**Atmospheric
Chemistry
and Physics
Discussions**

Interactive comment on "Urban aerosol number size distributions" *by* T. Hussein et al.

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General comments

The paper by Hussein et al. presents an interesting data set of long-term urban aerosol number size distribution measurements. The discussion of the measurement results, the experimental description, and the presentation quality of the manuscript, however, should be substantially widened and improved. Some suggestions are given below.

Specific comments

The results of the presented measurements and statistical analyses should be thoroughly discussed and compared with other long-term investigations of aerosol parameters, e.g. the recent studies by Wehner and Wiedensohler (2003), Tunved et al. (2003), and Birmili et al. (2003). It may be worthwhile to complement the statistical data evaluation by additional analyses as performed by other authors (e.g. size classifications

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and correlation analyses by Wehner and Wiedensohler, 2003). In any case the analogies and differences to the results of related studies should be explicitly pointed out and summarized. Moreover, it would be interesting to compare the measured particle number concentrations to air particulate matter mass concentrations (should be available from public air quality monitoring networks).

The experimental setup should be described in more detail (sampling inlets, sampling lines, particle counting efficiency and wall losses, etc.). Moreover, quality assurance and reliability (uncertainty) of measurements and data inversion should not only be mentioned (sections 2.2 and 3.1) but properly described.

Throughout the manuscript (abstract, introduction, etc.) the language should be improved, i.e. the phrases and statements should be formulated in a more precise and scientific way and in correct English grammar (past/present, singular/plural, verbal conjugation, etc.; proofreading by native English speaker).

Symbols should be precisely defined when first introduced (e.g. equations 1 and 2: define symbols x and N, indicate counting variable under summation sign). Moreover, a list of symbols should be added as a table or appendix. In equation 4 it might be better to use t or delta instead of T for the temperature in degree Celsius as opposed to absolute temperature.

The inconsistent use of terms and symbols should be corrected, i.e. the applied terminology should be made self-consistent. For example, the term "(integrated) total particle number concentration" should not be used alternatingly for N (p. 5147, l.4) and N_{tot} (p. 5150, l. 22 and 25). In general, terms like "total" and "overall" with a technical/statistical meaning should be defined and used with more care or replaced by more specific/unambigous terms. For example, "(arithmetic/geometric) mean" or "average" appears to be better suited than "overall" on p. 5153, l.18; multi-lognormal function fitted to the average/mean size distribution (not the other way round). The symbols introduced in equation 3 (N_i, $D_{pg,i}$, etc.) should be used consistently throughout the

text, tables and figures. The index p of the symbol D_p should be consistently set as a subscript (check also typesetting of other sub- and superscripts, e.g. p.5141, l.25). The terms "weekend", "weekday", and "work(ing) day" should be defined and used consistently (incl./excl. Saturday?) throughout the text, tables, and figures.

Abstract: Include lower and upper limits of particle diameter measurement range.

Section 4.3.2: Explain why seasons are not defined as usual (DJF, MAM, JJA, SON), in particular why August 15 was set as the limit between seasons 3 and 4.

Appendix B: Define variables and units used in the table (check also other table and figure captions for self-explanatory completeness and consistency). Include the word "mode" in the first column of the table and list only the numbers in the remaining columns (instead of nine-fold iteration of the word "mode").

Table 2: Arithmetic mean; Units cm^{-3} instead of $1000 \, cm^{-3}$?

Figures 3, 5, 6 (and corresponding text): The freqency distribution plots appear to be "histograms" rather than "cumulative frequency plots".

Figure 10: Re-scale y-axis for improved readability (reduce maximum values to 20/10/2 or 30/15/3).

References

Birmili, W., H. Berresheim, C. Plass-Dülmer, T. Elste, S. Gilge, A. Wiedensohler, and U. Uhrner, The Hohenpeissenberg aerosol formation experiment (HAFEX): a long-term study including size-resolved aerosol, H2SO4, OH, and monoterpenes measurements, Atmos. Chem. Phys., 3, 361-376, 2003.

Tunved, P., H.-C. Hansson, M. Kulmala, P. Aalto, Y. Viisanen, H. Karlsson, A. Kristensson, E. Swietlicki, M. Dal Maso, J. Ström, M. Komppula, One year boundary layer aerosol size distribution data from five nordic background stations, Atmos. Chem. Phys., 3, 2183-2205, 2003.

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Interactive comment on Atmos. Chem. Phys. Discuss., 3, 5139, 2003.

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