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Atmospheric Measurement Techniques Discussions

Interactive comment on "Microphysical particle properties derived from inversion algorithms developed in the framework of EARLINET" *by* D. Müller et al.

Anonymous Referee #1

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General comments

Manuscript summarizes the investigations on inversion of 3+2 lidar measurements to the particle microphysics with TROPOS and UP inversion algorithms. The authors are the experts in this field and provide detailed discussion of numerous issues in such inversion. The analysis was performed only for the monomodal PSDs, so the results obtained can be used only for certain types of the particles. Still the manuscript contains interesting results and can be published after some revision.

The paper tries to consolidate the results obtained with TROPOS and UP, still reading the manuscript I had feeling, that these are two independent papers, which were glued

together. The results for TROPOS and UP are presented in a different ways, so the reader can't really compare the operation of these two algorithms. And when two algorithms are presented together, reader usually hopes to find out what are advantages and disadvantages of approaches considered. So I would prefer to see the results for both algorithms presented in similar manner.

The manuscript contains too many plots. These plots are very small and it is very difficult to read the text inside. I would recommend strongly to decrease the number of plots, describing the main results in the text, and to increase the plots size.

Specific comments

p.12837/15 We repeated this procedure 8 times, and in this way obtained 8 different solutions. Why 8 times?

Fig.1 goes after Fig.2 in the text. I am not sure also that it is a good idea to show the screen shot of program window in the paper. Letters are very small and it is difficult to read. Why not to make this figure in traditional way?

Caption to Fig.2. "different constraints on the real part and error free data, i.e. 0.05" What does it mean? The search space is limited?

Section 2.3 contains nothing

Section 2.4.1. Are these results for TROPOS and UP algorithm?

p.12844/20 ". . .which in most cases correspond to 10 to 20 PSD's. . ." Unclear

p.12844/27 ". . .The exception are weakly absorbing (0.005i , 0.01i) particles with real part 1.4." Probably it should be for some range of the real parts. For example, what will happen for 1.42?

Fig.4. 24 examples of retrieval - too many. It would be better to decrease the number of plots.

p.12846/6 ” Table 1 shows the parameters. . .”. Authors have already mentioned it in section 2.2.2

p.12846 /10 ” Effective radii of 0.28 and 0.4 μm describe particle size distributions that have a significant share of particles in the coarse-mode fraction and the fine-mode fraction.” Authors consider monomodal PSD. How can they compare it with bimodal?

p.12848/3 “. . .the particle size distribution also influences the value of SSA. A small change of the imaginary part may have a large impact on SSA if the particles are in a specific radius range. A small change of the imaginary part may not have a significant impact on SSA if the particles are in another part of the radius range of atmospheric particles.” Can authors specify these radii range?

p.12848 ln. 15-25. I have difficulty in understanding this paragraph and Table 2. For example, in Table 2 the first line is “ext-A(355/532) 1.45–1.78” What does this range mean? Is it arising from different imaginary parts used?

Fig.5. The plots are too small, it is very difficult to read anything.

Interactive comment on Atmos. Meas. Tech. Discuss., 8, 12823, 2015.