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Atmospheric Chemistry and Physics Discussions

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.

Anonymous Referee #1

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General comments:

The manuscript presents calibration, at supersaturated conditions, of the very interesting and promising Leipzig Aerosol Cloud Interaction Simulator (LACIS). In addition some results of first atmospheric measurements (out-of-the-window) at both subsaturated and supersaturated conditions are presented.

The LACIS is a very promising tool, well suited for answering many of the open questions in cloud development and aerosol-cloud interaction science. Calibration with respect to water vapour supersaturation is crucial for validation of the performance of the instrument, and comparisons with earlier field measurements at similar urban loca-

tions are in addition of interest. The manuscript addresses relevant scientific questions within the scope of ACP. The calibration method used is established, although it could be described in some more detail in order to improve the traceability of results, see specific comments. The title is appropriate, the overall presentation is well structured and clear, and the language is fluent and precise.

Specific comments:

Section 3:

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

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.

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?

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

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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.

Technical corrections:

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

Page 5880, line 6, last word: change to “dew”

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....”.

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