

Review of ‘An observational record for global gridded near surface air temperature over land and ocean from 1781’ by Colin P. Morice and colleagues

Summary

The paper describes a major new dataset of surface temperatures. It describes the construction methods and undertakes a comparison (albeit superficial) to a range of existing datasets. The effort is important and publishable. The particular novelty of a GSAT rather than GMST product is noteworthy and further helps sample structural uncertainty in global surface temperature estimation in important ways.

In an ideal world I would like to have seen a more substantive comparison to the range of existing products but I don't think it reasonable to demand this in this paper. Rather, I would encourage a more substantive intercomparison in future work. None of my comments amount to show stoppers and I would encourage acceptance for publication.

Major comments

1. The introduction feels unduly short. This in part is because material I would have expected in the introduction instead is in Section 2. I would personally merge sections 1 and 2 as it feels decidedly odd to a reader to have such a short introduction followed immediately by what very much feels like introductory materials. Section 2 contains what, as a naïve reader I expected to be in the introduction and it throws me a bit as a reader to be given this structure.
2. I am very confused by what Figure 3 shows. I think what is throwing me is the label on the colour bar. Should this not be Temperature difference GloSATref – HadCRUT5? Otherwise the text and the figure are just in conflict with one another? Regardless, work is required here for clarity to avoid very confused readers between the figure and text to unconfound this.
3. While the data availability is well noted I don't see anything regarding code. Is the code used going to be made available?

Minor comments

1. Given that climate models warm SAT more than SST consistently across CMIP5 and CMIP6 ensembles it feels odd to make no reference to the fact that your results imply the opposite behaviour in the closing sentence of the abstract.
2. To Table 1 and associated discussion you may add the new JMA analysis?
3. Regarding the paragraph starting line 112 this is a bit misleading potentially to an unwary non-expert reader. While Berkeley Earth and GHCNM do not have explicit accounting for exposure bias both will be adjusting for the impacts of exposure bias where their breakpoint detection algorithms are identifying breaks. So while these are not specifically designed to identify and quantify exposure biases the de facto result is highly similar to an adjustment for exposure biases. The first sentence kind of hints at this but in a way that perhaps understates the impact.

4. In line 226 perhaps define pentad explicitly on first use (five day period) for a general reader who may not have come across this temporal aggregation before and especially since pentad can often be used for e.g. 5-year periods?
5. The sentence lines 356-357 I don't think make grammatical sense and regardless is very hard to parse. Please can you revise so as to be clearer what you mean here?
6. On line 421-422 it is unclear what is meant by the first period should it be to 1881-1900?
7. Line 435 would it be better to say less robustly quantified because uncertain uncertainties feels a little bit odd.
8. Line 438 Africa, and northern [...] (missing 'and')