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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The SOA/VOC/NOx system: an explicit model of secondary organic aerosol formation" *by* M. Camredon et al.

Anonymous Referee #1

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General Comments:

The authors have conducted an insightful modelling study. Their research builds on previous cloud chamber measurement studies, and the basis for their present work is clearly outlined. Although there is uncertainty on the mechanics of SOA formation the authors of this paper have set out their reasoning and assumptions very clearly. Presenting the large amount of output data in a logical way is challenging, though the authors have achieved this, for example with good use of contour plots to present results as a function of both ambient NO_x and initial 1-octene loading. Furthermore they have presented and discussed the model output in the context of previous studies.

Overall the paper is a very useful exploratory work and a good example of a study that

complements previous practical work to further the understanding of SOA formation, and will be of interest to the atmospheric chemistry community.

Specific Comments:

Section 5.1.3: This section describes the relationship observed between Y_{max} and the relative contribution of OH to the removal of 1-octene. This relationship could perhaps be better highlighted if Figures 6 and 8a were overlaid or at least presented in the same figure, so that comparison between the results could be made more easily by the reader. As the text focuses on the relative contribution of OH to oxidation, Figure 8b, showing the relative contribution of O3 on the same isopleths, might be redundant.

Section 5.2: This section briefly describes the time-dependent growth curve that has been modelled (depicted in Figure 9), and refers to Ng et al (2006). Ng et al noted that, from experiment, SOA formation appeared to be limited by the first oxidation step for species with single double bonds whereas second generation products contribute substantially to formation of SOA for species with several double bonds, and that a vertical section of the growth curve characterises this behaviour. 1-octene (the species simulated in this study), has only a single double bond, though was not one of the species studied by Ng et al. This study suggests that 1-octene may also contribute to SOA formation via multiple oxidation steps. It could therefore be interesting to comment specifically on the observation of a vertical section in the modelled time-dependent growth curve for this species, whilst discussing Figure 9.

General (graphs): where there is a logarithmic scale on the axis, the numbering system on the figures alternates between (0.1, 1, 10, 100...) and (10^{-1}, 10^{0}, 10^{1}, 10^{2}...). Keeping to one system here might improve clarity.

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