Atmos. Chem. Phys. Discuss., 9, C3573–C3575, 2009
www.atmos-chem-phys-discuss.net/9/C3573/2009/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Annual particle flux observations over a heterogeneous urban area" *by* L. Järvi et al.

J.R. Dorsey (Referee)

j.dorsey@manchester.ac.uk

Received and published: 4 August 2009

General Comments

The paper describes measurements and analysis of particle flux measurements conducted at the SMEAR III field station in Helsinki between July 2007 and July 2008. The investigation of the seasonal and land use controls on urban aerosol production is generally sound, and adds to the small but growing literature on urban aerosol flux measurements.

The paper is of a quality suitable for publication in ACP, subject to the authors addressing the following scientific comments and correcting the numerous typographical and linguistic errors throughout the paper. It would be very useful to have the paper proof

read and corrected by a native English speaker. Due to the scientifically useful nature of the paper, this reviewer is willing to assist with proof reading the manuscript if no suitable person can be found at the authors' institutions.

Specific Comments

It would be very useful to have some information on the magnitude of the co-spectral correction to the measured flux. The use of the fit shown in figure 3 and equation 3 gives rise to some concern about the accuracy of the correction in stable cases, as the fit appears to be less than robust. The mean value and variation in the ratio of the measured to corrected fluxes (F_s/F) would be a suitable measure, and should be clearly stated in section 2.4.

The method used to derive the footprint shown in figure 1 is not clearly described. It appears that the footprint is an average for one wind sector, and it should be made more explicit in the figure caption that it is an average rather than an example for a single half hour period. It appears that the authors have assumed a fixed wind direction for footprint calculations in the road sector. It would be useful to explain the reason for doing so rather than using measured wind direction.

Figure 4 is slightly difficult to read due to pixellation. Is it possible to replot this figure?

The comments on figure 7 suggest that particle emissions should be linearly correlated with traffic counts. No sound basis is given for this assertion, and indeed, lower traffic speed at high traffic flow rates might be expected to give rise to an exponential relationship. This section should be reconsidered.

Section 3.6 on the relationship between particle diameter and particle number flux is somewhat weak, and could be removed from the paper without compromising the scientific quality. The authors seem to state that the correlation between geometric mean aerosol diameter is only observed from one of the three wind sectors, and even then only during one of the three measurement periods. Given the weakness of the

ACPD

9, C3573–C3575, 2009

correlation, it seems tenuous to use figure 10 as evidence of road traffic being a major source of ultrafine aerosol. This is likely to be the case, but the argument is not strongly supported by the data presented.

It would be interesting to see section 3.5 substantially expanded. Given the fact that urban CO_2 and aerosol sources are both likely to be combustion related, it may be possible to distinguish between the effects of different types of combustion by comparing the fluxes in more detail (e.g. space heating vs. transport sources). This referee would suggest adding an extra figure with the CO_2 and aerosol fluxes plotted on the same axes as a diurnal average split by land use type and season. This may go some way towards explaining the differences between the diurnal patterns of traffic counts and aerosol number flux.

Technical Corrections

There are several more areas of the paper which are slightly unclear, but it is difficult to tell which of these are caused by linguistic difficulties. They are, in any case, far too numerous to list here. It seems likely that the paper will benefit greatly from further proof reading.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 13407, 2009.