**Atmospheric
Chemistry
and Physics
Discussions**

Interactive comment on "Inter-community variability in total particle number concentrations in the eastern Los Angeles air basin" *by* N. Hudda et al.

Anonymous Referee #2

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General comments:

The paper examines the spatial and diurnal variation of PNC in the greater Los Angelos Area. The use of CODs is a helpful approach to compare measurements between different stations. The data collected at seven locations during two measurement campaigns is presented in a scientifical but rather conventional way. However, I believe that the paper could be improves with regard to sufficient physical interpretation. The authors fail in providing the reader with a clear message of their findings.

It is an interesting work because it discuss number concentrations rather than mass concentration of ultrafine particles. Number concentration is a useful parameter for

epidemiological studies. Exposure assessment to UFPs is still in its initial stage compared to exposure assessment for fine particle PM2.5 and PM10. One of the major questions is how many sample points distributed in urban area are required to represent human exposure to particle number concentration. Due to their different physical properties, UFPs are supposed to have larger spatial and temporal variability than fine particles. Furthermore, there is a limited number of experimental studies for ultrafine particles in the international bibliography.

However, the contribution of this paper to exposure issues for epidemiological studies is limited. Beside the spatial variation (which is important for long term epidemiological studies) the temporal variation is very important for short-term studies. Unfortunately, the analysis presented in this paper focus on the spatial variability. The analysis of temporal variability (correlations between the monitoring sites on hourly and daily base) was not conducted.

The authors should give some information on the air quality status of the study area. How is the air quality status in the greater Los Angelos Area, what is the relationship between air quality and wind field (or other meteorological parameters), what are the main emission sources? The authors should provide a description on the seasonal distribution of the wind direction/intensity, the local flows, possible interaction with background wind. This information is necessary to be reported - before proceeding to the analysis of the measurements - to help the reader to understand the background air quality conditions and mechanisms responsible for the formation of these conditions.

Specific comments:

Introduction:

The authors stated in the introduction (line 54) that PM2.5 mass concentrations are often used as a surrogate for UFP concentration. I don't agree with this statement and I couldn't find it in the cited reference (Wilson et al., 2006).

To my knowledge Jerret et al. (2005) analyzed the associations between PM2.5 and mortality and not between UFP and health effects (line 62). Moreover, Jerret and colleagues didn't assume a homogeneous distribution of particles. In contrast, in this study PM2.5 exposure surface was developed by use of interpolation technique. It means that this reference is inadequate and the authors should exchange it. In the same sentence the authors state that UFP have pronounced spatial variation at local and regional scale with some references. The references are not chosen very well: - Pinto et al. (2004) described the spatial variation of PM2.5 and not of UFP - Zhu et al. (2002) described the decrease of UFP concentration depending on the distance to a major road (what is on a very local scale) - Krudysz et al. (2009) is still submitted (since 2008)? - Moore et al. (2009) is not in the reference list. I miss some very relevant European papers published on this topic: Buzorius et al., (1999), Tuch et al., (2006), Puustinen et al. (2007) and Cyrys et al. (2008).

Site description:

Concerning the monitoring sites, what are their characteristics related to any particle sources, apart from their distance from traffic sources? For example, are they close to an industrial area, or another combustion source? This material will greatly help the discussion of the results. The site type (urban background, regional background, traffic influenced, industrial…) for each location should be added either to the text in this section or to Table 1.

More details are required for the meteorological station: What is the distance of the meteorological station from the other measuring sites? Is it installed in an open area? Are there influences by other buildings? How representative is the station of the wind flow prevailing in the whole examined area? At which height is the wind recorded?

Data processing and validation:

What is PSD (line 167)?

It is well known that CPCs have an uncertainty of about 20%. Therefore the quality assurance procedures are very important, especially for this study. The authors report some quality assurance aspects, especially with regard to the CPCs. However, it is not clear to me why the CPCs at the beginning of the study were compared to the 'mean' CPC and at the end of the study to the concentration measured by one (even freshly calibrated) CPC. The comparison should be conducted in the same way. For each CPC the regression equation and R2 to the same "standard" (either to the 'mean' CPC or to the factory-calibrated CPC) at the beginning and the end of the study should be stated. It is not clear how the CPC data were corrected. The same is valid for the SMPS instruments.

3.2 Diurnal and Seasonal Variation:

For Figures 2b&c (3b&c, 4b&c and so on) please use the same scale on the y-axis (for better directly comparison).

3.2 Spatial distribution of PNC:

The discussion of Figure 5a is imprecise. The highest morning concentrations were observed for USC (45 000 1/cm3) followed by RUB and SBR (about 30 000 1/cm3 for both sites). The authors suggest similar concentrations for USC and RUB (as the two sites were located closest to freeways), but this is not true.

If the higher concentrations at SBR were caused only by the CPC 3025 (reporting higher numbers of particles) the curve for SBR should be corrected or removed from the figure.