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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Photochemical production of aerosols from real plant emissions" *by* Th. F. Mentel et al.

Th. F. Mentel et al.

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The authors thank the referee for the helpful comments. All comments were taken into consideration and we tried to improve the manuscript according to these comments.

Abstract line 23 (also page 3072 first paragraph): The calculations presented here also assume no change in the oxidant levels in the future atmosphere which is not what the models calculate.

This is indeed true and we thank the reviewer for this important comment. We noted in the abstract: For a future VOC increase of 50% we predict a particle mass increase due to SOA of 19

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Furthermore, on page 3072 first paragraph we added:

In our calculation we assumed today's oxidant levels in the future atmosphere which is not what models predict. According to the linearity of our findings higher oxidant levels should lead to the same amount of aerosols per ppbC but faster. Thus enhanced oxidant levels together with enhanced VOC emissions should lead to increased source strength for SOA in the future.

P 3046, line 20: It is not only OH driven chemistry but also O3 driven since O3 was measured in the chamber at significant levels as mentioned in section 2.3.

We changed p. 3046, line 20 accordingly to: We therefore used OH radicals in addition to O3 as oxidants allowing a better simulation of the atmosphere where nucleation events are normally coupled to photo-chemical activity

P3050, lines 23-27: It is interesting to provide information on the emission patterns under stress 8211; since such conditions might occur in a future atmosphere.

We started a systematic study of particle formation under stress induced conditions. The plants responses to stress have proven to be quite complex circumventing a short answer to this comment. To give short information to a reader we inserted some details in Table 2 listing some of the compounds from these stress induced emissions.

P 3053, last paragraph: Was all C in the chamber measured?

Certainly not all carbon entering the reaction chamber was measured. In particular methane and short chained alkanes like ethane and propane were not measurable by

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our equipment. However, these compounds exhibit comparably low reactivity towards OH and their reaction products have a quite high vapour pressure. We therefore neglected the contribution of such compounds to particle formation. The limits of the two GC systems in use were described in the experimental section on page 3048, line 29:

One system was optimized to measure VOC from C5 to C20 including isoprene, mono- and sesquiterpenes as well as compounds from lipoxygenase activity (LOX products) or methyl salicylate (Heiden et al., 1999). The second GC-MS system was used to quantify the concentrations of short chained oxygenated VOC from methanol up to C10 VOC (Folkers, 2002). Both systems were used for VOC identification and quantification.

We converted all peaks observed in GC-MS into carbon mixing ratios, based on the identification and on mol-peak masses. We estimate that we fetched more than 95

Table 2: Could you comment on the sesquiterpenes emissions non-attributed to individual species? They seem to be the majority of the sesquiterpenes emissions.

The mix of emitted sesquiterpenes is very inhomogeneous and contains several small contributions of sesquiterpenes not positively identified so far. But the mass spectra of the GC-MS measurements showed the typical mole peak at m/z = 204 indicating that these compounds are indeed sesquiterpenes. Nevertheless, the mainly emitted sequiterpenes are quite well known. These are listed in Table 2 which now also contains a remark regarding the contribution by non-attributed sesquiterpenes.

Finally in the main text there is a systematic typo in the units: g cm3 should be g cm-3 and ug m3 should be ug m-3

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Typos were corrected.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 3041, 2009.

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