Geophysical Research Abstracts
Vol. 20, EGU2018-16427, 2018
EGU General Assembly 2018

EURO CORDEX and WRF regional climate high-resolution temperature projections for Portugal

Rita M. Cardoso, Pedro MM Soares, Daniela CA Lima, and Pedro MA Miranda
IDL / Universidade de Lisboa, IDL, Lisboa, Portugal (rmcardoso@fc.ul.pt)

Large temperature spatio-temporal gradients are a common feature of Mediterranean climates. The Portuguese complex topography and coastlines enhances such features, and in a small region large temperature gradients with high interannual variability is detected. In this study, the EURO-CORDEX high-resolution regional climate simulations (0.11o and 0.44oresolutions) are used to investigate the maximum and minimum temperature projections across the 21stcentury according to RCP4.5 and RCP8.5. An additional WRF simulation with even higher resolution (9km) for RCP8.5 scenario is also examined. All simulations for the historical period (1971-2000) are evaluated against the available station observations and the EURO-CORDEX model results are ranked in order to build multi-model ensembles. In present climate models are able to reproduce the main topography/coast related temperature gradients. Although there are discernible differences between models, most present a cold bias. The multi-model ensembles improve the overall representation of the temperature. The ensembles project a significant increase of the maximum and minimum temperatures in all seasons and scenarios. Maximum increments of 8oC in summer and autumn and between 2 and 4oC in winter and spring are projected in RCP8.5. The temperature distributions for all models show a significant increase in the upper tails of the PDFs. In RCP8.5 more than half of the extended summer (MJJAS) has maximum temperatures exceeding the historical 90th percentile and, on average, 60 tropical nights are projected for the end of the century, whilst there are only 7 tropical nights in the historical period. Conversely, the number of cold days almost disappears. The yearly average number of heat waves increases by 7 to 9 fold by 2100 and the most frequent length rises from 5 days to 22 days throughout the 21st century. 5% of the longest events will last for more than one month. The amplitude is overwhelming larger, reaching values which are not observed in the historical period. More than half of the heat waves will be stronger than the extreme heat wave of 2003 by the end of the century. The future heatwaves will also enclose larger areas, approximately 100 events in the 2071-2100 period (more than 3 per year) will cover the whole country. The RCP4.5 scenario has in general smaller magnitudes.

Acknowledgements. The authors wish to acknowledge SOLAR (PTDC/GEOMET/7078/2014) and FCT UID/GEO/50019/ 2013 (Instituto Dom Luiz) projects.