Atmos. Chem. Phys. Discuss., 10, C10427–C10428, 2010
www.atmos-chem-phys-discuss.net/10/C10427/2010/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Controls of carbon dioxide concentrations and fluxes above central London" *by* C. Helfter et al.

Anonymous Referee #1

Received and published: 30 November 2010

This is a nicely written paper which clearly documents the seasonal and diurnal patterns of mean concentrations and fluxes of carbon dioxide as observed at the top of the BT tower in central London over a multi-year period. It is a useful contribution to the literature and worthy of publication subject to the following minor corrections.

Abstract: I'm not convinced that the abstract highlights the key findings of the text. You report a number of interesting results both relating to the seasonal and diurnal trends in CO2 concentration and flux. These could be more clearly stated in both the abstract and conclusion. For example you note that diurnal traffic counts and CO2 fluxes are well correlated but in the text you demonstrate that this is really only the case during the daytime period under well mixed conditions. This is an important and interesting qualification to your results.

Introduction This is well written and well referenced. Given that later in the paper you refer to the results from a number of key previous studies (Edinburgh, Vancouver, Tokyo, Basel etc.) it would be nice to see a brief summary of the key seasonal and diurnal trends observed and brief discussion of any differences observed between the sites. You could make more use of your tables as well.

Methodology This was very clear. It might have been helpful to discuss the issues surrounding data coverage upfront however. For example you state that only 54% of the data was used- is this spread equally throughout the day and year? Are there any notable consistent patterns in data loss (i.e. night time during the winter?) What impact does this have on your conclusions? (You do comment on this sporadically through the paper e.g. section 3.4.1 – but it is hard to assess the overall impact.)

Results In general these are well written. However, the figures could be more carefully woven into the discussion. For example I found Figure 6 and the related discussion quite confusing. The discussion of this figure could be clarified. Perhaps it would be helpful to plot a diurnal graph of two of the key wind directions to illustrate your points. A diagram to illustrate the seasonal variability in diurnal fluxes would also be helpful as discussed on p23753 second paragraph. Can you plot Figure 7 by stability as well? It seems likely that the higher traffic counts would be associated with times of the day that were biased towards a particular boundary layer depth and stability, thus it is hard to convincingly argue causation underlying the correlation between traffic counts and fluxes. This is especially true given the differences observed in the week day / week end patterns during the night time period.

Conclusion In your conclusions you recommend that concentration gradient measurements be made to reducing remaining uncertainties about storage. The limitations of not having this information and their implications for the study are not adequately discussed in this paper.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 23739, 2010.