

# Evaluation of Bias-adjusted Euro-Cordex simulations on Morocco and future changes

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This study revolves around two main parts. First, we conducted an assessment of Bias-adjusted Euro-Cordex simulations to examine their capability to reproduce the thermal and precipitation characteristics, both in terms of mean and extreme values, at the local scale of Morocco. This assessment was performed in comparison to data obtained from observations at weather stations and ERA5 reanalysis. Several metrics are used including the mean bias, coefficient of variation, distribution through quantile-quantile diagrams and the seasonal cycle. The assessment is also made in terms of indices of extreme events of temperature and precipitation. Then we proceeded to the evaluation of the future climate changes projected by one of the models on Morocco under the RCP scenarios at the both horizons 2031-2060 and 2070-2099 compared to the base period 1979-2005. The changes were assessed for cumulative precipitation, mean temperature, as well as thermal and precipitation extremes. The evaluation results in terms of bias show the effect of the bias-correction on all simulations. Indeed, the bias values are generally low at the annual and seasonal scales. The seasonal cycle pattern is also well reproduced by the models for mean temperature and cumulative precipitation. It was also observed that climate models generally exhibit good capability in reproducing temperatures. However, for cumulative precipitation, the models tend to overestimate heavy rainfall amounts. The thermal extremes are well simulated by the models. The rainfall extremes are reasonably well reproduced too. This analysis of comparisons, at the local scale, of the corrected simulations to the observation data showed the added value of the application of bias adjustment methods to the outputs of climate models before their use for the evaluation of future changes or impacts assessment. It also reveals that bias adjustment methods remain dependent on the observational data used and may not completely eliminate all biases, especially for extreme events at the local scale. Future projections show a significant warming generalized to the whole studied area. In terms of total precipitation, the model projects a significant decrease in total rainfall for mid-and End of the century. The extreme indicators calculated in the study area confirm a convergence towards warming and drying up. These results will interest various socio-economic sectors in our country, particularly those related to water, health, and agriculture.

**Key words:** Climate change, Euro-Cordex, Regional Climate Model, Bias-adjustment, extremes