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Atmospheric Chemistry and Physics Discussions

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

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. We have considered the comments and correspondingly corrected and re-edited the manuscript.

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

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. Done.

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). Please note that our main objective in this study is the particle number size distributions. The particulate mass concentrations are beyond the scope of this study. As you can see, the data analysis included the study is large and any additions such as particulate matter would double the size of the study. However, we have introduced a comparison between number concentrations and particulate matter concentrations during three years in a previous study by Laakso et al. (2003), which was mentioned in the introduction part.

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. Done.

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.; proof reading by native English speaker). Done.

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). Done.

Moreover, a list of symbols should be added as a table or appendix. The symbols were re-defined to be consistent in their term, use, and meaning.

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 temperature is now changed

ACPD

3, S2594–S2597, 2003

to Kelvin in equation 4.

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 Ntot (p. 5150, l. 22 and 25). Done.

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/unambiguous terms. For example, "(arithmetic/geometric) mean" or "average" appears to be better suited than "overall" on p. 5153, l. 18; multilognormal function fitted to the average/mean size distribution (not the other way round). Done.

The symbols introduced in equation 3 (Ni, Dpg, i, etc.) should be used consistently throughout the text, tables and figures. Done.

The index p of the symbol Dp should be consistently set as a subscript (check also type setting of other sub and superscripts, e.g. p. 5141, l.25). The sub- and superscripts were clearly defined in the provided files (both *.doc and *.pdf).

The terms "weekend", "weekday", and" work(ing) day" should be defined and used consistently (incl./excl. Saturday?) throughout the text, tables, and figures. Done.

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

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. The seasons were chosen according to the change in the aerosol characteristics (daily pattern and modal structure). The periods were chosen according to that conditions, and surprisingly, they did not match with usual (DJF, MAM, JJA, SON). More over, the seasons in Helsinki do not exactly follow the divisions to DJF, MAM, JJA, and SON. Usually the winter is the longest season as was explained in the manuscript.

ACPD

3, S2594–S2597, 2003

Appendix A: 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"). Variables were re-defined. The tables do not look clearly without grids and boarder lines. Therefore we applied Table formats to make it clear and there is no need to take out the word "mode".

Table2: Arithmetic mean; Units cm-3 instead of 1000cm-3? Done.

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

Figure 10: Re-scale y-axis for improved readability (reduce maximum values to 20/10/2 or 30/15/3). For better and clear presentation of the diurnal patterns, we have changed these figures to less subplots and make different set of plots for the two places Siltavuori and Kumpula.

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

ACPD

3, S2594–S2597, 2003

Interactive Comment