

***Interactive comment on* “Particle number emissions of motor traffic derived from street canyon measurements in a Central European city” by S. Klose et al.**

Anonymous Referee #2

Received and published: 11 March 2009

General Comments:

The paper describes particle number emission factors from traffic, which is an area where there is a substantial need of more research and data. The large data set upon where this manuscript resides is thus of great importance to the community and publication is recommended after taking a few comments into account.

Two important issues are detected in this manuscript; the data quality and the presentation, focusing on the description of details and use of symbols.

Specific Comments:

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With an improved treatment of details this paper would improve highly! Simple things like making graphs understandable also if printed in black and white, improving the naming of different variables, e.g. FA, FB and FC, where one could use names like Fpersistent, Fday and Fweek (here naturally the authors would be able to come up with better names than I did with only one minute thinking) etc. Also please be more clear on when "concentration" is discussed and when "emission factor" is discussed.

The use of "EF" as emission factor is commonly adapted and preferable from "E" that is used frequently for other purposes.

The data set used is large, but have some issues that is only briefly discussed; for the reader to get an opinion of the data quality the details of what data is removed from the data set, how large the data set is (e.g. number of data points), length and height of the vehicles for classification of vehicle category, ...

Some calibration procedures seem rather unorthodox, and the reader would need further input to understand if the data set is treated scientifically. Please also describe the inlet system and how the losses were decided. Also a short description of what data is removed from the data set, e.g. in a table, would help in understanding what part of the data set is used and where.

Details are often missing, hindering the reader from making judgment on the quality of the manuscript. In many places presenting the actual numbers used would increase the usability of the manuscript highly, e.g. page 10 "residence time within the street canyon" without a number, "considered inert" without a confidence level.

If the 4-10 nm particles are mainly due to meteorological effects, as pointed out in Fig 2, the choice to include this particle size range in the total particle number emissions need further explanation. (section 5.3). Also to include the particles larger than 30nm that had no temperature dependence; why include them in the temperature-dependent emission factor? Was this emission factor calculated based on the same data set as the size distributed emission factors presented in section 5.4?

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Please comment on the assumption that the particles are spherical, as most of the larger traffic emitted particles are soot that are not at all spherical. Is this the reason for not showing the analysis of the temperature dependence of particle mass emissions? As the theory says that the amount of condensable gases increase with temperature, a slight increase of particle size might give more mass no matter if the particle number is not very affected. Did you perform such an analysis or not? It would be interesting to know the result!

A comment on that the emission factors calculated at different temperatures are not perfectly sorted according to temperature would be in place, as this fact is now hidden in a blurry graph, Fig 11.

Section 5.6, comparison with particle number emission factors without a particle size range information is not usable, and should be avoided! There are also more published data to compare with. Is there a reason for choosing these studies? Comparing NOx emission factors between different sites not taking the fleet composition into account seem uninteresting. What is the part of heavy duty vehicles in the Copenhagen study, and for this study the emission factors for the different vehicle categories would be easily available by the multiple regression model used in section 5.5. Also for the comparison between light and heavy duty vehicles there are several more published studies to compare with.

Technical Corrections:

The last paragraph of section 4 mainly reports results from another study and those parts should be deleted, keeping only the references.

- p. 3767 Add references to the tunnel and "gaseous tracers" studies.
- p. 3767 Eisenbahnstrasse was supposed to be named Leipzig-Eiba, but is not.
- p. 3768 down-stream should be down-wind
- p. 3770 What do you mean by "self-driving experience" and please estimate the error

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in traffic speed related to this method. Two sentences further down you seem to know the traffic speed, "30 kmh-1, and individual vehicles at up to 40 kmh-1". How??

p. 3770 How often does the traffic light change, compared to the sampling time; this would tell if the assumption of averaging in one scan is OK.

p. 3770 "divergence in vehicle number ca. 3%" and what is the estimate for classification??

p. 3770 define "regular" street canyon

p. 3771 Go through the equations once more, together with the text, please.

p. 3771 before eq 2; insert "Nexp (in p. cm-3),by" to follow the idea for eq 1.

p. 3772 first line: "(or pollutants)" should read "(or amount of pollutants)"

Table 1 "spread parameter" is probably the geometric standard deviation??

Fig 4 and 11 etc Why do you use different particle sizes for different parts of the presentation? Please choose the same or tell why you choose different.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 3763, 2009.

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