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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Evaluation of a coupled dispersion and aerosol process model against measurements near a major road" *by* M. A. Pohjola et al.

Anonymous Referee #3

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General:

In this manuscript, a modeling system combining atmospheric dispersion and aerosol dynamics related to traffic exhaust particles is introduced and tested real measurement data. I find the paper very well written and it can be considered scientifically sound. There are a few points that require some action before the paper can be accepted for publication in Atmospheric Chemistry and Physics.

Detailed comments:

The authors rely on particle number emission factors given by Gidhagen et al. (2004)

and perform an extra sensitivity study using the emission factors reported by Yli-Tuomi et al. (2004). This is an acceptable approach. However, the authors should bring up more clearly in sections 3.1 (pages 2825 and 2826) that particle number emissions factors from vehicles are not well known and that they seem to depend on many factors related to both vehicles and environmental conditions. A good overview in this regard is the paper by Morawska et al. (2005, Environmental Science and Technology, vol 39, p. 9130-39).

By definition, VOCs are not condensable into aerosol particles unlike the authors state on page 2832 (end of section 3). However, some of the VOC oxidation products may condense onto aerosol particles. The authors should be more specific here.

The main result of the simulations presented by the authors is that dilution was the only important process affecting the evolution of the particle number size distribution in the simulated and that other processes were in practice negligible. This is quite an expected result and is apparently related to the prevailing conditions during the simulated days. On the other hand, other papers have been published where the role of coagulation and/or condensation/evaporation has been found to be important. The authors should explain why in most cases only dilution is important, whereas in some cases also other aerosol processes may become detectable. Clearly, all this is related to the relevant time scales of the processes involved.

The authors do not say practically anything about the role of stability or background aerosol in the simulated cases. Stability conditions seemed to be slightly different between the three simulated cases, could this be seen from the simulation results. The rates at which the number concentration of particles in different “modes” decrease as a function of distance from the road is dependent on background aerosol size distribution. This should be mentioned and discussed as well.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 2819, 2007.