Atmos. Chem. Phys. Discuss., 8, S8771–S8774, 2008
www.atmos-chem-phys-discuss.net/8/S8771/2008/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Cloud condensation nuclei in polluted air and biomass burning smoke near the mega-city Guangzhou, China – Part 1: Size-resolved measurements and implications for the modeling of aerosol particle hygroscopicity and CCN activity" *by* D. Rose et al.

Anonymous Referee #1

Received and published: 4 November 2008

General:

The authors describe CCN measurements within the PRIDE campaign near the mega-city Guangzhou. The data set contains about one month of continuous measurements. The manuscript focus on the evaluation and presentation of the data, obviously with the goal to make the data set available/public for more detailed interpretation. Some aspects are highlighted, e.g. a biomass burning episode and the predictive power of some

approaches to estimate/calculate CCN concentrations for given supersaturations from number concentration and hygroscopic properties of the particles. In many instances the manuscript is well written and interesting observations are presented. There are some minor issues which should be improved, see below. However, in my opinion, the manuscript contains a major problem, which is related to the application of the so called "two parameter fits" and regards all conclusions based on the results of the "two parameter fits". The paper would easily survive as a good paper if the "two parameter fit" issues would be skipped and the analysis of kappa t would be switched to the analysis of kappa a. I therefore suggest publication after major revisions.

Major comment:

p. 17535, p. 17 ff

I have a serious difficulty to accept the two parameter fitting (indexed t) and all resulting conclusions. You observe a portion of particles which can be activated and characterized by the CCN efficiency spectra. In addition you observe an offset of non activated particles, of which you know nothing more than that they are not activated at the given conditions. The latter shifts the 50Or you have to extend the measurement conditions such that you can measure the CCN efficiency spectra of the presently non-activated fraction. The two parameter fit is meaningless and arbitrary since it is not the correct model to describe an external mixture of particles which can be only partly activated. Is a mixture with a MAF = 80 percent less homogeneous than a mixture with MAF = 20 percent ? As a logical consequence of the "wrong premise" all conclusions based on it are arbitrary. Including your analysis of kappa t. You have to find here another way to describe and to present the problem of external mixtures.

Minor comments:

p. 17349, line 23

The timing for the measurement seems tight. How much time was allowed to adjust to

ACPD

8, S8771–S8774, 2008

Interactive Comment

the next particle size? How much time was allowed to adjust the next supersaturation level?

p.17351, line20 and Fig. 1

Shouldn't the correction function (red line in Fig. 1) follow the top of the sigmoidal curves)? It does for 20nm < D < 40nm, but not for 60nm < D < 100nm. Are there more reasons for size dependence of the CCN counting efficiency than loss inside the CCN counter ?

p.17351, line 25 f

"The deviation...". I don't understand this sentence. Do you refer to the scattering of the observations around your correction function ?

p.17351, line 28 f

"For the period...". How serious is that ? Please, you need to explain more, or to discard the affected data.

p.17353, line 6 ff.

I would expect that for an external mixed aerosol, the fractions of the components are themselves size dependent. In the chosen measurement scheme this could lead to a falling or a rising top of the sigmoidal curves. The latter seems to be the case for ss=0.27

p. 17355

R = 8.134 J mol-1 K-1

p.17355, line 20

Physically, the MAF cannot be larger than 1. Within your errors it can well be larger than 1. By suppressing this fact you bias your errors.

p.17356, line 24 and p. 1757, line 4

ACPD

8, S8771–S8774, 2008

Interactive Comment

"...a substantial portion..." and "...high portion..." ?

p.17359, line 11, Fig. 5 The diurnal cycles are difficult to recognize. It could make sense to present average diurnal cycles, maybe for a few typical periods (see next comment) .

p. 17359, line 19 ff, Fig. 5 What happened in the period 15.7. and 20.7. ? Please, comment.

p.17359, line 26 ff "...the burning of plant waste by local farmers was visible in the vicinity of the surrounding..." Despite the vicinity of (strong ?) sources the particle concentration was lower than on average, there were less small particles, but the non-activated fraction did not change. The single observations seem not match, please explain.

p. 17363, line 3

Andreae et al. 2008 ?

p. 17364, line 9, Fig. 13

Why are almost all deviations positive ?

Figures:

It would be helpful, if you could shade the BBE period in all relevant plots.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 17343, 2008.

ACPD

8, S8771–S8774, 2008

Interactive Comment