This manuscript introduced a downscaled and continuous daily LST and SNR product across Europe for 2018–2019. The validations of radiation against BSRN in-situ measured are also presented in the paper. And it is said that an improvement of the root mean squared error by ca.8% with a substantial increase in spatial detail compared to the original MSG product. The paper indicates that the resulting pan-European LST and SNR dataset can be used for hydrological modelling and as input to models dedicated to estimating evaporation and surface turbulent heat fluxes. The LST and SNR product is important to describe Earth surface energy balance. Overall, this manuscript is clear. And the study is of great significance to improve the new understanding of energy balance in Europe. However, there are several issues that need to be taken care of before this paper becomes acceptable for publication.

We thank the reviewer for the time and effort put into this review. Both the general comment above and the detailed comments below are very helpful for the improvement of this manuscript. We are happy to share our point-by-point reposes highlighted in blue.

1. the high resolution LST product is merged from LEAF (all sky) and Sentinel 3 LST (clear sky). The two LSTs have different spatial and temporal resolutions. While doing the merging, if any cloud effect is considered? If any cloud product is involved? If yes, please indicated it.

   Response:

   We have not included any cloud product although the prevalence of clouds is considered in the merging procedure. Cloud cover is assumed when no LSAF clear-sky data is available and we fall back to the all-sky dataset. Therefore:

   1) Cloud over is taken into account by only using clear-sky LSAF data for the computation of the bias between LSAF and Sentinel-3, both daytime and nighttime.

   2) When computing the diurnal cycle effect on the misalignment of the Sentinel-3 observation to the full hour, this is only done if the two required LSAF samples on which the linear-interpolation is performed are clear-sky observations.

   3) In the Kalman assimilation scheme a higher uncertainty is assumed for LSAF all-sky products than for the clear-sky equivalent.

   Action: We will clarify this in the revise manuscript by providing more details in Sect 3.3 on page 7 as well as in the discussion and appendix.

2. while downscaling the LST product, if any edge effects (coast lines, cloud edges) are considered?

Response:

Due to the coarser spatial resolution of LSAF coast lines are not as well represented as in the 1 km Sentinel-3 data, as pixels with a considerable amount of water are masked out. The merging procedure and calculation of all-sky LST and net radiation at 1 km resolution can only be carried out where all input datasets are available and therefore the same rugged coast lines are visible in the LST/net radiation product.

Action: A simple solution, albeit introducing some uncertainties, is to extrapolate from the closest pixels with valid data on a daily basis. We will implement this in the revised manuscript and make it clear which pixels are based on interpolation through a mask value.

3. Line 220, it is said "Extensive validation of the LSAF and Sentinel 3 LST products has already been performed (see below). Both have an average accuracy below 1.5 K, although it varies across space and time. Our goal is to combine their individual strengths in terms of spatial and temporal resolution to obtain an enhanced representation of landscape heterogeneity". Although there are extensive validations of the LSAF and Sentinel 3 LST products, the validations are based on different spatial and temporal resolutions. It does not mean that the merged product could also has a good performance. It is good to give the statistics.

   Response: We agree with the reviewer.

   Action: We will include more detailed validation statistics in Sect 4.2 (see also the next comment given by the reviewer).

4. The paper is lack of statistics. e.g. figure 1, any overall statistics could be summarized in a table? And the absolute RMSEs are given in Figure 1. The percentage-wise is worth known. And so does the validations of outgoing raditaions and SNR. Please summarize the overall statistics (R, bias, RMSE (including percentages)), degree of freedom) in tables.

   Response: We agree that they should be included.

   Action: We will include all the above mentioned statistics and seasonal analysis will be included as well in Sect 4. We will add time series were appropriate to highlight our case/analysis.

5. More detailed information of in-situ sites could be given or summarized.

   Response: We agree with this.

   Action: A table with more detailed information about the in-situ data locations will be given, including the data time period, lon/lat/altitude and climate zone. This will coincide with a more detailed discussion of the result in terms of geographic areas and land cover types as requested by the other anonymous reviewer.

6. Figure 2, 3, 4 and A1, A2, A3 could also give the bar chart distribution.

   Response: Thanks, we agree again.

   Action: We will provide this information in the revised manuscript.

7. Please explain the reasons for case selections. e.g. 30 June 2018 in Figure 4 and 30 Sep 2018 in Figure A2.

   Response: There was no specific reason for the case selections. They are representative for other time steps.

   Action: This will be explicitly mentioned in the revised manuscript. Moreover, to enhance the representativeness of the selected cases, one of the examples will be changed to a day in winter.

8. If the LST and SNR products are compared with any other reanalysis or satellite products?

   Response: Yes, this could be included.

   Action: We will explore the possibility to include a comparison to a suitable state-of-the-art dataset, e.g., ERA5-Land.