Atmospheric
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Discussions

Interactive comment on "Skin temperature from the Thermal Infrared Sounder IASI" *by* S. Safieddine et al.

Anonymous Referee #1

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This paper presents a methodology to retrieve skin temperature from IASI observations using a neural network approach. The channels and retrieval methods seem scientifically correct; however, I'm concerned with the calibration procedure. The authors have chosen skin temperature datasets from EUMETSAT and ERA5, which is acceptable. However, if I understood correctly, the NN is then trained using direct IASI observations. This is not an appropriate procedure since it will result in a NN that is biased towards the datasets used for the retrieval (EUMETSAT and ERA5). This is clear in Fig.5, where the comparison with the ERA5 show the lowest biases. The common procedure is to use a database of atmospheric profiles (from ERA5, for instance) together with a Radiative Transfer Model in order to obtain the best estimates of the relationship between top-of-atmosphere brightness temperatures and skin temperature. This is the

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procedure generally used in all currently available operational products. The calibration database is of very high importance in statistical retrieval methods. As such, although the methods are sound, the calibration database is not and I believe it will significantly impact the quality of your retrievals.

There is also no reference to how the authors deal with emissivity. If I understood correctly, you simply disregard it, which means that there will possibly be strong discrepancies between different land covers. Please the discuss the implications of this simplification.

Regarding the inter-comparison and validation exercises, please provide more details on how the spatial matching is performed? Is SEVIRI resampled to the other products resolution or do you use the closest pixel? For the in situ validation a single month does not seem enough to properly validate the products. At least different times of year should be considered. The differences you found for SEVIRI are significantly higher than what was previously reported by Gottshe et al. (2016), how do you justify this? You could have also used SEVIRI to access the spatial variability of the site, e.g. through the std of all SEVIRI pixels within an ISASI observation. Also, in the validation report of EUMETSAT product (EUM/TSS/REP/13/684650), they found that because they were using an area quite far from the station (as you are) sometimes the station area as clouded while the satellite footprint was clear. You might want to use SEVIRI to remove observations when the station is under clouds.

Despite the constrains related the spatial resolution, the authors could also have performed station comparisons with other KIT and e.g. SURFRAD stations as they could provide further information on the quality of the retrievals. Jimenez et al. (2017), for instance, used these to validate retrievals from the AMSR-E, which has approximately the same spatial resolution.

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