Review of “Bias correction of gauge-based gridded product to improve extreme precipitation analysis in the Yarlung Tsangpo-Brahmaputra River Basin”

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Summary

The paper by Luo X. and al proposes to compare the performance of four bias correction methods (Linear Scaling, Local Intensity Scaling, Power transformation and Quantile Mapping) of daily precipitations during 1951-2015 over Yarlung Tsangpo-Brahmaputra River Bassin (YBRB). The data to correct comes from the gridded APHRODITE dataset, and the reference dataset are sparse observations from meteorological stations. The performance of bias correction methods is evaluated with a spatial leave one-out cross validation method: one station is removed, and an IDW interpolation between others bias corrected grid point is applied to build them.

General comments

Having already participated in the first review round, I am glad to see that my comments have been taken into account. The main addition is the leave one-out cross validation. Contrary to the usual practice, instead of a cross-validation in time (the dataset is split into two time periods, which makes it possible to check the stationarity of the probability distribution in the context of this paper), the authors propose a leave one-out cross validation by removing alternatively one station from observational data.

I’m not convinced this approach can validate the quality of bias correction. Eventually, this method can be applied if the bias correction method is multivariate (dependence structure between grid points is also corrected, with methods as MBCn, R2D2 or dOTC, see Cannon, Vrac and Robin). In this context, it is not the bias correction method that is tested, but the interpolation method.

I’m sorry, but I can not understand why the authors can not split the dataset into two time periods even if it means removing stations when no data is available for the sub time period. Furthermore, cutting does not require the sub-periods to be continuous. The heart of this paper is the improvement due to a bias correction, and the prerequisite is to verify that the method reproduces well the distribution of the observations. The only element in this sense is the figure 6, which shows a better coherence with the topography.

I can not recommend publication without a clear proof of improvement compared to observations, and it is not the case (all the figures show a modification compared to APHRODITE, but do not show if it is closed to observations, or more realistic).

Specific comments

Lines 188-189

The sentence “according to the location and observation time.” is not really clear. It is my understanding that the authors correct only the grid points of APHRODITE that contain a time series of observations (and an interpolation is used for others), but I am note sure. Please clarify.

Lines 207-209

The sentence “To obtain extreme precipitation indices in other grids with no rainfall station distributed, spatial interpolation was performed using inverse distance weighted (IDW) interpolation” is slightly confusing. You perform the interpolation between the bias corrected dataset or between the extreme precipitation indices computed from the bias corrected dataset ?

Technical comments

Figure 4

In the x-label : correction instead of “coeeection”.

References

Cannon, A. J.: Multivariate quantile mapping bias correction: an N-dimensional probability density function transform for climate model simulations of multiple variables, Climate Dynamics, 50, 31–49, 2018.

Vrac, M.: Multivariate bias adjustment of high-dimensional climate simulations: the Rank Resampling for Distributions and Dependences (R2 D2) bias correction, Hydrology and Earth System Sciences, 22, 3175–3196, 2018.

Robin, Y., Vrac, M., Naveau, P., and Yiou, P.: Multivariate stochastic bias corrections with optimal transport, Hydrology and Earth System Sciences, 23, 773–786, 2019.