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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Influence of medium range transport of particles from nucleation burst on particle number concentration within the urban airshed" *by* H. C. Cheung et al.

Anonymous Referee #2

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The manuscript presents a long term measurement study of particle number concentrations in three sites around Brisbane region with different characteristics and geographic linkages. The diurnal variations were investigated with relation to the wind directions, regional transport using different tools. Several nucleation burst events were also observed and discussed. The study contributes a better understanding of the particle formation in urban areas due to typical urban sources and their transport in a regional scale. However, there are some major comments listed as below which will require the author's response and justifications.

Page 3, Line 14. Although the authors have acknowledged in the introduction that size

distributions of PNC have been less investigated, and the present study did employ a SMPS for size distribution measurement at least at one site, such information was not presented at all in the figures and discussions. Rather, only PNC was calculated based on the sum of all size channels from SMPS. The temporal variation of the particle size distribution could carry important information of UFP formation and evolution. It is highly recommended to include the data and discussion in the manuscript.

Page 3 Line 2. "thay are" is a typo and it should be "they are".

Page 5, Line 16. The measurement techniques part is not clear. CPC 3781 measures particle with size >6 nm and the authors stated the size distribution measurement with TSI 3080+CPC 3781 tandem was in the range of 4-110nm. Such discrepancy of information needs clarification. Also the type of DMA used isn't clear and from the presented information, it seems to be 3080N, a nano-DMA. It needs confirmation.

The second paragraph of the same section didn't mention where the real time measurements were located. It seems to be WOO and ROC with DERM stations. Also, the information of TEOM was a repetition from the first paragraph.

Page 6, Line 12. It is stated that approximately 28% of the data were removed based on the given criteria. The ratio of outliers seems quite high, and it is recommended to give possible reasons for this for readers' reference.

Page 7, Results and discussion. It is a big concern for the direct comparison of SMPS derived PNC (4-110nm as stated) with CPC 3781 measurement (>6nm) from different locations. First, the SMPS tandem uses a 3781 CPC with size cut >6nm so how effective was the distribution measurement for particles size <6nm; Second, for the upper size ranges >110nm. It is assumed in the manuscript that their contribution is negligible and the PNC from both set up were compared without justifications. If the authors have collected side-by-side data for both CPC3781 and SMPS (DMA3080N+CPC3781) during the study, it is recommended to present examples and analysis to clarify the concerns.

Page 7, line 9. For the presentation of grant average of diurnal profiles of the PNC from three sites, it is not clear if the averages were based on the overlapping periods of the measurement or the individual measurement. The roadside site missed almost half of the sampling time compared with the other two. It is recommended to make clarifications and justify the data presentation.

Page 7, line 18, it is not clear how 5.5% and 5.1% were calculated to evaluate the contributions from morning PNC peaks. If it is based on the ratio of peaks values over the sum of PNC from all day measurements, it may be questionable. The authors need to clarify the method of calculation. Same comments go to the relative contribution calculations for noon peaks.

Page 8 line 2, in the discussion of the diurnal trend of PNC, it is suggested to describe the temperature profiles during the sampling period since the stated pattern seems to be the impact of different heights of mixing layer that has been observed in most of the urban environments. However, only temperatures of two days of case studies were presented with little variation. How about other days?

Page 10, line 4. For the discussion of the correlations for nucleation events, these are interesting findings, but it is also possible that the high correlation coefficients were actually driven by the much higher values of concentrations from all sites due to the burst of PNC. What are the p values of the correlations? It is recommended to show examples of actual scatter plots of nucleation and non-nucleation events in the SI to strengthen the point.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 32965, 2011.