

Earth Syst. Sci. Data Discuss., community comment CC1
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Reply on RC1

Peng Si

Community comment on "Construction of homogenized daily surface air temperature for the city of Tianjin during 1887–2019" by Peng Si et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2020-343-CC1>, 2021

Thank you very much for the valuable time devoted to this paper by the referees and responsible editor of ESSD, as well as for the opportunity to reply to these comments. A point-by-point response to Anonymous Referee #1' comments is as followed.

Major comments:

- Figure 6: I noticed that the significant breakpoint occurred in 1955 for Tmax but in 1992 for Tmin. Why did these points differ greatly? Is this due to non-climate factor such as station relocation? If so, the influence is supposed to be the same. Explanation or discussion for this interesting phenomenon will benefit the improved understanding of the newly-constructed homogenized dataset.

Reply Thank you for your valuable comments.

It may be related with the physical characteristics of Tmax and Tmin themselves. The Tmin generally occurs near sunrise when calm and stable atmospheric boundary layer conditions are prevalent. Under these conditions, near surface temperature fields are strongly coupled to the local surface characteristics. On the other hand, during daylight hours (like Tmax), the boundary layer is commonly well mixed, and microclimate differences between nearby sites may be less evident. So the difference of the discontinuities between Tmax and Tmin temperature is very normal (Tmin always has more discontinuities in total, see the details in Li and Dong, 2009).

As to the discontinuities, the breakpoints in Jan 1 1955 and Jan 1 1992 are both caused by station relocation, which have an effect on homogeneity of different temperature elements. In Jan 1 1955 Tianjin meteorological station relocated from No. 22 Ziyou Road to Zunyi Road (Table 1), where is 5km north of the original site. However, the relocation of Tianjin meteorological station in 1992 was from Qixiangtai Road, Hexi District to Xidawa, Xiqing District. In addition, there are another two discontinuities in 1897 and in 1907 for Tmin, and both of these two are not for Tmax.

We have added this paragraph on L330–L333 in revised paper * - Feb 2, 2021.pdf.

Ref

Li, Q. X., and Dong, W. J.: Detection and adjustment of undocumented discontinuities in Chinese temperature series using a composite approach, *Adv., Atmos., Sci.* 26(1): 143-153, <https://doi.org/10.1007/s00376-009-0143-8>, 2009.

2. L393-396: it seems a paradox to argue that “annual trend change in mean temperature based on newly constructed series in Tianjin **is similar to** that for China (Li et al., 2020c)”. On the contrary, the trends derived from the other two dataset (Berkeley Earth and CRUTS4.03) are more similar the national warming rate as shown in Table 5. The authors are suggested to clarify this point.

Reply Thank you for your valuable comments.

The annual trend in T_{mean} from newly constructed series in Tianjin is a little larger than that over the whole China. We think this conforms that the result in this manuscript is reasonable. Because the trend in northern region is more prominent than that of other regions in mainland China (Li et al., 2004; Zhai et al., 2004).

Therefore, according to the comments, we have rewritten the sentence into ‘Moreover, annual trend change in mean temperature based on newly constructed series in Tianjin **is also a little larger than** that over the whole China (Li et al., 2020c), which are $0.130 \pm 0.009^\circ\text{C decade}^{-1}$, $0.114 \pm 0.009^\circ\text{C decade}^{-1}$ and $0.121 \pm 0.009^\circ\text{C decade}^{-1}$ respectively from CRUTEM4, GHCNV3 and C-LSAT (during 1900 - 2017).’ **on L398–L401 in revised paper * - Feb 2, 2021.pdf.**

And we also added the sentence ‘It conforms that the result is reasonable since the air temperature trends in northern China is more prominent than those in other regions in mainland China (Li et al., 2004; Zhai et al., 2004).’ **on L401–L403, and added two references** (Li et al., 2004; Zhai et al., 2004) **in References section on L527–L529, L618–L619 in revised paper * - Feb 2, 2021.pdf.**

Ref

Li, Q. X., Zhang, H. Z., Liu, X. N., and Huang, J. Y.: Urban heat island effect on annual mean temperature during the last 50 years in China, *Theor. Appl. Climatol.*, 79, 165-174, <https://doi.org/10.1007/s00704-004-0065-4>, 2004.

Zhai, P. M., Chao, Q. C., and Zou, X. K.: Progress in China’s climate change study in the 20th century, *J. Geograph. Sci.*, 14(1): 3-11, <https://doi.org/10.1007/BF02841101>, 2004.

Minor comments:

- L55: “representativeness” -> “better representativeness”

Done.

2. L286: “surface observation station” -> “surface weather station”

Done.

- L291: “quantile matching” has been widely used in recent research associated with precipitation (Lv et al. 2020, doi:10.16/j.atmosres.2019.104671), and PM2.5 (Bai et al. 2020, doi:10.5194/essd-12-3067-2020), which is suggested to be mentioned.

Done.

4. L384: “indicates” -> “shows”

Done.

5. L392: "internationally authoritative data calculations"? are there any references to support this argument? Further, this sentence is not logically connected with the following sentence "so they are more consistent". For instance, what does the "they" refer to? Therefore, it is suggested to be rewritten.

According to the Major Comments 2, we have deleted this sentence 'The average temperature trend changes from the newly constructed series are much closer to internationally authoritative data calculations, so they are more consistent.' on L396–L398, and rewritten the second half of the paragraph into 'Moreover, annual trend change in mean temperature based on newly constructed series in Tianjin is also a little larger than that over the whole China (Li et al., 2020c), which are $0.130\pm 0.009^{\circ}\text{C decade}^{-1}$, $0.114\pm 0.009^{\circ}\text{C decade}^{-1}$ and $0.121\pm 0.009^{\circ}\text{C decade}^{-1}$ respectively from CRUTEM4, GHCNV3 and C-LSAT (during 1900 - 2017). It conforms that the result is reasonable since the air temperature trends in northern China is more prominent than those in other regions in mainland China (Li et al., 2004; Zhai et al., 2004).' on L398–L403 in revised paper * - Feb 2, 2021.pdf.

- L404: "indiates"-> "shows" or "illustrates"

Done.

7. L409: grammar errors in "all passed"

Done.

8. L410: "trends of TN10p and TX10p in spring are the largest. They are" -> "the negative trends of TN10p and TX10p in spring are the largest, reaching up to be"

Done.

9. L422: it seems a little strong tone to argue "These same procedures could and should be use", which can be softened, since there are large room to improve the procedures for data homogeity. More importantly, it remains unknown whether the procedure developed here can be genalized or applied to other regions, which merits further investigation.

The word 'procedure' refers to the steps of constructing a long and complete climate time series, rather than the techniques and methods. To avoid the confusion, we have modified this sentence into 'These similar procedures could and should be used for other sufficiently long and complete series across the world.' on L429 in revised paper * - Feb 2, 2021.pdf.

Please also note the supplement to this comment:

<https://essd.copernicus.org/preprints/essd-2020-343/essd-2020-343-CC1-supplement.zip>