

Interactive comment on “Global modeling of organic aerosol: the importance of reactive nitrogen” by H. O. T. Pye et al.

Anonymous Referee #2

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Overall, this reviewer finds the paper well written and on a critical topic of aerosol science with applications to air quality and climate.

Does the course spatial resolution of the model influence the results and conclusions? NO_x / VOC ratios have large variability within single grid cells (e.g. Atlanta versus rural north Georgia).

Equation 5 could use additional discussion to clarify what is being calculated here. It was not clear what was “forcing” primary SVOCs out of particles (presumably preferentially to secondary SVOCs). Is this not just due to the thermodynamic assumptions in the model about these respective species. And how are gas phase reactions not in the fit. It is not clear how gas phase reactions would be included in the fit.

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In section 2.3.1 it was unclear how the enthalpy of vaporization was used. It seems it was used to adjust experimental yields to yields at the reference temperature. But was 42 kJ per mol also used to represent the temperature dependence of vapor pressures or saturation concentrations for all semivolatile species? Assuming saturation concentrations were adjusted in this way during the model runs, what is the sensitivity of concentrations to the enthalpy of vaporization?

Line 371 – the term nitrate aerosol is usually used to refer to ammonium nitrate. Can this be reworded to clarify this is meant for SOA from the nitrate radical pathway? Similar confusion may occur in other places in the manuscript, for example line 411.

Line 430 – This paragraph could be rewritten for improved clarity. For example, the term offline oxidation is perhaps inferior to offline calculation of oxidation rates; also a reference to where in the text the offline oxidation scheme is described (presumably in a previous section) would be helpful. However, at line 434, the offline oxidation scheme is described, a few lines after it is mentioned for the first time in section 4.2. Overall, more effort to explain separately the issues of knowing what is happening in the real reacting system, versus how it is simulated, would seem appropriate.

Line 454 – can a quantitative statement be used in place of fairly aggressive recycling levels.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 21259, 2010.

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