Downscaling of future scenarios of temperature and precipitation across Europe based on quantile-quantile correction of EURO-CORDEX projections

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Extreme weather events (e.g. heat waves, persistent droughts, heavy precipitation, severe convective storms and violent cyclonic windstorms) are responsible for most of the natural, human and economic costs in many regions of Europe, including the Mediterranean zone. In the context of climate change it is very likely that heat waves will occur more often and last longer while extreme precipitation events -and concomitant floods or flash floods- might become more intense. Prospects on the future of these events across Europe are here derived by using observed and model projected daily meteorological data. Specifically, E-OBS high resolution gridded data sets of daily observed precipitation and surface minimum and maximum temperatures have been used as the regional observed baseline. For projections, the same meteorological variables have been obtained from a set of regional climate models (RCMs) integrated in the EURO-CORDEX European project, considering the rcp4.5 and rcp8.5 future emissions scenarios. To properly project the RCM data at local scale, a quantile–quantile adjustment has been applied to the simulated regional scenarios. The method is based on detecting changes in the cumulative distribution functions (CDFs) between the recent past and successive time slices of the simulated climate and applying these changes, once calibrated, to the observed series of max, min temperature and precipitation. But for our specific purposes dealing with the extreme phenomenology, the general method has been first adapted to explicitly focus on the tails of the distribution, instead of deriving the calibration parameters from the general spectrum of the CDFs. Preliminary results on future annual and seasonal temperature and precipitation changes (both means and extremes) will be presented for each emission scenario, scaling down the results from the whole European continent throughout Southern Europe, the Mediterranean and Spain. We believe that with these sources of information at hand, including the identification of the most vulnerable geographical areas, policy makers and stakeholders can respond more effectively to the future challenges imposed by climate change.