

***Interactive comment on* “Retrieval of microphysical dust particle properties from SALTRACE lidar observations: Case studies” by Stefanos Samaras et al.**

Anonymous Referee #1

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The authors present a new method to simultaneously infer the size distribution and the aspect ratio distribution of non-spherical mineral dust particles from advanced lidar measurements. The scope of this approach is good as other retrievals are often limited from the outset in their general applicability by assuming a fixed aspect ratio distribution. However, the authors clearly show that the current version of the retrieval with a very limited parameter space considered in its look-up table is not yet up to the task of dealing with real-life data. I recommend to reject this contribution for publication in ACP as it is too technical to be within the scope of the journal and shows strong deficiencies in scientific and presentation quality. The authors should thoroughly revise their work into a technical note or paper, e.g. for AMT, in which they can clearly lay out

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the novelties of their method as well as the limitations that still need to be overcome.

The other Referees have already provided a wealth of detailed comments that cover most of my concerns with this contribution. In addition, the authors need to improve the structure of their presentation to allow the reader to follow their work. For instance, it would be good to first introduce the available measurements and later explain how they will be used in the description of the retrieval. Several figures are presented and never discussed (Figs. 3 and 9) or discussed long after referencing to them first (Figs. 5, 7, 11, 13). Some parameters get acronyms that are used only once while others get two variables. Comparisons are entirely qualitative, much too optimistic and mostly mixing up different things or incomparable studies (apples and oranges comparisons).

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