Supplementary Materials: Dispersion of Traffic Related Nanocluster Aerosol Near a Major Road

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Text S1. Uncertainty in NCA concentration

The uncertainty in the NCA concentration can be related to three main sources of error: 1) systematic error of the concentration measurement, caused by misjudgement of the detection efficiency of individual instruments, loss calculation errors, and dilution factor errors; 2) random effects caused both by uneven sampling from the atmospheric aerosol population and instrument noise 3) error in the determination of the particle size. Errors of type 1 can lead to a systematic over- or underestimation of the fraction of NCA from the total particle population, and are therefore the most important to tackle. In this study, we have used a constant saturator flow rate, and kept the system also constant otherwise. The observed time series shows that the CPC and PSM time series are consistent in such a way that the PSM always shows higher or equal concentrations in comparison to the CPC 3776, and there are time periods when they consistently show similar concentrations. Errors of type 2 are always part of measurements. Estimating the magnitude of the random error of the PSM+CPC system depends on the setup of the system, and has been done in detail in the recent paper by Olin et al. [1] (Supplementary material). They estimated the random uncertainty of the NCA concentration using a PSM+CPC system to be 60%; however, this also includes the uncertainty in the cutoff diameter of the CPC. Type 3 error can lead to bias in the absolute number of the NCA concentration when comparing the readings of two instruments. Errors in the estimate of cut-off size of the CPC leads to changes in the measured concentration; however, this error will in our case be constant over the measurement period. It should, however, be noted that the NCA size range definition used here is essentially an instrumentation-based definition; the observed concentration of NCA includes a fraction of > 4 nm particles

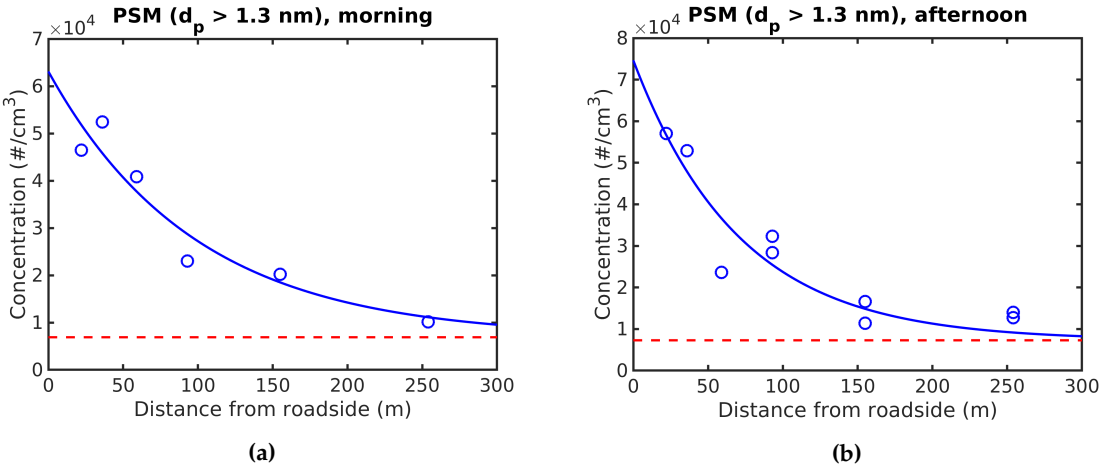


Figure S1. PSM concentration as a function of distance measured during **(a)** morning and **(b)** afternoon. The blue solid line is the exponential fit to data. The red dotted line is the background concentration taken after the roadside measurements.

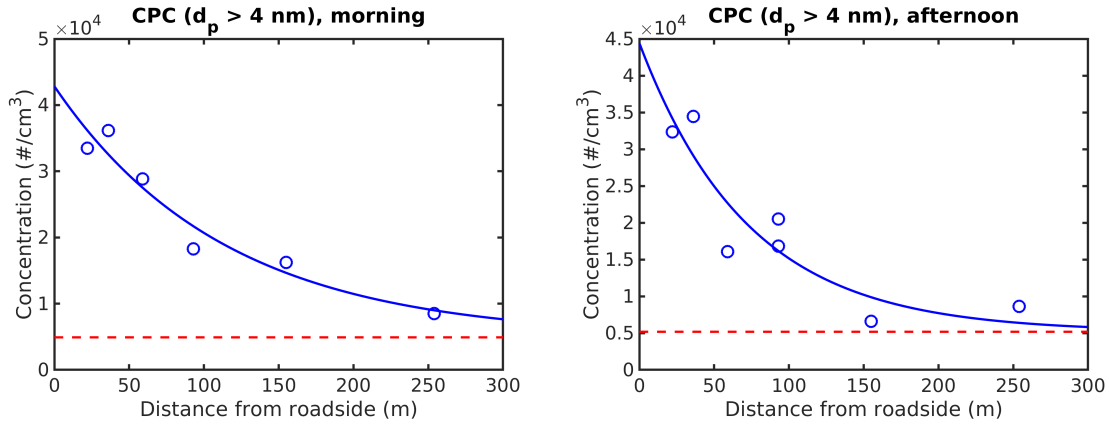


Figure S2. CPC concentration as a function of distance measured during **(a)** morning and **(b)** afternoon. The blue solid line is the exponential fit to data. The red dotted line is the background concentration taken after the roadside measurements.

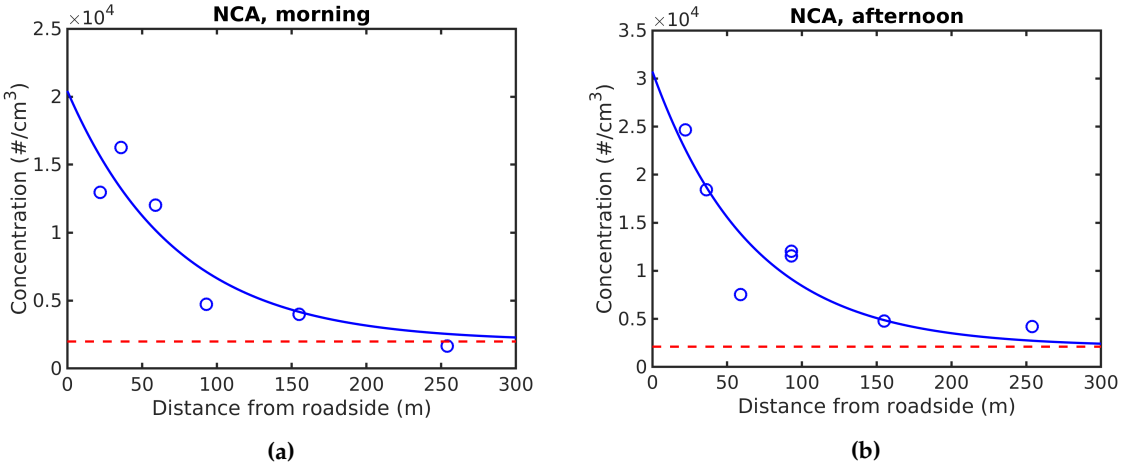


Figure S3. NCA concentration as a function of distance measured during **(a)** morning and **(b)** afternoon. The blue solid line is the exponential fit to data. The red dotted line is the background concentration taken after the roadside measurements.

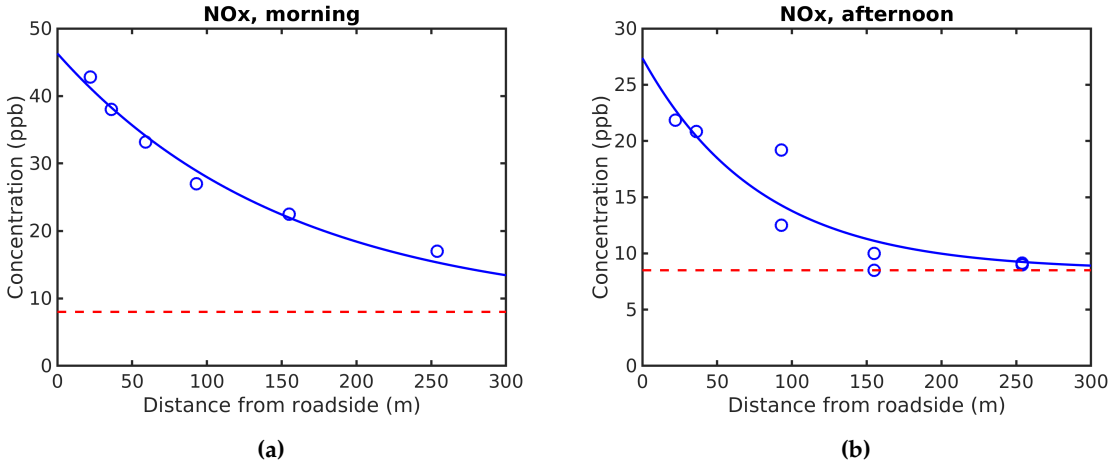
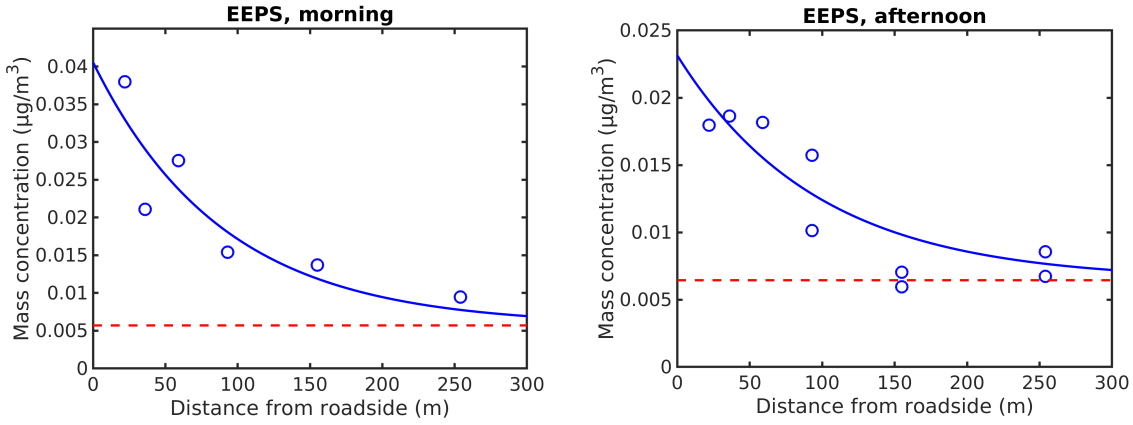
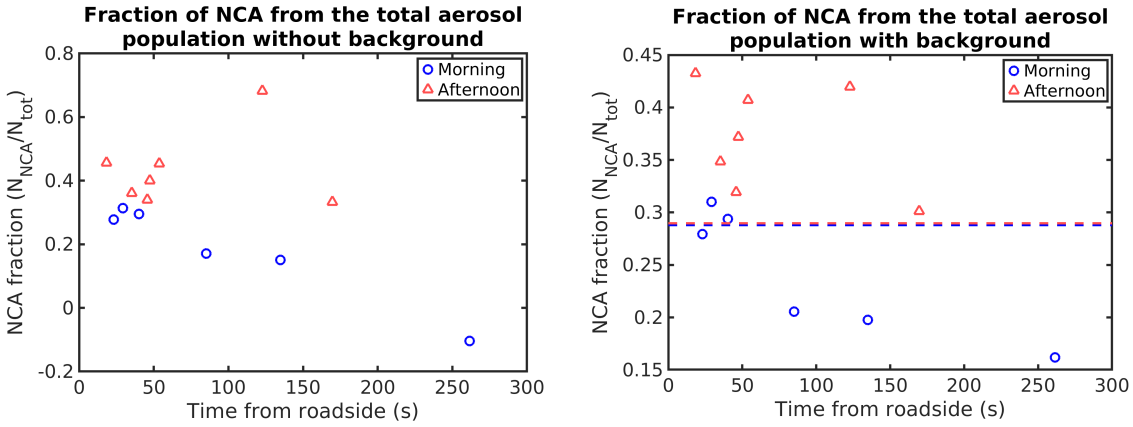


Figure S4. NO_x concentration as a function of distance measured during **(a)** morning and **(b)** afternoon. The blue solid line is the exponential fit to data. The red dotted line is the background concentration taken after the roadside measurements.



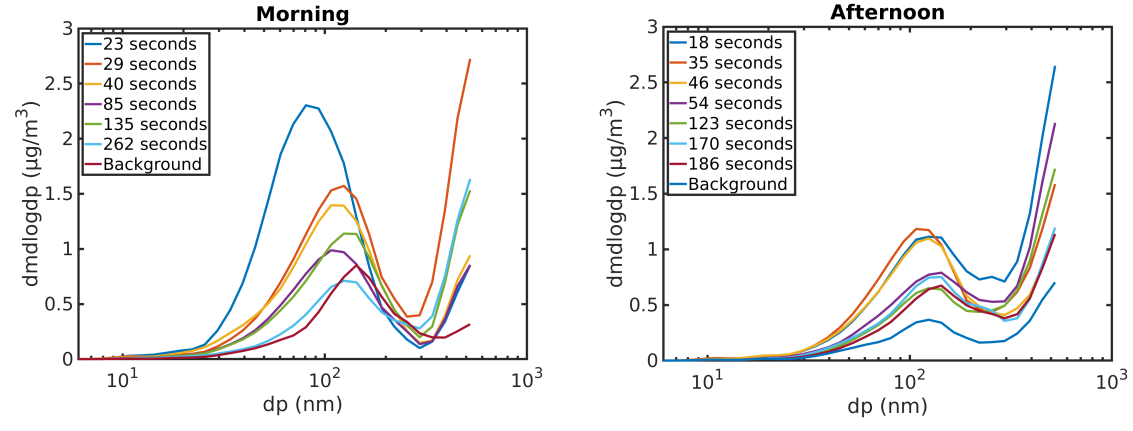
(a) **(b)**

Figure S5. Mass concentration as a function of distance for particles under 200 nm in diameter measured during **(a)** morning and **(b)** afternoon. The blue solid line is the exponential fit to data. The red dotted line is the background concentration taken after the roadside measurements.



(a) **(b)**

Figure S6. The fraction of NCA from the total aerosol population **(a)** without background concentration and **(b)** with background concentrations marked with blue and red dotted lines for morning and afternoon respectively.



(a) **(b)**

Figure S7. Mass distributions measured with EEPS measured during **(a)** morning and **(b)** afternoon.

References

1. Olin, M.; Alanen, J.; Palmroth, M.R.T.; Rönkkö, T.; Dal Maso, M. Inversely modeling homogeneous H_2SO_4–H_2O nucleation rate in exhaust-related conditions. *Atmospheric Chemistry and Physics* **2019**, *19*, 6367-6388, doi:10.5194/acp-19-6367-2019.