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Atmospheric Chemistry and Physics Discussions

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 #2

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The paper by Suni et al. studies the formation of ions and charged particles in Australian native forests. As most (all) of the measurements from forest systems were conducted in the northern hemisphere the measurements presented in this paper give an excellent contribution to the global importance of this phenomena. Further the authors have observed a very interesting phenomenon of nocturnal new particle formation.

The manuscript is very well written and the data presented in a clear way. I would only have few minor comments and would recommend that the manuscript is published with only minor changes.

Comments:

1. Page 10346. You are heavily relying on a reference (Thomas, S., Morawska, L., Akber, R., Quintarelli, F., Martin P., Ryan, B., and Keogh, D. U.: The source and behaviour of submicrometre airborne particles at a site in remote Northern Australia, Atmos. Environ.) that is not available. All references used should be available to the readers and reviewers of your manuscript. Please remove the reference and use available if not this should be personall communication.

2. Page 10349, 2^{nd} paragraph. The authors discus the nocturnal events. These events seem to appear as a large number of ions in all sizes. From figure 1d we can see that they extend during the day and abruptly disappear. If there is such a large change in the ion concentration that should also have been observed in the particle counts. If the 3010 CPC was used with the factory (default) settings its cuttof point should have been 10nm and it should have seen the nocturnal events. Did the CPC observe the nocturnal events?

3. Page 1049, 4^{th} paragraph. The authors claim: “So far nocturnal formation has not been reported to this degree at any other site around the world.” Was nocturnal formation observed anywhere else? If yes please cite the reference, if not than by my opinion this is the most important finding of this manuscript and should be highlighted even in the title.

4. In section 3.1.2 authors discuss the influence of meteorological variables. It would be very illustrative if the authors would provide some statistical analysis to confirm there observations. For example if the temperature was higher on event days than on non event days was there a statistically significant difference. In general some more statistical analysis would improve the manuscript.

5. Section 3.1.3 Growth rates. A similar comment would be valid for the growth rates as before. What is the standard deviation of the growth rates and are they statistically different between the positive and negative ions?

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6. Page 10351, row 15. The sentence: "*Because the GR in Tumbarumba were as large or larger than in Hyytiala although the background concentrations in general were lower (Sect. 3.2.1), it appears that the source of condensing vapours was stronger than in Hyytial a and enabled the particles to grow fast although conditions would have allowed for slower growth, too.*" The sentence is not clear and seems to contradict itself. If the source strength appears stronger what conditions would allow it to grow slower? Please explain this in more detail.

7. Page 10351, 2^{nd} paragraph. You claim: *"No clear seasonal pattern was evident for intermediate or cluster ions (Fig. 4). This suggests that substances other than organic vapours, such as sulphuric acid, have an important role in the condensational growth of these particles."* This would only be valid if you can confirm that sulphuric acid concentration does not have a seasonal patern.

8. Page 10352, 2^{nd} paragraph. You claim: *"This would indicate that the source of some condensating vapours was stronger in the thick, tall Eucalypt forest areas than in the agricultural fields. Indeed, the far larger biomass of tall open Eucalypt forests should produce larger amounts of organic vapours than the agricultural lowlands. It is unclear why the same did not apply for the larger ions."* This statement is in contradiction with the statement from the previous paragraph. In the previous paragraph you claim that: *"...GR for large ions was highest in summer...This is typical around the world and consistent with organic vapours forming a large part of the condensing matter as their concentrations should be highest in summertime."* In this statement you indicate that the GR of larger ions is tide to the abundance of organic vapours. If this is correct than you should have seen larger GR when the air is coming from the tall Eucalypt forests. Please clear this ambiguity.

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