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Multi-scale investigation of recent trends in precipitation in Portugal

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Climate change implies adjustments in the global hydrological cycle, which could affect the distribution, availability and sustainability of regional water resources. Modifications of the precipitation regime can affect the volume and temporal and spatial distribution of water availability (surface, subsurface and groundwater) and fluxes (e.g. flow regimes). Also, extreme events are more likely to end up being cause for concern than long-term change in the mean of climate variables such as precipitation.

For some locations in Europe, increased precipitation variability in recent years has already been reported by different studies, in particular on the basis on annual and monthly point data. However, studies focussing on smaller time scales are often lacking, despite the fact that many water related studies could benefit greatly from a better understanding of the structure of short-term precipitation (e.g. urban drainage systems).

The purpose of this work is to contribute to the investigation of changes in the variability of precipitation in Portugal. The data used consists of point precipitation records from locations scattered over Portugal. The resolution of the time series ranges from 1 month to 5-minutes; the longest records have monthly resolution and date back from the middle of the nineteen century, whereas the time series of higher resolution cover a period of approximately 30 years. Trend analysis focuses on precipitation intensities and also on several indices and parameters that are used as tools to characterize the temporal structure of this process. Results show that the spatial variability of relevant factors affecting precipitation can lead to contrasting statistics. The analyses lead to a characterization of changes in the distribution of precipitation within the year and over the territory, which further strengthens the well-known strong seasonal and regional character of precipitation in Portugal.