This is overall an interesting paper that suggests many improvements to the NASA CERES unfiltering process. The error analysis is very relevant (section 3). Although this work could be a step toward implementation in future CERES releases (eg Ed5), it does not fully explain the differences wrt to Ed4 that are shown in section 4. Additional validation/verification/documentation would be welcome before implementation in the CERES processing system.

I am not a native speaker but get the feeling that the English for some sentences could be improved. A careful review, eg by the journal editor, is suggested. Similarly, the authors should check the units and symbols (eg micrometer is sometime written as μm, or um, or mm).

I suggest the following points for an improved manuscript:

- Don't use "less than" in the abstract and text body (eg line 23: "... are reduced by less than 0.31 W/m² ..." should be "... are reduced by 0.31 W/m² ...").

Changed as suggested.

- Typos line 16 ("process that used one set ..."), line 46 ("covering"), line 55 ("surface the surface"), line 91 ("relationships"), 132 ("μm").

Done.

- line 132, the wavelength range is given in μm and the spectral resolution in wavenumbers. It would be good to indicate how many wavelength steps have been used or to specify the wavelength increments, in μm, at lower end (0.25μm) and upper end (1000μm) of the wavelength range.

It is changed to the following:

Simulations are performed from 0 to 40000 wavenumbers per cm (0.25 μm to ~1000 μm) with a spectral resolution of 2 wavenumbers per cm.

- For the MODTRAN radiative transfer calculation in the LW part of the spectrum it would be interesting to specify how the surface emissivity has been considered (especially over desert surface).

In the Ed4 radiance unfiltering process, the land and snow/ice surfaces were characterized by Lambertian surfaces with prescribed spectral reflectances; in this version, the land and snow/ice surfaces are characterized by BRDF models and the emissivities are internally handled by MODTRAN through the surface BRDF reflectances.

- The handling of the far infra-red region should be discussed in more details. The spectral responses seem to be defined until 140μm (or 200 μm?), please confirm. What is the assumed sensitivity beyond this limit? zero? In this case, why are the MODTRAN simulations performed until 1000 μm.

The spectral response functions for SW and TOT channels are defined from 0.2 to 200 μm and they are 0 beyond these ranges. Although the simulations were prescribed up to 1000 μm, the simulated radiances beyond 200 μm are not used anyway.

- The FM1 and FM3 have marked difference in terms of spectral response (Figure 1). A brief discussion of the difference would be welcome. Also, the far-IR leakage of the SW filter seems to have an identical effect on the SW spectral response for FM1 and FM3. Please confirm as it seems strange to have difference in TW responses and not in SW in the far IR.

We like to discuss the spectral response function differences of FM1 and FM3, however and unfortunately, as how does the response functions changing as a function of spectrum impact the radiance unfiltering is not clear. Instead of speculations, we prefer to leave it as it is. It's true that SW channel has quite large response in the far-IR range, but the actual SW energy is quite small. We think that its impact to the radiance unfiltering is negligible.

- Figures 20-22 show 4 panels that are said to be for April (a), July (b), October (c) and December (d). This is visibly not the case (eg (a) should be Winter (December?)). Further, the text discusses the results for January (eg line 343). Please check and correct.

Corrected. They should be January (a), April (b), July (c), and October (d).

- The end-to-end sensitivity study of the unfiltering algorithm (section 4) is really interesting. Given the (significant) observed differences with the Ed4 fluxes, this sections would deserve a longer discussion as well on the methodology as on the interpretation of the observed differences.

We have added more discussion in this section and please see the text for the details.

- Comparing Figures 21 and 22, it seems that most of the daytime difference in LW flux is coming from the subtraction of the SW component in the TW channel. Please confirm this and consider performing additional studies to confirm this work is an improvement with respect to Ed4.

We agree that the regions with positive values in SW are more likely to have negative values in the daytime LW. This statement has been added in Section 4.