

PARALLEL SESSION A : BENEFITS OF DOWNSCALING - A1: ADDED VALUE OF DOWNSCALING

Added value of high resolution RCM simulations and comparison with Statistical Downscaling Methods within the EURO-CORDEX framework

Ana CASANUEVA

Meteorology Group, Dept. Applied Mathematics and Computer Sciences.
University of Cantabria - Spain

High resolution Regional Climate Model (RCM) simulations and Statistical Downscaling Methods (SDMs) are important tools to provide the meteorological variables required in climate impact assessments. The present study analyzes two aspects that should be taken into account before using these methods in specific applications. First, we assess the added value of high resolution simulations from a EURO-CORDEX RCM ensemble. Secondly, RCMs are compared with SDMs, in order to show the merits and limitations of both downscaling techniques. Both aspects are assessed in terms of mean and extreme precipitation indices in Spain.

The EURO-CORDEX initiative provides an appropriate framework for this study, since a common grid is used for all RCMs and the high and low resolution grids match each other at the grid cell boundaries. The ability of the high-resolution RCM simulations (0.11°) to represent observed precipitation is assessed at their skillful scale, by aggregating the 0.11° grid to the 0.44° resolution and evaluating the added value with respect to the low resolution (0.44°) runs. Since RCMs are prone to systematic biases, the added value of the high resolution runs is also analyzed after applying bias correction methods to the RCMs. Gridded observational products are available over the same grids as the RCMs, such as the Spain02 v4 family of EURO-CORDEX-compliant gridded datasets over Spain. Therefore, the evaluation of the RCMs and the development of the SDMs can be carried out on exactly the same grids, and SDMs produce a downscaling output comparable to the RCMs. A set of SDMs (namely analog resampling, weather typing and different versions of Generalized Linear Models) are applied using ERA-Interim predictor variables under a cross-validation approach.

Results show limited evidence for an added value of the high resolution RCM simulations in terms of seasonal mean biases. There is an indication of added value in the spatial patterns; however, this is not statistically significant after bias correcting both simulations. The comparison of RCMs and SDMs based on specific precipitation-derived indices may not be fair as long as they are related to parameters that have been optimized in the calibration phase of SDMs. When the comparison is performed in terms of non-optimized parameters (e.g. dry spells), both downscaling techniques present similar skills and limitations.

Ana Casanueva¹, Sixto Herrera¹, Jesús Fernández¹, Sven Kotlarski² and José Manuel Gutiérrez³

¹Meteorology Group, Dept. Applied Mathematics and Computer Sciences. University of Cantabria. Spain, ²Federal Office of Meteorology and Climatology MeteoSwiss, Switzerland, ³Meteorology Group, Instituto de Física de Cantabria (CSIC-University of Cantabria). Spain