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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Precipitation bias correction of very high resolution regional climate models" *by* D. Argüeso et al.

Anonymous Referee #3

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This study by Argüeso et al. presents an enhancement for bias correction of RCM simulation. It reviews the respective state of the art approaches and proposes a new technique to circumvent or reduce a methodological inherent problem of histogram equalization approaches which occurs if the model simulation features fewer rainy days than the observation by application on station time series. The article is well written and concisely structured. However, the main methodological problem that occurs if the uncorrected RCM features less rainy days than the observation is not solved by this approach but circumvented. As the paper, nevertheless, proposes a new way to implement station data in the correction process, I would suggest to accept this manuscript after some minor remarks.

1) The authors should discuss the theoretical possibility that although the applied

method works in the shown study case, also observed station data could feature more rainy days than the RCM simulations.

2)Is this WRF simulation driven by re-analysis data?

3)The authors seem to apply their methodology on the entire time span between 1990 and 2009. However, it is strongly recommended to use a split sample evaluation, as without the skill of the results can in fact just be judged as test for the correct technical implementation of the method. If this is the case, could the authors discuss why the correction is not nearly perfect? Does the remaining errors stem from the seasonally applied correction?

4)The approach to use 5 stations instead of the one nearest to the model grid cell in general should strongly reduce the spatial scale problem between gridded model results and observational station data. However, the network density strongly differs within the study region (e.g. region 3 is very sparsely covered) which may have an impact on the correction. Could the authors discuss this issue e.g. in respect to small scale summer convective systems which could only influence one of the observational stations due to their small spatial extension.

5)Referring to the latter remark no. 4, why did the authors not average, or take into account more grid cells from the RCMs considering the issue of effective resolution of RCMs and the issue that the exact location of precipitation cells in the RCM cannot be expected.

6)Why do the authors "only" apply seasonal correction, as e.g. Figure4 indicates strong intra-annual variations of the climatologies on monthly scale. Would the performance of the method be still stable if the correction process is applied on smaller time scales?

7)The authors use the AWAP precipitation data set for the regionalization. However it is not shown if the patterns of the AWAP and the then evaluated GHCN rain gauge data show similar patterns on daily scale (on seasonal scale those patterns are shown

in Figure 5). This issue may also influence the applied averaging-penalization.

8)How were the used factors and numbers (0.5 penalization factor, 5 stations used for the correction process, wet-day limit of 0.0 mm/d) determined?

9)Concerning the results, it would be nice to have some plot dealing with the pdf characteristics between 0 mm/d and 5 mm/d that the actual skill of the proposed enhancement at lower intensities can be seen more easily.

10)Concerning the comparison of bias patterns after correction in Figure 5, some obvious and interesting differences exist. I.e. just regarding the lower coastline region in study region 4 where the observational net is quite dense and the topography should be rather neglectable. Why do in the station data corrected results error remain up to 50 mm/month?

11)Page 8150, line 5: Change: “However, the number of days tends to decrease with resolution. . .” to "However, the respective number of days tends to decrease with increasing resolution. . ."

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 8145, 2013.