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Atmospheric Chemistry and Physics Discussions

Interactive comment on "River Breezes for Pollutant Dispersion in GoAmazon2014/5" *by* Adan S. S. Medeiros et al.

Anonymous Referee #1

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General Comment

This study analyzed the effect of the river breezes on the dispersion or canalization of the Manaus pollution using observational data and numerical simulations with high spatial resolution. Results show that the river breeze cell is, on average, confined below 150 m suggesting that the river breeze effect on pollution dispersion above this level is negligible. Observed data of CO NOx and O3 concentration confirmed that the river breeze does not affect the pollution dissipation at 500 m. On the other hand, the river breezes remarkably affect the pollutant dispersion near the surface, mainly over "R1" and "R2" locations. This study demonstrated that the river breezes play an important role in the Manaus pollution dispersion in the low atmospheric levels. Moreover, this paper also highlights locations where the river breeze influence on pollution dispersion

is more effective. These finds are very important to the Amazon local-climate understanding and complement the previous discoveries. The used methods are appropriate for the study purpose and the paper, in general, is well written. However, some "major" points should be reviewed. The points are below listed.

Specific Comments

Introduction

1 - In the paragraph that starts in line #38, I recommend citing the dos Santos, M. J., M. A. F. Silva Dias, and E. D. Freitas (2014),doi:10.1002/2014JD021969, since this paper shows evidence of river breeze for the Manaus area using long-term observation.

2 – The citation of dos Santos, M. J., M. A. F. Silva Dias and E. D. Freitas (2014) is also recommended in the paragraph that starts in the line #52;

3 – This part of the text should be improved. "On at least one day, a reversal in wind direction caused by the afternoon influence of the river breeze was associated with a shift in concentrations representative of background and polluted conditions". It is not clear.

Simulations

Some crucial information required in local circulations modeling are missing in this section:

#1 - There is no information about the soil initialization. In other words, the soil initial conditions (i.e., soil temperature and moisture) used in these simulations have to be described in this section.

#2 - There is no information about the surface temperature of the rivers prescribed in the simulations.

In line 125 It is written that the simulations were carried out for March 2014, but there It does not explain why this period was selected.

The following sentence is not clear at all. "After the spin-up period, simulations in lots of 72 h were performed for March 2014 as a balance between conserving computing resources and avoiding excessive numerical drift (Medeiros et al., 2017)."

Results and Discussion

In line 166 It is written: "Figure 4 shows that the flight paths intercepted the Manaus pollution plume in the planetary boundary layer on March 14 from 10:20 to 11:20 (local time; UTC - 4 h)". Figure 4 show does not show It since there is no time information there.

In lines 186 and 187, I suggest you present the maximum absolute concentration differences instead of maximum concentration differences. If you present the maximum absolute concentration, the NOx difference value will be larger than 5 ppb.

In lines 170-171 It is written: "The results show that there was no obvious influence of river breezes on the dispersion of the Manaus pollutant plume at 500 m". This affirmation can be corroborated by plotting vertical cross-sections of the simulated pollutants across Manaus pollutant plume. Thus, I suggest to include these cross-sections on the paper discussion.

In lines 187-190 I agree with the following sentence: "The overall implication is that the effects of the trade winds on transport largely dominated over the influence of river breezes in this region when considering the larger part of Manaus pollutant outflow". But, I do not agree with this part: "in agreement with the modeling and observational results of section 4.1." In section 4.1, It showed the concentration of pollutants at 500 m altitude, where the river breeze effect is negligible. In section 4.2, It was analyzed the pollutant concentration near the surface where the local circulations are remarkable. In other words, the conditions are different.

The small perturbations (concentration difference less than 6%, line 186) caused by the presence of the rivers is, probably, related to the river breeze activity. The river

breeze occurrence is more frequent in the dry season, please check, dos Santos M. J., M. A. F. Silva Dias, and E. D. Freitas (2014).

In lines 209-210 the following sentence is unclear. “which can be called strong canalization, for at least two pollutants at 5% frequency for March 2014.”

In Figure 2 and 8, I suggest that you replot the right column figures using a Diverging Color Schemes for a better visualization of the results. The following link shows many options. https://www.mathworks.com/matlabcentral/fileexchange/34087-cbrewer—colorbrewer-schemes-for-matlab

In the captions of Figure 5,6 and 7, you should mention the atmospheric level of the presented pollutant concentrations.

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