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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Vertical variation of optical properties of mixed Asian dust/pollution plumes according to pathway of airmass transport over East Asia" *by* S.-K. Shin et al.

Anonymous Referee #4

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This paper describes dependence of optical properties of Asian dust observed with a multi-wavelength Raman lidar in Gwangju, Korea on the dust transport path. The paper presents interesting results on mixing of Asian dust and air pollution particles, and it merits publication in ACP. However, revisions are recommended.

Specific comments:

- Fig. 8: There are no explanations of the solid lines in Fig. 8. They look misleading and should be removed.

- An analysis in a multi-parameter space would provide more information. In other

words, it would be better to give the depolarization ratio, AE-BSC, lidar ratios at 532 nm and 355 nm, at the same time for each data point. It would be useful, for example, to put numbers to typical data points in Fig. 7 (and/or in Fig. 8) for identifying internally mixed cases, though it looks most of the data can be explained by external mixing. Internal mixing of Asian dust and air pollution particles is discussed in a recent JQSRT paper (Sugimoto et al., J. Quantitative Spectroscopy & Radiative Transfer 150 (2015) 107–113, http://dx.doi.org/10.1016/j.jqsrt.2014.08.003) They discussed using a depolarization ratio vs. backscattering color ratio plot. This paper might provide further information including the lidar ratios.

- It would be better to plot the data in the lower heights in the foreground in Figs. 7 and 8.

- The depolarization ratio is defined by (Pperpendicular/(Ppaerpendicular+Pparallel)) in this paper. However, some of the authors of the cited papers use the (Pperpendicular/Pparallel) definition. It seems they are mixed in the manuscript. More accurate descriptions are required, and the values must be converted if needed.

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 3381, 2015.