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# ***Interactive comment on “New emission factors for Australian vegetation fires measured using open-path Fourier transform infrared spectroscopy – Part 1: methods and Australian temperate forest fires” by C. Paton-Walsh et al.***

**C. Paton-Walsh et al.**

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Given the substantial delay in receiving a 2nd review for this paper, we have decided that it makes sense to post an interim response to the first reviewer, in case we have misunderstood any of the points raised in the review.

Emissions from fires are known to be highly variable (see e.g. Agaki et al, 2011). Most papers that report emissions factors therefore ignore the role of measurement uncertainty and assume that the variance in the results primarily originates from true

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natural variability in the emissions.

In the detailed discussion of uncertainties within this paper we try to quantify the total uncertainties that arise from the measurements themselves. Later in the paper we compare the measurement uncertainties to the actual variance found from different fires.

1. The first point raised by Reviewer 1 is that co-variance between uncertainties needs to be accounted for. We have done this for the one case where we expect there to be significant co-variance (the spectral and density temperature errors). This is mentioned already on lines 20 – 23 on page 24, but obviously this point is not made clearly enough in the original manuscript. We suggest that we clarify this point by adding another column to Table 3 called “combined temperature error”, rearranging the columns and reiterating the point in the Table caption.

2. Reviewer 1 suggests that a Monte Carlo approach would be a good idea - however as well as being extremely difficult to implement, the authors do not believe that it would yield the information suggested (i.e. whether or not the mean emission factors reported are negatively or positively biased). This is because our detailed uncertainty analysis only yields information about the measurement uncertainty and contains no information about the true underlying natural variability in the emission factors from the fires.

3. Reviewer 1 points out that our estimates of measurement uncertainty are reported as absolute limits and so some of the inferences made from comparison to the standard deviations in emission factors from the different fires are not valid (e.g about variability of the fuel carbon in the ecosystem). This is a good point and the authors will revisit the relevant discussions on page 4357 L1-10 and on the 2nd paragraph of page 4358 and in the summary and conclusions section as suggested when preparing the revised manuscript.

We will also address all the minor comments when we prepare the final manuscript

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once the 2nd review is available.

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Interactive comment on Atmos. Chem. Phys. Discuss., 14, 4327, 2014.

**ACPD**

14, C2210–C2212, 2014

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