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Discussions

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Interactive comment on "Retrieval of aerosol properties from ceilometer and photometer measurements: long-term evaluation with in-situ data and statistical analysis at Montsec (southern Pyrenees)" *by* Gloria Titos et al.

Anonymous Referee #1

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This paper addresses an evaluation of the aerosol property profiles retrieved from GRASP algorithm and which uses as inputs ceilometer and sun-photometer (SPM) measurements versus in-situ measurements. The work presents different relevant aspects that show its importance and novelty. This is the first time that GRASP algorithm using as inputs ceilometer and SPM measurements (GRASPpac) has been evaluated in a long-term comparison. This new approach (GRASPpac) presents big advantages since these two instruments can be operated in a continuous and almost unattended way and its use has been expanded by networks providing much more global cover-

age. However, before this approach is widely used its products need to be validated as is done in this work.

In addition the work have dealt with the complexity of comparing different techniques (remote and in-situ) which also cover different ranges in the Earth-atmosphere system (surface and almost full troposphere). The results presented here show a good agreement between the optical properties from techniques and larger discrepancies in the volume size distribution when fine particles are dominant.

So after these comments I conclude that the paper is very interesting, well written and show the capability of GRASPpac approach to retrieve vertical information of aerosol properties based on this long-term study. I consider that this work is appropriated for Atmospheric Measurement Techniques and it should be published after some minor corrections:

- About the comparison: some explanations should be given about how the in-situ measurements and the GRASP profiles are compared. How many points from the lowest part of the profiles do you take? Do you average those points? What is the altitude range that they represent? The lowest part of the remote sensing profiles are always more problematic due to the incomplete overlap of the ceilometer (even if it is corrected with the overlap function provided by the manufacturer). So I consider that is important to discuss these points in the manuscript.

- Looking at the histograms presented in Figure 2 I have the impression that the distributions of the relative differences are bounded to a certain positive value, how do you explain that there are no observations with discrepancies larger than +1%?

- Page 2, line 30: it should be also indicated that ceilometer provides continuous measurements, in contrast with most of the "more sophisticated" lidar systems.

- Page 4, line 22: I wonder why you use Aeronet data level 1.5. For this long-term study level 2 data (quality assured) should be available.

- Page 4, line 27: authors indicate that the ceilometer is located 760 meters downslope of MSA station, but what is the different in altitude between both measurement sites? In addition some lines below authors indicate that the overlap is higher than 85% at 760 m (same number), is it a typo or just a coincidence?

- Page 6, line 20: I understand that in Figure 3 authors compare the lowest part of GRASP profiles, so please indicate it.

- Page 7, line 16: delete the parenthesis: ". . . before)."

- Page 11, line 1: Ceilometers can be considered automated lidars, so just mention the first one. "the use of automated lidars for the determination . . ..".

- Page 11, line 5: Correct the next typo: (ceilometer and lidar have to be in singular) ". . . ceilometer and lidar networks . . ."