class. These items are compared for both formulations. The forecast skills are evaluated in the Portugal region using categorical scores: the Heidke Skill Score (HSS) and the Peirce Skill Score (PSS).