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Interactive comment on “Retrieval of height-temporal distributions of particle parameters from multiwavelength lidar measurements using linear estimation technique and comparison results with AERONET” by I. Veselovskii et al.

Anonymous Referee #3

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This is a well-written and interesting paper. This work builds on the earlier theoretical work of the lead author and demonstrates the ability of the LE approach to be usefully applied to large amounts of high-resolution multiwavelength lidar data. This paper will be of interest to various lidar groups as well as aerosol-data end-users. The paper succeeds in the limited objective of demonstrating the applicability of the method using real observations. This is of particular importance given the rise of multiwavelength ra-

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man lidar networks and the eventual possibility of space-based multiwavelength HSRL systems. One could argue that a more extensive evaluation both in terms of evaluation/validation and comparison with e.g. regularization inversion results should be presented. However, I am comfortable with the more limited scope of this present paper (I am sure more extensive results in this field will be forthcoming in due course).

I have a few comments/suggestions

1) Regarding the results shown in Fig 1, it is unclear what simulated measurements were used (3+2) (3+1?). Since 3+1 measurements are mainly used later in the paper 3+1 (at least) simulations should be shown. I would further suggest that 3+2 measurements be also shown.

2) The reference to (cor) de Graaf et al (2010) on page 3065 should likely be replaced with the more recent and extensive de Graaf et al. (2013) Applied Optics paper.

3) How many principle components were used to generate the coefficients ultimately applied to the real data? What was the associated magnitude of the expected error magnification factors?

4) I understand that the extinction was not derived directly from the uv Raman channel and that employing a Klett inversion using a S value estimated using the Raman channel will yield a higher resolution and more precise (but less accurate) extinction estimate. However, you should estimate the error in S and propagate this uncertainty into your extinction estimates and ultimate results. As far as I can determine, this has not been done and a fixed value for S of 70+-0sr has been used.

5) Line 16 “..laser wavelengths”

6) Change all instances of “validation” to “evaluation”. The favourable comparison of the lidar results with AeroNET results is important but given that they are both optical remote sensing methods employing not too dissimilar wavelengths I feel that “validation” is too strong a term.

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