

## ***Interactive comment on “Different Pathways of the Formation of Highly Oxidized Multifunctional Organic Compounds (HOMs) from the Gas-Phase Ozonolysis of $\beta$ -Caryophyllene” by S. Richters et al.***

**Anonymous Referee #1**

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The authors describe a product study of caryophyllene ozonolysis in a free jet flow tube. Experiments were performed applying acetate CI-API-TOF-MS and nitrate CI-API-TOF-MS to detect peroxy radicals and closed shell oxidation products. Labelling experiments using heavy O<sub>3</sub> and D<sub>2</sub>O helped to discriminate product classes from different reaction pathways and were used to underpin the proposed reaction scheme. This is an excellent, original study which was carefully conducted and evaluated. The proposed reaction schemes are reasonable and - wherever possible - supported with earlier findings by the authors and in the literature, although it has some speculative moments. But I see the latter as a challenge and I am wondering if the authors have

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ideas how a proof for the scheme in Fig 7 could look like. The paper is well written and very good to read (with a few exceptions, where formulations seem to be a little bit intricate). The results are original and new and give further deep insights into autoxidation and formation of highly oxidized molecules. This excellent manuscript should be published in ACP as it is.

The authors may want to consider the following minor suggestions:

Figures are not addressed in sequence of their numberings in manuscript.

page 5, line 28: “Up to now” does not seem the right intro for what is following.

page 6, line 21: Maybe it is better use “analysis” instead of “investigation” in this context.

page 6, line 26: I think it is better to talk about “HOM signal” instead of “HOM yield”, the yield should be the same, independent of the detection scheme.

page 7, line 17: It may be simpler to replace “comparing by using” by “applying”.

page 7, line 19: typo, ... second oxygen atom from the initial ozone attack must “have been” abstracted ...

page 7, line 28: an acylalkoxy radical “(species 15)”. Addition of species number would be helpful.

page 11, line 26: “The analysis has been done using nitrate ionization.” may be better “These measurements were performed applying nitrate ionization” ?

page 12, line 10: typo, “of” missing.

Figure 2, caption: Although it is explained later in the caption it confused me that there was no blue signal shown in the Figure. May be better “(in black with blue label)” or so.

Supplement line 15: “deflected” seems to be more appropriate to me than “sucked”.

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