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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Investigation of particle and vapor wall-loss effects on controlled wood-smoke smog-chamber experiments" *by* Q. Bian et al.

Anonymous Referee #1

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General Comments:

This paper describes a modeling effort aimed at investigating the effects of wall losses of organic particles and gases on the mass and number concentrations of particles measured in a series of experiments in which aerosol was formed by burning various types of biomass and then added to a Teflon film chamber. A state-of-the-art model was used for this purpose and wall loss parameters were calculated from theory or taken from the literature. Although it is standard practice to correct chamber studies for losses of particles, only recently has it been shown that loss of gases can also be important. A few modeling studies of secondary organic aerosol (SOA) formation

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have investigated the effects of wall loss of gases on SOA yields, and shown them to be important, but to my knowledge this is the first to look at the effects on chamber studies of primary emissions. The results are significant, in that they indicate that both particle and gas losses were important, and roughly equal, thus indicating that these effects should be included in future chamber modeling studies. The study appears to be well done, and the manuscript is clearly and concisely written. I think the paper should be published in ACP, although I have a few comments for authors to consider.

Specific Comments:

1. Page 15250, line 24-28: The volatility distribution was determined on aerosol that had already been added to the chamber. How would losses of vapors and particles affect the validity of this distribution? Are these effects included in the upper and lower bounds to the uncertainties used in Section 3.2.1?

2. Page 15252, lines 18-19: The results of Matsunaga and Ziemann 2010 were consistent with wall loss rates that were independent of the accommodation coefficient, which meant that the value was at least ∼10ˆ-5, but could have been much larger. So it was not necessarily 10ˆ-5, the value used here. How would the results here be affected if the value was much larger than 10ˆ-5? Also, weren't the values calculated using the approach of Zhang et al. (2015) less than 10ˆ-5?

3. Page 15259, line 5: I suggest rewording this to make it clear that it is the values of the CM/g ratio calculated here using the approach of Zhang et al. (2015) that are much smaller, since that study did report values of the ratio that were much larger than those in Matsunaga and Ziemann (2010).

Technical Comments:

1. Page 15248, line 19: Should be "studied".

2. Page 15254, line 10: Something seems wrong with the phrase ". . .particles are thus in proportional with on the. . .".

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