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Trends of extreme temperature events over the Iberian Peninsula during the 21st century

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Heat waves are meteorological events exceptionally extremes that are increasing in frequency, duration and intensity. The Iberian Peninsula is characterized in the last decades by an increase in the trend of extreme temperature events and its consequences are important not only for the effects over the population but also for agriculture and biodiversity. The main objective in this study is to analyse future trends over the 21st century for extreme temperature using two events: heat waves and warm events. These are defined as the period of at least two consecutive days with temperatures over a certain threshold, the 95th percentile for heat waves and the 75th percentile for warm events. For this purpose, 14 different regionalized dynamic climate projections dataset are used. Firstly, to choose the better climate models, the common period 1961-2000 is used to compare with observational data obtained from SPAIN02 grid dataset. Once the better climate models are selected, trends in both events are analysed for the past (1961-2000) and the future (2011-2099). To estimate trends, Mann-Kendall test and Theil-Sen estimator were applied. Mann-Kendall test returns the significance of the trends for each grid point, while Theil-Sen estimator estimates the value of that trend. Moreover, max-stables processes are used to compare spatial dependence between dynamic projections. The results for the comparison period show that maximum temperature and moderate values of the maximum temperature are increasing smoothly, while low values of maximum temperatures are increasing even faster. This means that the variability of extreme temperature is decreasing, especially in the Mediterranean area of the Iberian Peninsula. For the 21st century, results reveal a significant positive trend in low values of the maximum temperatures that increases throughout the century over the whole study area. Warm events show a significant positive trend in frequency and intensity. This trend drastically increases from 2050 onwards.