

Interactive comment on “Spatial patterns in timing of the diurnal temperature cycle” by T. R. H. Holmes et al.

Anonymous Referee #1

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In the abstract the peak times for the GMAO (NWP) and the TIR are given, and also their difference (23 min). It is left to the reader to calculate the corresponding peak time for the Ka band for non-desert areas (TIR peak time + 15 min = 13:28); however, on page 6032, line 11, I only found an average peak time of 13:44 for the Ka band. I therefore assume that the 13:28 peak time is the result for the non-desert areas; however, since this number is not given in the abstract nor in '5. Results', this is somewhat confusing. I recommend to include the Ka band peak time in the abstract so that readers can directly compare all three peak times. The 13:28 Ka peak time 'without deserts' should then also be mentioned in the '5. Results' section. On page 6034, line 14, the authors then give a delay of 14 min between the Ka band and the TIR band peak times for Europe: this is close to, but not identical to the time delay of the non-desert sites:

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please clarify.

page 6022, line 26: 'MERRA' needs to be explained (this is done later on page 6027, lines 3-4).

page 6024, eq. (1): please state here the Ka band frequency used to estimate damping depth ZD. (it is given on page 6025 in line 19 as 37GHz).

page 6028, line 10: it is stated that the coverage of MSG observations is limited to $< 78^\circ$ 'Earth incidence angle'. However, what this means is not easy to picture: it would be helpful to additionally provide the approximate MSG/SEVIRI view zenith angle (VZA) that this corresponds to. This must be smaller than the VZA limit of 55° degrees used by LSA SAF.

In section '3.3 Geostationary thermal infrared based LST' it is not mentioned if the data may be subject to a clear-sky bias and if this could have an impact on the peak times - the other two LST sources are not (or less) affected by this. Please comment and give a judgement of what the impact may be.

Figure 2: please also label and indicate (i.e. by horizontal line to y-axis) the 'half of the decrease in temperature' for the start of the attenuation function at time t_s .

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