Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2018-347-RC2, 2018

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 #2

Received and published: 9 June 2018

The manuscript shows the effect of river breezes for the city of Manaus using data from a field campaign and WRF-Chem modeling. I believe this is the first study to analyze the effects of river breezes on pollutant transport at the city scale using models, which makes it very valuable. The paper is well written and the topic is relevant and in the scope of the Journal. I have a few comments and suggestions outlined below, mainly requesting additional complementary analysis.

General comments

Given that this is the first study of it's kind, it would be great to see additional analysis performed by including sensitivity simulations. Given that river breezes are being studied, it would be helpful to see what's the model response to the representation of river breezes when the grid-spacing is changed. I recommend adding simulations

(with and without rivers) going down to 1 km horizontal resolution and by refining the vertical resolution in the region where the breeze develops. Including the 10km domain into this analysis (if two-way nesting is not used) would be helpful too. Analyzing the changes in meteorology and pollutant concentrations as a function of the grid-spacing would provide great insight into the subject.

Another sensitivity simulation that comes to mind has to do with changes of the river properties. Fig. 1 shows a very distinct albedo difference between the Rio Negro vs the Amazons. Adding a simulation where this contrast is added by changing the reflective properties of one of the rivers could be useful to see if this has any effect.

Finally, the manuscript should be revised more carefully for English by a native English speaker.

Comments by line

19. You could include the % of change associated with these concentrations

Intro. Additional information of the effect of lake breezes on air quality could be included together with expected similarities and differences to river breezes.

99. Provide the vertical grid-spacing in the first layers up to 200m, as this is the region where the largest sensitivities occur due to river breezes

Fig S1. It would be helpful to add the data for both simulations in this plot, to have an idea of the changes (if any) in the performance of modeled meteorology due to river breeze

133-135. You mean that every 72h meteorology was initialized from CFSv2? If this is the case, did you leave some spin-up time for meteorology after every initialization? This would be recommended given that you are studying river breeze effects.

Fig. 2. Maybe you can add a column showing the mean surface values at noon, which is where your maximum changes occur.

147-165. This analysis is great but could be complemented with the addition of changes of wind direction and vertical winds. Maybe adding arrows representing horizontal (in the A-C axis) and vertical winds (differences?) in the profiles could help. In the intro you mention that the breezes happen due to temperature gradients, so including temperature differences would also contribute.

166-182. Here you only discuss the flight observations. I recommend adding the simulated values over the flight track for both simulations on the time series in Figure 4, so is visually clear that there are no differences at this altitude and also to have an idea of the model performance.

Figs 5-7. It would be great to have an idea of model performance by adding the observed T3 concentrations to the upper-left panel

184-195. CO seems to present a high frequency variability coming from Manaus while there is a long frequency probably because of background air changing, could you elaborate on this? Is this also seen in the observations at T3?

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2018-347, 2018.