

***Interactive comment on “Microphysical simulations of new particle formation in the upper troposphere and lower stratosphere” by J. M. English et al.***

**Anonymous Referee #2**

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The paper examines aerosol microphysics and particle formation in the upper troposphere and lower stratosphere. The CARMA microphysics model is coupled to the WACCM GCM and 3 different nucleation schemes are tested. The study concludes that coagulation is more important than nucleation for controlling aerosol number concentrations at sizes greater than 10 nm. Modelled size distributions and number concentrations are compared against observations. It is suggested that Van der Waals forces are needed in the coagulation scheme to best match the observations.

The paper is within scope of ACP. The paper is well written and presents results that will be of interest to the community. I recommend publication in ACP after the following

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minor comments have been addressed.

P12445, Line 13. Do you include oceanic DMS emissions (P12450, L23 suggests that you do not) or volcanic S emissions? In particular volcanic S emissions could have a big impact on aerosol in the UT/LS. If volcanic S emissions are not included this at least needs some discussion of how this will likely impact your results.

P12453, L21. Underprediction of aerosol surface area and volume will mean that your model will have lower aerosol condensation sink than in reality. How will this impact your results? What are the likely reasons for this underprediction? I guess that some possibilities are missing S sources, lack of organics and lack of carbonaceous aerosol sources.

P12457, L22. Could the underprediction in the tropics be due to lack of natural aerosol emissions (volcanic S, biomass burning)? The order of magnitude underprediction of aerosol number in the tropics for particle sizes greater than 12 nm needs some additional discussion.

P12457, L24. Define the conditions for STP and spell out acronym. Clarify whether all model and observations are reported at STP.

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Interactive comment on Atmos. Chem. Phys. Discuss., 11, 12441, 2011.

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