

Interactive comment on “Identifying homogenous sub-periods in HadISD” by R. J. H. Dunn et al.

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The authors describe a method to find breaks in the subdaily climate dataset HadISD. They only detect inhomogeneities; the data is not corrected. Detection is performed at a yearly scale using the existing pairwise homogenization algorithm (PHA), which was developed by NOAA to homogenize their global monthly dataset. The most interesting part of the article is a detailed analysis of the characteristics of the breaks that are found in this unique subdaily dataset.

The manuscript is written clearly, the dataset is important, and the analysis of the breaks is original. I would thus in principle recommend publishing this manuscript, but do have some minor remarks that the authors may want to take into account. The most important recommendation would be to add a quality measure that describes the noise level of the difference series; that would be a good guidance to the users of how well

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the series could be homogenized.

1 Major remarks

1. Introduction, page 1570, line 5-15. I would personally call the “off-the-shelf” packages: Modern multiple breakpoint methods. SPLIDHOM is a daily correction methods and does not fit too well to the rest here.

2. Introduction, page 1570, line 15-25. The main conclusion from HOME is missing, that modern methods (multiple breakpoint methods designed to deal with inhomogeneous references) are clearly better than traditional ones. You might want to add that PHA was recommended by HOME for the homogenization of large datasets.

3. Introduction, page 1570, line 23. Here SPLIDHOM should be mentioned. You could also mention Quantile Matching (RhTest), wavelet homogenization (Yan and Jones, 2008) and maybe daily detection (Rienzner and Gandolfi, 2011, 2013; Wang 2008) here. The sub-daily physical corrections of temperature of Auchmann and Brönnimann may also be something that is worth to mention in this sub-daily article.

4. Section 2, page 1572, line 10. If the network wide change is at the same date at all stations also pairwise cannot help, that is a basic limitation of relative homogenization. I would add something about network-wide changes happening during relatively short periods.

5. Section 2, page 1572, line 15. The number of breaks is not an important quality measure in itself. The break variance would be a better one. (Next to break variance maybe also the trend in the inhomogeneities could be an interesting measure.) A problem for all such measures is that the quality of homogenization depends on the noise level of the reference series. I would thus advice to give your users also the guidance of provide some information on this noise level, maybe the noise level using

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the nearest reference or the mean of all references used by the PHA.

6. Section 2, page 1572, line 25. What does HadISD do in this case? Is such a station withheld?

7. Section 3, page 1575, line 7. Is there really not pattern? It seems that there are more non-processed stations in data sparse areas. The colours in Figure 1(b) make it hard to estimate the values; it does not have much more dynamic range as a black white colour scale. I had expect to see more breaks where the station density is higher (easier to detect), Figure 1(b) almost suggests the opposite.

8. Section 3, page 1575, line 25. The bias may be small relative the typical break size, but is climatologically important. Investigating this is scientifically very important, if you could do something here that would be appreciated, but maybe it is more the topic of a follow up study. If you remove the “broader positive wing” in Fig. 2a would there still be a bias? Here is the bias regionally, how does it depend on station density, is there a dependence on the number of readings per day (as proxy for whether the station was always automatic or switched from observations to automatic) such kind of questions come to mind. Idem for Section 4, page 1577, line 21.

9. Section 3, page 1567, line 18. “The distribution of adjustment values with latitude and longitude show that the largest adjustments are mainly found in regions with large numbers of stations (Fig. 5)” Could this also be an artefact of your scatter plot. Where you have more values you also have more strongly deviating values. I wonder if the 2D histogram would give the same impression.

10. Section 4, page 1577, line 18. Based on the lower correlations between stations one would expect to find less inhomogeneities in wind.

11. Section 4. Do you have any explanation for the rejections of SLP in Africa and China? The station density should be high enough, especially as SLP is well correlated.

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12. Section 5 Validation. For all these number about hits and misses, I was always wondering how many you would expect to get by coincidence.

13. Section 7, page 1582, line 28. Are you sure there is an improvement in the homogeneity of the stations used?

14. Section 8. Page 1585, line 10. There are some articles on daily detection (Rienzner and Gandolfi, 2011, 2013; Wang 2008).

15. Figure 2. How did you make the (censored) Gaussian fit? Because the lines are so thin, the difference between blue and black are small. The statistics for the Gaussian fit may also be worth reporting (or are the top values the ones of the fit and not of the raw detectstion).

16. Figure 7. The ticker tail than a normal distribution would have is not sign yet that the distribution of real inhomogeneities is also not normal. Two breaks in the same direction may be combined by statistical homogenization.

17. I agree with the main comments of Blair Trewin and Enric Aguilar. Except that the small networks in the COST-HOME benchmark were a problem for the PHA. One contribution using the PHA actually performed as the best contribution for the smallest networks (5 stations).

2 Minor remarks

1. Title. In science the preferred form seems to be “homogeneous” not “homogenous”.

2. Affiliations: I wonder whether the Latex double ff would make a problem for the email link.

3. Page 1575, line 20. Which *four* methods?

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4. Page 1576, line 12. Please, add that these are station numbers.
5. Page 1577, line 13. "For the SLP, we use the deviations from 1000hPa when calculating the monthly mean values." Why is this sentence important?
6. Page 1579. Line 1-2. "There do not appear to be any correlations with geographic features for any of the variables." Didn't you just mention these in the previous sentence?
7. Page 1579. Line 12. Add "(Figure 13)". All figures should be mentioned.
8. The degree sign in many plots is not printed right.
9. Figure 6. Is this the distribution of the *absolutely* largest adjustment values?

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