

Interactive comment on “Formation of secondary aerosols: impact of the gas-phase chemical mechanism” by Y. Kim et al.

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The authors are commended for producing a very interesting and complete study of secondary aerosol formation. A comparison of the modeled secondary aerosol formation by a modified version of the gas-phase Carbon Bond, version 5 mechanism (CB05) and the Regional Atmospheric Chemistry Mechanism, version 2 (RACM2) is an integral part of the study.

As a developer of RACM2 it is pleasing to see that the two mechanisms yield similarly acceptable results. However, the authors should stress more strongly in the abstract and in the conclusion that they are not comparing the standard version of the CB05 mechanism with RACM2.

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This reviewer acknowledges that there were some modifications to both mechanisms; for example, the same production of aerosol precursors was added to several reactions of CB05 and RACM2. However, the version of CB05 used in this study was modified to make it more like RACM2. This seems necessary because CB05 lack treatment of important higher weight molecular organic compounds. The authors have added several species from RACM2 to CB05: a higher molecular weight alkane (HC8) and two biogenic alkenes (API and LIM). Also similar reactions of HC8, API, LIM, toluene (TOL) and xylene (TOL) added to CB05 from RACM2.

A conclusion that is strongly implied by this study is that the original CB05, now implemented in many air quality models, would give similar results. If CB05 is used to forecast secondary organic aerosol then the air quality model needs to use a modified version of the mechanism with a treatment of higher molecular weight organic compounds that is similar to RACM2.

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