**Atmospheric
Chemistry
and Physics**
Discussions

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Interactive comment on "Airborne observations of trace gases over boreal Canada during BORTAS: campaign climatology, airmass analysis and enhancement ratios" *by* S. J. O'Shea et al.

Anonymous Referee #2

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1. Summary

This paper presents a detailed analysis of several flights during the BORTAS experiment dedicated to the study of boreal forest fires in summer 2011. I have retained three major conclusions for the paper. First, the observed CH_4 and CO_2 concentrations are comparable with observations made during previous campaigns in the same region/season. Second, emission factors for CO and CH_4 based on observations in a fresh sampled plume are higher than the values given in the literature. Third, the calculation of emission factors based on aged plume can lead to important biases and requires a careful discrimination of the biomass burning origin.

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2. Overall evaluation and recommendations

This paper is an interesting contribution to the limitations of the current methodologies used to derive emission factors of biomass burning chemical species. The paper is well written. The methodology is sound. The figures are clear and concise.

3. Details supporting the evaluation

Could the authors provide a recommendation to the modelers concerning the emission factors of CO_2, CH_4, CO ? Table 2 shows higher EF for CH_4 and CO then the literature.

I would recommend that the authors list the studied chemical species in the abstract. The sentence "and other biomass burning tracers and related trace gases" does not reflect the contents of the paper which only illustrates and discusses CO, CH_4, CO_2, HCN, CH_3CN.

The legend in Figure 4 needs to be completed (what do boxes / lines represent ?) In Figure 4, why are they less model levels for CO_2 than for CO or CH_4?

The fraction of C in the fuel is taken equal to 500g/kg. The authors may indicate that this value is only valid for boreal forests.

5-days backtrajectories in Figure 7b shows trajectories arriving from the boundary layer in the US south-east sector (30/40°N, -90/-80°W) where active fires were detected. These trajectories are not anymore in Figure 7c, which, if I understand it correctly, indicates that the associated flights points did not exhibit enhanced CO and HCN. If the trajectories are correct, the aircraft should have sampled these fires plumes. Could the authors comment on that point in terms of trajectory uncertainties or discrimination using CO/HCN tracers?

Figure 8: Would it be possible to extract the legend bars from the figures and put them on the right side of the panel plot?

P14090: Table 1 → Table 2

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p14091: Fig 9b → Fig10b