**Atmospheric
Chemistry
and Physics
Discussions**

Interactive comment on "A two-dimensional volatility basis set: 1. organic-aerosol mixing thermodynamics" *by* N. M. Donahue et al.

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In the present paper the authors present a highly simplified and potentially useful treatment of non-ideality which is wrapped up into an effective volatility basis set. The authors then propose this simplified model can be used as a diagnostic tool.

It would be useful if the authors could clarify their treatment of activity coefficients so that their work can be repeated and compared with existing treatments. it would appear, based on figures 2 and 9 that only positive deviations from non-ideality are considered/predicted across the entire C*, O:C ratio composition space. Specifically, activity coefficients are always shown to be greater than 1, suggesting non-ideality always increases the volatility of all condensates to varying degrees. Isnt this missing half of the story? i.e., negative deviations from non-ideality? There are numerous

sources in the literature which present both positive and negative deviations from non-ideality [e.g. Vladimir A. Durov and Oleg G. Tereshin, Fluid Phase Equilibria, Volume 210, Issue 1, 30 July 2003, Pages 91-104].

Since the direct equations for the activity coefficient are not given it is difficult to formulate a more detailed comment.

Similarly, since it is claimed that the parameters required for predictive purposes can be constrained from ambient data, essentially fitting the model to the system which you would like to follow, does this not already implicitly include the effect of non-ideality? It would be useful if the authors could clarify this point.

Many thanks.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 24091, 2010.