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Atmospheric Measurement Techniques Discussions



# *Interactive comment on* "Aerosol classification using airborne High Spectral Resolution Lidar measurements – methodology and examples" *by* S. P. Burton et al.

**Anonymous Referee #3**

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Review of the paper "Aerosol classification using airborne High Spectral resolution Lidar measurements , methodology and examples" presented to AMTD by Burton et al. General appreciation This paper presents a new aerosol classification based on results obtained with the Airborne high spectral resolution lidar developed at NASA/LaRC. Results based on the analysis of intensive parameters (including a new spectral depolarization ratio) are convincingly presented and used to discuss classification of observations for a large number of campaigns in a large variety of areas, allowing for a representative analysis. This paper should be a reference in the domain.

I recommend publication, taking into account a few minor modifications listed below.

Detailed comments Page 5633, line 21 : Add reference to McCormick et al., BAMS, 1993. Page 5637, line 6 : Add a reference on extinction profile retrieval, may be Burton et al., 2010. Page 5638, lines 19 and 20 : numbers in parentheses are not coherent with percentages given. Page 5640, line 5 : Add an older reference to Sassen on depolarization and cirrus clouds Page 5641, line 26 : "aerosol" badly written Page 5642, line 16 : the identification of 8 classes appears as a magic numbering. It is discussed in the text further on from observations, as why this number has been identified, but the authors may discuss more precisely the objectives at the beginning, not only on a posteriori basis(should they have a large SNR on all signals a large number may be possible which may not be needed). A short discussion on the needs with respect to in situ observations and occurrence, improving and extending what has been done already (as mentioned in the introduction) as well as need for modelling/understanding interactions and radiative forcings may be appropriate to include in this section, as an introduction. This will emphasize the success of identification of classes and problems on others ! Page 5643, line 1 : some reference on k-means clustering may be useful here (MacQueen) Page 5649 and 5650 and conclusion : properties of aged carbonated particles are different as discussed for smoke in p. 5650. It is not clear if this difference can be really taken into account. Discuss a little with respect to SNR and potential improvements.

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Interactive comment on Atmos. Meas. Tech. Discuss., 4, 5631, 2011.