

Interactive comment on “Modelling and measurements of urban aerosol processes on the neighborhood scale in Rotterdam, Oslo and Helsinki” by M. Karl et al.

Anonymous Referee #1

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GENERAL COMMENTS

A very useful contribution to the scientific community, modeling particle size distribution data collected at roadside and urban background sites in: Rotterdam; Oslo; and Helsinki. The paper fits the fully size-resolved MAFOR model to data collected to the distributions at the pair sites and then cleverly interpolates the development of the distribution from at roadside to urban background. The model is used to estimate the contributions of coagulation, condensation and dry deposition in the ensemble development for different conditions of dispersion, namely: moderate; efficient and inefficient. The work discusses the findings within the limitations of the model and then proposes

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useful parameterization.

SPECIFIC COMMENTS

Line 15 of the Abstract. "It was not necessary to model the nucleation of the gas-phase vapors..." This sentence created immediate concern (suggestion nucleation had been neglected) until I read further into the manuscript to understand fully. I suggest adding a short sentence after this to say why, i.e. post tail-pipe emissions were considered.

Line 22 of pg 35168. "The traffic volume at Bentinckplein, which is a street canyon..." The measurement PN in Street canyons is affected by the circulation of air within the canyon whether it passes across the traffic before passing over the sampler or whether it passes over the sampler first before the traffic. This is dependent on the wind direction across the canyon. Was this taken into account?

Line 21 of pg 35171 "The mean traffic-related size..." Three distinct modes are described with mean diameters 17, 85 and 250nm. Are these peak fitted modes and if so please specify how you fitted them.

Lines 1-10 of pg 35184. In the conclusions the inaccuracies of the simplified treatment of the coagulation process was discussed, which did not account for the coagulation between size categories. How does the accuracy improve as the number of size categories is increased, eg X2 and X4?

Table 3 pg35193 The average PN concentration for Helsinki LIPIKA Case 1 (186100 cm⁻³) is much higher than the other sites, what is the explanation for this?

Figure 4A. The size development of the size spectra for Oslo Winter UFP - Oslo shows the nucleation mode being diluted. It would be useful to have had a third intermediate size distribution collected half way between the roadside and background to fit the model through. Is there a possibility that there could be nanoparticle loss by evaporation, rather than coagulation processes? (ref M. Dall'Osto et al Atmos. Chem. Phys., 11, 6623-6637, 2011).

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TECHNICAL CORRECTIONS The paper is well written needing no technical corrections.

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 35157, 2015.

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