

Comment on **essd-2022-83**

Anonymous Referee #1

Referee comment on "A global dataset of spatiotemporally seamless daily mean land surface temperatures: generation, validation, and analysis" by Falu Hong et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2022-83-RC1>, 2022

This study designed an operational framework that uses the annual temperature cycle (ATC) and diurnal temperature cycle (DTC) models to generate global seamless daily mean land surface temperature (LST). The framework and generated product were validated with globally distributed in situ measurements. The validations show that the generated daily mean LST can correct the sampling bias caused by directly compositing the cloud-free MODIS LSTs. This is an interesting point for the thermal remote sensing community. Additionally, the authors discussed the uncertainties of the daily mean LST products, which are useful for further improvement. The authors clearly addressed the structure of the IADTC framework and comprehensively evaluated the generated daily mean LST product. This manuscript is generally well written and clearly organized. I recommend the paper for publication after the following issues are answered.

Major comments

- (1) The direct comparison results between the generated daily mean land surface temperature product and in situ measurements display systematically negative bias at most sites (Tables 1 and 2). The authors should provide more explanations about the negative bias.
- (2) The authors used the diurnal temperature range (DTR) to define different scenarios. In this paper, the calculated DTR can be affected by the accuracy of ATC model, then affecting the determination of which scenario is used to generate daily mean land surface temperature. I recommend the authors add more discussions about the uncertainties of ATC model to the daily mean LST estimation.

Minor comments

- (3) Line 138: I recommend the authors to add some descriptions about how they process the in situ measurement outliers.
- (4) Line 176-178: Please add more examples or references about the LST change in low-latitude and high-latitude regions.
- (5) Line 218: Temporal normalization is a good way to handle the overpassing time fluctuations. Please provide more discussions about the role of temporal normalization in

generating consistent LST products.

(6) Line 242: Moving this sentence after the introduction of DTRfour would be better.

(7) Fig. 4: I recommend the authors to add one subplot for the illustration of Scenario #1.

(8) Line 317: "Lower accuracy" being compared to what needs to be clarified.

(9) Line 394: Please provide more evidence about the link between ΔT_{sb} and land cover type or DTR.

(10) Line 414: Please clarify what's the different information contained within the ΔT_{sb} .

(11) Fig. 11: I am wondering about the variation of error of Tdm_ATC_DTC versus DTRfour, which can provide more solid support for the necessity of defining Scenario #1.