

Previous reviewer comments, amended by editor suggestions:

Reviewer 1, comment 1: Please be more specific how and where references were added and novel aspects are discussed.

Reviewer 1, comment 2: (also Reviewer 2, comment 2): Both reviewers pointed out that the SOA burst in the morning needs more explanation. Referring to previous studies where this has been observed as well is not sufficient.

I restate the reviewer's suggestion to do a sensitivity test and check whether your explanation in Section 4.3 may be valid that a high OH concentration may have caused this peak. Is the required OH concentration even realistic? What other factor could lead to such a peak? Were the conditions in the limonene study by Yu et al comparable to yours?

Reviewer 1, comment 4: I agree with the reviewer that it is very confusing to use identical symbols for different quantities. Please choose different symbols for different parameters.

Reviewer 2, comment 5: How and where was this reviewer comment addressed? Just adding a figure is not sufficient as an explanation.

Reviewer 2, comment 6: The reviewer asked for an optimization of model parameters. They also pointed out that your conclusions on the role of straight-chain alkanes may be misleading. Just adding another reference does not suffice to back up your model-based conclusions.

Please address the reviewer comment "the authors conclude from this modeling exercise that straight chain alkanes are important for urban SOA - without showing much evidence. This is not backed up by the results shown" by justifying in detail your conclusions despite the extreme extrapolations that implies.

Reviewer 2, comment 7: Is this information added in the text?

Additional editor comments:

Scientific:

I. 83: In the abstract, you write that in addition to NOX levels and seed conditions also temperature was controlled. In addition, referee 2 asked how light conditions were monitored. Please be consistent and clear which conditions were controlled and how.

I. 121: It is not clear what you mean by 'The UNIPAR model has been demonstrated...'. What was demonstrated? E.g. good performance to predict SOA formation? Or do you mean '... has been applied...'?

I. 130: What do you mean by 'mathematically' here? Can it be omitted? If not, please explain.

I. 132: In the abstract, you state that there are three main pathways. Here, you refer to two pathways. Be consistent to avoid confusion.

I. 139: What do you mean by 'The atmospheric process of alkanes'? 'Atmospheric oxidation'?

I. 150/151: Please revise this sentence. It is not clear what exactly is lumped.

I. 158: What are 'photolytic products'? And why do you write 'or'? It seems that products could be more reactive and less volatile and originating from photolysis. Or did I misunderstand what you mean here?

I. 176: Again, the use of 'mathematically' is not clear here. If it is necessary, please explain what you mean here.

Section 4.2: This section is very descriptive and brief though it is a key section of your paper. Please add more discussion on likely reasons of the better agreement in some but not in all cases.

I. 369 – 371: Please be more quantitative here. How much higher are the SOA loadings in the chamber as compared to typical environmental conditions? With your model, you should be able to do a sensitivity study to explore how this might affect the OM(p) and OM(AR) ratio.

Section 4.5: 1) The header of this section is very general, compared to the content. 'Model parameters' may also include temperature, vapor pressures, product distributions etc. However, in fact, you only varied two rate constants. Please clarify this in the section header.

2) What is the reasoning to change the rate constant by +/- 50%. This seems a very narrow range. Please add some references that show that such rate constants indeed only vary within this range.

I. 381: Please add 'of SOA' in this sentence. ('source of SOA')

I. 403-405: Is this a result from your study or by Gentner et al?

Please add a section 'Summary and Conclusions'.

Technical:

I. 13: replace 'formation' by 'prediction' (then you can omit "better predict" at the end of the sentence).

I. 14: It is not clear what 'lumping groups' are. Do you mean 'lumped into volatility-reactivity based groups'?

I. 47: replace 'have often' by 'has often'

I. 49/50: the addition of 'using the CHIMERE regional air quality model' seems at the wrong place. It should be inserted either at the very beginning of the sentence or after 'of SOA'.

I. 53: replace 'predicted' by 'reproduced'

I. 60: which 'current explicit mechanism' do you mean here? Are PRAM not included in any available mechanism or specific in MCM?

I. 72: add 's' to precursor

- I. 73: add 'for' (account for...)
- I. 124: replace 'mechanisms' by 'mechanism'
- I. 175: MCM stands for 'Master Chemical Mechanism'; thus, MCM mechanisms seems redundant.
- I. 177: replace 'increase' by 'increases'
- I. 215: replace 'or' and 'in' by 'org' and 'inorg'. Please check carefully the full manuscript for other instances (eg.. Eq-6, 7, 10, 11 , I. 227, I. 233 etc).
- I. 221: Is there anything missing or should the colon at the end of the sentence be replaced by a period?
- I. 344: replace 'lowly volatile' by 'low volatility'