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An integration of statistic method to track droughts periods induced by global change.

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During the last decades, droughts are occurring frequently in France, most notably in 1976, 1988, 1997 and 2003. This culminated in the severe drought of 2003 which affected mainly the south-east of Europe. Global climate models predict a prominent change in rainfall with wetter winters and drier summers over the medium latitude in the Northern Hemisphere. In France, regional climate models (ARPEGE) shows an increasing seasonal climatic variability with (a) hotter, drier summer and (b) an increase in the duration and severity of low-flow periods. The paper focuses on the temperate zone of the south-east of France on the catchment of the Ain river where water resources, consisting mainly of karstic and alluvial groundwater, are already a major concern today. This contribution tried to identify whether any trend in the annual and monthly series of rainfall already appears at the scale of this region and to obtain realistic previsions at 60 years. Two data sources have been used : (a) spatially interpolated historical data for the period 1970-2006 from the French weather service model SAFRAN (NCEP re-analysis for the MSLP field and the Meteo-France SAFRAN mesoscale analysis for the precipitation observations); and (b) the four SRES B2 scenarios namely Arpege_2, Arpege_1, Arpege_A2 and Arpege_B1 have been widely adopted as standard scenarios for the use in climate change impact studies. Scenario runs were taken over two time periods: a) 2010-2040 and b) 2041-2070.
Drought characteristics over the study area were revealed by employing the Standardized Precipitation Index (SPI) in different time scales. Negative trends of the SPI drought index were recognized by using the Mann-Kendall non parametric test, which suggested that drought conditions were intensified through time. The trends observed in the 13 sub catchments of interest are consistent with those observed at a larger scale. The results indicated that the drought severity and duration will increase in the future periods. Overall, the number of dry months will increase for all the four scenarios and the two periods for the catchment of Ain River. For the first period (2010-2040) the scenario Arpege_1 is the most severe and the Arpege_B1 is the most conservative scenario. For the second period, Arpege_1 is being the most severe and Arpege_A2 the most conservative scenario.