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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.

Anonymous Referee #2

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The paper presents an evaluation of the emissions of the megacitiy of Lagos, from airplane measurements. This constitutes interesting data for atmospheric pollution research, and a relevant issue for this journal. Other studies proposed such approach to evaluate the emissions of a city. However, the emissions of megacities outside Europe are currently very badly estimated and such evaluations are clearly needed. The paper reaches its objectives and proposes a quantification of the NOx, VOC and CO emissions. The main questioning about this paper concerns the uncertainties of the method that are not deeply dealed with, and the differences with previous estimates that are also not completely investigated. This is why I recommend "major" revisions. I did not notice any bias in the approach, but I think supplementary calculations or estimates of the uncertainties should be conducted and added to the discussion.

A first hypothesis is made in the calculations fo 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 bottom to top. Do the authors have any support to say that the measured value can be extrapolated to the whole layer?

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? Especially, it is questionning 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?)?

At the bottom of the same page, the factor of 2-3 is not explained.

Why is the Butler et al. work not reported in the table?

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.

There seems to be an error in the table, some values are not written under the right header (NOx and VOC emissions per person).

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.

Page 8674, the authors say "this appears consistent with our understanding of urban NOx sources". What does this mean exactly?

This is all for unclear points. The paper is however very clear, concise, well structured and well-written. The paper is interesting and easy to read and understand, the title is

in agreement with the study and results.

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