

# ***Interactive comment on “Using GECKO-A to derive mechanistic understanding of SOA formation from the ubiquitous but understudied camphene” by Isaac Kwadjo Afreh et al.***

## **Anonymous Referee #1**

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The authors present a unique study in which a near-explicit chemical mechanism generator (GECKO-A) is used to consider the oxidation and SOA formation potential of camphene, a monoterpene of importance as a biomass burning emission, but that has received only limited attention in chamber studies. Comparisons are made with two well-studied species,  $\alpha$ -pinene and limonene. The study is, in my opinion, very well conceived, thoroughly conducted and well written. I have some questions and comments below (mostly minor) that the author should consider prior to final publication in ACP.

It looks to me as though some of the initial steps in the OH/ $\alpha$ -pinene and maybe

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OH/limonene are specified (to match chamber data?), whereas camphene chemistry is presumably all derived from 'free-running' GECKO. If true, could this bias the results in any way?

Page 3, line 107: Can anything more be said to justify the selection of six generations of oxidation - e.g. were any of the previous studies alluded to conducted on monoterpenes?

Bottom right of Figure 3, the co-product should be acetone instead of formaldehyde.

Page 4, line 128: The peroxy radicals formed seem mostly to still contain the double-ring structure of  $\alpha$ -pinene (not just the 4-membered ring?).

Page 4, line 135: I think the compound formed is camphenilone?

Page 5, line 151: Did you mean acetylperoxy radical, rather than acetaldehyde?

Page 5, line 154: camphenilone spelled incorrectly.

Page 5, line 155-157: You might mention here that an OH radical is also generated.

Page 6, line 220: What precursor(s) were studied by Shilling et al.?

Page 7: line 228: This is maybe not be a fully addressable question at this point, but would the presence of OH scavengers likely have a major effect on the results?

Page 7, line 232: It might be worth emphasizing that these top-ten lists presumably evolve with reaction time.

Some of the structures in Figures 5 and 6 look a little bit strange (with overlapping or extended bonds). Can these be cleaned up a bit?

Figure 9b: Converting the x-axis units to ppb would be useful, I think, since these are the units used throughout the text.

Page 9, near line 305: Could the high SOA yield from limonene (and its by-products) be in part driven by its shorter lifetime (hence giving more time in the simulations for

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oxidation of products?).

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