MIdAS- MultI-scale bias AdjuStment

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1. Summery

In this paper, Berg et al. 2022 suggested a modern code set-up that allows for flexible bias adjustment and compared it to different methods based on quantile mapping. This set-up allows for 1-day-of-year-bias 2-cascacade adjustments to prevent from discontinuity and variance inflation in the data. The paper culminates in discussions about the skill of different methods and future directions for advancing MIdAS code implementation.

2. General Comment

The paper is very well-written. It was quite easy to understand and enjoyable to read the paper. I found the story about King Midas and the effort to relate the story to bias adjustment, quite cool. My only issue was 'the extent of discussion' about some matters. I was expecting a little bit more of explanation (e.g., about CDF-t method, why distribution-based methods are not covered or around L286 to 291). I understand that the authors might deliberately opted out of thorough discussions because of the nature of the paper, but in my opinion, such discussions strengthen this paper and make the whole bias adjustment process clearer.

Given the quality of this paper, I suggest **minor revisions** for this paper.

3. Specific Comment

L3: I would remove 'distribution based' from this sentence. There are some advanced multivariate methods that are not distribution based.

L14-L16: This whole part is a bit unclear to me.

-Can you please clarify: what do you mean by 'spatial focus is put on preservation of trends'?

-What do you mean by more advanced trend preserving method? Do you consider QDM or CDF-t as the advanced method? To me Midas might be as advanced as QDM (simply because I have worked with QDM but have not implemented multiscale bias adjustment). Thus, isn't advanced a bit subjective here?

Please also consider naming some of the advanced methods.

L23: What are some of the side effect adjustment? Please consider naming some.

L47: multi-variate features

L50: This sentence is unclear to me. please consider re-writing it. What do you mean by stress test of methods?

L77: I would clearly state that why only QM-based methods are selected to be compared to MIdAS.

L115: please consider referring to Piani and Haerter (2012).

L136-138: Which projects? Why? Please consider clarifying.

L147: this sentence needs to be rephrased. Ny probably needs to be changed to no

L153: This part needs more clarification. Why distribution-based methods are not favored?

Coming from hydrological community, maybe I am biased but among us distribution-based methods are highly favored. This also comes naturally, as distribution-based smoothing is applied in many hydrological studies to smoothen outliers. In fact, in some studies, at least for temperature, Gaussian distribution seemed to perform reasonably well. Note for example Räty et al. (2018).

L170: I would prefer a little bit more explanation of the theory of this method as it is the most intricate one.

Change and to an

L232: I don't understand why this part (method intercomparing) is located in result section? Doesn't it fit better in the method section? With e.g., **experiment protocol** subheading?

and why the order of describing variables, is changed (in section 4.1 first temperature is explained while in section 4.2.1 first precipitation is described).

Please consider modifying this section.

L286-287: this part seems like a very important part of discussion. However, it is not entirely clear to me what do you mean by different methods for mapping. By 'such methods' which methods are you referring to? Please consider rephrasing.

Sincerely

Faranak Tootoonchi

References:

Piani, C. and Haerter, J. O.: Two dimensional bias correction of temperature and precipitation copulas in climate models, Geophys. Res. Lett., 39(20), 1–6, doi:10.1029/2012GL053839, 2012.

Räty, O., Räisänen, J., Bosshard, T. and Donnelly, C.: Intercomparison of Univariate and Joint Bias Correction Methods in Changing Climate From a Hydrological Perspective, Climate, 6(2), 33, doi:10.3390/cli6020033, 2018.