

# ***Interactive comment on “Future changes in isoprene-epoxydiol-derived secondary organic aerosol (IEPOX-SOA) under the shared socioeconomic pathways: the importance of explicit chemistry” by Duseong S. et al.***

## **Anonymous Referee #1**

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The authors have provided an assessment of the development in a global model of new explicit processes in the formation of SOA. Specifically, the authors have focused on IEPOX derived SOA. The authors compared their implementation with currently used parameterized approaches and sensitivity to future changes in climate and emissions. They found that IEPOX-SOA was predicted to increase in all future scenarios. This was attributed to a combination of isoprene emission changes and acidity influences on reaction chemistry. The new implementation was more responsive to future changes in emissions than the parameterized approaches. These parameterized approaches

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predicted nearly constant SOA yield from isoprene emissions regardless of region or type of future scenario. Minor comments below

Section 3 - while the comparison with the observational data was useful I think some intermodel comparison could also provide relevant insights on model behavior. Regardless of the observational locations, where and when were the largest differences in predictions from the parameterized base case to the new model? How did the model do in high urban loading versus more rural locations. Did the changes occur where expected, any surprising predictions?

Line 130 and 151 introduces the scenarios used in the study (SSP5-8.5, SSP3-7.0, SSP2-4.5, and SSP1-2.6). It was hard to follow what unique climatic inputs for each scenario the results were based on in section 4 . Referring to a table could help in briefly listing/defining the differences between scenarios (emissions, anthropogenic activity, etc. . .) and treatment of the uncertainties within the scenarios either in the main text or in the supplement may help.

Line 328 - There was no discussion of H sensitivity in section 2.2.2. Could a justification be provided here for the range of H

Line 367 - some context on the implications on the focus on the background. How important are these processes in the background relative to the urban plumes. Would some of the new things that have been instrumented in the model, ie. coatings, may have more impact in urban plumes versus background. Could this be explored in the inter-model comparison?

Line 407 if this is a known experimental bias why can't it be corrected prior to model evaluation?

Line 420 - could more detail be provided on how did the model improve by using the results from D'Ambro et. al?

Line 424 - detailed molecular-level scheme seems to be an important finding here. Can

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text be provided with some guidance as to the type or class of molecules need to be considered or are most relevant for future study?

Line 545 - can the changes in Ph be quantified as well as a discussion on the spatial changes in Ph.

Figure 2 c missing quartiles upper altitude?

Figure 11 - can text be provided discussing reasons for driving the predicted changes in South Asia?

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Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2020-543>, 2020.

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