Referee #4

General Comments

Here the authors report results of a laboratory study of the volatility of HULIS extracted from aerosol samples collected at a rural site in eastern China. Samples were atomized, four different sizes were selected with a DMA, and then aerosol was passes through a thermal denuder to measure changes in size with increasing temperature. Extracts were also mixed with ammonium sulfate prior to atomization to investigate the effects of salt-organic interactions on volatility. The volatility profiles were analyzed using a model in which various parameters (heat of vaporization, molecular weight, etc.) were assigned based on previous studies and the aerosol was distributed among three volatility bins (SVOC, LVOC, ELVOC) using the model-measurement comparison. The results of AMS measurements indicate that HULIS is highly oxidized (O/C _ 1 or greater) and the volatility measurements show that most of the HULIS is low and extremely low volatility material, consistent with the high degree of oxidation. Small decreases in volatility were also observed when ammonium sulfate was added that indicate chemical interactions between the organic and inorganic materials. The explanations for the general trends observed in the data and model results are reasonable, and overall there are no real surprises. This is a pretty straightforward study, the experimental and modeling components are well done, and the data interpretation is reasonable. The paper is a useful contribution to the literature and is worthy of publication in ACP. I have only a few minor comments that should be addressed.

Specific Comments

1. Line 194–197: What is the fraction of HULIS in the organic component of the samples?

Response: The HULIS-C made about 30% of the total organic carbon (OC). We will add this information into the revised manuscript.

2. Line 199–201: Is auto-oxidation a potential source for these HOMs?

Response: Yes, it is possible.

Aromatics have been demonstrated to form HOMs via auto-oxidation, which would be one possible source of HULIS (Molteni et al., 2016).

We will add some discussion on this into the revised manuscript.

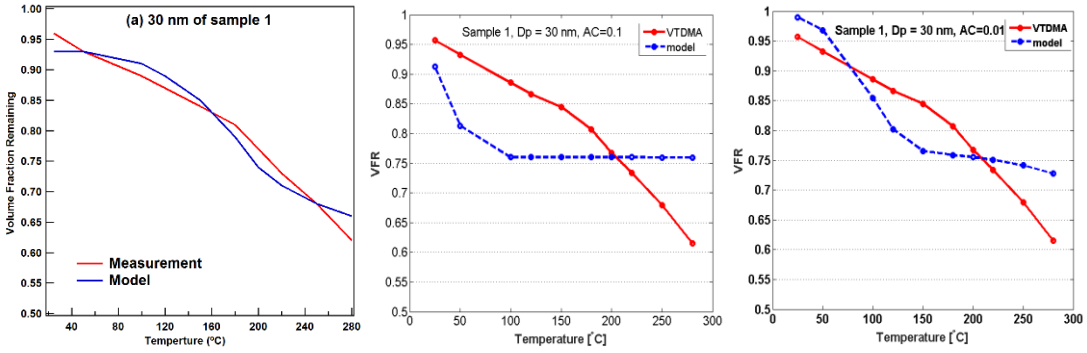
Molteni, U., Bianchi, F., Klein, F., El Haddad, I., Frege, C., Rossi, M. J., Dommen, J., and Baltensperger, U.: Formation of highly oxygenated organic molecules from aromatic compounds, Atmos. Chem. Phys. Discuss., 2016, 1-39, 10.5194/acp-2016-1126, 2016.

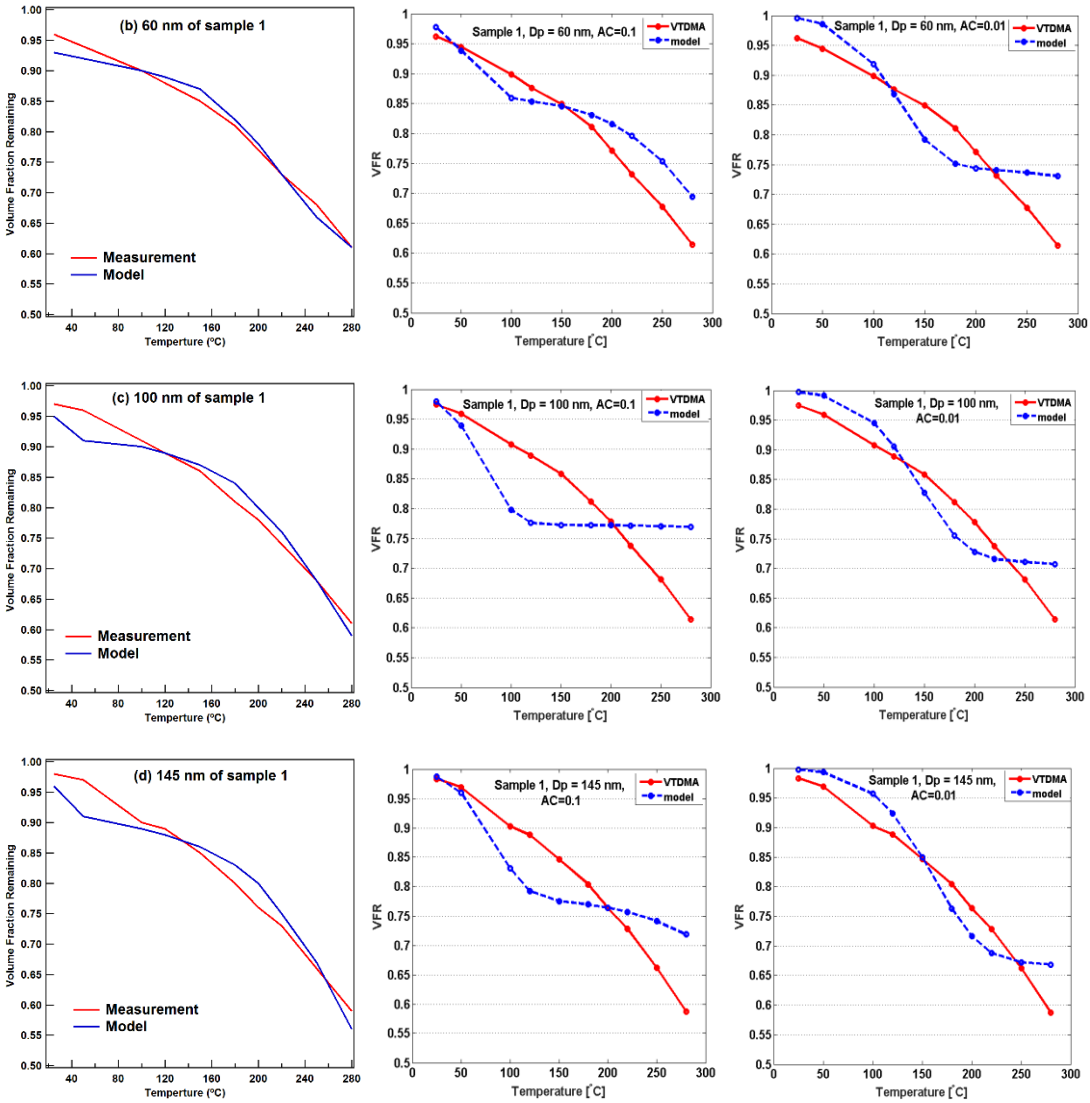
3. What are the effects of assumed model parameters on the interpretation of experimental results? Were sensitivity studies conducted? For example, there is ongoing debate about the appropriate value of the mass accommodation coefficient, which may range from about 1 to 0.001. Couldn't changes in these parameters with organic and inorganic composition be responsible for the observations rather than changes in the SVOC, LVOC, and ELVOC fractions? Some discussion of these issues is needed.

Response: Thanks for the comment.

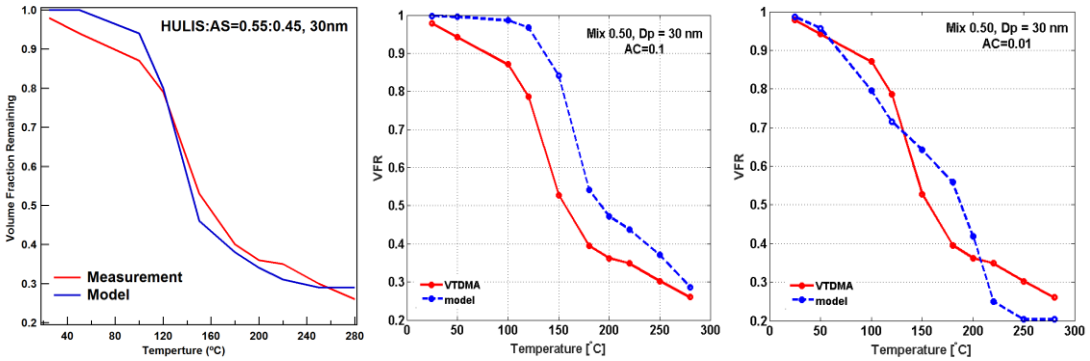
This is actually a good question. The value of mass accommodation coefficient (MAC) did influence the simulated distribution of SVOC, LVOC and ELVOC. What we need is to choose a MCA value that the model can best reproduce the measured evaporation behavior. As showed in the following figures, sensitivity of the kinetic evaporation model was tested towards different MAC values (i.e. MAC=1, 0.1, 0.01) for both pure HULIS sample and mixed samples. It was obviously that only when MAC was set to 1, the simulated thermogram showed the best agreement with the observation. This is the reason we chose 1 as the MAC value in the MS.

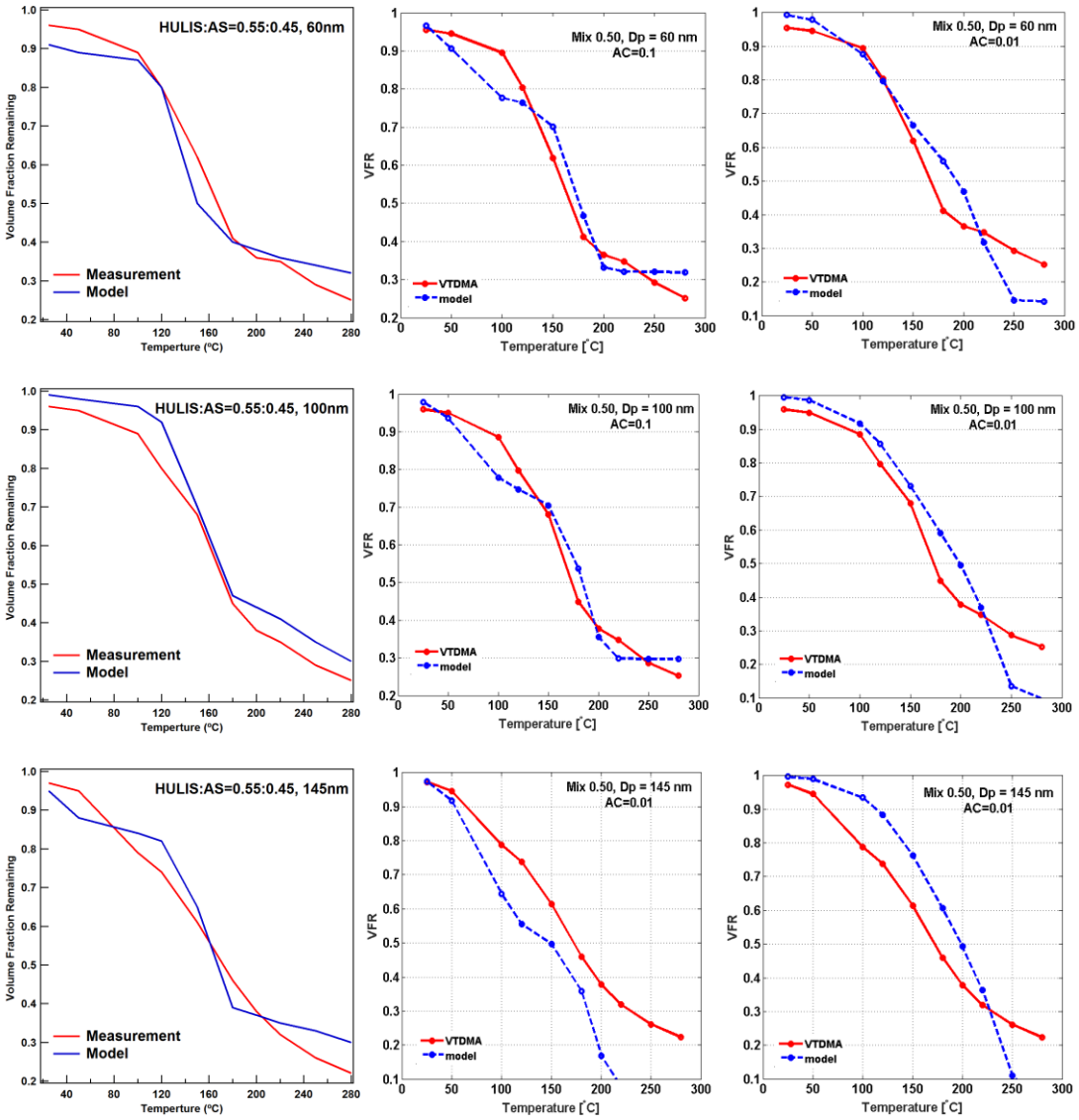
We will add some discussion on this in the revised manuscript.





Comparison of measured VFR with modeled VFR for HULIS of sample 1, with accommodation coefficient of 1 in left panel, 0.1 middle panel, and 0.01 in right panel.





Comparison of measured VFR with modeled VFR for 1:1 mixed sample of HULIS and AS, with accommodation coefficient of 1 in left panel, 0.1 middle panel, and 0.01 in right panel.

Technical Comments

Line 61: “Abortion” should be “absorption”.

Response: Thanks. We will correct it in the revised manuscript.

Line 128: “An- alyzer” should be “Analyzer”.

Response: Thanks. We will correct it in the revised manuscript.