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Comparison of statistical and dynamical downscaling methods in representing temperature extremes

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The study of extreme events has become of great interest in the recent years due to their direct impact on society and it is very useful for stakeholders community. Some of the most commonly used extreme indicators are based on percentiles. In this study we calculate extreme percentiles in maximum (95p) and minimum (5p) temperature derived from dynamical and statistical downscaling methods over the Iberian Peninsula. We analyze some of the regional climate models (RCMs) provided by the ENSEMBLES (EU-funded) and esTcena (strategic action of Plan Nacional de I+D+i 2008-2011 funded by the Spanish government) projects.

The downscaling methods are first tested in present climate using reanalysis data as large scale input in order to assess to what extent these approaches reproduce the observed percentiles. To this end, we consider the new, public, gridded dataset developed for continental Spain and Balearic Islands with 0.2° resolution (Spain02; Herrera et al. 2012). The comparison among the different models is obtained in terms of both the annual and seasonal biases.

Secondly, we analyze the effect of nesting the methods to different GCMs, using the 20C3M historical scenario as reference. The study assesses the changes projected for extreme temperature percentiles in two future periods (near and far future) for the A1B emission scenario. By analyzing these changes, we are able to extract differences due to the downscaling method and to the driving Global Circulation Model (GCM).

Herrera, S., Gutierrez, J., Ancell, R., Pons, M., Frias, M., and Fernandez, J.: Development and Analysis of a 50 year high-resolution daily gridded precipitation dataset over Spain (Spain02). International Journal of Climatology 32:74-85 DOI: 10.1002/joc.2256.