Review of “Correcting mean and extremes in monthly precipitation” by B. Kurnik, L. Kajfez-Bogataj and A. Seglar.

General comments:

The present paper deals with adjustment of simulated precipitation from a number of RCM-runs forced at their lateral boundaries by a few GCMs. “Bias-correction” is done using monthly mean data where observations have been taken from the E-OBS gridded daily data at the same horizontal resolution as the models. Transfer functions are calculated for the 1961-1990 time period and then used to adjust RCM data from 1991-2010. The adjusted data are then compared to the E-OBS 1991-2010 data in order to evaluate the method. In its present form the paper is not acceptable and I recommend that the paper is rejected.

My main motivations are:

1) The paper is not very clear in its details. It is often difficult to understand what has been done as explanations are too brief (e.g. what is the “ensemble spread” in Fig. 4). Likewise, it is not evident what is presented in all of the figures (examples are given below). The number of figures is relatively high but unfortunately the color scales are not always easy to read and not easily comparable to each other.
2) There is a lack of conclusions in the paper and there is no discussion of the results. The chapter “Discussion and conclusions” is merely a summary of the paper. The last two sentences is what could possibly be termed “Discussion (second last sentence holds one reflection) and Conclusions (last sentence)”. This lack of conclusions makes me wonder why the paper was written at all.

In their revision I think that the authors should consider using “adjustment” instead of “correction” as there is a risk in using the word “bias correction/corrected” when observational data are not perfect. The E-OBS data that is probably the best data set there exists for all of Europe at daily resolution on a relatively high spatial resolution. However, also E-OBS is known to be biased. There are a number of studies pointing to this in different regions (e.g. Haylock et al. 2008, Hofstra et al. 2010).

Another interesting question related to E-OBS in this study, not touched upon in the present paper, is the large differences in the number of underlying observations in different time periods (Haylock et al., see their Fig 2). As the validation is done for the period 1991-2010 while the transfer functions are derived for 1961-1990 there are rather large differences in the station density. Could this be a possible reason for some of the differences between the adjusted data and the observations? It would be good if this question is discussed in the study.

I would also strongly recommend that the manuscript undergoes a proper language check.

Detailed comments:

P954, l 18. Reference is needed for this statement.

P955, l3-5. This is true for some, but not all impact models/studies. It clearly depends on the application. Please reformulate.

P955,25-26. This was one among several objectives of the ENSEMBLES project. Either change “the main” into “one” or remove the last part of the sentence.

P955, l28. You need to be specific about what version of the E-OBS data you use. There have been a number of versions throughout the years and they all differ from each other in some respects.

P956, l13. What is "correction of the ensemble spread"? Please define this so that it is clear what is meant.

P956, l21-23 (and p957, l1-4). I suggest that the assumption about the gamma (this is not correctly spelled at all places in the manuscript) distribution is tested so that you can state whether the assumption is valid or not.

P957, l9. How was this normalization done?

P957, l14. Here it says "form parameters". Should it really be plural here? Or do you mean both form and scale parameters? Or, do you mean form parameters in different locations?

P958, l15-16. There are also other GCMs that give a poor CTRL climate. I think you need to be more specific here and clearly state on what grounds you have excluded these models.

P958-959. I suggest converting the bullet points with information about models into a Table as the information could be made a bit more condensed and easy to get an overview of. Further, there are a number of references to technical reports here. I suggest you take a look in Christensen et al. (2010) and Kjellström et al. (2011) to update references for the RCMs and GCMs respectively.

P958, l21. Should read "(BCM)".

P959, l6. "same institute" is not correct here as RACMO is from KNMI and REMO from MPI-met.

P959, l7. Should read "(ETHZ)".

P959, l24. It is not clear what the "intra-ensemble standard deviation" is. What did you calculate here? Interannual variability? Variability between the models? Spatial variability? Has it anything to do with the climate change signal? Further, I'm wondering a bit about why this table is included at all? As stated in the manuscript it is only there to give a general background. But, in that case why only this intra-ensemble standard deviation and nothing else?

P962, l 15. What do you mean by "average summer precipitation" here? It is July precipitation isn't it? I suggest removing "average".

P962, section 3.1.2. Be more clear about what time periods you are studying here. Is it 1991-2010 for both "simulated" and "corrected" (in the latter case the simulated precipitation with transfer functions from 1961-1990)?

P963, l4-15. Is a consequence of what is written here that ETH is better in its original than the others?

P965, l7-9. If the differences are this small I suggest removing the figure and just state this in the text instead.

P972, figure 1. This figure needs a more comprehensive caption stating what time period that is considered and what data it is based upon.

P973, Figure 2. Explain if this is observed precipitation or simulated precipitation in the figure caption. What about time period? Data set?

P981-983, Figure 10-12. What is green and yellow here?

References

Christensen, J.H., Kjellström, E., Giorgi, F., Lenderink, G., Rummukainen, M., 2010. Weight assignment in regional climate models. Climate Research, 44(2-3), 179-194.

Hofstra N, New M, McSweeney C (2010) The influence of interpolation and station network density on the distribution and extreme trends of climate variables in gridded data. Clim Dyn 35:841–858

Kjellström, E., Nikulin, G., Hansson, U., Strandberg, G. and Ullerstig, A., 2011. 21st century changes in the European climate: uncertainties derived from an ensemble of regional climate model simulations. Tellus, 63A(1), 24-40. DOI: 10.1111/j.1600-0870.2010.00475.x