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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Simultaneous measurements of particle number size distributions at ground level and 260 m on a meteorological tower in urban Beijing, China" *by* Wei Du et al.

Anonymous Referee #2

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This manuscript presents simultaneous measurements of particle number size distribution and particle chemical composition at a high level of 260 meter and at ground level. Information on comparison measurements in megacities such as Beijing can provide new insights into vertical distribution of particle formation and growth. In addition, comparison of measurements between control and non-control period will help to evaluate the effectiveness of the proposed emission control strategies. The paper in general is well written and should be publishable after some minor issues are address:

1. The authors conclude that investigation of new particle formation and growth events

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at ground level in megacities needs to consider the influences of local cooking emissions. This is a very strong statement. Can the conclusion be generalized in megacities around the world or it is just constrained to some regions?

2. The conclusion of emission controls enhancing new particle formation is another strong statement that may need a little more elaboration, for example, more in-depth data analysis and showing more evidences.

3. The authors claimed that "One of the major reasons is that emission controls decrease the gas precursors (e.g., SO2 and NOx) and PM2.5 mass concentrations substantially and hence suppress the growth of particles to larger sizes." Is there something else that needs to be explored? For example, is it possible that accumulation mode particles are controlled from their direct emissions from industries or coal-fired power plants in addition to their contribution from secondary formation?

4. The authors used PMF to perform source apportionment and found two factors (factors 2&3) is likely associated with cooking emissions. The size distribution corresponding to factor 2 peaks at about 32 nm, which by and large falls within the small Aitken mode size range (15-40nm). This conclusion somehow is not consistent with the statements between L160-170 which attribute large Aitken mode particles (40-100 nm) to cooking emissions. In addition, while both factors 2 and 3 are attributed to local cooking emissions, what are the reasons that they are divided into two factors rather than combined into one?

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