

Atmos. Chem. Phys. Discuss., referee comment RC2  
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## Comment on acp-2020-1282

Anonymous Referee #2

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Referee comment on "Measurement report: The influence of traffic and new particle formation on the size distribution of 1–800 nm particles in Helsinki – a street canyon and an urban background station comparison" by Magdalena Okuljar et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2020-1282-RC2>, 2021

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The manuscript by M. Okuljar and coauthors presents size distribution data over the size range between 1 and 800 nm from two urban locations in Helsinki. One station is located near a busy road while at the other measurement station urban background air is sampled. For the present study a multitude of instruments has been utilized to characterize particle size distribution, particle number concentration, selected gas phase compounds and meteorological parameters. The obtained particle data are categorized into different size ranges (sub-3 nm, nucleation mode, Aitken mode and accumulation mode) aiming at source apportionment between traffic related emissions and new particle formation (NPF). Apparently, traffic is a substantial local source of very small nanoparticles affecting sub-3 nm concentrations, nucleation mode and partly Aitken mode whereas accumulation mode particles are more related to long-range transport. Based on a statistical analysis the authors present a method by which the sub-3 nm concentration can be attributed to traffic and/or NPF. I think the manuscript clearly fits the scope of ACP and is of sufficient quality that allows publication with some minor corrections.

My only concern is about the dominant focus on the sub-3 nm particles. While the title emphasizes the full size range between 1 and 800 nm, most of the analysis (>50%) only addresses the very smallest particles. I'd have preferred to see also some more information on the nucleation mode as this is also clearly affected by traffic, maybe even more than the sub-3 nm particles (comparison of Figs. 3c and 4g). It would be interesting to see the regression analysis (section 3.5) also for nucleation mode and Aitken mode particles. If this is not intended for the current manuscript it should somehow reflect in the title (more focus on sub-3 nm).

One other point relates to Figure 2. What causes the jump between the dots and lines? Could this be related to the conversion of CPC concentrations to  $dN/d\log D_p$ ? I guess there would also be some scatter on these data points that would maybe relax this sharp transition there.

Editorial suggestions:

Page 4, line 135: ...particles of lower mobility... I'd replace "lower" by "corresponding"

Page 8, line 228: ...particles in the nucleation mode...

Page 8, line 233: ...likely linked to NPF. ("an NPF event" does not make sense with the statistical analysis)

Page 8, line 235: ...instruments particles... needs a preposition in between

Page 11, line 319: ...an order of magnitude higher... When looking at Figure 6 I would rather estimate a factor of 5 difference for night time sulfuric acid between street canyon and background.

Page 14, Table 3: The two asterisks next to SO<sub>2</sub> are not explained.