

## ***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 #3**

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This is an interesting work and this referee has a few minor comments for authors considering. 1) Lines 48-51, “The first continuous measurements of aerosol number size distributions within the city area of Beijing indicated a high variability in number concentrations, and the variations were substantially different among dust storm, clean and polluted periods (Wehner et al., 50, 2004).” This is not fact, please double check and give a credit to a right one. 2) Lines 56-57 “organics were found to be the dominant species in new particle formation events during the Beijing Olympic Games (Zhang et al., 2011)”. No direct measurements for chemicals in <50 nm atmospheric particles were available in China, how can Zhang find organics to be the dominant species in

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new particle formation events? Argue? 3) Lines 63-64 “Therefore, measurements of size-resolved number concentrations at high altitude with less local influences” Why? Local stacks at height can also greatly increase particle number concentrations? If the sampling site is on the route for air plane landing or taking off, huge local emissions at height are also there. 4) Lines 84-92, SMPS suffers from a problem in accurately measuring particle size distribution in dynamic polluted air and is also unable to separate primary particles from grown new particles in the size range  $> 30$  nm. The weakness should be considered and mentioned. 5) Lines 135-145, the referee has tested size distributions of particle number concentration and found that there was a dominant mode at  $\sim 20$  nm. Of course, different cookings may not generate the same size distributions of particle number concentration. Please give more evidences for cooking source. 6) Lines 163-164 “Indeed, pronounced peaks for N 15-40 were often observed at evening time, likely indicating the influences of local emissions, e.g., cooking and traffic emissions.” Yes, the two types of sources could be the cause. Vertical exchange of regional transported particles can also be a potential cause. 7) Lines 175-195, changing size distributions of particle number concentration between two periods can also be due to the presence or absence of cloud-modification and should be considered. More clear days in control periods even strongly implied the possibility. 8) Lines 220-221 “During the growth period, the GMD increased from 29 to 57 nm in 14 h at ground level, while it increased from 41 to 88 nm in 12 h at 260 m” It could be true, but hard to believe this. Please consider the weakness of SMPS measurements in dynamic urban atmospheres. 9) “our results likely indicate that organics played an important role in the early stage of particle growth, while both organics and sulfate are important in the subsequent growth.” Without direct measurements for chemicals in nucleation mode particles, it is really hard to say this. The same comment is applicable for lines 290-293. 10) Section 3.4, please consider cloud-modification for particle number size distribution

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