

## ***Interactive comment on “Dispersion of traffic-related exhaust particles near the Berlin urban motorway: estimation of fleet emission factors” by W. Birmili et al.***

**Anonymous Referee #1**

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General comments:

The paper investigates the particle number concentrations and particle size distribution at an urban roadside site and two nearby background sites located at distances of 80m and 400m from the motorway. In addition, a 3d obstacle-resolving dispersion model is applied to calculate the dilution of particulate emissions from the road traffic adjacent to the roadside site. This allowed the determination of the average emission factor for total particle numbers for the traffic fleet on the nearby motorway. Regression analysis allowed the calculation of emission factors for passenger cars and heavy duty vehicles separately. The obtained results are compared with emission factors from literature

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derived with different methods. The paper is good to read and scientifically sound, the results are relevant and novel. I therefore recommend the publication of this paper in ACP after consideration of the following comments:

#### Special comments:

In section 2.3 the used particle measurement method is described. For SMPS measurements at the roadside site with certainly highly varying particle size distributions it is advantageous (or necessary) to use a buffer volume at the entrance of the instrument. Otherwise, the measured total particle number concentrations can systematically be too low and the size distributions can be biased. It seems from the text that no buffer volume was used. This issue should be discussed, it should be mentioned what effect on the results can be expected from not using a buffer volume.

Page 15551, last sentence: It is stated that "An important assumption is that the normalised local wind speeds  $u^*$  and concentrations  $c^*$  are nearly independent of the magnitude of  $U$  and  $Q$ , leaving ...". This sentence is unclear to me because equations (1) and (2) describe the dependence of  $u^*$  and  $c^*$  on  $U$  and  $Q$ , so why is it important to assume independence. This should be clarified.

#### Minor comments:

Page 15541, last sentence: Should read something like "...these streets play a minor role."

Section 3.1. A consistent notation for the two vehicle classes should be used (e.g. "lorry-like vehicles" and "passenger car-like vehicles" as in the abstract). In section 3.1 and in the legend of Fig. 2, other terms ("lorry like", "car like", passenger cars) are used. This should be avoided.

Page 15545 lines 24/25: Should note "...morning rush hour, a high level of the traffic volume during the day and slow decrease...".

Page 15549, line 4: Should note "... It becomes obvious...".

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Page 15549, line 7: Should note "...to increase above...".

Page 15549, line 21: Should note "...diverging traffic pattern.".

Page 15560, line 1: Should note "...insufficient...".

Page 15560, line 9: Should note "...might also be biased...".

Page 15561, Discussion: It is mentioned that it is a useful byproduct of the method, that "the 3-D simulation pictures the impact of traffic emissions in the surroundings of the motorway". This could be more exploited in this study, e.g. some brief analysis of the small-scale variability of the particle number concentrations could be included.

Fig. 12: Label of y-axis is wrong, should be  $dE/d\log D_p$  rather than emission factor E.

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Interactive comment on Atmos. Chem. Phys. Discuss., 8, 15537, 2008.

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