**Atmospheric
Measurement
Techniques
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Interactive comment on "Measurement of relative humidity dependent light scattering of aerosols" *by* R. Fierz-Schmidhauser et al.

Anonymous Referee #1

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The manuscript presents laboratory and ambient data of light scattering coefficient from two integrating nephelometer systems in which the relative humidity was measured, controlled and scanned to yield the hygroscopic, deliquescence and hysteresis properties of the aerosols. The fundamental light scattering ratio at 80% RH, f(RH), presented for quasi-monodisperse test aerosol of known composition, is new and reasonably good agreement is found between measured and modeled f(RH) for the test aerosol though the error bands are large. However, the agreement between measured and modeled scattering coefficient results does not seem to be within the range of experimental uncertainty. This is contrary to the statements in the text (see figure A2 and A3). Again the uncertainty ranges are large. The difference between the two parallel nephelometer systems when measuring ambient aerosol seems to be larger than can be explained except by unmeasured parameters, e.g. line-losses and aerosol volatility.

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Some aspects of the data analysis remain unclear, particularly the truncation and RH corrections. The narrative is succinct to the point of being laconic.

Figures 2 through 4 focus on f(RH) while figure 5 presents light scattering coefficient as a function of RH. It would be clearer if the data in figure 5 were normalized to present f(RH) as well.

Specific, line by line comments

Page 2163, line 20, Some added discussion of the connection between hysteresis, atmospheric aerosol hysteresis and metastability would be useful to the reader and would support the subsequent results and discussion thereof.

line 17 The correction is small but easily calculated and applied. How does this error compare to that derived from the T and RH uncertainties? What truncation correction scheme was applied to the data? Given the quasi-monodisperse nature of the laboratory aerosol, what added uncertainties are there if the usual polydisperse correction schemes are applied?

Page 2166, line 21 Just to be perfectly clear: Since we refer to this lower RH in the nephelometer in all our figures, the apparent deliquescence step change appears at a lower RH than the true literature value

Page 2167, line 3, I think the proper term is: monotonically

line 9, Put the residence time in context of the equilibration time of hydration and dehydration for submicrometric particles. Ditto for the DOE system.

Page 2169, line 10, Quantify "minimal". Is the same IR blocking filter and cooling system as in the PSI nephelometer used?

Section 2.3 What were the uncertainties in the DOE system including RH, T, losses?

Page 2170, line 19, Even though the.....

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line 21 A previous experiment showed differences in the measured vs. Mie scattering anomaly for monodisperse aerosols at different wavelengths, Heintzenberg et. al. Was that not the case here?

Page 2171, line 18, The measurements are compatible with the model. I don't know how to interpret the term "compatible". What is this quantitatively? Line 20 Similarly, define "very good agreement".

line 21, Figures A2 and A3 Can the difference between the scattering per particle at 100 and 150nm cf. 240 and 300nm be explained? One set of results is at the upper limit of theory the other at the lower.

Page 2172, line 15, How was the empirical correction determined? How does it compare to the loss determined for the PSI system?

line 21, On most days the f (RH) obtained by the PSI humidified nephelometer was slightly higher... The result should be quantified more completely than the graphical presentation, the range of f(RH)s and "slightly". This result is the crux of the experiment. What are the mean values, mean difference and standard deviations thereof, the mean difference for the 4 selected cases? This is the result needed in tabular form for easiest understanding and as a reference for subsequent experiments and for modelers to use, for this aerosol case anyway.

Page 2182 The model values shown in figure A3-a should also be presented in figure 2.

Interactive comment on Atmos. Meas. Tech. Discuss., 2, 2161, 2009.

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