Assessing bias correction methods for EURO-CORDEX projections (temperature and precipitation)

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Climate models make an incomplete representation of reality, currently they don't succeed to simulate all temporal and spatial scales or all processes in the atmosphere. The processes in the climate system occur on spatial-temporal scales ranging from tens of thousands of kilometres to less than 1 kilometre and from centuries scales to the sub-daily temporal scales. Several processes and interactions such as turbulent exchanges under stable conditions or aerosol life cycles are not yet fully understood and, therefore, are not directly quantifiable in explicit terms. Thus, to improve the quality of the information provided by climate models, statistical techniques are used to adjust systematic errors.

In this study, two categories of bias correction (BC) methods of climate scenarios data were tested: univariate and multivariate. The BC methods were calibrated for the period 1971 – 2005 using as reference the ROCADA dataset. The temperature and precipitation data provided by three EURO-CORDEX models were analysed in this paper.

The calibration of the BC methods was performed for each grid point with daily ROCADA data of temperature (average, minimum and maximum) and precipitation. By comparing the calibrated data with the ROCADA data set, the results of the two methods of climate scenario adjustment were evaluated. For a detailed analysis of the results, three indicators of measurement of the estimation errors were calculated: the mean absolute error (MAE), the mean square error (RMSE) and the Pearson's correlation coefficients (CORR).

It was found that regardless of the climatic scenario, for the temperature data both categories applied methods obtain similar results, with the mention that the multivariate method corrects better the extreme negative values. The analysis of the precipitation data revealed an obvious differentiation between the results of the two categories of BC methods, the data calibrated with the multivariate method having statistical properties closest to those of the reference data.

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