

Atmos. Chem. Phys. Discuss., referee comment RC2  
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## Comment on acp-2022-380

Anonymous Referee #2

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Referee comment on "Vertical characterization of fine and coarse dust particles during an intense Saharan dust outbreak over the Iberian Peninsula in springtime 2021" by María Ángeles López-Cayuela et al., Atmos. Chem. Phys. Discuss.,  
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Review of the paper by Lopez-Cayuela et al.

The paper presents in detail a Saharan dust event that was observed over the entire Iberian Peninsula from a number of lidar stations. Emphasis is given in the separation of fine and coarse dust profiles, applying the well established two-step POLIPHON algorithm. Additionally estimates of the corresponding mass concentration profiles of fine and coarse dust are made using conversion factors from previous studies. The paper is well structured and the results presented, as stated in the conclusions, are important for studying the relatively different radiative effects of fine and coarse dust. The paper could be accepted for publication in ACP but the authors should put more effort in a revised version to highlight the main findings and their relevance. The current version of the paper is too lengthy and detailed concerning the presentation of the measurements and the synoptic situation and thus at the end it is not clear which are the major findings of the paper. Therefore, I would suggest the authors would consider the following general comments before their paper would be accepted.

The authors should mention early in the manuscript, why this event was interesting. There are already similar studies for the same area. What is the new approach here? What is the new information from these measurements compared to the previous studies? Then the discussion and description should provide the answers to these questions.

Sections 4.2 and 4.3 are too lengthy and the reader misses this way the important information. The authors want to show the time and latitudinal evolution of the event through the lidar data analysis. At the end it is not very clear what is the answer, i.e. is there a significant change with time and latitude?

The discussion section has a lot of repetitions with the previous section.

The authors mention ageing of dust. They should mention in the discussion what are the metrics they use for potentially identifying ageing processes? Changes in concentration, depol ratio, lidar ratio etc.?

Time-Latitude cross sections of average quantities (e.g. from intensive parameters, fine/coarse dust, ratio, center of mass etc), would help to have an overview the evolution of the event.