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# ***Interactive comment on “Investigation of CO, C<sub>2</sub>H<sub>6</sub> and aerosols in a boreal fire plume over eastern Canada during BORTAS 2011 using ground- and satellite-based observations, and model simulations” by D. Griffin et al.***

**D. Griffin et al.**

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We would like to thank reviewer #1 for his/her corrections and recommendations. We have indicated our corrections based on reviewer # 1's comments in red in the annotated manuscript.

**1. I think that it is somewhat misleading to state in the Abstract that the measurements are used to estimate an emission factor as well as an emission**

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ratio. In reality the measurements yield only an enhancement ratio that is equivalent to the emission ratio. The authors simply calculate the equivalent emission factor assuming the literature average emission factor for carbon monoxide.

We have clarified the abstract as follows:

“Furthermore **the enhancement ratio, that is in this case equivalent to the emission ratio ( $ER_{C_2H_6/CO}$ ), was estimated** from these ground-based observations.”

**2. The second from last sentence of the Abstract needs rephrasing as it currently reads as if the enhancements are only 3% and 8% (not the uncertainties)!**

We have changed the wording of the sentence:

“Agreement within the stated measurement **uncertainty ( $\sim 3\%$  for CO and  $\sim 8\%$  for  $C_2H_6$ ) was found for the magnitude of the enhancement of the CO and  $C_2H_6$  total columns between the measured and modelled results.**”

**3. Page 11076, line11-12 seems miss-placed or ill-phrased, since a couple of sentences later you start the explanation of how it was determined that the enhancements originated from these fires. Perhaps rephrase or omit.**

This sentence has been deleted.

**4. Page 11088, line 23. I suggest that you add a comment regarding the possibly strong dependence of the results on the two higher measurements.**

The two higher measurements are important to include in the regression fit as those are the only measurements taken when the smoke plume passed over Halifax.

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We have included the following sentence to highlight this:

“This lower correlation constant is possibly due to the limited number of enhanced  $C_2H_6$  measurements from DAO-DA8, which makes it more difficult to determine the correlation of  $C_2H_6$  against the fine mode AOD. There are only 27 measurements of  $C_2H_6$  available, which were taken between 17 and 25 July 2011. Of these, there are only two measurements which were taken when the smoke plume passed over Halifax on 21 July 2011.”

**5. Page 11089, I suggest you change heading to “Estimation of emission ratio and equivalent emission factor”**

We have changed the heading to the suggested one:

“4.3 Estimation of emission ratio and equivalent emission factor for  $C_2H_6$ ”

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Interactive comment on Atmos. Chem. Phys. Discuss., 13, 11071, 2013.

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