

Interactive comment on “Correlation between traffic density and particle size distribution in a street canyon and the dependence on wind direction” by J. Voigtländer et al.

Anonymous Referee #1

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General Comments,

This manuscript presents an investigation of the correlation between traffic density and size resolved particle concentrations. The data analysis shows in several ways of plots that wind direction has a main influence on the concentrations measured in a street canyon. As stated in the paper this supports previous findings and has been shown in many other locations and for other pollutants. The authors present a very interesting and comprehensive data set, but the data analysis, discussions and conclusions are limited to correlation analysis with traffic counts. The results from the correlation analysis are overinterpreted and some conclusions not fully justified (size dependence of

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the correlation coefficient, ratio of particles originating from traffic, lack of temperature dependence, see detailed comments). More use should be made of the background data measured at IfT to separate the traffic contribution to the particle concentrations from the background. The reasons to not include them (p. 4092) are not obvious since Fig. 6b shows clearly that IfT seems to be a good background side for the street canyon Eisenbahnstr. Also gaseous pollutants that are very good tracers for traffic pollution as NO_x and CO could be included in such an analysis.

Detailed Comments:

A major change in traffic volume occurred in Jan 2004. All data analysis should be made separately for times before and after this major change since the traffic composition has changed, the traffic signal is much smaller and other sources due to the reconstruction might have appeared. IfT data should be included also in Fig. 4 to see the change in the traffic contribution (street - urban) background.

The regression analysis might be useful for a first interpretation of the data, but how much solid conclusions can be drawn from this type of analysis alone is questionable. Results from Table 1 are not sufficiently discussed. How should the different parts of the table (a-d, (a) is missing) be interpreted. Temperature and maybe RH could shift the change the shape or the position of the maximum of the size distribution without altering the total number concentration. This will not show up in the regression analysis. This limitation should be discussed when stating that those parameters have no effect. Moreover the conclusion that 70% of the particles originate from traffic (p. 4094) is not supported by presented analysis. It can not be drawn from the linear correlation of e.g. Fig. 9, it requires rather the use of the background data from IfT or some factor analysis methods.

The scatter or noise the average diurnal profiles in Fig 6. a+b is relatively large compared to Fig.5. What wind direction ranges are used in Fig.6. for north / south wind. Is the range sufficiently wide to allow enough data behind each average data point. Fig.

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6 shows also that correlation analysis.

The size distribution plots (Fig. 7) are important for interpretation and comparison with other studies. This are also the original measurements. Here the IfT size distribution should be included for information about background. The plot should be done for the northerly / southerly winds separately. The maximum here is located around 20 nm particle size. This is where most particles from traffic are emitted. It is a bit surprising that the correlation analysis (Fig. 9) shows a minimum at the just the 20 nm size, where one would expect a maximum due to the high traffic contribution. This has to be discussed and clarified and sets the question how detailed the structure (position of maxima) of the curve in Fig. 9 really can be used for interpretation. The below 10 nm maxima seems to appear only for some of the northern wind directions (see Fig. 10)

The flow pattern shown in Fig. 1 can be found in literature and could be omitted and replaced by a reference. The authors develop a new CFD model, the motivation for adding a new model to the already large number of existing street canyon models, rather than using an existing one is not stated. The use made of the model in this paper is very limited.

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