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Interactive comment on "Global modeling of secondary organic aerosol formation from aromatic hydrocarbons: high- vs low-yield pathways" *by* D. K. Henze et al.

D. K. Henze et al.

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Reviewer comments are italicized. References to specific text of the revised manuscript are given as sYpZ for section Y, paragraph Z.

Nevertheless one should keep in mind, that the conditions within the atmosphere are quite different from those used in simulation chambers. The authors used the results from the study of Ng et al (2007) where, under low NOx conditions, due to the findings that the yield is constant with respect to changes in available substrate and the semivolatile products are essential non-volatile under these conditions. It is worthwhile to mention that in the study of Martin-Reviejo and Wirtz, 2005, the same behavior was

described even under moderate NOx conditions, but using constant NOx levels. The use of the stoichiometric coefficients and equilibrium constants from the study of Ng et. al (2007) may only reflect the experimental conditions used and an interpretation in a global model, with a huge number of different conditions with respect to the free radical levels, NOx concentration, temperature and pressure regions, can be seen as an first approach. More experimental data is needed to improve our understanding. On the global scale the aromatic SOA-fraction is small, but regionally it can be quite substantial. No clear estimate of the error on the results is given.

A new section (Section 5) exploring sources of model uncertainty is now included in the revised manuscript. The contrast between the benzene SOA yields observed by Martin-Reviejo and Wirtz (2005) and Ng et al. (2007) is explored more fully, and the range of estimates of global SOA from aromatics based upon each study is quantified, s5p1. The assumption that reactions (R2) and (R3) completely describe the relevant peroxy radical chemistry is now given further attention in s5p3. Attempts to quantify the associated uncertainty from factors such as the effect of temperature on partitioning (s5p2), the amount of substrate available for partitioning (s5p2), and the attributes of two different models with different climatologies (s5p5), are now also included.

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