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Atmospheric Measurement Techniques Discussions

Interactive comment on "Validation of CALIPSO space-borne-derived aerosol vertical structures using a ground-based lidar in Athens, Greece" *by* R. E. Mamouri et al.

Anonymous Referee #1

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General comments

This paper describes a nice piece of work, that could only be achieved through hard work and dedication. Validation of space based sensors is an important task and especially in the case of the novel products of vertical aerosol profiles, requires new methods. Due to the variablility in space and time of the aerosols, this is not a trivial task and ultimately would require a network of ground based stations. All of these points are adequately addressed in the manuscript, which is clear and generally well written.

Specific comments

Abstract: - Mention in the abstract which CALIPSO product is under study. - Meniton in the abstract what the space-time constraints for the collocation are.

- page 564 line 8: Calipso was launced in April, but started measurements in June

- page 564 line 26: remove "the" in "In the Sect. 2"

- page 565 line 10: what is the bandwidth of the detection of the Athens lidar? Indicate here what the limitations are for daytime/nighttime observations.

- Page 565 line 21: Whiteman

- Page 567 line 23: The authors argue why they chose to validate the L1v201 dataproduct, rather than the L2 data, which are still unvalidated. While a validation of the L2 data cannot be done properly whithout first validating the L1, I am tempted to think that the authours are actually in a position to make an attempt to validate L2 data (eventually starting from a subset of best cases that come out of this study). My impression is that this study (of L2 data) is actually under way, but outside the scope of this paper. Perhaps the authors could reflect in this.

- Page 569 line 14: Since the Raman channels are not (fully?) operational during daytime, the nighttime derived lidar ration is extrapolated for use during daytime. While this may be permitted for some cases, such as the case used as an example, I doubt whether this can be done during cases of higher atmospheric variability. Perhaps the authors could reflect in this.

- Page 570 line 7: "both the daytime and nighttime"

- Page 570 line 20: ". . . dust outbreak occurred . . ."

- Page 571 line 3: The sentence "so the profiles would be correlative" is a bit unclear. I assume it is meant to say that the height binning is done to make the profiles from both instruments comparable to each other.

- Page 571 line 20: "the two systems". I think it is actually meant to say here that the

aerosol profile observed by both instruments etc.

- Page 571 line 7-8: Temporal and spatial averaging of the CALIOP data is extended from 5 to 20km to reduce noise in the first place. Apparently, the authors chose not to reduce the vertical resolution. Why not? By decreasing the along track resolution to 20km also raises the point of representativity (also addressed in Fig. 8). Perhaps the authors could reflect on where the limits are: i.e. what (might) happen when the averaging is further increased and would there be a distance beyond which the correlation clearly decrases?

- Page 574 line 8: "... distributions are in most cases inhomogeneous".

- Page 575 line 7: Mentioning the subject of overlap height at this point in the manuscript is too late. This should be done in Sec 2.1, with the description of the ground based lidar. Also, for non-lidar people, some explanation about the consequences on incomplete overlap might be helpful. Clearly this is a systematic effect that would result in a bias. What is the direction/sign of the bias expected. Is this consistent with the results and what are the implications for your conclusions? If the implications of the instrumental effects of the ground based lidar are large in the region of incomplete overlap, it might be better to restrict the graps and conclusions based on them to distances beyond the full overlap.

- Page 581 Fig 2-3.: What is the color scale? Are they comparable?

- Page 583 Fig 3: replace "up" and "down" by "top" and "bottom" respectively, also in the main text.

- Page 584-585 Fig 5-6: I have the impression that the plots are interchanged. The description above the graphs do not match the figure captions.

Interactive comment on Atmos. Meas. Tech. Discuss., 2, 561, 2009.