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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Measurements of reactive trace gases and variable O_3 formation rates in some South Carolina biomass burning plumes" *by* S. K. Akagi et al.

Anonymous Referee #2

Received and published: 18 December 2012

The manuscript presented emission factors for 97 trace gas species measured from prescribed fires in South Carolina, US using Fourier transform infrared spectrometer (FTIR) and whole air sampling (WAS) in October-November 2011. It provides a most comprehensive suite of measurements of trace gas species emitted from temperate forest fires. The results were compared with previous measurements of fire emissions, and demonstrated the variability and uncertainties in trace gas emissions from prescribed fires. The study further examined ozone photochemical production rates in four measured fire plumes downwind, and showed large ozone production on a sunny day when fire emissions mixed with urban emissions. The study also showed evidence of post-emission methanol and formaldehyde production in fire plumes. The manuscript

is comprehensively summarized and well written. It will provide an improved picture of prescribed fire emissions in the southeast US and their impacts on air quality. I recommend publish on ACP after the following minor comments been addressed.

Comments:

1) Page 25270, Line 2-5:

Can you please comment in Figure 5 why the emission ratio (ER) calculated from LAFTIR ground measurements is a factor of 3 higher than that from airborne measurements?

2) Page 25280, Line 1-3:

The sentence is not clear to me. What explains why the ground-based samples had lower EF(NH3) than the airborne samples? It seems to me that ground-based samples had higher EF(NH3) because of lower MCE and NH3 is emitted from smoldering combustion.

3) Page 25284, Line 21:

Suggest delete "at the appropriate ER".

4) Page 25285, Line 26: I suggest also cite the study of Singh et al. (2010) that showed ozone production in fire plumes when mixing with urban pollution measured from the ARCTAS campaign.

"Singh, H. B., Anderson, B. E., Brune, W. H., Cai, C., Cohen, R. C., Crawford, J. H., Cubison, M. J., Czech, E. P., Emmons, L., and Fuelberg, H. E.: Pollution influences on atmospheric composition and chemistry at high northern latitudes: Boreal and California forest fire emissions, Atmospheric Environment, 44, 4553-4564, 2010."

5) Page 25285, Line 6-8:

What are the ozone concentrations in the fire plumes and in background air? The ex-

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cess CO mixing ratios in those plumes are relatively low as discussed on page 25283. Would this lead to a higher DO3/DCO ratio in this study than previous studies as shown in Figure 13?

6) Page 25287 and 25288:

Should section 3.7.1 and 3.7.2 be section 3.8 and 3.9?

7) Page 25304, Table 1:

Please describe what 'nd' means.

8) Page 25325, Fig. 12:

Do the regression lines include both Lagrangian and non-Lagrangian samples? The Figure only plotted regression lines for the 1 Nov and 8 Nov samples. How about 7 Nov and 10 Nov? Are they not statistically significant?

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 25255, 2012.

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Interactive Comment