Trends in extreme precipitation events in Portugal

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Mainland Portugal is located in the transitional region between the sub-tropical anticyclone and the sub-polar depression zones. The spatial distribution of precipitation over the territory and its seasonal variability are the result of the characteristics of the global circulation (specifically the Atlantic origin of many synoptic disturbances; e.g. seasonal movements of the Azores high pressure system) in the context of the regional geography (e.g. latitude, orography, oceanic and continental influences). Although the variation in climate factors is rather small, it is sufficient to justify significant variations in precipitation.

Although mainland Portugal is not located in the Mediterranean basin, it is characterized by mild Mediterranean climate, with a warm and dry summer period, more pronounced in the southern regions, but with well known vulnerability to climate variability. The understanding of the precipitation regime and variability in this part of the Iberian Peninsula contributes to clarify the behaviour observed in neighbouring Mediterranean regions (and vice-versa).

Two storm types dominate the occurrence of precipitation in mainland Portugal: convective storms and frontal storms. Convective storms are frequent during the summer season and the early and mid autumn, and are more frequent in the southern regions; frontal storms occur principally in the winter season, and affect more the northern regions.

Usually, both types of storms are pooled for the analysis and characterization of intense rain events, regardless of their respective statistical signature. In this work we analyse daily and hourly rain from several locations in mainland Portugal aiming at investigating increased variability in the rain process, traduced by trends in the temporal structure of rain. The seasonality of rain is accounted for by investigating changes in the distribution and structure of rain within the year. This study complements previous studies of trends in annual and monthly rain amounts in the region and clarifies the small scale behaviour and statistics.