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Interactive comment on “The chemical and microphysical properties of secondary organic aerosols from Holm Oak emissions” by N. Lang-Yona et al.

Anonymous Referee #2

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In this research, the formation and properties of secondary organic aerosols (SOA) from Holm oak emissions were studied using a biogenic aerosol environmental chamber. Holm oak was used as a model plant for the Mediterranean area. The temperature in the chamber was varied in order to study temperature dependence of volatile organic compound (VOC) emissions and subsequent SOA formation (i.e. to simulate future warmer climate). Furthermore, chemical and physical properties of SOA particles (e.g. hygroscopicity and optical properties) were characterized to evaluate impact of formed SOA on the climate.

Generally, the area of this study is very interesting since biogenic SOA particles are

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suggested to have an important impact on the global climate. Furthermore, there are still not many studies on SOA formation in which living plants have been used as natural sources of VOCs. Therefore, this study presents novel and important results on SOA formation from Holm oak emissions. The manuscript (MS) is quite well written and clear and the scope of MS is suitable for publication in this journal. However, there are some minor comments and suggestions that should be considered before publication.

ACPD

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1) Abstract. There is mentioned that Mediterranean areas may have a stronger impact on VOC emissions and SOA formation than in areas with Boreal forests. I think that is too strong a statement based on results reported in this MS. For instance, the materials of this study are very limited to make this kind of statements, only a few experiments were carried out mainly with one tree species (Holm oak). I think that more experiments with different kind of species in different conditions (temperature, light, seasons, drought, and other abiotic and biotic stresses) as well as large scale climate modeling studies are needed for the complete comparison between Mediterranean and Boreal areas. The main results should be presented in the abstract.

2) Introduction. There are quite many references on general aerosol/climate effects in the first chapter. I think that only the most important are needed.

3) Methods.

a) For clarification, a table which summaries the conducted experiments (date/ID, plants, number of plants, VOC-induced/Ox.-induced, temperature, light, RH, total VOC concentrations, etc.) should be included in the Methods chapter.

b) 1st chapter (p. 4757, l. 11): Is there one comma missing (before 3 Aleppo Pine)?

c) 2nd chapter (p. 4757, l. 19): I think that "the average residence time" is more informative than "the residence time".

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d) p. 4761, l. 5: acronym DMA not described.

e) Same chapter. What was residence time from aerosol humidification to particle classification in HTDMA system? And is this enough long to achieve complete water uptake for SOA particles at certain RH?

4) Results and discussion.

a) Eq. (1) (p. 4763, l. 3): Although PPPD has been described earlier, it should be also done after this equation.

b) Ch. 3.2 (p. 4764, l. 5-): It is mentioned in the text that flush out (dilution of chamber air) decreases the particle concentrations. Can you estimate the effect of other losses on particle concentration (e.g. wall losses due to diffusion, sedimentation, etc.)? Furthermore, VOC from plants were introduced to chamber during experiments. How does it affect particle concentrations (flush out reduces particle concentrations but this may increase VOC concentrations and SOA formation in the chamber).

c) Ch. 3.4.1 (p.4767, l. 4-): Can you compare GF results to other chamber and field results (e.g. from a-pinene chamber studies).

d) Ch. 3.4.1 (p.4767, l. 16): Please define acronym SS in order to avoid misunderstandings.

5) Summary and conclusions.

a) p. 4769, l. 26-: Why ocimene emissions have a high temperature dependence?

b) p. 4770, l. 7: Please describe T-induced shifts.

c) See also comments for Abstract (1).

6) Tables. Please add a table that summarizes experiment conducted (see comment 3a).

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7) Figures.

- a) Fig. 2: Please include total VOC concentration values to this figure or an experiment summary table.
- b) Fig. 4 and 5: Is there any specific reason to use different x-axis units?
- c) Fig. 6. The figure will be easier to read if colors are described as pure hydrocarbons, singly oxygenated and multiply oxygenated (not only CxHy, etc.).
- d) Fig. 9. Both situations can be plotted in one plot (two separate plots are not needed).

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