

#Referee1

I congratulate the authors for their high-quality work developing a theoretical approach to estimate the lidar ratio values for CALIPSO aerosol models. The research results can be used to evaluate the extinction profiles of atmospheric aerosols by using CALIPSO data. The paper is well written with an excellent logical presentation sequence. The methodology is clearly outlined and based on valid assumptions. The authors describe the approach limitations and expected sources of uncertainties. The authors compared their results to ground observations and results from other consolidated and published results, demonstrating the research's accuracy and contribution to atmospheric science.

However, there are some issues that the authors should work on before the paper's publication:

a) There are a few typo errors that I found and highlighted in the attached file;

Answer: We thank you for your comment. These are corrected in the revised manuscript.

b) I'm afraid I have to disagree with the statement in line 300 when the authors discuss the increase of the backscattering coefficient with relative humidity. Figure 3 shows that the backscattering coefficient sensitivity to relative humidity is higher for clean continental aerosols than urban and polluted continental aerosols. Maybe the line patterns in the figure are hard to read in black and white, making it hard to read the information from the plot. I suggest preparing the figure using colors or a continuous line for the clean continental and marine continental for better identification;

Answer: We thank you for highlighting this point. The backscattering sensitivity with respect to clean continental and clean maritime aerosols was higher as compared to polluted continental, urban and polluted maritime aerosols. This is corrected in the revised manuscript.

c) I suggest that the authors modify the statement in line 308. According to Figure 6(e), both wavelengths show an increase in LIDAR ratio, but 532 nm has a more significant increase than 1064 nm. Also, the LIDAR ratio values are lower at 1064nm than at 532nm;

Answer: We thank you for this suggestion. Corrections are incorporated in the revised manuscript.

d) I recommend using (a), (b), and (c) instead of (c), (d), and (e) in Figures 4 and 6.

Answer: We thank you for this recommendation. Corrections are incorporated in the revised manuscript.

e) The Figures 1 to 6 look like the graphs are in low resolution. Their presentation quality can be improved.

Answer: We thank you for this recommendation. Corrections are incorporated in the revised manuscript.

Once again, congratulations for the good work.