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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Aerosol optical properties and trace gas emissions by PAX and OP-FTIR for laboratory-simulated western US wildfires during FIREX" *by* Vanessa Selimovic et al.

Anonymous Referee #2

Received and published: 4 December 2017

This is a very important and generally well-written manuscript reporting on characterization of gaseous and particulate emission from the laboratory burning of a multitude of Wildland fuels. However, comparisons to results from previous laboratory studies, especially for aerosol emissions and their optical properties are largely missing and errors are not quantified in many figures. This manuscript is appropriate for ACO and should be published after these shortcoming have been corrected and the comments below have been taken into account.

1. P2,L33, 37: Replace the technobabble "lab" with "laboratory" here and elsewhere.

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2. Introduction: The work presented here needs to be put into the context of the earlier laboratory studies of aerosol emissions and optical properties including the FLAME study, also conducted at the FSL in Missoula, MT; references to earlier laboratory studies and comparison of results are completely missing. For example, the fact that emissions from the combustion of duffs have a very high AAE (P11, L32) has been reported from a previous FLAME study (Chakrabarty et al., 2010). References and comparisons of emissions from peat and rice straw combustion are also missing.

3. P5,L24-42: References for the PAX instrument including reciprocal nephelometer are mostly missing.

4. P7,L29: Replace "The EFs for scattering and absorption. . ." with "The EFs for scattering and absorption cross-sections. . ." to better define what you are actually reporting.

5. P8,L30-31: " It is important to compare our FIREX lab fire emissions data to field measurements of real wildfires to assess how representative and useful the lab-based data are, especially for the many species measured in the lab, but not the field." This seems pretty nonsensical, how do you compare laboratory data with field data for species that weren't measured in the field. Please explain!

6. P8, L41-44: ". . .because the lab fires had higher average MCE (i.e. a higher fire-integrated flaming/smoldering ratio) than the real wildfires sampled to date, most likely due to some unavoidable drying of the fuels during storage." The second reason may be that in the laboratory, one burns fairly small pieces of fuel, while in the field larger pieces (e.g., tree trunks) may smolder for days.

7. P8, L43 & P9, L30: Please define the "flaming/smoldering ratio"!

8. Error bars must be added to figs. 2, 6, 7, and 8.

REFERENCES Chakrabarty, R. K., H. Moosmuller, L.-W. A. Chen, K. Lewis, W. P. Arnott, C. Mazzoleni, M. Dubey, C. E. Wold, W. M. Hao, and S. M. Kreidenweis (2010).

Brown Carbon in Tar Balls from Smoldering Biomass Combustion. Atmos. Chem. Phys., 10(13), 6363-6370.

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