

Interactive comment on “Formation and characteristics of ions and charged aerosol particles in a native Australian Eucalypt forest” by T. Suni et al.

Anonymous Referee #1

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In this paper, the authors present interesting results of atmospheric ion and charged particle concentrations as well as they study new particle formation for a first time in a Eucalypt forest in Tumbarumba, South-East Australia, from July 2005 to October 2006. The manuscript is well written and the subject is appropriate to ACP. I recommend the manuscript to be published after meeting the following comments and suggestions.

Specific comments:

-The classification method you describe on page 10348: Was it a visual analysis by a person or some sort of algorithm based analysis? It is somewhat difficult to perceive your criteria for classifying the nocturnal events. Please, explain this class a little bit

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more. You say that during nocturnal events, (large numbers of ions appeared in most size classes at the same time). Does this mean that growth of the ions is not discernible (as in the normal banana plots)? Looking at Fig. 1d, it appears the event has started already before midnight. If so, please produce a plot showing the whole evolution of a nocturnal event. Also, since nocturnal events have not been observed in any other site around the world, how do you explain the finding that in Australian Eucalypt forest that nocturnal production was the major particle formation mechanisms in summer and autumn? Have you tried to analyse the nocturnal events in more detail? Some additional discussion would be welcome.

-What about non-event days? They have not been mentioned in the text at all, however in fig.3 the meteorological parameters have been compared on normal event days and on (non-event/unclear days). Also, the number of non-event days has been presented in table 1. They have also been taken into account when calculating event frequencies. Some additional discussion concerning the nonevent day characteristics would be welcome.

-If I understand it correctly, (unclear) days are such that it is difficult to say whether or not NPF took place. However, it would be nice to have some discussion on how you draw the line between event day and unclear day, on one hand, and between an unclear day and a nonevent day, on the other hand. Also I'd suggest including example plots of unclear and nonevent days in Fig. 1. that will help the reader to get an idea how different those two classes are from the other classes.

-I am not quite sure if the comparison presented in Fig. 3 (meteorological variables on normal event days and on non-event plus unclear days) is as informative as would be a comparison between normal events and non-events. That would seem more logical in case you are trying to highlight the similarities and differences between meteorological conditions on certain event and nonevent days. Also, it would be nice to have additional bars in Fig. 3 showing the ranges of variation of the parameters.

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-Fig.5 would be clearer if you present wind direction as wind rose instead of bars. Together with a map of the station location, this will aid the reader to follow your discussion concerning the effect of wind direction on growth rates.

-I do not agree that the comparison of growth rates among different sites around the world would be particularly difficult, quite probably the 7-20 nm growth rates correspond to those determined from DMPS or SMPS measurements at different sites.

-The first sentence in the conclusion part, on what basis you can conclude that? There were only 2 days of radon efflux measurements from the soil around Tumbarumba. On page 10354, a little comparison has been presented between ion concentrations values in Tumbarumba with two sites- where they found a correlation between radon concentrations and ion concentrations- and based on their finding and on 2 days measurements for radon efflux, you got your conclusion. 2 days is not good enough to draw that conclusion (statistically it is nothing respect to 15 months data that you are using in your study, especially when the measured values ranged a lot (values ranged from 9 to 102 Bqm-3)). Also, although the average cluster ion concentrations were undeniably high, are you completely certain that they are higher than reported anywhere else so far?

- In Site and station description: Continuous measurements within the canopy (humidity, CO₂ and temperature profile) and soil measurements (soil moisture, soil heat flux and temperature) have been mentioned but no results have been presented. Have these data has been utilized, some how?

Technical corrections:

-Line 23 till line 25 in page 10345: Please, add some references that support both contribution and negligible effect of ions in aerosol formation.

-Line8, page 0346: Morawska et al.2007 -> Thomas et al.2007. Also , page 10351 line 7.

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- Page 10346 line 6: SE -> South East.
- Line 2 and everywhere else: new-particle-> new particle
- Title of x-axis is missing in figure 2. Also, unify the way you refer to different months, now you are using both abbreviations (figure 2) and numbers (figure 4).
- Figure 6: is too crowded, might be better to split it into 3 parts according to ion types.
- I'd recommend including a map of the measurement site.

Interactive comment on *Atmos. Chem. Phys. Discuss.*, 7, 10343, 2007.

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