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Evaluation of surface temperature regional climate projections over the Iberian Peninsula

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The realism of the WRF Regional Climate Model (RCM) to represent the observed temperature evolution over the Iberian Peninsula (IP)in the 1971-2005 period is analyzed. The E-OBS observational dataset is used for this purpose. Also, the added value of the WRF simulations with respect to the IPSL Earth System Model (ESM) used to drive the WRF RCM is evaluated. WRF presents statistically significant cold biases in relation to observations over the IP, both in the spatial distribution of mean and extreme values, particularly in summer. WRF simulations show considerably larger biases than those of the driving ESM. From this perspective the application of nudging techniques to perform this type of simulations may be advisable. Once of the biases belonging to each model are removed, WRF provides added value in terms of improving the spatial representation of the mean and extremes. Problems with spatial variability are found in some regions where WRF introduces a greater variability than ESM that is not reflected in the observations. Warming trends in the observation are also well represented by the RCM and improve relative to the lower resolution ESM.
In the second part of the study, the projections of future climate performed with the ESM and the RGM under RCP4.5 and RCP8.5 scenarios during the 21st century are evaluated. The RCM simulates a smaller temperature increase than the ESM after the mid-21st century, except for winter. Maximum temperature changes simulated by the WRF by the end of the 21st century can reach in RCP8.5 (RCP4.5) 6 [U+25E6] C (3 [U+25E6] C) in the SE in summer, while IPSL simulates maximum temperature changes of the order of 7 [U+25E6] C (4 [U+25E6] C).