Earth System
Dynamics
Discussions

Interactive comment on "Addressing the assumption of stationarityin statistical bias correction of temperature" *by* Manolis G. Grillakis et al.

Anonymous Referee #2

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The article tries to address the common assumption of stationarity in statistical bias correction of modeled temperature by separating the stationary and non-stationary signals in the time series and only correct the stationary part. The idea is novel but the method is questionable, furthermore, the presentation of the paper is inadequate. It is poorly structured and the description of the method is unclear, which made it impossible for the audience to repeat the test. The results are not thoroughly discussed and conclusions are not well supported. Thus I recommend this paper to go through a major revision before it can be considered for publication.

The authors assert that the difference between the original model data and the normalized data is the non-stationary component of the time series, which are subsequently

added back in. The key assumptions here would be that i) the "non-stationary components" would contain trends as well as year to year fluctuations (and presumably even changes to seasonality and day to day fluctuations as well); and ii) these components are not subject to bias correction. In my opinion, both are questionable. What if the model get these things systematically wrong in the first place? The use of "stationary" is somewhat confusing here, since it's really an anomaly from resampled climatology. And it's totally dependent on the reference period selected.

While the n-fold cross validation scheme has been used in similar research before, it is commonly recognized that at least 30 years of data should be used in the calibration of a bias correction method. Why not use a moving window of 30 years to do the calibration and validation? If you have to use this scheme, each of the 10-year period need to be analyzed (before the normalization) to show their characteristics and each pair of calibration-validation need to be studied separately to show the effect of NSM.

Are Figures 1 and 2 a test performed on one point/grid cell in the study area? If so, the results should be discussed in the results and discussion section. This is not mentioned anywhere in the text. Such obscurities should be avoid in the manuscript. Also, the authors shouldn't assume readers to have knowledge of their study area or data. The study area, including the model domain and its climate should be discussed in the data section.

What is the basis of selecting 5th and 95th percentiles in case study and 10th and 90th percentiles in results? Neither of them can be considered as extremes with respect to temperature.

The captions and legends in Figures 3, 5 and 6 need to be rewritten in a more precise and descriptive way and need to be discussed thoroughly in the text to reflect the intention of these figures.

There are grammatical mistakes and incomprehensible sentences in the manuscript. A few examples in the abstract:

1. Lines 26-27: change 'their majority assumes' to 'the majority of them assume';

2. Line 29: change 'in the context of a climate' to 'in the context of climate research';

3. Line 31: change "pre-post processing" to "pre- and post-processing";

4. Line 36: change 'but also' to 'and';

The authors will benefit from using a language editor before resubmitting the manuscript.

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