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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Direct measurement of particle formation and growth from the oxidation of biogenic emissions" *by* T. M. VanReken et al.

Anonymous Referee #1

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"Direct measurement of particle formation and growth from the oxidation of biogenic emissions" by T. M. VanReken et al.,

General comments:

The paper by VanReken et al. presents a scientifically interesting system where secondary aerosol formation and particle growth as a result of oxidation of biogenic volatile emissions can be studied separately from the plant enclosure. This will eliminate any reactions taking place on plant surfaces. The system and the measurements are carefully described and the paper is free of technical flaws. Selection of PTR-MS for biogenic VOC monitoring has allowed online measurement of monoterpene concentrations in aerosol growth chamber inlet and outlet. The limitation of the method did not

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allow separation of different monoterpenes in online monitoring. Therefore, authors also measured VOCs emitted by test plants with traditional adsorbent sampling and GC-MS analysis from the outlet plant enclosure. I wonder why they did not use the same method in combination with ozone scrubber to detect the loss of different terpenes in aerosol growth chamber. The wall loss analysis of aerosol particles is an important part of this type of experiments and it is conducted here innovatively.

This is a technical paper which demonstrates the function of the constructed system with preliminary trial tests. The primary goal of these experiments was to determine whether new particle formation can occur readily from the oxidation of biogenic emissions. The answer to the primary question was positive and it is a result worth of publishing. As only one plant specimen of each of the plant species is investigated, the results concerning the differences between two plant species as biogenic emission sources should be considered as tentative. Replicated experiments with the other individuals of same plant species (or an experiment with a group of plants) allow estimate the actual differences between the plant species and define the range in aerosol particle producing capacity of Q. ilex and P. taeda. There could be huge genotypic variation in terpene emission and composition between plant individuals. Therefore, I strongly encourage the authors to replicate their experiments with both plant species to confirm the observed differences in terpene emission profiles and particle formation intensity of the selected plant species before the final publication of the results. Anyway, the facility surely will be a great tool for future biogenic aerosol particle formation studies.

Specific comments:

p. 6592, lines 21-23, Why authors did not measure the temperature directly from both enclosures?

p.6592, lines 5, 10, 14, 15, Give the values in metric system

p. 6593, l. 11, Why authors did not filter the air coming from plant enclosure? Were there any particles of plant origin (e.g. stomatal wax) detectable?

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p. 6603, l. 15, The speculation of the role of sesquiterpenes in intense particle formation events during the P. taeda experiment could have been easier with replicated experiments where individual plants with different sesquiterpene emission capacity can be compared and related to particle formation events.

p 6603, lines 18-25 and p.6611 fig. 5, Authors suggests that the reason for the high variation in magnitude the particle formation events is caused by changed composition of P. taeda emission from day to day although total emission were similar. Could this be a stress effect caused by the heating of the branch inside the teflon bag? What could be the "some gas species" that where not observed?

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 6587, 2006.

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