Reply on RC2
Wenbin Sun et al.

Author comment on "Description of the China global Merged Surface Temperature version 2.0" by Wenbin Sun et al., Earth Syst. Sci. Data Discuss., https://doi.org/10.5194/essd-2021-447-AC2, 2022

Line 52: it could be "How to account for this deficiency…", deficiency should not be improved.
Reply: done.

Line 70: ‘…, which was generated by merging China…’
Reply: done.

Line 154: references are need here to describe the proposed “IDW extrapolation method”.
Reply: Thanks.
It should be Adjusted IDW used in Cheng et al (2020), we have cited the relevant literature in the revised manuscript when the AIDW was firstly referred in line 140.

Section 3.2.1: how to deal with data in the boundary when performing running means with a given window? Padding data at the boundary or simply using the available data in within the window?
Reply: Thanks.
We use only the data available in the window when performing sliding averaging in the longitude direction. In the latitudinal direction, the longitude is different from the latitude and there is no boundary effect.

Table 2: spatial and temporal resolutions of each dataset could be provided.
Reply: All the versions of CMST should be in the resolution of 5°×5° in the latitudinal and longitudinal directions. Per your request, we clarified this in the section 1 (lines 77-78).

Table 3 General information of input datasets

<table>
<thead>
<tr>
<th>Dataset</th>
<th>Period of record</th>
<th>Land component</th>
<th>SST component</th>
<th>Resolution</th>
<th>Interpolation, reconstruction, and uncertainties evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>China-MST2.0</td>
<td>1850-2020</td>
<td>China-LSAT2.0</td>
<td>ERSSTv5</td>
<td>5°×5°</td>
<td>Spatial smoothing and EOTs; observational constraint; ensemble uncertainties</td>
</tr>
<tr>
<td>HadCRUT5</td>
<td>1850-2020</td>
<td>CRUTEM5</td>
<td>HadSST4</td>
<td>5°×5°</td>
<td>Gaussian process method; observational constraint; ensemble uncertainties</td>
</tr>
<tr>
<td>NOAA Global Interim</td>
<td>1850-2020</td>
<td>GHCNv4</td>
<td>ERSSTv5</td>
<td>5°×5°</td>
<td>Spatial smoothing and EOTs; ensemble uncertainties</td>
</tr>
<tr>
<td>GISTEMP v4</td>
<td>1880-2020</td>
<td>GHCNv4</td>
<td>ERSSTv5</td>
<td>2°×2°</td>
<td>Spatial interpolation methods over reasonable distances; ensemble uncertainties</td>
</tr>
<tr>
<td>Berkeley Earth</td>
<td>1850-2020</td>
<td>Berkeley</td>
<td>HadSST4</td>
<td>1°×1°</td>
<td>Kriging-based spatial interpolation with constant distance parameters at all latitudes</td>
</tr>
</tbody>
</table>
Table 3: the warming trend appears to be systematically underestimated by CMST-2.0 when compared with other datasets, any specific reasons?

Reply: Thanks.

First of all, due to the data resources and processing methods, the warming trends estimated from different datasets would have some differences. For example, from 1880 through 2020, the warming trends estimated from CMST2.0-I max and CMST2.0-I min are broadly consistent with those from NOAAGlobal-Interim and GISTEMP v4, lower than those from HadCRUT5 and Berkeley Earth, and higher than those from Cowtan and Way (Table 4 in the revised manuscript). All of the datasets have been used to contribute to the evaluation of the GMST warming trends in the newly released IPCC AR6 (Gulev et al., 2021).

Secondly, the differences among all the datasets are not statistically significant (their estimated warming trend ranges are largely overlapping when the uncertainties of the linear trend have been considered). Table 4 compares the global surface temperature trends for different datasets at different periods. In addition, since we focus on the reconstruction scenarios in the polar regions of the CMST in this paper, we also compare the distribution of temperature trends in the Arctic for different datasets in lines 494-510.

In summary, although there are some differences, the warming trends estimated by CMST2.0-I max and CMST2.0-I min in CMST2.0 do not systematically underestimate the warming trends if we consider the warming trends with the uncertainty range.

Ref:


Figure 11: a trend deviation map helps better interpret difference between different GMST datasets.

Reply: Thanks.

Since we cannot take any dataset as the truth of the observation, we added Figure 12 in the manuscript, which shows the distribution of differences in warming trends estimated with CMST2.0-I max for different datasets
Please also note the supplement to this comment: