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Interactive comment on "CHASE-PL Climate Projection dataset over Poland – Bias adjustment of EURO-CORDEX simulations" *by* Abdelkader Mezghani et al.

J. Wibig (Referee)

zameteo@uni.lodz.pl

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The paper provides an update of climate projections over Poland by adopting the new generation of concentration pathways and recent developments in climate modelling.It provides a dataset of scenarios of temperature and precipitation developed for nine individual RCM simulations and the ensamble one. For each RCM the bias is firstly assessed and than the scenario is adjusted. The scenarios are prepared on annual and seasonal resolution. Among the reasons of systematic biases in the regional climate models only two are mentioned: i) imperfect model representation of the physical processes or phenomena and ii) the parametrization or incorrect initialization

of the models. There is no suggestion that there are other causes of bias. However, the high grid resolution leads to imperfect topography and land use data. Topography is flattened and less variable affecting considerable the atmospheric circulation in particular in mountainous regions. In Poland it can considerably influence on the transport of heat and humidity in southern areas as well as the course of foehn events and spatial distribution of rainy and rain shadow areas. The other effect of coarse resolution is location of land/sea boundaries. RCM climate change projections in EURO-CORDEX are still carried out for the atmosphere only. Such models prescribe SST data from the driving GCM (Christensen et al., 2008). Consequently the quality of the prescribed SST/sea ice data depends on the quality of much coarser resolution of the global ocean component in GCM simulations. For a relatively small and semi-close seas like the Baltic Sea the effect can be quite important (Wibig et al., 2015). The discussion of these effects should be given in the introduction or in conclussions. Describing the papers on bias correction methods authors mentioned the paper by Berg et al. (2012) where three bias correction methods were applied to correct the mean and variance of precipitation and temperature modelled by the RCM COSMO-CLM driven by the ECHAM5-MPIOM GCM over entire Germany and its near surrounding areas. They stated that "the method corrects not only means but also higher moments". But it is not clear if this statement applies to all three methods or to one of them only, and if to the one only, the more detailed description of this method should be given. Further, talking over the Quantile Mapping methods based on Gutjahr and Heinemann paper (2013), the authors stated that quantile mapping method has shown a good performance in reproducing not only the mean and the standard deviation but also other statistical properties such as quantiles, as it belongs to the non-parametric family and does not require a prior knowledge of the theoretical distribution of the weather variable which makes it very attractive as it is easy to implement. However, in general the quantile mapping method may be parametric or non-parametric depending on the method of computing the quantiles. Data used in the paper are described in chapter 2. There are two data sets. First one, Polish high resolution observational climate dataset, consists of 5 km x 5 km gridded daily precipitation, maximum and minimum temperature data. The second one consists of regional climate model simulations provided within the EURO-CORDEX initiative. As the simulation were available on different spatial resolution they were interpolated to the same grid as observational data. More details about the interpolation method should be given here. In particular some information on topography should be given and how the simulated data were altitude-adjusted to the topography of observational data. In description of the bias correction method the way of the adjustment of wet-day frequencies for precipitation should be described in details. It should be also mentioned if the quantiles for precipitation were calculated basing on all days or on wet days only, and if on wet days only the threshold for wet day should be given. In the chapter 3.2 the presentation of method is incorrect. In the description of equation 3 instead of "where s and s refer to simulated and observed values", should be "where s and o refer to simulated and observed values". In the definition of RMSE (equation 4) the quantity under root square should be divided by the number of grid points (Ng) as it is a root mean square error: . Usually when bias correction method is used, the absolute differences are used for temperature data and relative difference in case of precipitation to avoid the negative precipitation totals as a corrected values (van Roosmalen et al., 2011). Here it seems that in both cases the absolute differences were used. Why? How the problem of negative values of precipitation was solved? The other issue is the number of quantiles. The autors used 1000 uniformly distributed quantiles. In case of tails of distribution the change in correction factors can be very high from one quantile to the other, in particular for precipitation. How did you solve this problem? In further analysis the relative changes of precipitation between historical and future periods were applied. There is a clear inconsistency. Description of results is very well prepared, however some shortcomings also can be observed. When the projected temperatures are considered the increase of the annual mean temperature over Poland is presented for two periods separately, but in the case of seasonal values only one value is given for each season without information if they concern near or far future. I have also

objections to scales of some figures. For example the scale range of Fig. 7-8 are so large that the spatial differences disappear. On fig 13 the information on RCP scenario (4.5 or 8.5) should be added. On all maps the boundaries of Poland should be added. Supplementary material is very rich. Contains almost 200 maps, but there is a lot of mistakes: some maps have wrong titles, the others are located in wrong places, some are doubled. I am giving only selected examples, but because of huge number of maps I am not able to check all of them. Fig. SM61 and SM99 : figures have exactly the same titles but they are different Fig. SM60 and SM154 : figures have exactly the same titles but they are different Fig. SM59 and SM153 : figures have exactly the same titles but they are different Fig. SM62 and SM99 are identical subchapter 5.2.7 titled Projected precipitation is located in chapter 5.2 titled Projected maximum temperature. Generally my opinion on the paper is very positive. I am seeing some drawbacks presented above, however it is a first so robust and ambitious set of climate projection for Poland and the way of dissemination is very clear and easy to use. I am convinced that the shortcomings are easy to correct. References: Christensen JH, Boberg F, Christensen OB, Lucas-Picher P, 2008, On the need for bias correction of regional climate change projections of temperature and precipitation. Geohys res Lett 35:L.20709, doi:10.1029/2008GL035694. van Roosmalen L, Sonnenborg TO, Jensen KH, Christensen JH, 2011, Comparison of hydrological simulations of climate change using perturbation of observation and distribution-based scaling. Vadose J 10:136-150, doi:10.2136/vzj2010.0112 Wibig J, Maraun D, Benestad R, Kjellström E, Lorenz P, Christensen OB, 2015, Projected changes – Models and methodology, [in:] BACC II author team, Second assessment of climate change for the Baltic Sea Basin, Regional Climate Studies, Spronger Open, pp. 189-215.

Please also note the supplement to this comment:
https://www.earth-syst-sci-data-discuss.net/essd-2017-51/essd-2017-51-RC1-supplement.pdf

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