



Assessing the spatial-temporal patterns of frequency and severity of extreme rainy events under a changing climate: case study of the Segura River Basin (Spain)

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Abstract: The flash floods constitute one of the main problems of the Mediterranean semiarid zones. The convective storms of high intensity, typical of these zones, produce hydrological events that can turn out to be catastrophic. The Segura River basin (SRB), a semiarid basin located in the South east of Spain, is a territory highly vulnerable to negative impacts of climate change and variability on hydrometeorological extremes such as flash flood frequency. Then, the SRB has been suffering significant changes in land uses (such as increasing urbanization in coastal areas) in the recent decades, with consequent amplified effects on floods. The present study analyses spatial-temporal patterns of rainfall, focusing in particular on extreme hydrometeorological phenomena. The objectives of the study could be summarized in assessing the spatial-temporal trends of: 1- number of rainy events above a threshold (very heavy, heavy and moderate rainy events); 2- annual maximum daily rainfall, 3- maximum wet spells lengths (MWSL); and 4 – total rainfall of the MWS (or events). By GAMLSS (Generalized Additive Models for Location, Scale and Shape) approach, are possible non-stationary analyses of the spatial-temporal trends. Grids of observed daily rainfall for the time period 1950-2009 are worked with. These findings are expected to contribute to improving the understanding of spatial-temporal distributed patterns of extreme rainfall at basin scale, in order to reveal the underlying linkages with flash floods in the SRB. The fluctuations in frequency and severity of extreme rainfall events, under a changing climate, should be considered in defining design floods.

Key words: frequency of storms, climate change, flash flood, GAMLSS, non-stationarity, Segura River Basin.