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***Interactive comment on* “Effects of relative humidity on aerosol light scattering: results from different European sites” by P. Zieger et al.**

Anonymous Referee #2

Received and published: 30 May 2013

General comments:

The article ‘Effects of relative humidity on aerosol light scattering’ by Paul Zieger et al. provides an overview of measured humidity scattering enhancement factors in Central Europe. The available data set, although limited to intensive campaigns at only five European stations, gives a valuable insight into the situation in Central Europe.

The reviewer appreciates that the authors aimed to present their work without too many excessively explanation and unnecessary annotation. However, at some points the given information is not sufficient. The main criticism of the reviewer is that a description of the used instrumentation and measurement uncertainties is too short or even missing. Measurement uncertainties and systematic errors of the used instrumenta-

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tion and derived parameters are important to judge if a closure is successful. This is a necessary prerequisite for a comparison with the OPAC database.

Data were measured with an up-to-date instrumentation and the principle approach of data evaluation is sound. The comparison with the OPAC database could be an important scientific contribution when considering the measurement uncertainties.

Specific Comments:

Page 8942 lines 16 to 18: Can the authors give references for pure mineral dust

Section 3.2 : The description of the additional aerosol measurements is too short. What are the size ranges of the size spectrometers SMPS, APS, OPSS? It should be mentioned that these size spectrometers measure different diameters. These are the mobility, aerodynamic and optical diameters. Similar for the H-TDMA and AMS, at what diameters the hygroscopic growth factor and chemical composition were measured? For each instrument the manufacturer and references to the working principle should be given. In this section the reader would expect information on the measurement uncertainties.

Page 8949 lines 17 to 19: How were the hygroscopic growth factors and refractive indices derived from AMS ?

Page 8949 lines 21 to 24: The authors should explain the inversion calculation of the hygroscopic growth factor in more detail. What refractive index was assumed? How do the inverse calculation and assumption of refractive index affect the error of the hygroscopic growth factor?

Page 8951 line 17: The reviewer can't see a two sector discrimination in Fig. 3.

Page 8952 line 5: What are the criteria for achieving a closure?

Page 8953, lines 10 to 12: How much varied the imaginary part of the refractive index between the clean and the polluted case?

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Page 8953, lines 25 to 27: Can the authors explain the 'proposed parameterization'.

Page 8969, line 29: Curve for constant $g=1.48$ should be orange curve?

Page 8955, line 16 ff: The reviewer thinks that it would be better to present the results as function of the coarse mode surface fraction instead of the coarse mode number fraction, since the surface size distribution is a better representation for optical properties (see page 8959 line 26ff)

Page 8959 line 10 to 14: Generally one would expect an overlap between the two modes. Is it valid to split the size distribution using a sharp cut diameter since the scattering enhancement is sensitive to the size as discussed before?

Page 8959 line 20: The influence of the refractive index could not be checked because of missing measurement. Can the authors estimate the influence by a sensitivity study?

Page 8961 line 15 to 24: Can the authors explain what the modifications of the 'OPAC components' are.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 8939, 2013.

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