

Dear referee,

Thank you for your valuable comments on our manuscript and help us to improve the quality of our paper. We have carefully studied all the comments and have made revisions for manuscript. Please find our detailed responses below. Thanks again.

Sincerely,
Wang Ping and co-authors

General comment:

The daily highest air temperature (T_{\max}) is a key parameter for climate change analysis. The authors proposed an estimation model to obtain high-precision T_{\max} , and built a dataset of T_{\max} in China from 1979 to 2018. The authors analyzed the spatial-temporal variation characteristics of high temperature in China using the estimated T_{\max} data, and found that the frequency of high temperature events in most areas of China exhibited an increasing trend. The authors also showed that the temperature abrupt changes mostly occurred in El Niño years or La Niña years, indicating that China was highly vulnerable to global climate change. By analyzing the impact of ocean climate modes on temperature in China, the authors found that the warming of the Indian Ocean had a strong positive impact on warm events in most regions of China. This study is novel and significant for estimating T_{\max} by using multi-source data and predicting extreme weather. I suggest to accept this manuscript after minor revisions. Follows are some specific comments.

Response: Thank you for your comprehensive review and such encouraging comments on our manuscript, all the comments have been carefully addressed. Enclosed below are our point to point responses to these comments.

Major comments:

1. Section 2: How are the boundaries of regional divisions determined?

Response: We divided China into six regions mainly based on topographic conditions (elevation), and climatic conditions (air temperature and precipitation).

2. Section 4.1: How to solve the problem of different spatial resolutions of ERA5 data and CMFD data?

Response: We sample the two data to the same resolution, and then use latitude and longitude as control conditions to match the different data.

3. Section 4.4: Are the 90th percentile in TX90p and the 10th percentile in TX10p determined based on all the data in a year?

Response: The 90th percentile in TX90p and the 10th percentile in TX10p are obtained in ascending order based on the T_{\max} data of each month during 1979-2018.

4. Section 5.2: What is the significance level represented by "Significant upward" and

"Significant downward" in Table 2?

Response: The significance level represented by "Significant upward" and "Significant downward" in Table 2 is 0.05.

Minor comments:

1. L26: "region" to "regions".

Response: Thank you for the valuable guidance, and we have made revisions.

2. L50: "model" should be "models".

Response: Thank you, and we have made revisions.

3. L55: "spatialize" should be "spatialized".

Response: Thank you for your good suggestions. We have made revisions.

4. L77: "use" should be "used".

Response: Thank you, and we have made revisions.

5. L93: "use" to "used".

Response: Thank you for the valuable comment, and we have made revisions.

6. L94: "constructs" to "constructed".

Response: Thank you for your guidance. We have made revisions.

7. L178: "considers" to "consider".

Response: Thank you, and we have made revisions.

8. L196: I think "the missing point" should be "the missing values".

Response: Thank you. We have made revisions.

9. L200: Should "used it" be "used sine function"?

Response: Thank you very much for your advice, and we have made revisions.

10. L205: No need to express here: "Use the least square method to solve the unknowns A and B."

Response: Thank you, and we have made revisions.

11. L284: "may be" to "can be".

Response: Thank you. We have modified it in the manuscript.

12. L306: delete "the correlation coefficient".

Response: Thank you for the valuable comment and guidance. We have made revisions.

13. L384: "opposing" to "opposite".

Response: Thank you, and we have made revisions.

14. L386: “the regions with the fastest T_{\max} rise in spring, summer, autumn and winter are III, I, I and VI respectively” to “in spring, summer, autumn and winter, the regions with the fastest T_{\max} rise are III, I, I and VI respectively”.

Response: Thank you very much for your careful review, and we have made revisions.

15. L443: “built data” to “the dataset”.

Response: Thank you, and we have made revisions.

16. L460: “first decreasing” to “decreasing first”.

Response: Thank you for your guidance, and we have made revisions.

17. L482: The tense of “The regions with no significant change in SU are mainly distributed in region VI” and the following sentence are not consistent.

Response: Thank you, and we have made revisions.

18. L605: delete “daily”.

Response: Thanks for your good suggestion. We have modified it in the manuscript.