

Interactive comment on “Atmospheric ions and nucleation: a review of observations” by A. Hirsikko et al.

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While congratulating the authors on a long-overdue comprehensive review of observations on atmospheric ions and nucleation, I would like to point out a possible misconception regarding the concentration of small ions near road traffic. On page 24273 (line 24) and in the concluding remarks on page 24290 (line 27), the authors correctly cite Ling et al (2010) in stating that they observed an increase in small ion concentrations near busy roads. However, in a more detailed analysis that we presented in a recent paper that was published probably after the above paper had been submitted (E.R. Jayaratne, X. Ling and L. Morawska. “Ions in motor vehicle exhaust and their

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dispersion near busy roads”. Atmospheric Environment, 44, 3644-3650, 2010.), we showed that the high small ion concentrations exist only very close to the kerb. To quote from the abstract of this paper: “Measurements were conducted as a function of downwind distance from two motorways carrying around 120-150 vehicles per minute. Total traffic-related cluster ion concentrations decreased rapidly with distance, falling by one-half from the closest approach of 2 m to 5 m of the kerb. Measured concentrations decreased to background at about 15 m from the kerb when the wind speed was 1.3 m s⁻¹, this distance being greater at higher wind speed. The number and net charge concentrations of aerosol particles were also measured. Unlike particles that were carried downwind to distances of a few hundred metres, cluster ions emitted by motor vehicles were not present at more than a few tens of metres from the road.” So, in summary, while motor vehicles emit copious quantities of ions of both signs, owing to the very high concentration of particles in the exhaust plume, the small ions are quickly removed by coagulation, falling to less than one-half of its concentration within a distance of less than 5m from the road. This removes any contradiction with the findings of Titta et al (2007) and Hirsikko et al (2007c) who carried out their measurements at greater distances from the nearest road traffic.

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