

Geosci. Model Dev. Discuss., referee comment RC3
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Comment on gmd-2022-6

Joel Fiddes (Referee)

Referee comment on "MIIdASv0.2.1 – Multi-scale bias AdjuStment" by Peter Berg et al.,
Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2022-6-RC3>, 2022

General Comments

In this manuscript, Berg and coauthors introduce a new Python-based implementation platform for bias adjustment called MIIdAS (Multi-scale bias AdjuStment) with one of the more impressive acronym justifications I've seen in the introduction.

The authors state that this is an extendable platform that is aimed at modern computing infrastructure and workflows and thus makes use of modern libraries such as IRIS and DASK.

The paper is generally well written, the experiment setup is clear and well designed and I think the comparison of the various methods (with particular implementations) is a really useful contribution, particularly the effect of the method on the preservation of the climate change signal, which is often an important concern of bias correction studies.

However, I think some important points of discussion are still currently missing and also a stronger positioning of the contribution, which, I think is the fact that this is designed to be a flexible and modern platform for the implementation of various bias correction methods. I feel this needs to be more strongly demonstrated.

Main comments

- The authors very much position this contribution as an extendable platform based on modern computing workflows. Therefore I think it would be useful to have more discussion on the technology itself and which bottlenecks are solved by using specific libraries. This is currently reduced to a single sentence on p3 l.82--84. It actually seems there is more discussion on the technology in the abstract than in the text itself. An example of this is why use IRIS instead of Xarray/Dask. I think an entire section would be justified on this in the Methods Section 2 and then perhaps rename Section 2 so that it is a broader section covering both the theory and the technology.
- Connected to (1), I would really like to see a system diagram or similar that makes it clear how the actual implementation is put together and illustrates the "platform" nature of the software with a view to extendability and how that is in the system design.
- Connected to (1) and (2), more justification of the contribution needs to be made, I think. I see the strength of this paper is the stated aim of developing a modern extendable platform, however, I do not currently see this as being well described or

demonstrated. I think this needs to include, for example, a discussion on the vision of the next steps and how that is currently part of the system design, extension to other variables, and also performance bottlenecks that have been solved by the implementation with modern libraries. Arguably, when the platform itself is the novelty rather than the methods implemented therein, I might expect to see a community available development page so progress can be followed.

- While it is quite normal that just T and P are targeted in such studies it would be nice to see that motivated and should probably be stated that only T and P are evaluated in either 2.4 or 3 so the reader knows what to expect. Is there an ambition to include other variables?
- Precipitation frequency is mentioned in Section 2 under "SSR" however there doesn't seem to be any evaluation of this. Given wet day frequency can be an important feature of bias I think it would be useful to see this evaluation.
- For impact assessments, bias correction often has an implicit downscaling step in order to produce time series at a scale that is meaningful for impact models (e.g. Teutschbein, C., and J. Seibert, 2012, Rajczak et al. 2016, Fiddes et al. 2022 - note this is not a suggestion to cite, merely an example of the point). While there is some discussion of this e.g. P.11 l.287-290. I think this deserves more attention given the importance of such techniques to the impact model community, who are important target users of bias adjustment methods.
- The effect of bias correction on the climate change signal is an important topic but only first mentioned here on P.7 in the evaluation strategy Section 2.4. I think there needs to be some discussion of this in the introduction and discussion with appropriate citations e.g. Themeßl et al. 2012 (among others).

Minor comments

Title: I believe a code version number is required by GMD in the title.

Abstract: I think you can remove the last sentence as the code availability is given at the end of the paper. In addition, I don't think Berg 2021 is the citation you mean as that seems to be a data paper in the reference list.

P.3 l.75 "know" to "known"

P.5 l.147 "ny" to "new"

P.5 l.147-149 consider rephrasing as the sentence structure is quite unclear here.

P.6 l.174 Missing space after full stop. "(Maraun, 2012).In"

P.7 l.197 can you give a citation for this important point ("However, detailed studies....")

P.7 l.197 "However, detailed studies...." - this sentence also needs a restructure I think as it is not currently grammatically clear.

P.7 Section 3 I think it should be stated here what temporal resolution the data is.

Table 3 and 4: typo "Variabel"

Table 3 and 4: what are the units?

P12 l.308 Suggested sentence structure: "Further, MIdAS has the following additional features as compared to currently released bias adjustment software"

Code comments

- Data and code are present and well structured and documented in the two cited Zenodo repositories.
- While an open repository is not required by GMD, it may be nice to see if there is a community page where users can submit bugs etc and follow development.
- There is no environment.yml as stated in the README.rst.
- However, Pip install worked fine to install the code.

References

Fiddes, J., K. Aalstad, and M. Lehning, 2022: TopoCLIM: rapid topography-based downscaling of regional climate model output in complex terrain v1.1. *Geosci. Model Dev.*, **15**, 1753–1768.

Rajczak, J., S. Kotlarski, N. Salzmann, and C. Schär, 2016: Robust climate scenarios for sites with sparse observations: a two-step bias correction approach. *Int. J. Climatol.*, **36**, 1226–1243.

Teutschbein, C., and J. Seibert, 2012: Bias correction of regional climate model simulations for hydrological climate-change impact studies: Review and evaluation of different methods. *J. Hydrol.*, **456-457**, 12–29.

Themeßl, M. J., A. Gobiet, and G. Heinrich, 2012: Empirical-statistical downscaling and error correction of regional climate models and its impact on the climate change signal. *Clim. Change*, **112**, 449–468.