

Second review of “Simultaneous retrievals of biomass-burning aerosols and trace gases from the ultraviolet to near-infrared over northern Thailand during the 2019 pre-monsoon season” by Jeong et al.

July 23, 2022

Reviewer Recommendation: Minor revisions before publication

Summary:

The content of the submitted manuscript remains largely the same information as the first

iteration of the article. The SMART-s sensor is described with emphasis given to the retrieval of physical properties of aerosols with the combination of gaseous column measurements from the UV to the red portion of the visible spectrum. The changes made by the authors have clarified almost all my original concerns and focused the results, in my opinion, adequately for publication. The few areas where the authors elected to ignore my original comments seem reasonable.

I believe the revised manuscript is publishable as the information contained is very similar to the original draft. The presentation of that information is clearer, in my opinion, in the current form. I would suggest the revised manuscript is publishable, provided the authors address a few very minor concerns that remain to clear up some lingering points of confusion.

Again, we sincerely appreciate the referee #1 and #2 for their time and critical review of the manuscript which we feel provided an important and neutral perspective on the material presented. As such, the manuscript is much more focused and streamlined. Our point-to-point responses to the reviewer are given below. For clarity, all responses are provided in blue.

Minor Comments:

1. Line 18: I would modify this sentence to specify the instruments of interest are spectrometers, i.e. “...advent of spaceborne spectrometers in geostationary...”
→ We appreciate the suggestion. The sentence was revised as the referee suggested.
2. Line 34-35: I would suggest modifying to “...and higher water vapor concentrations when approaching...”
→ We appreciate the comment. We revised the sentence as the referee suggested.
3. Line 118: Remove “A” before “SKYNET (SKY radiometer NETwork) instruments”
→ We appreciate the correction. We revised the sentence as the referee suggested.
4. Line 154: Suggest changing “covering UV” to either “covering the UV” or “covering

UV wavelengths”

→ The sentence was revised as the referee suggested (covering **the** UV).

5. Line 185: Suggest inserting “campaign” after “7-SEAS”

→ The sentence was revised as the referee suggested.

6. Line 186: Suggest modifying the article in front of sUAS to “...deployed a sUAS (...) in a rotary...”. This will also match Line 432 below.

→ The sentence was revised as the referee suggested.

7. Line 193-194: There is no need to define the acronyms for VIIRS and SNPP in the main text and Figure 1 caption. One should be removed to avoid redundancy.

→ We revised the caption of Figure 1 as the referee suggested.

8. Line 221: This sentence is past tense so should be “The SMART-s instrument was originally...”

→ The sentence was revised as the referee suggested.

9. Line 229: Suggest adding “pixels” (I assume this is what the numbers are) after “2,048x64”

→ We appreciate the comment. We revised the sentence as the referee suggested.

10. Line 231-233: The parentheticals here is too long, I think. I think this sentence should read: “...bandpass filters (e.g., U340 and BP300) to block out...” and “...ground fused-silica diffuser (defuser hereafter) for NO₂ ...”. Otherwise, they do not match the last element describing the dark current.

→ We appreciate the comment. We revised the sentence as the referee suggested.

11. Line 350: Either missing "an" before “unscreened thin cirrus cloud” or suggest using the plural ("clouds")

→ We appreciate the comment. We revised the sentence as the referee suggested as follows:

“...However, unscreened thin cirrus clouds may generate diffuse light within the FOV more effectively than the aerosols due to their stronger forward scattering ...”

12. Line 374-375: Not quite clear what “to avoid a strong gas absorption bands” expresses. Did you mean “to avoid a strong gas absorption band” or “to avoid strong gas absorption bands” or “to avoid absorption bands of a strong gas”?

→ We appreciate the comment. We revised the sentence as the referee suggested.

“...which is carefully selected to avoid strong absorption bands of atmospheric gases...”

13. Line 388: Suggest replacing “spectrums” with “spectra”.

→ The sentence was revised as the referee suggested.

14. Line 407: I think in “dry areas of the Indo-Gangetic plain” the “of” should be "off", as the deserts are away from the plain instead of a part of the plain. Unless this meant for the Thar desert to be the dry area of the plain, as I am not familiar exactly with the geography in that region. If that is the case I would suggest “transported dust from the Saharan desert or the Thar desert, which is a dry area of the Indo-Gangetic plain”

→ The Saharan desert, Thar desert, and dry areas of the Indo-Gangetic plain are different places at upwind areas of the measurement site. As the referee indicated, the sentence was revised as follows for clarity:

“e.g., transported dust from Saharan desert, Thar desert, and dry areas of the Indo-Gangetic plain”

15. Line 438: MBE and RMSE are now defined above so their definition here is redundant. Suggest removing the definitions.

→ The sentence was revised as the referee suggested.

16. Line 512: Suggest “increased” instead of “increases” (past tense was also chosen in e.g. Lines 516 or 524)

→ The sentence was revised as the referee suggested.

17. Line 610: Suggest replacing with “... for the 340-550 nm pair” and “for the 378 nm and the 550 nm pairs”

→ The sentence was revised as the referee suggested.

18. Line 633: Suggest adding the date here again, i.e. “...during the pre-monsoon season in northern Thailand in 2019 to perform...”

→ The sentence was revised as the referee suggested.

19. Line 663: Suggest removing the “s” from “contents.

→ The sentence was revised as the referee suggested.

20. Figure 3: The different color lines plotted in panel (a) are almost impossible to see.

My first reading suggested that the lines were all orange. I therefore suggest you rephrase the caption slightly to note that there are different colors and that they simply overlap or include a legend, otherwise it is easy to miss the colors completely. For example, I might modify the sentence “Different colors indicate...” to “All nine colors are plotted as in Figure 2 indicating average current measurements over 10 repetitions, which overlap almost completely.” Alternatively, you could plot the mean measurement and the 9 deviations from it.

→ We appreciate the comment. The Figure 3 caption was revised as the referee suggested.

21. Figure 5: I would be concerned about misrepresenting data if your instrument is insensitive to particles with data larger than 10 microns. For clarity, I would strongly suggest simply removing lines and error estimates where you have no sensitivity as they do not represent data per say but rather a model that may or may not continue to be accurate.

→ We appreciate the comment. The vertical bars in Figure 5 represents variability of the particle size distribution at each radius node, which do not represent retrieval errors. We believe the “variability” also provides some information for comparison of the two different sources of data, thus decided to keep the original figure. However, we agree that the vertical bar may misled the readers, therefore we revised the Figure caption as below.

“... Variability of the retrievals (standard deviations at each radius node) during the period are represented as vertical bars in this figure. The SMART-s spectral range is not sensitive to aerosols with radius greater than about 10 μm , and the SMART-s retrievals over this range (see long tails of the blue dashed-line) are mostly determined by the lognormal-shape assumption, thus with the small variability. Note that the vertical bars do not represent retrieval errors at each radius node.”

22. Figure 15: AAE is already defined in the text and should be removed to avoid redundancy.

→ We appreciate the comment. The Figure 15 caption was revised as the referee suggested.

23. Figure A4: Suggest capitalizing "Residual" for consistency with Figure A3 and Optical Thickness

→ We appreciate the comment. Figure A4 was revised as the referee suggested.

