

In the study at hand, a previously developed kinetic box model is applied to a plethora of scenarios that could be encountered when using oxidation flow reactors (OFR) to produce secondary organic aerosol (SOA) in the presence of NO. Peng et al. present a very detailed study that, while not directly relevant for the general public, might be very helpful for the specialized field of atmospheric researchers employing OFR and falls within the scope of ACP. Especially the comprehensive Fig. S7 should be a fantastic resource for research groups working with OFR and without excess to kinetic modelling tools. The authors convincingly show that the conditions in which OFR are often operated are far from atmospheric relevance. The article is well-structured, but is now and then difficult to read, e.g. in Sects. 3.1.1 and 3.2. A reason for this might be that the narrative doesn't closely follow the figures, and, while the figures contain lots of useful information, it seems that much of the given information is not discussed in the manuscript, which would technically render most of the figures in the main text supplementary material. I would like to encourage the authors at this point to re-think their use of figures in this manuscript. For example, can the information in Figure 1 be presented in a more concise, meaningful way? It also does not help that positions and sizes of fonts and symbols in Fig. 1 are different in all three panels. This does not diminish the solid scientific message of this work, but would help immensely to reach a larger audience. Thus, I can recommend this paper for publication in ACP after only minor revisions, but would encourage the authors to revise the visual presentation of their scientific results. Further point-by-point comments are given below.

### General Comments

- The authors have to define “non-tropospheric” photolysis, which shows up as early as in the abstract, but is never properly defined. Is the connotation of stratospheric or mesospheric photolysis intended?
- Why have the authors chosen the term “risky” for conditions that are not unambiguously good or bad? What is the “risk” that is taken here? It would be helpful to briefly motivate the use of this word around l. 171.
- Fig. 2: What is shown on the x-axis? Please label/explain these cases. This is also relevant in the later discussion, around l. 323.
- l. 295: You compare NO lifetime to reactor residence time. Should it not be better to compare to e.g. VOC lifetime in the reactor, or generally to total overturn of reactive material? I can imagine a scenario where NO is used up very quickly, but so are all other reactive gases, so that much of the reactor residence time is not used to make (or age) SOA and hence mostly irrelevant anyhow.
- l. 299: Figure 3 is very complex, yet it doesn't find much introduction. Please expand your discussion of this figure the first time it is referenced in the text.

### Minor Comments

- l. 40: “on similar timescales”
- l. 41: Is there an “of” missing after “decoupling”? Alternatively: “... to decouple ...”
- l. 72: Please give a unit of exposure. Also relevant e.g. in line 197.
- l. 275: Instead of “similar with those cases” it must read “similar to those cases”.
- l. 394: “Despite its double bond, ethene reacts as slowly with NO<sub>3</sub> as alkanes, likely due to lack of alkyl groups enriching electron density on the C=C bond, which slows NO<sub>3</sub> addition.” Why is this relevant here?
- l. 439-441: This sentence is confusing, the word “process” seems out of place here.
- l. 444-447: In this sentence, please briefly state again (maybe in parenthesis) which route is which in this example (H-abstraction vs. OH addition) to avoid confusion.
- l. 465: “... suppression can as high ...” should read “... suppression can be as high... ”.

- 1. 477: “most hot stabilized period”. Is there a word missing here?
- Fig. S1: please use consistent colors for chemical species.