RC3: 'Comment on amt-2024-13', Anonymous Referee #3

We highly appreciate your comments on our manuscript. We hope that you will find our responses and the corresponding revisions for the original manuscript satisfactory. Please find below your comments/suggestions (blue color) and our responses (red color).

I believe that this manuscript aligns perfectly with the scope of AMT, and the presented results are indeed relevant. There are only a few minor technical remarks to address.

Minor/technical comments:

Page 2, line 47: Following Giles et al. (2019), AERONET derives AOD at 9 different spectral bands although the AOD at 935 nm is extrapolated based on the Ångström Exponent. Why did the authors state in the text that AERONET provides information at seven spectral bands?

Corrected (lines 49-50).

4: There is a typo in the y-axis? Are these values unitless?

Fixed (Figure 5).

Section 2.2.8 and Figure 4: What atmospheric conditions are considered "good" by the authors in the Figure? I believe that some explanation about this classification in the text would be necessary. Additionally, are the spectral bands not included (marked with asterisks) due to the influence of atmospheric gas absorption?

Yes.

Have the authors accounted for these absorption processes in their calculations?

No, we've excluded them from the Langley-derived Io values and then interpolated with lamp-derived responsivities following the practice of Kindel et al. (2001) and of Michalsky & Kiedron (2022).

Figure 5 and Section 2.2.9: Are the authors applying the Langley-Plot method between air masses from 1.X to 6, as stated in the Figure?

Yes, the Langley's are only fit from 1.x to 6 airmasses.

Page 9, line 220: I consider it will be highlighting to include the number of Langleys performed (and maybe the time interval?). I haven't read this information in the text or maybe I have missed this number. Furthermore, the authors set a threshold in the text to define those stable Langleys performed in the whole time series: below 1% per day. Are the authors talking about the standard deviation of the fitting?

In analog to the MFRSR we apply an interquartile filter to Io values over a span of several weeks, and then apply a sliding Gaussian-weighted averaging filter to determine a daily Io. The daily Io values are stable to within a few tenths of a percent per day, which effects OD at less than 0.01.

Figure 6: Is Optical Depth (OD), TOD (as expressed in the caption) or AOD (as expressed in the legend)? Please clarify. I understand that with "good AOD", the authors are referring to those spectral bands that can be used to retrieve effectively AOD and TOD from the SAS-He. Maybe the term "good AOD" is not the best one to be included in the legend.

Clarified (lines 287-289).

Page 10, line 250: It is important to highlight that you are comparing with independent instruments!

Done (line 296).

Page 14, first paragraph: Why do you think the 1020nm spectral band presents worse results (in addition to 380nm in TRACER)?
We had noticed this issue (1020 nm) previously. However, we had not been able to identify this spectrometer degradation issue until recently. We have replaced the previous plots, which used the 1020 nm pixel from the degraded NIR spectrometer with new figures using the corresponding pixel from the UV/VIS spectrometer. Such replacement yields consistent agreement for all three campaigns. We attribute the previous disagreement at the TRACER and EPCAPE to degradation of the NIR spectrometer affecting its short wavelength range, but apparently leaving the 1.6 micron values unaffected.

In comparison with the TCAP and EPCAPE, the TRACER is characterized by slightly larger value of the RMSE (0.021) at 380 nm wavelength (Table 2). However, this value and other TRACER-related statistics (Table 2) appear feasible.