

# ***Interactive comment on “Contribution of Surface Solar Radiation and Precipitation to Spatiotemporal Patterns of Surface and Air Temperature Warming in China from 1960 to 2003” by Jizheng Du et al.***

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Please find our response below your comments

1). General Comment: This paper analyzed the spatial patterns of  $T_s$  and  $T_a$  and their relations with SSR and precipitation using the observations. It is important to study the mechanism of T changes in the warming climate in regional scales. I think this article is publishable after major corrections.

Reply: Thanks for your high recommendation and the insightful comments, which substantially improve the paper. As a result, four figures were removed and about 1400

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words were removed from main text of the revised manuscript. Below please find our point to point response to your comments.

2). Major Comment: Eq (1) is not needed, "linear trend" or "Linear regression" should be enough.

Reply: We have replaced the Eq (1) to a statement in Lines 213-214 that "The linear trends reported in this study were calculated by a linear regression based on monthly anomalies of T, Rs, and P".

3) Comment: Please discuss why the T<sub>adjusted</sub> is calculated? State its actual meaning and applications.

Reply: Thanks for your positive comments. We have added the description in Lines 241-246: "To illustrate the impact of Rs /P on the temperatures, we removed their impacts from their original time series of Ts-max and Ta-max based on multilinear relationship in Eq (1). Then we calculated trends from both the original and adjusted time series. By comparing derived trends of original and adjusted time series, we can quantitatively assess the impact of Rs /P on the Ts-max and Ta-max, in particularly the spatial-temporal pattern of their trends".

4). Comment: The detailed descriptions are not necessary in Figure captions and can be moved to the text.

Reply: Following the reviewer's suggestion, we substantially reduced the figure captions.

5). Minor Comment: Line 54: Hegerl and Zwiers is missing in the references

Reply: We have added this literature to references. (Lines 523)

6). Comment: Is that 1990?

Reply: Yes, it is 1990. We have changed the 1900 to 1990.

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7). Comment: Please check Ts-max and Ta-max trends. By eye, both values should be close.

Reply: We have checked the results of Ts-max and Ta-max trends. The results in paper is right.

8). Comment: Line 277-281: Mechanism of the difference should be mentioned here.

Reply: We have added the mechanism analysis of those difference as followed in main text. "Some previous studies hold an opinion that the microclimate (e.g. urban heat island) has a larger impact on minimum temperatures due to the lower and more stable boundary layer at night (Zhou and Ren, 2011; Christy et al., 2009), while many investigators argued that the variabilities of Rs are the main reason for this daily contrast in warming rates (Sanchez-Lorenzo and Wild, 2012; Makowski et al., 2009)." (Lines 277-281).

9). Comment: Line 284: greater than

Reply: Corrected as suggested.

10). Comment: Line 294: Significant difference. Can you clarify how significant it is please?

Reply: We deleted this sentence from the revised paper. In the revised paper, 95% confidence intervals were added to all the trends.

11). Comment: Line 374: along the coast

Reply: Corrected as suggested.

12). Comment: Line 534: References

Reply: Corrected as suggested.

13). Comment: Line 570: Eastling et al and Line. 638: Ohmura; They are not referenced in the text, please check.

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Reply: We cited both references in the revised paper in Lines 274-277: “The warming rate of Ts-min (Ta-min) was significantly faster than that of Ts-max (Ta-max) and the warming rates of all temperatures in cold seasons were substantially stronger than those in warm seasons (Li et al., 2015; Liu et al., 2004; Easterling et al., 1997).”

in Lines 336-342: “Our results are considerably less than the global average dimming rate ( $-2.3 \sim -5.1 \text{ W m}^{-2} 10\text{yr}^{-1}$ ) between the 1960s and the 1990s (Gilgen et al., 1998; Liepert, 2002; Stanhill and Cohen, 2001; Ohmura, 2006).”

14). Comment: Ta-min in Figs 5,6,8,9 can be removed, since they don't give much information. They can be briefly discussed in the text.

Reply: Corrected as suggested. We have moved the Figs 5, 6, 8, 9 to the supplementary material and their discussion in main text was substantially reduced.

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