

Interactive comment on “CityFlux perfluorocarbon tracer experiments” by F. K. Petersson et al.

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Response to referee 1.

We thank the referee for her constructive comments.

A discussion of circulation patterns in street canyons has not been included. The best way to study those would be to conduct short-range experiments (e.g. several receptors in the same street canyon) or conduct wind flow studies using 3D anemometers which was not within the scope of these experiments.

Regarding the questions concerning the third measurement period the most likely cause is that there was a change in wind direction towards the end of the experiment. The majority of the plume missed the receptors in the beginning of the experiment whereas it passed by the receptors in the third sampling period.

C1830

More details of the topography of the experimental area will be included. As pointed out by both referees the thinking behind the network model needs to be clarified which also will be done.

Response to referee 2.

We thank the referee for his/her constructive comments.

Variability in results obtained from tracer experiments has previously been seen as pointed out by the referee. Higher concentration of tracer material was seen at roof level compared to ground level in both experiments conducted. Thus, both experiments resulted in the same conclusion regarding non-suitability of Gaussian vertical profiles under convective situations since a Gaussian profile would predict higher concentration at ground level. As mentioned by referee 1 these types of experiments are essential for our understanding of dispersion. The experiments presented here are almost unprecedented in that vertical dispersion under convective conditions was studied using perfluorocarbon tracers.

Apart from evaluating ground/roof ratios, which are the main new results of this work, the experimental data has been tested against known theories such as the simple correlation model originating from the DAPPLE work and that the relationship between wind direction and city layout is of great important (which is the main idea behind the street network model). Work on evaluating the street network model with other experimental data sets has been made and will be presented later.

The referee is right in that no sampler has sampled the whole of the plume. We have therefore only compared results from samplers with approximately the same source receptor distance (e.g. ground and roof level samplers at the same position). This has avoided the problem the referee mentioned since these receptors have sampled the same proportion of the plume.

Regarding the second experiment, since little material reaches any receptors in the

C1831

first two sampling periods it is very likely there was a change in wind direction towards the end of the experiment. In the beginning of the experiment the tracer cloud was not dispersed towards the receptor positions as occurred during the third sampling period.

Response to page by page comments

Page 29. References to previous wind tunnel work will be made although they focus on neutral conditions as pointed out by the referee.

Page 30 and Page 36 Both data sets will be plotted with airport wind data. This will not change the overall conclusion. Reference to DAPPLE will be made.

Page 31. Clarification about ADS-GC-NICI-MS and the time reference will be made. The positions for samplers 1, 2 and 3 are already marked on their right positions.

Page 32. A problem when studying vertical dispersion is that access to houses/towers is needed (or design of sampling structures/cranes). One of the main aims of these experiments was to place receptors at as many different heights as possible.

Page 33. Non-uniformity of the street network will be a matter of uncertainty for the network model as pointed out by the referee. More details about this model will be added. There will be a division of the plume unless the wind direction is parallel with the street in question.

Page 34. Both points regarding wind data will be added.

Page 35. Approximate normal profiles were found but also that they were dependent on source receptor distance which makes normal profiles debatable. The text will be changed in order to reflect this.

Page 37. The changes suggested by both referees will not result in any changes to the overall conclusions.

Table 1. The Gaussian sigma values deduced will be added as well as that the results are 10 min averages.

C1832

Table 2. The averaging time will be added.

Figs 1 and 2. The wind speed and degree will be added to the legend and in the case of the second experiment it will be mentioned that this is the results from the third measurement period. The actual figures will remain like they are since we and referee 1 think they are clear.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 27, 2010.

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