Projection of occurrence of extreme dry-wet years and seasons in Europe with stationary and non-stationary Standardized Precipitation Index

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The probability of the occurrence of extreme dry/wet years and seasons in Europe are estimated by using both the Standardzided Precipitation Index (SPI) and the Standarzided non-stationary Precipitation Index (SnsPI). The latter is defined as the SPI by fitting precipitation data with non-stationary gamma distribution, in order to model precipitation time dependence under climate change. Daily precipitation outputs from five different regional climate models provided by the ENSEMBLES project, and bias corrected, are used to predict extreme dry and wet hazard under the A1B emission scenario. The five RCMs are selected in order that one is the best representative of the ensemble mean, and four standing out as wet-cold, wet-warm, dry-cold and dry-warm. All indicators are calculated both for each single RCM output and for the ensemble of the five models over the period 1961-2098. Results show that, under global warming, climate in Europe will significantly change from its current state with the probability of the occurrence of extreme dry and wet years and seasons increasing respectively over Southern dry and Northen wet regions. Comparing non stationary and stationary indices the SnsPI seems to be more robust than the common SPI in the prediction of precipitation changes with multimodel ensembles.