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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Technical note: A method for measuring size-resolved CCN in the atmosphere" *by* G. P. Frank et al.

Anonymous Referee #1

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The paper presents a method for size-resolved CCN measurements under ambient conditions. The set-up of the instruments, data analysis theory and measurement examples are given. The presented set-up itself is well established for laboratory measurements for particles of known chemical composition. The novelty of the presented work is the application of the method to atmospheric measurements which makes data analysis more challenging and brings the CCN counter easier on its statistical limits. The paper is well written and is useful for those who want a brief overview on this topic. Thus, the paper is suitable for a technical note. However, before publication the following points should be addressed.

As a DMA is used upstream of the CCN counter here, the particle number concentration available for analysis with the CCN counter is a factor of about 10 lower than the

ambient number concentration. This is also briefly addressed in the text where a time extension of the measurement is suggested to undergo this problem. I would appreciate some more details on this topic: what is on the author's experience the lower limit in particle number concentration down to which the technique is applicable? During field measurements an increase in sampling time might be associated with an air mass change, which makes data interpretation pretty challenging. How much does this limit the usage of the method?

The authors suggest increasing the aerosol to sheath air flow ratio to enhance the number of particles downstream the DMA and thereby improving measurement statistics. The authors describe an increase in number concentration by a factor of 3.5 while changing the flow ratio from 1:10 to 1:3. This enhancement is accompanied by a DMA transfer function broadening of 7% (one sigma). Choosing 50 nm particles with the DMA a range between 46 and 54 nm would be selected. For ammonium sulphate particles this difference in size is connected to a range in particle's critical supersaturation of 0.1%. How much of a limitation is this to the method?

Technical comments:

p4881, 22: What kind of additional measurements did they perform?

p4881, 4-15 and p4889, 13-19: I suggest harmonizing your motivation points of the method and their numbering in introduction and conclusion.

p4881, 22 delete " have "

p4881, 25-26 and p4882, 2: To my opinion the terms "3-D CCN measurements" and "3-D CCN counter" are misleading. I suggest sticking to the term "size-resolved CCN measurements".

p4884, 27ff: Up to which number of charges was the presented correction applied?

p4893, fig 2a: I would omit this figure, as there is no additional information in comparison with fig2b and fig2c, which are also easier to read.

ACPD

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References should be checked once more in detail, e.g.:

p4890, 7: change "Scmid" to "Schmid"

p4890, 15-16: recheck author list “Dusek, U.; Frank, G. P.; Helas, G.; Iinuma, Y.; Zeromskiene, K.; Gwaze, P.; Hennig, T.; Massling, A.; Schmid, O.; Herrmann, H.; Wiedensohler, A.; Andreae, M. O. “

p4890, 27: delete extra dot after Reischl

p4891, 21-24: use ACP citation “ Atmos. Chem. Phys., 6, 1937-1952, 2006.“

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 4879, 2006.