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Assessment of the projected temperature extremes over the MENA region from CIMP5 scenario runs

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This study provides an overview of the projected temperature extremes over the MENA region until the end of the 21st century. The main objectives of our analysis are the following: i) analyze the projected changes in temperature extremes using the CMIP5 multi-model ensemble, reveal ii) the warmest model realizations and iii) the “hotspot” locations within MENA with the projected highest temperature extremes. For this purpose, a list of indices of temperature extremes, based on threshold, percentile, heatwave and coldwave characteristics is used, as defined by the Expert Team on Climate Change Detection and Indices (ETCCDI). We use daily near-surface air (2-metre) temperature (Tmax and Tmin) to derive the extremes-indices for the period 1980-2100. The data were taken from 18 CMIP5 models combining historical (1980-2005) and scenario runs (2006-2100 under RCP 2.6, RCP4.5 and RCP8.5). Using these datasets, the indices of temperature extremes were derived. The changes of the extremes over the 21st century are analyzed, in space and time, relative to the reference period 1981-2000. Moreover, a model ranking is performed based on the magnitude of the projected changes of the indices and the relation with the model climate sensitivity is explored. A further analysis of model statistics over specific locations/grid points reveals the areas with the projected most intense heat extremes.