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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Direct estimates of emissions from the megacity of Lagos" *by* J. R. Hopkins et al.

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We thank the reviewers for their comments which have helped us to create a better paper. Here we reply to their detail comments and show how we have addressed them in a revised manuscript.

Reviewer 2 main criticism of the paper is the discussion of the errors. We have performed further calculations using a Monte Carlo approach to deduce the impact of the uncertainties of the observations on the calculations made.

A first hypothesis is made in the calculations for the fluxes, about the uniformity of the concentrations in the boundary layer. It is supposed to be well-mixed indeed, but due to strong emission fluxes, a gradient in the concentrations may be observed from

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bottom to top. Do the authors have any support to say that the measured value can be extrapolated to the whole layer? ** Point measurements from aircraft force us to make some assumptions regarding vertical homogeneity. We have included additional information in the discussion of uncertainties on the impact of non-uniform composition. We use the observed variability of mixing ratio through the boundary layer on the airport vertical profile as a guide.

The boundary layer height, as mentioned "naively estimated" height, is also supposed to bring an uncertainty in the flux calculation. Could this be estimated and discussed? ** We have added a discussion of the impact of the uncertainties into the text.

Especially, it is questioning for the reader to see (line 18 in page 8672) that the non NOx component of the NOy is about 20%, which is an "acceptable" uncertainty. What may be the total uncertainty in the other terms so that 20% can be neglected, and not event corrected (empriic correction?)? ** We have added a discussion of these uncertainties into the text together with a similar discussion of VOCs discussion.

At the bottom of the same page, the factor of 2-3 is not explained. ** We have added a discussion of the uncertainties into the text

Why is the Butler et al. work not reported in the table? ** The table is already fairly complex and cluttered. We do not believe adding an additional column will add much to the readers understanding of the table's main aims.

Next page, the authors say "given the uncertainties in our estimates and in the bottom up estimates, the differences are not large". But the uncertainties here have not been detailed. ** We have now included a more robust discussion of the uncertainties in the paper.

There seems to be an error in the table, some values are not written under the right header (NOx and VOC emissions per person). ** We have corrected this and apologise for any confusion this may have caused.

ACPD

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The authors say that the population may be 17 millions and not 9, which is considered to make their emission estimates per person more consistent. But then, they say that the higher per person values compared to other megacities reflects an economical specificity of Lagos. This does not appear consistent for the reader. ** We have clarified the text.

Page 8674, the authors say "this appears consistent with our understanding of urban NOx sources". What does this mean exactly? ** We have clarified this in the text, see changes made in response to previous reviewer.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 8667, 2009.