

Interactive comment on “Bias correction of temperature and precipitation data for regional climate model application to the Rhine basin” by W. Terink et al.

Anonymous Referee #1

Received and published: 1 September 2009

General:

In this paper the authors consider a very important problem – the reliability of regional temperature and precipitation in ERA15. They suggest to implement the correction of biases to be applied regionally to ERA15 (or regionalized with finer resolution models) ERA15 data. Global and regional models represent a very important source of high resolution temperature and precipitation data. For many areas this is the only source of information with high resolution. However, the quality of these data (especially for precipitation) is quite low. So that it is a reasonable approach to identify and quantify

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the biases and to try to correct them.

First of all I would like to mention a very high technical level of this paper. Only few things can be improved, like de-abbreviation of acronyms when they appear for the first time in the text. At the same time, I have several conceptual caveats (see below) which should be addressed preferably in the introduction and conclusion sections.

Specific comments:

1. My main question (as of a potential reader) is, "Can I use this method of correction for the others regions, other time periods and other data (e.g. NARR, NCEP/NCAR, ERA-40, ERA-Interim)? Or I can need to use just a general approach, but will need to derive a new correction algorithm? If so, what should I do, if I have short of data for comparison for e.g. different region? It seems that the results are applicable only for this particular region and for this particular time period and model output. Authors have to very precisely explain that this study is a technical part of some larger format work associated with the usage of hydrological models (if it is really so).

2. Other question is why the authors use ERA-15 which has quite strong (and known) problems especially with precipitation estimates? For details one can consult Zolina et al. (2004), where all problems of precipitation in 4 reanalyses were briefly mentioned. These problems involve setting of parameterizations for convective and stratiform parts, spin-up effect (see Kallberg et al. 2002, Hagemann et al. 2002), assimilation of different inputs which affected the model solution, including precipitation. Many of problems were partly accounted for in ERA-40 which shows better consistency in many precipitation characteristics (see Zolina et al. 2004). Before going through the statistical corrections, one should consider the elimination of very light precipitation which may already seriously improve the output (especially for ERA15, showing in places 330-365 formal wet days per year).

3. Since the NWP models (and therefore reanalyses) have some internal consistency, i.e. keep the major balances, at least on the global scale, a formal statistical correction

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implies change in precipitation which breaks the consistency with the other model output values. Thus, it is important to explain whether the VIC model will further use the corrected precipitation and temperature only, or it will use also the other meteorological forcing data, such as pressure, humidity and so on. If the authors are going to take these data also from ERA-15 (seems to be quite logical) they have to be very careful because the original modal data and the corrected precipitation and temperature will not be anymore in the balance.

4. It is not clear from the paper of which quality were the observational data used for the comparison. Authors should explain in more details this data set. How the observations were consolidated into 134 sub-basins? Which corrections were applied to the data? Is these data from DWD? If so, they are subject for some biases and inconsistencies. See for technical details Zolina et al. (2008), particularly the appendix. How the region-averages were consolidated (by simple spatial averaging or using more sophisticated interpolation procedures)? All these issues should be addressed in the data/methodology section.

References:

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Hagemann, S., Arpe, K., Bengtsson, L., Kirchner, I., 2002. Validation of precipitation from ERA40 and an ECHAM4.5 simulation nudged with ERA40 data. ERA-40 Project Report Series: 3. Workshop on Reanalysis, 5–9 November 2001. ECMWF, Reading, England, pp. 211–228.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 5377, 2009.

HESSD

6, C1942–C1945, 2009

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