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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Sensitivity of aerosol concentrations and cloud properties to nucleation and secondary organic distribution in ECHAM5-HAM global circulation model" *by* R. Makkonen et al.

Anonymous Referee #4

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Referee comments on "Sensitivity of aerosol concentrations and cloud properties to nucleation and secondary organic distribution in ECHAM5-HAM global circulation model", by R. Makkonen et al.

General comments

The manuscript discusses the impact of using two different nucleation schemes and an improved SOA scheme in the GCM ECHAM5-HAM. The paper is well written; however before the manuscript is accepted some clarifications are needed, accordingly to the

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following comments.

Specific comments Paragraph 2.3, pg 10962, the choice of simulations deserves some explanation concerning their meaning. Paragraph 2.4: - Can you please quantify and report the yearly emissions of BSOA that are used in these simulations? - From the text it appears that the organic vapors stick on the particles, on which they condense, and there is not equilibrium between the aerosol and gas phase, can you comment and justify the impact of this choice? Paragraph 3.1, the modeled results are averages of various years?

Paragraph 3.3, The distribution of BSOA in the model is done considering the available surface in the modes, while the original ECHAM5-HAM approach assumed that 65% of the biogenic organic vapors are soluble. Since this is one of the major outcomes of this study I would like to see reported here if there is some evidence from the observations in support to the model results.

Figure 2, I would like to have all graphs up to more than 100 hPa as in figure 2 b, Nb plot. Figure 9, Change the figure caption, it is not clear what is the parameter reported in the figure (Sensitivity?) Figure 10, Red and magenta lines are not discernable

Technical comments The reference list is incomplete, some references mentioned in the text are missing (Stier et al. 2005, Vignati et al. 2004, Lin and Leaitch 1997,...) or errors (Bennartz 2006 or 2007?,...)

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 10955, 2008.

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Interactive Comment