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Discussions

# *Interactive comment on* "Investigating uncertainties in global gridded datasets of climate extremes" *by* R. J. H. Dunn et al.

R. J. H. Dunn et al.

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We thank the reviewer for their comments and address each in turn below.

Reviewer

The manuscript "Investigating uncertainties in global gridded datasets of climate extremes" by Dunn et al. is focused on the evaluation of uncertainties affecting a specific gridded dataset. The study is interesting and useful for the climate community. However, as highlighted by the other two referees (I fully agree with their comments), several minor issues should be solved before publication. The authors should give "more weight" to the regional differences and improve the explanation and description of the (very interesting) results connected with the Taylor diagrams. Linear trend is not always

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the optimal choice, so other options should be explored (e.g., change points affecting the global-regional time series). The introduction should be improved and better linked to the rest of the manuscript. Readability can be improved as well and typos must be corrected.

Response

We increased discussion of the Taylor Diagrams in later sub-sections of Section 5 and linked back to the differing behaviour observed in the global timeseries in earlier sections, and the regional changes were also addressed in more detail (also in light of comments by Reviewer 2).

We agree that a linear trend is rarely the true behaviour of the underlying change, however it does provide an easily understood and calculable number when discussing the rate of change over a given time period. We are not assessing the long-term behaviour of the indices over time in this study per se, but trying to compare between different versions of the datasets. Hence we believe that a homogeneity assessment (change point detection) is something which falls outside of the scope of this analysis. It would also be best applied to the raw input data rather than to the final averaged time series.

We have re-structured parts of the introduction to try and improve its flow and relevance to the manuscript. We also now start with a new paragraph which focuses on the importance of uncertainty estimates in climate datasets and what they bring to their usefulness.

We have gone through the manuscript to try and improve readability and correct any typographical errors.

Reviewer

Finally, a couple of important specific comments: p2109, 1: this is questionable. Other (more complex) methods exist that can take better into account the spatial structure of

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the given field. ADW could be appropriate for indices but not the most appropriate for every (irregularly) data set.

Response

We have adapted this sentence slightly (removed "most").

However, the work by New et al (2000) assessed spline fitting, triangulation, Thiessen polygons, and ADW for seven climate elements (not indices), and found that "ADW performed better in areas with sparse data because the distance weighting produced a less-irregular grid, which is a result of the combination of a greater number of stations used in determining a gridpoint average and the use of distance weighting."

We agree that there are likely to be better methods to perform the gridding, even than the three alternative methods chosen in Section 4.6. However, in order to match the HadEX methodology, HadEX2 was calculated in the same way, and hence in this work we use ADW as the baseline to compare against. For simplicity and consistency ADW was used for each index, but we would welcome further assessments of the HadEX2 results using different and more complex gridding methodologies. Indeed, this is one reason why the HadEX2 station data have been made available on www.climdex.org to encourage others to test this for themselves.

Reviewer

p2110/2111,27/1: this statement is wrong. Correlation cannot be used to assess trend similarities.

Response

This has been rephrased as "indicating close agreement between the time series".

Reviewer

p2111, 28: This is simply called the Theil-Sen estimator

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Response

Thank you – reference updated. We continue to refer to it as the median of pairwise slopes estimator as this is usefully descriptive to the reader.