

Interactive comment on “Detection of particles layers in backscatter profiles: application to Antarctic lidar measurements” by J. Gazeaux et al.

Anonymous Referee #2

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Comments:

The paper has improved significantly over the original version after addressing the review comments in the first round. This is mainly reflected in their clear explanations of stationarization, and their improved modeling considering the Poisson distribution of photon counting. In general the paper is now understandable and their examples on the simulated and real lidar data are illustrative. This paper is a good start on automatically processing lidar data for cloud and aerosol detection. The method could be applied to other clouds and aerosol detections under the condition of detecting only single layers.

However, the contents and presentations of the paper at several places are still poor. Below is an incomplete list of places needing improvement. I recommend authors to go through the paper very carefully to further revise the paper for publication quality.

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Major comments:

1. The Introduction section still needs better English writing. From Lines 41 to 81, authors' description on existing methods, their pros and cons is confusing. Please go through these paragraphs to improve.
2. Line 129, the variance should be from “photon noise”, rather than “instrumental noise”. The nature of photon counting obeys the Poisson distribution, so the variance in photon counts follows Poisson distribution. Authors seem to be confused between photon noise and instrumental noise.
3. Line 435, do you mean “the averaging has a positive effect”, rather than a “negative” effect?
4. Lines 435 to 440, the example of 2008/09/07 isn't shown in Figure 8, as the data seem to stop before September 1, 2008. Did authors mean “2008-07-09”? If so, I'm not sure what authors mean by “this layer is very thin”?
5. Lines 491 to 502, it is important to know what would happen if the current method is applied to multiple layers of PSC. In other words, how the results will look like when you apply the current method to all your lidar data without knowing the PSCs have single or multiple layers? How will you or other users know whether the results are right or wrong?
6. The caption of Figure 8 doesn't match the figure. There are only four panels in the figure, but authors listed many averaging intervals. Please correct the caption.

Minor comments:

1. In the paper title, change “particles layers” to “particle layers”

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2. In the Abstract, change “Clouds” to “Cloud”
3. Line 44, change “low divergence” to “small divergence”
4. Line 47, change “altitude” to “range”
5. Line 65, change “Method” to “Methods”
6. Line 83, remove “by the way”
7. What is z_0 in Equation (1)? A notation of z_0 must be given for Eq. (1).
8. Equations (6) and (7), lines 248, 249, 287, Equation (9) and many equations in the Appendix A should write “[x , x]”, instead of “[x , x]”
9. Line 252, what does “concoiding” mean? Did you mean “considering”?
10. Line 275, change “too sensitive to outliers, in equation (7) . . .” to “too sensitive to outliers. In equation (7) . . .”
11. Line 276, change “large” to “wide”
12. Line 345, remove the comma “,”
13. Lines 395, 426, change “instrumental noise” to “photon noise”
14. Line 452, it should be “30 min”
15. Line 458, it should be “. . . procedure consists of three steps. The first step consists of . . .”

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 21935, 2011.

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