

On the representativeness of the ground-based lidar observations for satellite calibration/validation—the example of the archipelago of Cabo Verde, Athena Augusta Floutsi, Konstantinos Rizos, Dimitri Trapon, Ronny Engelmann, Dietrich Althausen, Eleni Marinou, Peristera Paschou, Julian Hofer, Emmanouil Proestakis, Henriette Gebauer, Annett Skupin, Albert Ansmann, Thorsten Fehr, Timon Hummel, Rob Koopman, Vassilis Amiridis, Ulla Wandinger, and Holger Baars

General Comments

The paper is logically structured, clearly presenting the data, methodology, results from long-term and monthly comparisons, and detailed case studies. The conclusions drawn are well-supported by the evidence, particularly highlighting the conditional representativeness of the Mindelo station.

A key strength of the paper is the clear distinction and recommendation for using monthly averaged profiles over single overpasses for long-term validation. The findings strongly suggest that monthly averaged aerosol profiles are better for validating spaceborne profiles over long times, as representativeness cannot be guaranteed for single overpasses without additional measures.

I would like to offer several constructive observations that may help refine the study and guide future work as follows.

Minor general comments:

- The comparison lacks statistical measures when comparing ground based and satellite derived measurements for monthly analysis.
- The difference between mean and median analysis could be emphasized a bit more in the analysis

Specific Comments

- Line 47, please add the Level 1 and Level 2 ATBD references for CALIPSO;
- Line 68, please add the lat/lon information on the JATAC location;
- Line 91, please clarify what “not as part of ACTRIS facility” mean in the context of your cal/val campaign;
- Line 113, please add a reference for aerosol typing and its residence time;
- Line 154, all the aerosol typing analysis throughout ASKOS is based on Floutsi et. al., 2023? Please clarify that this is true for all your analysis. As you are referencing it just for dust aerosol, it is not very clear as this is true for other aerosol types.
- Line 170, please add an example and/or reference for deriving Ångström exponent from optical models.
- Line 175, as above, please add the CALIPSO L2 ATBD reference;
- Line 203, do you have any statistics that supports your choice as a starting altitude that you ran HYSPLIT? How the lofted aerosol layers are calculated from PollyXT system? What is the bin range for each altitude that HYSPLIT considers? Please argue a bit more on how these input value have been chosen.

- Line 225, please clarify the methodology that you used to reach to the statement that “the backscatter and extinction profiles per radius are very similar”. What are the statistical criteria you used in your analysis? Please also clarify how you define here that “the atmosphere around Mindelo is comparable homogeneous”.
- Fig. 6, Have you used other filtering criteria on both LIVAS and PollyXT data (e.g., associated errors, QA filters) other than cloud screening?
- Line 283, please comment and define the terms “satisfactory” and “severely overestimated” at Line 287. What are the statistical measures used to reach these conclusions?
- Line 314, assuming maximum distance should be less than 100 km between ground based and satellite, the 11 Sept 2022 case is greater than your filtering, please clarify.
- Line 334, please comment and/or argue why the chosen of the ground based retrieval measurements interval was not centered around the satellite overpass.
- Line 441, please add reference to EarthCARE L1 and L2 ATBDs

Technical Corrections

- valid throughout document: please be consistent with the acronyms and their explanation. Either use the acronym first and the explanation in parenthesis, e.g., line 36, or full name and the acronym in parenthesis, e.g., line 53.
- Line 96, you end the sentence and start the next one with same word (i.e., EarthCARE), please rephrase.
- Line 307, please clarify how the spatial filtering was done here. The phrase “The maximum distance of the CALIPSO overpass to the ground-based station was chosen such as to exceed the radius threshold of 100 km...”, one can understand that the **minimum** distance between the two instruments should be **more** than 100 km.