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Trends and variability in total and extreme precipitation over mainland Portugal, 1941-2012

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Changes in the climate are expected to affect the occurrence of extreme weather and climate events that might influence significantly the distribution, availability and sustainability of regional water resources. The location of mainland Portugal on the Northeast Atlantic Ocean region, in South-western Europe, together with other geographical features, makes this territory highly vulnerable to extreme hydrological events, such as floods and droughts, driven by the strong variability in precipitation.

To study changes in the total and extreme precipitation in this area, at the annual and seasonal scales, 27 daily precipitation time series for the period 1941-2012 were analysed. We applied 8 selected precipitation-related indices of "moderate" extremes that include duration, threshold, absolute and percentile indices.

In general, the results found in this study are in agreement with other studies that inspected changes in precipitation in western Iberia. Since the 1980s, it is notable the occurrence of long drought spells, as well as the more intense precipitation events on record; these events distressed more the centre and southern regions of mainland Portugal, which are the most vulnerable and the more affected by these types of events. Moreover, results show regional differences in the indices' trends and also point out to a greater asymmetry in the temporal distribution of precipitation and variations in the intensity, persistence and frequency of extreme events at various scales, which may influence the risk associated with floods and droughts. Overall, while contributing to the increased understanding of local and regional specificities in the study area, and in the context of the Iberian Peninsula, results can also be useful for disaster risk management and definition of adaptation and mitigation measures to climate change.