Response to the review of # acp-2013-915 by Zhang et al.

We thank Dr. Ganzeveld for his thoughtful comments. Each comment has been addressed below (review comments in black; author responses in red).

Editor Initial Decision: Reconsider after minor revisions (Editor review) (12 Aug 2014) by Laurens Ganzeveld

Comments to the Author:
Dear author, co-authors,
I have checked carefully your response to the reviewers comments as well as the revised version of the ms. It seems that you made a good effort to address all the raised issues and have introduced substantial modifications to tackle the comments/suggestions for changes. I have considered to invite again one of the reviewers to check if they feel that all the comments have been properly addressed but actually one of them already followed carefully the review process and checked your response and indicated that the paper has substantially improved. In addition, I have checked again the revision and found some last minor issues that I would like you to address before I can accept the ms for publication in ACP.

Minor correction; Bakwin et al. (2004) adjusted the CO2 concentration at 30 m height increasing it by 2.5 ppm to estimate in summer.....

We have changed the text accordingly.

Line 240; Checking the revised ms, in particular on the introduced modifications in section 2.5, which has substantially changed I noticed that you introduce there the two footprint methods; the second is mentioned after an extensive introduction of method number 1. I would therefore suggest to change the text to: "We used two footprint methods. The first method is based on determining an equally-weighted circular footprint centered at the tall tower. The area within each circular footprint was equally weighted, therefore fraci is the fraction of land cover type i within a certain radius around the tall tower."
What do you mean here with equally-weighted?? Is fraci constant (but different from 1/6) for the different radii or is it 1/6 so that each land cover type contributes 1/6 to the total footprint (read that later on there is more explanation about how fraci is determined but the way it is now put here is confusing).

We have changed the text to the following sentences:

"We used two footprint methods. The first method is based on determining an equally-weighted circular footprint centered at the tall tower. This method assumes that the area within each circular footprint has the same influence on the flux measured at the tall tower despite its distance from the tower, and therefore, $frac_i$ is the fraction of land cover type i within a certain radius around the tall tower."

Further textual modification: “The second footprint method we applied derives the footprint from the Stochastic Time-Inverted Lagrangian Transport model (STILT, Lin et al., 2003).”

We have changed the text accordingly.

In your reference to the EDGAR dataset you initially refer to it as EDGAR and then continue to EDGAR42 reflecting the fact that you used version v4.2 of EDGAR. Refer consistently to this emission dataset after you have chosen your abbreviation for this one.

We referred to EDGAR in the following places after introducing the EDGAR42 (L76-79), and found it is appropriate to use EDGAR instead of EDGAR42.

L215: EDGAR was referred to here as part of the introduction for Carbon Tracker emission inventory.

L527-531 EDGAR was referred to here in the context of a short review. Not all references here used EDGAR42, for example, Kort et al. (2008) evaluated EDGAR 32 FT2000 in their study.

In your discussion you have included a short statement about how the fluxes of EDGAR/the data compare to the emission/fluxes from a national inventory, the one by EPA; “The GHG inventory developed by EPA (EPA inventory) was based on more country-specific emission factors or models...”. What is missing here is a short introduction statement that explains that to further analyse the significance of the underestimation of the EDGAR emissions, that you have also included a the National scale EPA inventory in your analysis to determine some plausible explanations for this underestimation and to appreciate the uncertainty in the top-down and bottom-up approaches compare to the differences between different available emission inventories. Your statement now comes too much out of the blue.

The purpose of section 4.5 was to compare the top-down measurement with the bottom-up emission inventories (EDGAR and EPA inventory).

In the introduction (L75-81) we stated

“The final task was to compare the CH_4 and N_2O fluxes with two bottom-up emission inventories: 1) EDGAR42 …; and 2) a national GHG inventory developed by the U.S. Environmental Protection Agency (U.S. EPA, 2014).”

Following the editor’s suggestion, we have added the following sentence at the beginning of the paragraph starting at L552.

"In addition to EDGAR42, we compare the CH_4 and N_2O fluxes measured at the KCMP tower with the GHG inventory developed by the EPA (EPA inventory), which was based on more country-specific emission factors or models."

Regards, Laurens Ganzeveld