Response to reviewer 2.

Review of "A modeling approach to evaluate the uncertainty in estimating the evaporation behaviour and volatility of organic aerosols" by Fuentes and McFiggans.

We thank the reviewer's interest in our study and the suggestions to improve this manuscript. Below we provide answers to general and specific comments (blue-Reviewer, black-Authors)

1. I second the opinion of referee #1 on focusing the article more on the interpretation of the Faulhaber et al. results, as these are among the most important unique results presented in the paper. I also think that since many of the main conclusions (e.g. the importance of the accommodation coefficient, denuder section etc.) have already been discussed in previous work on the topic, the manuscript could be tighthened, to highlight the most important new insights.

The reviewer's main suggestion is that the manuscript should be refocused on the thermogram interpretation analysis and less attention should be given to the re-condensation study. We agree that the most interesting part of our study is the analysis of volatility distributions from thermograms and that we should highlight the new findings on this area in our manuscript. However, we also believe that showing the re-condensation study in the first instance is necessary for presenting the results in a consistent manner, since re-condensation is also considered as a source of uncertainty which affects the subsequent analysis on volatility estimations. The reviewer points out that previous literature already shows the effect of different parameters on thermograms. This is true for the evaporation process but not for re-condensation, which is the focus of the thermogram analysis in our study. To the authors' knowledge the only parameter whose effect has already been analysed regarding re-condensation is the aerosol mass loading (Cappa (2010)). However, the influence of parameters such as volatility, evaporation coefficient, diffusion coefficient and particle size on re-condensation has not been shown before. With this parametric analysis we provide additional detailed information on the conditions that may promote re-condensation. For example, to previous findings showing that the potential for re-condensation is enhanced at high aerosol loadings (Cappa, 2010) we add that re-condensation could be negligible at high aerosol mass loadings for samples with low accommodation coefficient. We agree, however, that it is more appropriate to reduce and tighten the re-condensation analysis, so that only the main results are shown, and re-focus the paper on our analysis and findings on volatility estimations.

3. While I think that many of the issues raised by Dr. Khlystov in the comment for this paper are relevant and should be addressed, I also feel that one of the strengths of this manuscript is the use of the modeling results in tight connection of experimental variables and thus the interpretation of experimental data (and direct measurables) – such as the interpretation of the Faulhaber et al. data. I therefore feel that a more detailed theoretical work would not improve this manuscript but rather the authors should concentrate on the implications of the kinetic evaporation for interpretation of measurement data.

All comments by Dr. Khlystov have been addressed; including doing new calculations with a wall condensation boundary condition (please see response to Dr. Khlystov's comments). Although this does not substantially change the conclusions of our study we feel it is reasonable to account for a lower estimate for re-condensation in our model and provide these new estimations. As suggested by the reviewer we will also refocus the manuscript on

the calibration curves and thermogram interpretation analysis, while tightening the study on re-condensation.

4. In the results presented in Figs. 14-16 the authors present fits of > 7 volatility bins. It is important for the authors to clearly indicate how it was possible to constrain such a large number of bins from the data they were using. This is explained in Cappa and Jimenez (2010) but I think it should be summarised here as well.

The method to derive the volatility distribution is based on the assumption that the distribution follows an exponential function with an upper limit of Csat=10000 ug/m3. The lower volatility bin limit was iterated to obtain agreement between measurements and model, which explains the large number of bins presented in the volatility distributions. The details of the method will be described in the revised manuscript.

References

Cappa, C. D.: A model of aerosol evaporation kinetics in a thermodenuder, Atmos. Meas. Tech., 3, 579–592, doi:10.5194/amt-3-579-2010, 2010.