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***Interactive comment on* “Comparison of methods for evaluation of wood smoke and estimation of UK ambient concentrations” by R. M. Harrison et al.**

Anonymous Referee #1

Received and published: 27 April 2012

The paper is interesting and brings light to the field. Some issues should be addressed and/or clarified:

SPECIFIC COMMENTS:

- page 6808, line 16: a factor of approximately two in what? Levoglucosan concentrations?
- Page 6810, 2.1 sampling procedures: include here the sampling schedule for each of the sites. It is not said clearly anywhere in the paper, just some dates are included in figure legends. Probably a table with a summary of the sampling schedule could be provided in supp. Material

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- Page 6810, lines 8-11: It is deduced that the Andersen high volume sampler was used for the sites other than North Kesington, please clarify.
- Page 6810, line 18: “for some of the sampling periods”. Say exactly when and where
- Page 6811, line 16: clarify how you calculate Casoil and Canss, the reader only knows that you got Cameasured, which is not in the formula.
- Page 6811, line 16: clarify what the “ws” subscript makes reference to. It is deduced it is wood smoke, but it should be said. Moreover, during the rest of the paper you use ws and wb, and the difference is not clarified until page 6817. It should be explained before and keep coherent nomenclature throughout the paper. The fact that authors say ‘wood smoke’ but write wb and the other way around is confusing if they are really trying to mean different things (or the same thing calculated by different methods, as deduced by text in page 6817)
- Page 6813, lines 8-10: what are the results of this intercomparison?
- Page 6813, lines 19-20: from the current text, it seems that $CM_{total}=PM_{traffic} + PM_{wb}$, and it should be $CM_{total}=CM_{traffic} + CM_{wb}$. Clarify.
- Page 6814 and 6815: add numbers to the equations
- Page 6814 and 6815: keep nomenclature coherent: $babs(950nm)_{traffic}$ vs $babs(950)_{traf}...$
- Page 6815, line 15: during the course of the work, which work? This one? Then say the present work
- Page 6815, line 17: it is the first time BC appears in the text. It needs to be introduced before (probably page 6813, line 14). How was this BC measured? It is very important to define.
- Page 6816, lines 9-11: re-write the sentence, the calculation was done for wood smoke and for traffic.

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- Page 6817, line 2: how was this traffic PM estimated?
- Page 6817, line 3: how was this BC measured?
- Page 6817, line 5: which gradient do you mean? where do we have the OC:EC in the equation from line 4? We have PM/BC
- Page 6817, line 7: where is this OM:OC ratio of 1.5 coming from?
- Page 6817, lines 14-15: re-write. They are scatter plots and linear regressions.
- Page 6817, lines 14-17: were these regressions orthogonal distance regressions? If not, they should, and the information should be specified. The scatter plots could be shown in supp. Material.
- Page 6817, lines 16 and 17: define MR and NK, despite one can deduce easily what they are
- Page 6818, line 8: the correlation was much weaker?? The r^2 was 0.27, and the r^2 for MR was 0.32, which is not so different.
- Page 6818, line 9: the lev/K showed a strong seasonality. Try to distinguish winter and summer in figure 2 so that this seasonality could (or should) also be seen there somehow.
- Page 6818, line 9: data (as plotted in fig. 4) is not shown for the rest of the sites. It needs to be said (or the plots shown)
- Page 6818, lines 20-21: should the correction be re-considered and adjusted to the reality? If too many negative values are obtained probably the correction is not good.
- Page 6819, lines 2-3: why do you take the slopes as levoglucosan/K ratios instead of taking the mean or median from table 1? Comment on this, or justify why you disregard table 1 at this point
- Page 6822, lines 20-22: one would also say that at Budbrooke they are not correlated,

given the $r^2=0.2$. Why don't you report the data here? (you could write $r^2<0.1$, if this is the case). Scatter plots could be provided in supp. Material

- Page 6822, lines 23-24: consistent with the ratio measure at Budbrooke?? The r^2 is very low. Is the ratio meaningful??

- Page 6824, lines 16-20: why Marylebone is not included?

- Page 6825, line 9: two sets of earlier data? You say in the methods section that data from this study was used by Yin et al. (2010). Hence, they are they same data, not earlier data. Clarify.

- Page 6825, lines 16-17: What is the lev/OC in the profile used for CMB? It would be helpful to include this lev/OC ratio in the profile for CMB, and compare to the lev/OC ratio used here

- Page 6825, lines 24-27: It could be due to several things, not necessarily an artefact of the selected days. Modern carbon may come from biogenic sources, more abundant in summer, which then compensates the lower biomass burning in summer

- Page 6826, lines 4-5: EC content in what? PM? or CM?

- Page 6826, lines 10-12: possible reasons for differences? Different methods?

- Page 6826, lines 20-22: before you say that info about fire places in UK is not available, but you say there was an increase in the use of wood for heating and you assume the new devices are more efficient and emit less organics (including lev) and more K. Why do you say now that there are no fireplaces in modern houses?

- Page 6826, lines 10-11: it is the first time HULIS are mentioned. Shouldn't it be discussed before (in the discussion section)?

- Page 6826, lines 13-19: this should be discussed in the discussion section?

- Page 6826, lines 13-15: the r^2 in the present study is very low, so not sure if the slope

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is meaningful. Conclusions need to be softened.

GENERAL/TABLES/FIGURES COMMENTS:

- A review of lev/OC and lev/PM ratios and lev/K ratios with more recent additional data could be done (for instance to add in Page 6824, line 8)
- Table 1: add number of samples
- Table 1: in Budbrooke, summer only includes April. Sampling periods and number of samples need to be included here or elsewhere, otherwise the data is meaningless
- Figure 1: add number of samples for each month?
- Figure 1 legend: levoglucosan concentrations measured
- Figure 2: use coherent nomenclature for the sites
- Figure 2: distinguish winter and summer for all sites
- Figure 2: slope 0.18 for MR, very different from the mean and median in Table 1. Comment on this somewhere in the text.
- Figures 3 and 6: including the sites and weekday/weekend info on the plots themselves (instead of the legend) would help

EDITING COMMENTS:

- page 6807, line 12: Chow et al., 2007
- page 6809, line 2 : an urban
- Page 6817, line 2: North
- Page 6817, line 22 : than for potassium
- Page 6818, line 21 : North
- Page 6819, line 3: remove respectively

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- Page 6819, line 4: North Kesington, respectively, and. . .
- Page 6820, line 2: three sites? Aren't they 4?
- Page 6825, line 24: fraction of modern carbon

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 6805, 2012.

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