Atmos. Meas. Tech. Discuss., 2, C741–C742, 2009
www.atmos-meas-tech-discuss.net/2/C741/2009/

Atmospheric Measurement Techniques Discussions

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

Anonymous Referee #3

Received and published: 10 November 2009

General This is an excellent paper on an important field of atmospheric measurements and as such it fits perfectly to the scope of ATM. The paper describes a setup for measuring the hygroscopic growth of aerosol scattering coefficient. The instrumentation, the lab tests, and the field experiment are carefully done, I have not found any real errors. Below I write some points that I was not quite sure of and could perhaps be clarified - so that the reader (including me) may repeat the experiments.

Detailled comments P2164, 2.1 Setup of the humidified nephelometer I did not find any explanation about RH2&T2 and the tube between the humidifier and the dryer. Then in Fig A1 there is a time series of RH and T and the temperature drops very clearly, close to T1. Is there some cooling element or just a long (how long?) metal tube?

P2164L21- "We moved the original RH and T sensor in the nephelometer (described

by TSI as the sample RH) to the nephelometer inlet" Is this then RH4 & T4 in Fig 1?

"However, the temperature measurement by the TSI sensor is necessary for the nephelometer calibration and was therefore kept in the system." Which T number in Fig 1 is this?

P2167L7- "The residence time of the aerosol at high RH depends on the operating conditions. During hydration the aerosol experiences $\sim$3 s at high RH before entering the nephelometer while during dehydration this time is shortened to $\sim$1 s." What is the time needed for reaching equilibrium state? Is 1 s enough for all sizes? References.

P2176L23- "Even though multiply charged particles are considerably less numerous than the singly charged 25 ones they can significantly contribute to light scattering due to their larger size. The percentage of doubly and triply charged particles in terms of numbers ranged from 9.5 to 24%, and from 1.5 to 6%, respectively." This is a question that I hope the authors would discuss more. After all, SC = SUM(N(Dp,i)*Q(Dp,i)*A(Dp,i)) where now Dp,i would be the size of particles with i charges. Both Q and A are so much larger for the doubly and triply charged particles than for the singly charged ones that their contribution may really be significant. Please present numbers, what is the contribution of doubly and triply charged particles to scattering?

Did you actually calculate the scattering as the sum SC = SUM(N(Dp,i)*Q(Dp,i)*A(Dp,i)) over all charging states in the modeling? If not, that might explain some of the fairly large difference between modeled and measured SC/N in Figs A2 & A3.

Figures 4 and A5. I would rather see these on top of each other. And the whole discussion related to A5 could easily be in the main text instead of in the appendix. But that is a matter of taste.

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