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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Nocturnal new particle formation events in urban environment" *by* Farhad Salimi et al.

Anonymous Referee #2

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This manuscripts investigates nighttime formation of new particles by nucleation in an urban environment. The analysis is based on data obtained from short measurement campaigns at 25 different sites in Brisbane, Australia. The paper contains interesting new information on nocturnal new particle formation and should therefore be published. Before acceptance, there are a number of concerns, mostly minor, that the authors should address.

Section 2.1. While detailed site information is not essential for the purpose of this paper, some information on the sites should be provided, such as which kind of different urban sites (traffic sites, urban background sites, etc.) the data set covered and how many of each site type there were.

The statement made at the end of section 2.3 (line 91) does not make any sense.

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Please delete, or provide additional information.

Section 3.1, lines 122-137. Comparing to the whole range of observed GR values by two different studies saying that these values are similar or different not make much sense. Such a comparison should be based on narrower range of values like mean+/-STD or median+/-STD. Concerning urban areas in China, there are several recent publications from various sites to which new particle formation and growth rates could be compared as well.

Section 3.1. I do not undertand what the given CCN size range of 61-97 nm is supposed to mean here. The minimum size at which particles may as CCN depend on both supersaturation (S) and particles chemical composition. At high but realistic values of S even particles as small as 50 nm in diameter may act as CCN, whereas in most environments the minimum activation diameter is around 100 nm. There are several papers that discuss this topic.

Section 3.2, lines 145-147. The discussion is confusing. What is meant by "Diurnal model"? It seems that GAM results have somehow been applied here but the extremely short description of the model in section 2.5 makes it impossible for the reader to understand what has been really done.

Section 3.3, line 160: the event-quencing ability of high CS is an interesting observation that has been seen in many other, but not in all, earlier studies. The recent paper by Salma et al. (2016, Atmos. Chem. Phys. 16, p. 8715) investigates this same issue in detail based on an urban-rural pair of measurement data sets. The authors could discuss the role of CS a bit more and cite a couple of relevant papers.

There are some inconsistences in the values GR discussed in the text and GR shown by figures 3 and 8. While there is one high value of GR at around 10 am in Figure 3, the GR in general tends to be a bit higher at night compared with daytime. This is supported by figure 8. In the text, it is stated that GR had the highest value in November, which is not supported by figure 3.

There seems to be a scale error in the values of CS in Figure 4. Should be the real values be three orders of magnitude lower?

Language/other technical issues:

line 30: . . . urban areas

line 94: . . . onto particles

lines 98-99: incorrect way of citing papers. Should be ". . .using the method described in Svenningson et al. (2008), Kulmala. . .."

lines 120-121: the ranges should be expressed either as "in the range of M-N" or "ranged between M and N". Please correct.

line 122, . . .Hemisphere, we observed. . .

line 147: . . .less GR?

Times of days should be expressed consistently in the paper. Now the time is given as an hour of day in many figures (which is OK), while expressions like 6pm (line 181) is used in the text.

Having no space between individual papers in the reference list makes the list a bit difficult to read.

Finally, many of the figure captions contain too little information to understand the figure without search for more information from the main text. For example, the meaning of dots, lines and shadowed areas should be explained in the caption of Figure 3.

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