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Atmospheric Measurement Techniques Discussions

Interactive comment on "Dual-wavelength light scattering for selective detection of volcanic ash particles" *by* Z. Jurányi et al.

Anonymous Referee #2

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General comments.

The paper describes a method of distinguishing individual water particles from volcanic ash particles. Discrimination is attained by measuring the relative cross sections at two diffrent wavelengths. The cross sections differ significantly due to differences in refractive indices. They show both theoretically and experimentally that discrimination is possible.

Specific comments.

The following issues should be addressed before publishing:

1) No mention is made of the instruments response to ice crystals. It would be useful

to understand if the instrument will be able to discriminate between ice and ash as can be encountered in the atmosphere.

2) The work is somewhat limited by the use of mie theory which assumes that the particles are spherical. Whilst this factors mentioned in line 26 some theoretical calculations showing that the discrimination will still work should be included.

3) Despite the fact the lasers will be highly polarized no mention is made of the instruments polarization response. For example the laser diode used at 660nm could have a polarization ratio of 100 to 1. It is also likely that the 2750nm laser is also polarized again this is not mentioned in the text. This aspect is critical in defining the scattering cross sections used. Some calculations should be performed to demonstrate if this effect is important. At the scattering angles involved this effect could be as large as one or two orders of magnitude in measured signal. Ideally such calculations should be made using both a spherical me theory model and a non-spherical model.

4) Ideally the instrument should be calibrated this could be achieved by the use of spherical particles of known refractive indices. The authors should consider using calibration glass beads for this purpose. This would allow the absolute detector responses to be derived as the mie theory response is known.

5) It would be helpful to clarify if the APS size measurements of the water droplets were made with the same length and diameter of pipe that was used to transport the aerosol to the new instrument, the particle size distribution between these two measurements may be skewed if this is not the case.

If the above changes are made this paper should be accepted for publication.

Interactive comment on Atmos. Meas. Tech. Discuss., 8, 8701, 2015.