

Response to Referee #2

We would like to thank the reviewer for the comments and suggestions, which help to improve the quality of our work. We have made revisions and have replied to all comments and suggestions. Please find a detailed point-by-point response to each comment.

Comment:

This manuscript produced a dense station-based long-term dataset of daily surface solar radiation in China at the 2473 CMA meteorological stations during 1950s -2021, and the dataset consists of estimates of global, direct and diffuse radiation. Surface solar radiation is crucial in research of agriculture, hydrology, ecology, climate change, and simulations of land surface processes. Validation against in-situ observations and comparisons with two satellite-based radiation products show that the station-based radiation dataset clearly outperforms the satellite-based radiation products at both daily and monthly scales. The dataset produced in this study was available for more than 60 years and includes three radiation components, which is not possible with satellite products. This dataset will contribute to the climate change research and solar energy engineering applications in the future. The topic is highly interesting and appropriated for ESSD. The paper is clear and well written. Therefore, I recommend its publishing on the ESSD after answering the following several minor issues.

Response:

We thank Referee #2 for the encouraging comments. All comments and suggestions have been considered carefully and well addressed.

Comment:

1. Line 77-78, the sentence of “Among the GEBA, there are only about 100 radiation stations (Jiang et al. 2020a), which are provided by the China Meteorological Administration (CMA).” is repeated with the sentence of “For example, there are only about 100 radiation stations maintained by CMA,” in Line 111-112.

Response:

Accepted! We will change the sentence in Line 111-112 in the original manuscript to “For example, the number of radiation stations maintained by the CMA is only about 100, but the number of routine weather stations with long-term observations is much denser, exceeding 2400 stations” in the revised manuscript.

Comment:

2. Line 116, “sunshine-duration-based models” should be “sunshine duration-based models”.

Response:

Accepted!

Comment:

3. Line 143-144, the sentence of “, including three elements of global radiation, direct radiation and diffuse radiation” should be polished.

Response:

Accepted! We will change the sentence to “which includes three elements: global radiation, direct radiation and diffuse radiation.” in the revised manuscript.

Comment:

4. Equations (2) and (5), it should be better to use $\tau_{c,b}$ (but not $\tau_{c,dir}$) to denote cloud transmittance for the daily direct radiation.

Response:

Accepted!

Comment:

5. Line 226, “period 1961-2021” should be “period of 1961-2021”.

Response:

Accepted!

Comment:

6. Line 242, “that of the global and diffuse radiation” should be “those of the global and diffuse radiation”.

Response:

Accepted!

Comment:

7. Line 270, “the period 1983.7-2018.12” should be “the period of 1983.7-2018.12”.

Response:

Accepted!

Comment:

8. Line 323, “a R” should be “an R”.

Response:

Accepted!

Comment:

9. Line 359, “direct and global radiation” should be “direct and diffuse radiation”.

Response:

Accepted!

Comment:

10. Line 385-386, the word “from 2000 to 2010” is redundant.

Response:

Accepted! We will delete the word.

Comment:

11. Line 394, “W m-2” should be “W m⁻²”.

Response:

Accepted!

Comment:

12. Line 397, “Jiang et al. (2020a)’s” should be “Jiang et al. (2020a)”.

Response:

Accepted!

Comment:

13. The format of Tables 1 and 2 should be a “three line table”.

Response:

Accepted! We will improve the Tables in the revised manuscript.

Comment:

14. Line 414, “that of the two satellite products” should be “those of the two satellite products”.

Response:

Accepted!

Comment:

15. Line 410-413, the sentence should be polished.

Response:

Accepted! We will change the sentence to “The MBE and RMSE of our estimate are 2.6 W m⁻² and 13.4 W m⁻², respectively, which are lower than those of the two satellite products, with MBE and RMSE values of 4.6 W m⁻² and 18.5 W m⁻² for the Jiang et al. (2020a) product and 6.7 W m⁻² and 16.3 W m⁻² for the Tang et al. (2019a) product.” in the revised manuscript.

Comment:

16. Line 448, “northwester” should be “northwestern”.

Response:

Accepted!