

We thank reviewer #3 for his/her comments. Here are our responses to the specific comments. Changes to the text in the manuscript are printed in italic.

Comment: Some information on the sampling of potential semi-volatile OC concentrations in the PLUS outlet would be useful. Was a heated line used for the PTR sampling? It is stated that the likely source of acetone and isoprene was offgassing from the pneumatic seals. Such a source may also emit semi-volatiles and any experiments for SOA precursors will be sensitive to lower volatility components and their oxidation products.

Response: The PTR-ToF-MS sampling line on both the PLUS inlet and PLUS outlet is heated to 60 °C to minimize any (semi-volatile) VOC losses. We added this information to the manuscript: "For gas phase measurements, a *heated (60 °C)* sampling line (6 mm Teflon tube) is installed 15 cm next to the transfer line tube." Therefore any typical (semi-volatile) VOC measurable with PTR-MS should have been detected if present. However during the background experiment and also during later experiments where PLUS and SAPHIR were coupled (measured in PLUS and in SAPHIR using PTR-MS and GC-MS/FID) no indication of additional compounds in the background could be found.

Comment: I have one brief question surrounding the differences in purification of air in PLUS and SAPHIR - the latter uses air generated from liquid nitrogen and oxygen whilst PLUS uses scrubbed ambient air. Has SAPHIR been filled with air from PLUS without plants in order to establish the background chemistry from the scrubbed air introduced into SAPHIR. If so, it would be useful to see results from this "blank background".

Response: Both air supply systems, the scrubbed air and the air generated from liquid nitrogen and oxygen, can be used for PLUS operations (see section 2.2 first paragraph). The scrubbed air is only used for PLUS standby purposes. If an experiment includes transferring mixtures from PLUS to SAPHIR only the air generated from liquid nitrogen and oxygen is used prevent any additional unwanted "background chemistry" in SAPHIR due to contaminants in the air supply. Additionally before an experiment which includes SAPHIR the PLUS gas exchange volume is flushed before coupling with SAPHIR long enough (at least exchanging the air in the PLUS gas exchange volume 5 times) with the generated air to ensure that only the same air which is used in the standard SAPHIR operation is also injected via PLUS. Therefore no additional "blank background" measurements are necessary. For clarification we added the following sentence to the manuscript: "*This air supply is always used in experiments where both chambers are coupled.*"

Comment: It is noted that the RH in SAPHIR was very low and remained largely unchanged during the transfers from PLUS. Could the authors clarify whether SAPHIR experiments were usually conducted under such dry conditions and comment on the implications for atmospheric extrapolation? Does water vapour condensation influence the condensation of SOA components, for example? What will be the influence on the phase state of any semi-volatile components of transfer from humid to dry conditions and hence on measurements of such components in either phase?

Response: SAPHIR experiments can vary widely in initial conditions prior to an oxidation experiment. The statement in the paper serves the purpose to show that the influence on the initial conditions in SAPHIR prior to an experiment are minimal during typical coupling durations. Since this paper focus on the technical and operational aspects of the new plant chamber PLUS discussion of the impact of water vapor on SOA formation and partitioning of compounds from gas to aerosol phase are beyond the scope of this paper.

Comment: In characterising the emissions from Quercus ilex, Figure 6 seems to be missing the ocimene fraction, stated as being one of the main emitted compounds.

Response: Figure 6 was corrected showing now the ocimene compounds. For details please see comments to Reviewer #1.

Comment: The characterisation of emission with light intensity is useful. A spectral characterisation of the lights would also be a useful additional panel rather than showing the integrated light intensity across all wavelengths. Whilst uv will likely be too low to initiate any OH driven photochemistry from ozone photolysis, have the authors considered any other potential sources of oxidants that may be photochemically produced in PLUS in the wavelengths emitted by the lamps?

Response: The spectrum of the lamps start to increase at 400 nm with a maximum at about 570 nm and declining afterwards until 700 nm with a strong drop in intensity at 480 nm. A description of the spectrum is added to section 2.1 which in our opinion is sufficient to inform about the spectral characteristics of the LED panels: *“The spectrum of the LED panels has a bimodal bell shaped characteristic with the first mode ranging from 400 nm to 480 nm having the maximum at 440 nm and the second mode ranging from 480 nm to 700 nm with a maximum at 570 nm.”*

Due to the missing/low intensity below 400 nm we can assume that no additional photochemically produced oxidants are formed due to UV radiation. Additionally no indication of oxygenated products or decay of compound concentration was found while determining the background concentration in section 3.2 where the lights were turned on at 100 % intensity during the experiment strengthening the assumption that no additional oxidants are produced in PLUS.

Comment: p 11780 line 5 - "flow through" should be hyphenated, replace with "flow-through"

Response: Corrected.

Comment: p 11780 line 11 - replace "leafes" with "leaves"

Response: Corrected.

Comment: p 11780 line 11 - replace "exposed to FEP Teflon film and other Teflon surfaces only" with "exposed to only FEP Teflon film and other Teflon surfaces"

Response: Corrected.

Comment: p11782 line 2 - the study of Wyche et al., 2014 falls into this category and is missing

Response: The reference was added to the manuscript.

Comment: p11782 line 12 - replace "atmosphere" by "atmospheric"

Response: The authors refer to SAPHIR as an atmosphere simulation chamber throughout the paper which is in the authors opinion the correct way to describe such a chamber. To be consistent we haven't changed the description at that particle line in the manuscript.

Comment: p11782 line 12 - add comma "brief, SAPHIR"

Response: The descriptor for the chamber (atmosphere simulation chamber) and the explanation for the abbreviation for SAPHIR is given in the abstract (p.11780, l. 1) and in the introduction (p. 11782 l. 4) as "atmosphere simulation chamber SAPHIR (Simulation of Atmospheric PHotochemistry In a large Reaction Chamber)". Therefore in our opinion it is not necessary to repeat this in section 2 again.

Comment: p11782 line 23 - add comma "SAPHIR, this"

Response: Added.

Comment: p11788 line 17 - add comma "For gas phase measurements, a sampling line"

Response: Added.