

Interactive comment on “Precipitation ensembles conforming to natural variations derived from Regional Climate Model using a new bias correction scheme” by K. B. Kim et al.

B. van den Hurk (Editor)

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Received and published: 9 December 2015

Both reviewers have some common comments on the manuscript, including the need to demonstrate the bias correction with a practical application. Particularly reviewer 2 raises valid concerns on the underlying philosophy of the methodology. Therefore I recommend major revision to improve the structure and the rationale of the study. Specific comments:

- both reviewers suggested to complement your study with a hydrological application, and so I welcome your initiative to include the IHACRES model. However, I

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do advise you to redesign the structure of the paper in line with the suggestions put forward by reviewer 2, to convince the reader that your new bias correction is indeed an improvement to current practice.

- In response to the 5th specific comment of reviewer 2 you state "In our view, as each ensemble member has different systematic error, it can be considered as independent from other ensembles". This in itself is a bit controversial, as systematic bias is (implicitly) assumed to originate from a structural error in the model, and thus should be the same across the ensemble members. You have to make clear why you disagree with this notion and what other sources of systematic error could contribute to ensemble spread that needs to be corrected. Please put this discussion in the introduction section of your revised manuscript.
- I also tend to disagree with your statement that "the purpose of a model simulation is to be indistinguishable from the real world". Natural variability is one reason why this will never be the case. But a more philosophical objection against this statement is that any model, no matter how complex, will always be different from the real world since it is essentially a schematization. You might argue that a model simulation should allow you to extract relevant information on how the real world works (see first comment reviewer 2), but that is something different than a model that has to be indistinguishable from the real world.
- Your new figure 1 could have a display of the spread of the uncorrected RCM data as well, to see where the bias correction changed the representation of natural variability.
- the shading in figure 1 leaves some room for various interpretations: does the darkest area fall entirely within the range of the lighter shaded area, or does the dark area just point at a (partial) overlap between the two bc methods?
- I don't understand very well your reply to the third comment of reviewer Photi-

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adou. She doubts whether a bias correction is necessary, and you reply with a demonstration of variability between ensemble members that could well represent natural variability, a feature that you want to preserve in your bias correction method. Please motivate the need for a bias correction a bit stronger.

- the second point of reviewer 2, about the dependence of bias on the specific rainfall characteristic, is nicely demonstrated in Kew et al (<http://www.hydrol-earth-syst-sci.net/15/1157/2011/hess-15-1157-2011.pdf>.)
- textual corrections are required. I suggest invoking the help of a native English speaker or using the editorial service of HESSD

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 10261, 2015.