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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Evaluation and modeling of the size fractionated aerosol number concentration measurements near a major road in Helsinki" *by* T. Hussein et al.

Anonymous Referee #1

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This work reports the roadside measurements of nanoparticles near a major roadway and evaluated the temporal and local meteorological conditions on the measured aerosol number concentrations and size distributions. A coupled modeling system was applied in an attempt to explain the evolution of nanoparticle number concentrations as the exhaust moves away from roadway. This paper provides a useful source for the model evaluation. Overall, I recommend the publication of this work after the following issues are addressed.

1.It is well established that the nanoparticle formation in vehicular exhaust is very sensitive to the ambient temperature. Fig. 3 and 4 in the paper represent two different

scenarios in which Case I is in summer time and Case II is in winter time. The maximum temperature difference between the cases is as large as 30 C. However, the measured nanoparticle concentrations at roadside in these two cases are of similar magnitude. Can you explain why there is no direct temperature effect on the measured nanoparticle concentration as observed in other field measurements?

2.It is clearly mentioned in the paper that “total particle number concentration decreased by 35-45% while transported from the roadside to a distance of about 60-80 m from the road”. However, Fig. 11(a) shows a 67 % reduction, from 4.5e05 cm-3 at 0 m from roadside to 1.5e5 cm-3 at 65 m from roadside in simulated number concentration in the “3x emission factor” case. Why does the model predict such high reduction in the particle number concentration, especially in the winter time case? To my best knowledge, the 35-45% reduction (Zhu et al.,2002) was observed at summer time when the nanoparticles tend to shrink quickly, leading to more decrease in particle number concentration as opposed to winter time.

3.It seems to me that the reduction in particle concentration is also sensitive to the initial emission factor. Fig. 11 shows that there is a considerable difference in the particle concentration reduction between Base case and 3x emission factor case. Can you explain how the change in emission factor affects the particle evolution?

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