Atmospheric Chemistry and Physics Discussions

Interactive Comment

Interactive comment on "Calibration of LACIS as a CCN detector and its use in measuring activation and hygroscopic growth of atmospheric aerosol particles" by H. Wex et al.

H. Wex et al.

Received and published: 27 September 2006

to: Anonymous Referee #1 Review received and published: 18 August 2006

We thank the reviewer for the comments on LACIS and on our manuscript. Also thanks for the advises. We describe in the following, inserted in you original specific comments, how we proceeded:

Specific comments:

Section 3:

1. Heading: Consider revising! The section also includes calibration with ammonium sulphate. "3. Calibration" might be enough.

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Has been done!

2. The manuscript would improve if the method on how to calculate the critical supersaturation from the Köhler equation was described, in particular which assumptions that were made, and if and how the Köhler equation was simplified. Different methods of how to calculate critical supersaturations are available in the literature, some more precise than other, and it is interesting to know which method was used here. What is the uncertainty of the calculated critical supersaturation? An added description would improve the traceability of the results.

In the revised version, the text now refers to a paper that gives the Köhler equation in the exact format that was used here. Also, the text now explicitly states the surface tension and osmotic coefficients that were used in the calculations.

In the past, comparing results obtained from our Köhler code with those obtained by other groups using a comparable code showed, that these results were in agreement (concerning the critical super-saturation for the same diameters) within less than 0.01% (absolute). Thus, we think our code is described properly in the manuscript now, and we did not add a value for the uncertainty of the code.

3. A discussion about the comparison and agreement/disagreement between the calibration results and the simulations using the Fluent/FPM model would be a valuable addition. Are the calibrations always in agreement with the model, or only in the case presented in Figure 4? Can the model be used to describe the performance of the LACIS, or are regular calibrations at different operating conditions necessary?

This comment is a very important one, however, we are still in the process of examining these things. By now there are more measurements comparing calibration measurements with Fluent-calculations, and the agreement was found for these measurements, too. But the research we are doing on this goes by far beyond the scope of this work. A separate manuscript on this is in preparation, and we hope the referee can accept that we did not include any more information on this point in this manuscript.

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4. An overall discussion about the uncertainty of the selected simulator supersaturation would be of importance for the validity of the instrument. A more precise statement about the uncertainty, how it is derived, and what it depends on, is desirable. In section 3, it is mentioned that the deviation between the supersaturations derived by calibrating with sodium chloride and ammonium sulphate is below 0.03%, and that this is within the measurement uncertainty. But, how large is the measurement uncertainty, and what does it depend on (temperature and flow stability of the instrument, etc.)? In addition it is interesting to know the uncertainty of the calibration method? Combined this will give an overall uncertainty in supersaturation, which is important to know when operating the instrument.

We have expressed the issue about measurements uncertainty more clearly now in the respective section (see last paragraph in section 3).

Technical corrections:

Page and line numbers are as in the print version of the manuscript.

4. Page 5880, line 6, last word: change to "dew"

OK, thanks!

5. Page 5888, Line 15: The word "Simulator" is missing, and the abbreviation "LACIS" should probably be within brackets. "The Leipzig Aerosol Cloud Interaction Simulator (LACIS) was...."

OK, thanks!

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 5877, 2006.

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