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Discussions

Interactive comment on "GARRLiC and LIRIC: strengths and limitations for the characterization of dust and marine particles along with their mixtures" *by* Alexandra Tsekeri et al.

Anonymous Referee #2

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Tsekeri et al. present a study on the performance of two lidar algorithms in characterizing the vertical distribution of Saharan dust, marine particles and mixtures thereof for three case studies.

The evaluation of retrieval algorithms that combine lidar with passive remote sensing measurements, such as sunphotomers or polarimeters, is an important piece in a much larger puzzle that aims to understand how to effectively combine measurements obtained from a number of different instruments in order to maximize the information content available in the data to accurately retrieve optical and physical properties of aerosols, allowing us to have a complete spatial (horizontal and vertical) and temporal

characterization of the atmosphere.

The manuscript is well written and well structured, and the methodology used is sound. However, the results are presented mostly in qualitative terms. The readers would benefit from having more quantitative results described in the paper. I recommend the publication of this manuscript once the authors address the following points:

Specific comments:

Page 3: lines 26-28: This segment does not read well. Perhaps change to something like: "(. . .) coarse particles. The cross-polarized lidar signal at 532 nm allows the decoupling of the coarse mode into its spherical and non-spherical components"

Page 4, line 7-9: Please elaborate a bit more on the retrieval uncertainties. How do you determine them? What's the difference in determining the uncertainties for the total-column microphysical retrievals vs. for the profile retrieval of concentrations?

Page 4, line 18: What do you mean by "whereas otherwise" in this case? It doesn't seem to fit in the sentence.

Page 5, line 25-26: Suggestion: "Dust transport, while less frequent during the dry period, it is still observed (e.g. . . .) and it is characterized by a transport pattern (. . .)"

Page 7, line 1: "instrument and calibration precision" instead of "instrument precision and calibration precision".

Page 7, line 2: replace "Visible" by "visible range".

Page 7, line 16: replace "extent" by "fraction".

Page 8, line 22: Why 40,000? Is that an arbitrary or standard number of particles that modelers use, or was there another reason for that choice?

Page 9, line 12: what is Eta in "24 Eta vertical layers"?

Page 9, line 13: Change 1/3 to 0.33

Page 10, lines 3-9: I think it might be good to include a shorter version of this in the abstract since currently you do not mention anything about the models or in situ measurements that you use to aid in the characterization study.

Page 10, line 28: How much is "quite well" in % difference?

Figure 4: Consider labeling each panel like 4a, 4b, etc so you don't have to refer to them as "first and second row in Fig 4".

Page 11, line 1: replace "cut above" by "restricted to"

Page 12, line 7-8: "Moreover, due to the low RH at the surface (16%) we do not (...)"

Page 12, line 10: What's excellent in % difference? Please quantify it.

Figure 6: Instead of having Fig 6b with two panels, just relabel each plot in Figure 6 as 6a, 6b, 6c. Makes it easier to reference.

Page 13, line 1: replace "indicatory" by "indicative" or "qualitative"

Page 14, line 7: missing LR unit (sr).

Page 19, line 3-17: Please quantify the agreement levels that you mention in this paragraph. How many %?

Page 19, line 8: replace "from" by "than"

Page 19, line 24: replace "near-to-surface" by "near-surface".