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Atmospheric Chemistry and Physics Discussions

Interactive comment on "In-depth characterization of submicron particulate matter inter-annual variations at a street canyon site in Northern Europe" *by* Luis M. F. Barreira et al.

Anonymous Referee #2

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Overview: The manuscript by Barreira et al. used four major instruments (ACSM, DMPS, AETH, MAAP) to measure the chemical composition, diurnal trend, seasonal trend, and simple source apportionment of PM1 and PM2.5 from an urban street canyon in Helsinki, Finland, for four and half years. The results demonstrate that various kinds of chemical composition have been decreasing during the measurement time, and that season trend of the organic, black carbon, and particle size distributions were also described in this study. Overall the study is clearly written and easy to follow. I recommend for publication after the following points addressed.

Major Comments: In section 3.5, the author discussed the effects of local and long-

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Discussion paper

range transport by comparing a few factors for defining long range transport vs local formation. The author also used satellite data to support these arguments. I am curious whether the author did any examination based on certain tracer ions from previous studies to perform a more detailed the source apportionment of the data collected. For instance, have the authors analyzed m/z 82 signal to examine the fraction of the IEPOX-SOA? (Budisulistiorini et al., 2013, Hu et al., 2016), or m/z 60 to understand the concentration of levoglucosan or biomass burning (Bougiatioti et al., 2014)). With four and a half year data, the author should probably also use PMF to analyze the data and look for any information that the PMF may be able to provide. For instance, the author can look at the ratio between more aged organic components vs less oxidized, which may help distinguish aerosols from long range or local transportation.

It was a bit confusing when the author described the density conversion in line 150-155. For instance, the author described a constant density of 1.5 g cm-3 was used to convert mobility diameter to vacuum aerodynamic diameter, without specifying the reference. Then the author calculated the gravimetric density to be 1.42 g cm-3. Why would the author not use 1.42 g cm-3 to reconvert the mobility diameter to vacuum aerodynamic diameter again to make the results more accurate?

Minor Comment: L 135: Please define BC(FF) and BC(WB) when it first appear.

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