Point-to-point response to comments by Referee #2

[Comments are in regular font and answers are in bold font.]

We thank both the reviewers for their positive and constructive comments, and finding the article interesting and worthy of publication. We have carefully considered their suggestions and necessary changes have been made to the manuscript. Our detailed responses to their comments are provided below.

The paper takes forward the well known OSPM model developed some 20 years go by allowing for some limited aspects of inhomogeneous emission geometry in a street canyon. Given the time lapse, it is surprising that the authors make little or no mention of studies of urban flows that have taken place during this period nor the improved understanding gained, nor, on the basis of this work what are the strengths and weaknesses of OSPM.

>> The paper is on implementing inhomogeneous emissions in OSPM, not a review of studies on urban flows and how these might be used to improve process descriptions/parameterizations in OSPM. This would make the paper too lengthy and distract the focus from the aim of the study on inhomogeneous emissions. To get an overview of studies on urban flow or strength and weaknesses of OSPM in particular, the reader is referred to the review paper mentioned in the introduction (Kakosimos et. al., 2010)

Overall the paper seems unambitious and quite limited in scope.

The correlations do not give confidence that there is much if any improvement over the original OSPM model.

>> Even it seems simple at first glance, introducing inhomogeneous emissions into OSPM requires substantial changes and re-thinking of the integration procedures in the model. We will not judge if this is ambitious or not, but just note that the result is a significant upgrade of the OSPM and for sure a highly requested upgrade by all the users of OSPM, which will lead to a much better scientific understanding of the concentration distribution in street canyons. We are aware that more complex descriptions of flow and dispersion in street canyons have been made but these are beyond the scope of this article. It should be noted that one of the main advantages of OSPM is that the model is fast and simple to operate and the aim is thus not to make an upgrade of the model to a version that would be more resource demanding.

Specific questions and comments:

-Under future work is stated: 'At present the receptor is located at the wall of the street ....' Obviously it would be much more useful if receptors could be located anywhere in the canyon. It needs to be clear earlier in the text where receptors can be located and why there are limitations in where they can be located.

>> The receptor point can be moved along the street canyon by adjusting the length to the respective end of the street canyon. The receptor height can likewise be adjusted. The receptor point cannot (at present) be moved in the crosswise direction, since this would require allowing a contribution from "the back" of the receptor. Such an option would require significant redesigning of the model and was therefore deemed outside the scope of the present work. Allowing the receptor to move away from the building walls will be a next step of the model development that also requires more experimental data that will first be available in the coming year.

-At section 3.2 is stated 'Introducing

horizontal diffusion was deemed outside the scope of the present study'. Why?

Is it indeed possible to include horizontal diffusion neatly within the OSPM framework?

>> It is possible to implement a description of horizontal diffusion in the formulas of OSPM, however, it would require some significant reprogramming of the model plus development of a mathematical model for this. Implementing and validating this would therefore make the paper too long, and was therefore deemed outside the scope of the present study.

It's also not clear why only two segments have been allowed for.

>> There is no limit on the number of segments the user can decide to split the street canyon into. The number two was chosen as a pragmatic limit, given the above limitations, in order to be able to validate the inhomogeneous emission scheme on its own. We will formulate this more clearly in the final version of the manuscript.