

## Comment on **essd-2022-233**

Anonymous Referee #1

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Referee comment on "A global dataset of daily near-surface air temperature at 1-km resolution (2003–2020)" by Tao Zhang et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2022-233-RC1>, 2022

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Satellite remote sensing and ground-based stations play their unique advantages in global meteorological parameter retrieval, and near-surface temperature is of great significance to global and local climate. In this study, satellite and ground-based data are used to retrieve near-surface maximum and minimum temperatures in almost global land regions with 1-km resolution. Overall, this manuscript is clear and well written and presents interesting research, however I found there was a lack of details necessary to fully understand the methods. Some concerns are needed to address, below are my major comments. (Major revision)

- Line 16: I think "ground station-based  $T_a$ " is better than "station-based ground  $T_a$ ".
- The description of the "global dataset" is not rigorous, as the authors have only achieved retrieval of near-surface temperatures for most of the global land region.
- Lines 82-83: Different regional retrieval models have certain differences. Two different  $T_{max}$  and  $T_{min}$  will be obtained in the overlapping region. How does the author calculate the final  $T_{max}$  and  $T_{min}$  results?
- The latitude and longitude grid should be added in Figure 1.
- Please explain in detail the similarities and differences with the study by Zhang et al. (2022b), and whether there are other differences besides the study area.
- Lines 107-114: The ground-based stations usually have a high temporal resolution, and the seamless global surface temperature data used by the author comes from the MODIS sensor, which has a limited number of transits. When the training sample library is constructed, the author only describes the spatial matching process and ignores the temporal matching, please give a detailed description.
- Lines 124-125: Does the authors mean that the ground-based measurement result corresponding to mid-daytime is the  $T_{max}$  of the site, and the ground-based measurement result corresponding to mid-nighttime is the  $T_{min}$  of the site? If yes, I don't think it's reasonable, especially for the  $T_{min}$ .
- Due to the spatial correlation of the near-surface air temperature at the different stations and the temporal correlation between the training data at same station, the 10-fold cross-validation verification cannot truly reflect the accuracy of the model. The author needs to give independent verification results, such as the first 15 days of each month as training Set, the data of the last 5 days is used as the validation set or test

set, or the data from 2003-2018 is used as the training set, and the data in 2020 is used as the validation or test set, or 80% of the site data is used as the training set, and the data from the remaining 20% sites is used as the validation or test set.

- What does the Y-axis of Figure S1 represent? Is it the number of valid observation samples or the number of stations that only include 1 valid observation sample? Also, I did not find a related description of Figure S1 in the manuscript.
- Comparing Figure 1 and Figure 3 confuses me. In my view, the author has constructed Ta estimation models in 5 study regions, but does not include Greenland (Figure 1). I have three questions. First of all, why can the Ta retrieval in the Greenland region be achieved? The parameters of the retrieval model are the same as in which regions Ta retrieval model? In addition, the standardized regression coefficient for the Greenland region in Figure S7 is also absent. Second, can the constructed retrieval model be used for the retrieval of Ta in the oceanic region? Third, what do the non-color-filled regions on land in Figure 3 (such as the Amazon region and south-central Africa) mean?
- It is suggested to modify the color bar range of Tmax and Tmin in Figure 5 to be the same
- I think that the validation of the results in this manuscript needs to be expanded further and needs to add scatter plots for the validation of the retrieval results, such as density scatter plots instead of just calculating RMSE and MAE.