EGUsphere, referee comment RC3
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Comment on egusphere-2022-245

Anonymous Referee #3

Referee comment on "GENerator of reduced Organic Aerosol mechanism (GENOA v1.0): an automatic generation tool of semi-explicit mechanisms" by Zhizhao Wang et al., EGUsphere, https://doi.org/10.5194/egusphere-2022-245-RC3, 2022

This paper presented a reduction strategy and developed a software package to reduce the mechanism of SOA formation. The paper is reasonably well written. The method described is innovative and effective. However, there are some information misleading and inappropriate. The current manuscripts needs to be modified before it is accepted for publication.

General comments:

The authors chose sesquiterpenes as an example to show the methods to reduce SOA formation mechanism. One obvious question is that most of the reactions listed are linear and therefore analytical solutions can be achieved. In such case, the reduction may be of less significance. Moreover, the authors did not show the impact of reduction on the concentration of short-lifetime oxidants, such as OH, HO2 and NO3, which have an important influence on SOA yields. How are the coupling between VOC species and oxidants resolved? Reasonable explanations should be highlighted.

Since GENOA is a semi-explicit mechanism and designed to be used in 3-D models, how

can the species in GENOA be matched with the species in 3-D models. One problem that arises is whether GENOA is scale adaptive so that the transport of organic species is well resolved depending on the problem of concern. If not, the package may be useful in optimizing mechanisms for specific urban scenarios and then used in regulatory modeling rather than stated "multi-scale AQM" by the authors.

It would be more useful if the manuscript can include some information on memory optimization and computational efficiency.

Specific comments:

L26: three-dimensional models -> three-dimensional (3-D) models

L27: 3D -> 3-D

L32: carbon-bound -> carbon-bond

L34: The expression "These mechanisms were primarily developed for ozone simulation" may be NOT appropriate.

Table 1: As the authors stated "using surrogates assigned to molecular structures", listing the information of molecular structure of major species in another table would be better for other researchers to understand the reduction strategy.

Table2: please check the expressions of reactions and coefficients.

L425-428: Some quantitative explanations associated with the results in L415-418 is necessary.