

Earth Syst. Sci. Data Discuss., referee comment RC2  
<https://doi.org/10.5194/essd-2021-313-RC2>, 2021  
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## Comment on **essd-2021-313**

Anonymous Referee #2

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Referee comment on "A global seamless 1 km resolution daily land surface temperature dataset (2003–2020)" by Tao Zhang et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2021-313-RC2>, 2021

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Zhang et al. proposed a novel method to generate a seamless global 1 km daily MODIS-like LST dataset. The topic is very interesting and the performance of the method looks good. The newly developed dataset should be of great use in climatic and ecological studies. I would like recommend acceptance after following minor revisions.

Line 15: "first, we fitted the long-term trend (overall mean) of observations in each pixel (ordered by day of year)" is confusing. First, the "overall mean" is ambiguous. Second, the independent variable should be included (e.g., Day of year?). Last, the fitting method should be introduced as well.

Lines 40-42: Some descriptions are not so accurate. For example, the spatial resolution of the Landsat series and ASTER data should be 60-120m; the temporal resolution for the ASTER data is not 16 days; the MODIS data should not be termed as "high spatial resolution about 1 km and high temporal resolution of..." as compared to the former two groups of the datasets. May be "moderate" is more appropriate.

Line 57: It remains unclear what are the so-called "there are still limitations in these products" here. It seems that this paragraph list some previous studies without pointing

out the specific knowledge gaps. Maybe it's better to incorporate this paragraph into the following one.

Line 75: I think the method based on empirical relationship is not necessarily computationally expensive as compared to the spatiotemporal interpolation and hybrid methods. For example, I came across studies that filled the missing LST values based on the ERA5-Land skin temperature might be more efficiently though with low accuracies.

Line 97: The legends of figure 1 are somewhat confusing. I think this study filled the gaps for all the tiles. Thus the "Title for gap-filling" should be removed to avoid possible misleading.

Line 102-108: Most descriptions here are completely the same as that in Abstract. Given that these have been detailed in the following sections, it's better to simplify or remove the duplications.

Line 115: "If PVD of T2  $\geq$  5%, did not change the data and accepted it, otherwise we gap-filled missing values based on the following order": I am lost on whether this study filled the missing values or not for the "PVD of T2  $\geq$  5%".

Lines 116-118: Did this study fills the missing values by all the three methods or just one of them for a given pixel location?

Line 118: A brief introduction to the "shift methods" is needed here.

Line 123: Does "the overall mean of observations in each pixel" mean the pixel with all the four valid observations?

Lines 127-128: I have two confusions here. First, it remains unclear which type (e.g., linear regression or others) of the correlation has been used and how many of the neighboring valid pixels (or how large the neighborhood size) have been used for each target pixel. Second, if the value for the target pixel is missing, how did this study obtain the correlation between the target pixel and its neighboring valid pixels?

Line 137: "In each of these years, we selected 19 days with the largest coverage of high quality data (coverage > 95% quantile)": It remains unclear what does the coverage mean? the coverage of all the four observations or the "overall mean" in a day ?

Lines 160: Besides the contrasting performances between urban and rural areas, the accuracies may vary substantially by the climate zones due to the different data availability and seasonality. For example, the tropical regions may have lower accuracies than the high latitude regions. I am wondering if possible to show the model performances for different climate zones.

Line 179: I think we cannot see the UHI phenomenon from figure 6 if we do not know where the urban areas are.

Line 179: It would be much better if this study can summarize the existing seamless LST data by a table.