

Short Comment on "The sensitivity of secondary organic aerosol (SOA) component partitioning to the predictions of component properties- part 3: investigation of condensed compounds generated by a near-explicit model of VOC oxidation"

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For a specific point raised by Reviewer 2 we have redone the analysis and are pleased to amend our previous response with further information that was not covered in our recently uploaded responses to the reviewers:- The point in question is:-

p. 21065 l. 18: *Comparisons with previous published results on the influence of activity coefficient on SOA formation have to be performed (see for example Compernelle et al., 2009).*

Our response was:- The following text was added after "...Topping et al., 2011." on p. 21065 l. 18

The box-whisker plot for N-N/VP act in Fig. 2 shows that the inclusion of non-ideality can both increase and decrease SOA mass compared to the ideal base case. The results presented in Compennolle et al., (2009) show that the effect on yield of including non-ideality in the partitioning calculation can result in increased SOA mass under dry conditions but with the inclusion of water, and particularly at high %RH, the amount of SOA is reduced compared with the ideal calculations (see their Fig. 3). A more detailed analysis of our results to determine whether there was evidence of increased SOA mass at low RH and decreased SOA mass at high RH was not possible due to missing data for the non-ideal calculations resulting from the convergence issues described in Section 2.2.

We would like to change this response in the following way:-

Delete the last sentence and replace it with:- "A plot of the ratio of SOA Mass(Non-Ideal) to SOA Mass(Ideal) (inversely related to the average effective activity coefficient) against %RH for the scenarios used in Fig. 2 is shown in Fig. S5 in the Supplementary material. The lack of a consistent trend with %RH shows that neither the direction nor magnitude of non-ideality can be predicted based only on how moist the atmosphere is. The dataset shown in Fig. S5 is incomplete due to those cases (concentrated among the 10% and 80% RH data) where the non-ideal calculation failed to converge (see Section 2.2). Given this caveat the following tentative conclusions can be drawn from Fig. S5. At each temperature you are roughly equally likely to get more mass than less mass along with increasing scatter with rising %RH at all temperatures other than 273K. The scatter at higher %RH increases with increasing temperature; and there seems to be little core mass dependence (i.e. little dependence on the total condensed mass; given that total condensed mass increases with core mass)."

The extra figure and caption to be added to the Supplementary material is reproduced below; subsequent figures in the Supplementary Material will be renumbered.

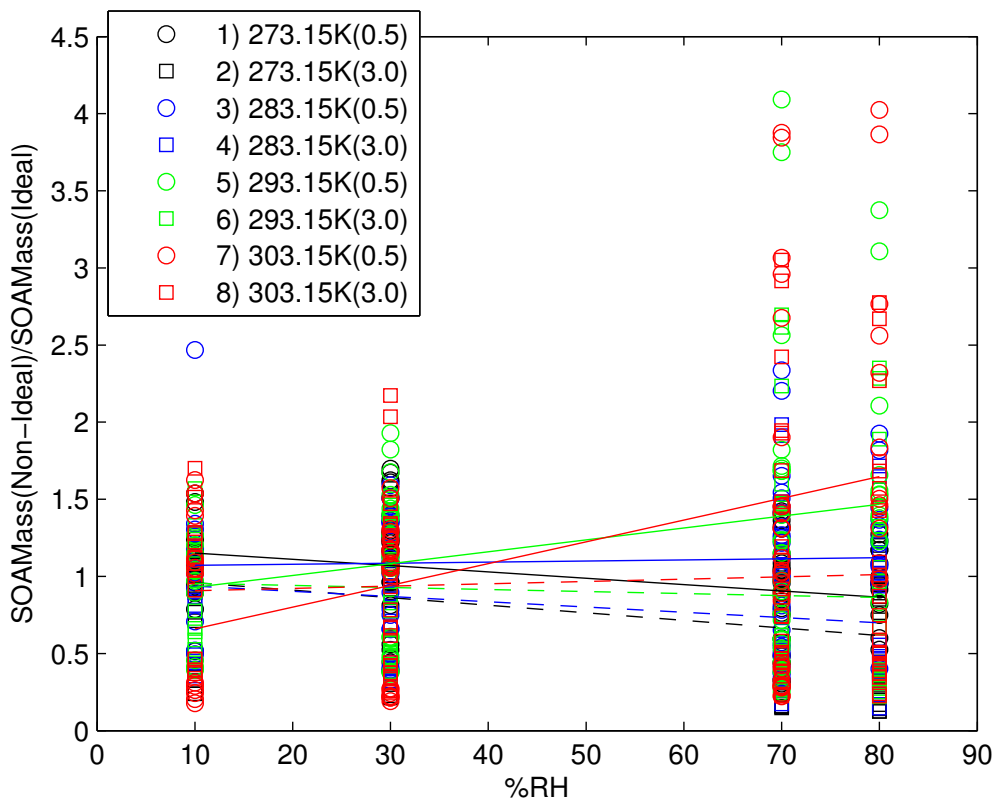


Fig. S1. Plot of the ratio of SOA Mass(Non-Ideal) to SOA Mass(Ideal) (inversely related to the average effective activity coefficient) against %RH for the scenarios used in Fig. 2, with the data classified into 8 sets by temperature and core size (in brackets:- units of $\mu\text{grams.m}^{-3}$). Individual trend lines for each set are shown (solid lines core = $0.5\mu\text{grams.m}^{-3}$; dashed lines core = $3.0\mu\text{grams.m}^{-3}$ and the R^2 values are:- 1) 0.10261, 2) 0.12644, 3) 0.00135, 4) 0.03958, 5) 0.07005, 6) 0.00406, 7) 0.14892, 8) 0.00412.