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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The role of vegetation in the CO_2 flux from a tropical urban neighbourhood" *by* E. Velasco et al.

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Thanks very much for the comments and suggestions.

1) Section 2.2 Line 10: Urban flux measurements are becoming more common and, given the heterogeneity of urban landscapes, flux footprint modeling is an important part of the analysis. The authors describe one footprint model (Hsieh et al., 2000), but don't indicate why they selected this model or whether it is well suited to an urban environment. In general, the question can be asked whether any footprint models are well suited to urban flux measurements, but this may be a question for the larger community.

Many footprint models have been developed using different approaches including an-

alytical, Lagrangian stochastic particle dispersion, large-eddy and ensemble-averaged closure models. Vesala et al. (2008) reviewed the advantages and disadvantages of these approaches, concluding that analytical models, such as the model of Hsieh et al. (2000) used in this study, are usually suitable to evaluate footprints. It is important to remember that none of these approaches have been developed exclusively for flux measurements over urbanized land areas and that their performance is still under evaluation.

2) Section 4 Line 31: There have been some tries to apply flux measurements to a whole city by extrapolation to fill the gap between different scales or between bottom-up and top-down methods. Authors need to describe the possible reasons why they cannot extrapolate to the whole city. This is also good for the community to take care of the application areas of flux measurements.

Our results are only valid for the particular neighbourhood investigated. However, given the good agreement between the two independent methods to determine the annual carbon sequestration, the application of the approach based on allometric equations and an alternative model of the metabolic theory of ecology for tropical forests, could be used to estimate the carbon sequestration from the whole city. For this, a comprehensive dataset of the city's trees is required, or at least from representative plots (i.e. neighbourhoods). The revised manuscript will include this explanation.

The large diversity of urban morphology and vegetation, level of activity, economic and social factors complicate a direct extrapolation of our flux observations to the whole city. A few studies have used the eddy covariance (EC) method in concert with other approaches to evaluate CO2 emissions at city scale. The CO2 fluxes measured by EC can be compared directly to estimated emissions by other methods within the monitored neighbourhood if these are available. Comparisons with bottom-up emission inventories with spatial resolution similar to the size of flux footprints (e.g. 1 km2) have reduced uncertainties on emission estimations and improved the development of environmental policies intended to reduce emissions of GHG and toxic pollutants (e.g.

Velasco et al. 2009).

3) Figure 4: Technically the quality of figure must be improved, especially the low resolution of letters of references on y-axis.

We will verify the resolution of all figures in the final version of the manuscript. We have found difficult to control the size and resolution of figures in the Discussion format of ACP.

4) Figure S11: Open circles can much clearly show color codes instead of filled ones. Some local time circles seems hidden by others.

We will replace the current filled circles by open ones in the final manuscript.

References

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Vesala, T., Kljun, N., Rannik, U., Rinne, J., Sogachev, A., Markkanen, T., Sabelfeld, K., Foken, Th., and Leclerc, M. Y.: Flux and concentration footprint modeling: state of the art, Environ. Pollut., 152, 653-666, 2008.

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