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Atmospheric Measurement Techniques Discussions

Interactive comment on "Target categorization of aerosol and clouds by continuous multiwavelength-polarization lidar measurements" *by* Holger Baars et al.

Anonymous Referee #2

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This paper proposes a method on target categorization of aerosol and clouds using calibrated lidar signals (i.e., attenuated backscatter coefficients) at 532 and 1064nm with depolarization ratio at 532nm and demonstrates the performance using ground-based multi-wavelength polarization lidar data. This paper is well written and it is easy for readers to read understand the contents of this paper. The proposed method is based on a commonly-used threshold method, however, a new idea that uses quasi backscatter coefficient and particle depolarization ratio is introduced. The target categorization products evaluated by the developed method are useful for understanding the distribution of aerosol and clouds and their occurrence. The content of this paper is suitable to this journal (AMT). Only comments on minor revision are given as follows:

1) P6. Line 174-180, "For that reason ∼∼∼ Baars et al. 2016". What does the term "hybrid approach" mean? Do you use particle backscatter coefficients derived from Raman lidar measurements for nighttime data and derived by Klett-Fernald method for daytime data to evaluate particle extinction coefficients by multiplying the assumed lidar ratio of 55sr? Readers needs more explanation to understand this part.

2) Figure 1. It seems that the variation of the 1064nm lidar system parameter is larger than the calibration constants at 355nm and 532nm. What is the cause on this larger variation? Regarding to question 1), when you derive the 1064nm lidar system parameter, how do you evaluate the backscatter coefficients at 1064nm? If you use Klett-Fernald method, how you assume the boundary condition (can you find aerosol free layer for the 1064nm data) ?

3) Figure 5 It may be difficult to distinguish each line by difference of only color. It would be better to use solid, dashed, and dotted lines with color difference.

4) Figure 6 "Aerosol typing" is connected with "untyped aerosol/low concentration" by line.

5) p20 Line483, "Therefore, we conclude ∼∼∼simultaneously". It is difficult to "conclude" because there is no evidence to prove that ice and supercooled drops, and large, spherical aerosols coexisted though the lidar and radar measurements indicate the possibility of their co-exsistence as you suggest.

6) P21 Line 526 "identifies large aerosol ∼∼∼ evaporation" The target categorization of CloudNet and the lidar derived target categorization seem to indicate the coexistence of drizzle particle and large, spherical aerosol particles (evapolated drizzle particle) in the area, however, one can suggest that this lidar derived target categorization fails and identifies drizzle (or rain) particles as aerosol particles though you commented in this paper that the categorization of drizzle or rain was beyond scope. I recommend you to mention (or discuss) about possibility of identification (categorization) of drizzle particles using lidar data to make clear the performance and limitation of this target

categorization method.

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