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Hydrology and Earth System Sciences Discussions

Interactive comment on "Technical Note: Bias correcting climate model simulated daily temperature extremes with quantile mapping" *by* B. L. Thrasher et al.

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Summary and General Comments

The authors present an alternative approach to correct minimum and maximum temperature from GCMs with quantile mapping, in order to avoid unphysical (negative) values of the diurnal temperature range (DTR). This is accomplished by directly correcting DTR instead of deriving it from corrected Tmin and Tmax. It is demonstrated that negative DTR values occur after bias correction (BC) with quantile mapping and the authors argue that their approach avoids negative DTRs, while not degrading Tmin

and Tmax too much. The study is of practical value for several applications in hydrological climate impact research and therefore suitable as a technical note in HESS. The method is clearly described, properly evaluated and the evaluation results support the conclusions.

The authors don't comment much on the characteristics of cases with negative DTR (see specific comments below). More information on such cases would be beneficial for better understanding of the issue and for further future development of bias correction methods.

I suggest the paper for publication with minor revisions as noted in the specific comments.

Specific Comments

P5517: You refer to Quintana Segui et al. (2010) as reference for unrealistic DTR after quantile mapping. However, Quintana Segui et al. didn't comment on DTR and comment only very generally: "... there is no physical coherence between the different corrected variables." They don't investigate the validity of this hypothesis in any respect. I regard this reference as unsuitable.

Figure 1: The numbers below the legend are hard to read. Please use a larger font.

P5519: You demonstrate that after BC cases with Tmin > Tmax occur. It would be very interesting to analyze these cases in more depth. I assume that they occur on days where DTR in the GCM is very small. Probably also the resulting negative DTR values are quite small? Please give more information on the characteristics of such unphysical cases: Under what circumstances do they occur? How large is the typical error in DTR in such cases? This will help the reader to judge the severity of the problem.

P5519f: You demonstrate that "derived Tmin" performs much better than "derived Tmax". Any explanation for that? This basically means that BC of Tmax works better than BC of Tmin (since derived Tmin = Tmax – DTR, derived Tmax = Tmin + DTR,

and DTR is the same in both cases). One could speculate, that local Tmax is better correlated to the large scale than local Tmin (night-time, frequent inversions, . . .). This could lead to a better performance of BC. The paper would gain from more information with regard to that. If possible (without speculating too much), please comment on it.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 9, 5515, 2012.