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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.

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General comments.

The topic addressed by this paper is so important to the overall project that it deserves to be done more thoroughly. I always fear that, in the course of large field projects, topics are doled out for publishing among participating groups in such a way to avoid overlapping discussions, but, in so doing, incomplete research results. Fortunately, the authors have considerable information in hand, and, if they are willing to re-enter the data analysis phase a bit, they could complete the missing parts. The resulting paper

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Discussion paper

will be of greater use to the community. Please make a major revision. Among the missing parts I identified are:

âĂć Plots and discussion of the vertical structure of the convective boundary layer (CBL), and this material must include wind direction & speed as well as potential temperature. There are three ways to address this issue with the available data: The conventional radiosondes at MAO, the aircraft soundings on takeoff and upon landing, and the model output. The authors make a conclusion that breeze circulations are not important in dispersion, on the two case study days, but they offer little context. How thick was the convective boundary layer, over land and over the river, where vertical mixing will be suppressed?

âĂć Better exploitation of the single month of modeling than was done. The current side-long glance at these results is insufficient. I am looking particularly for average diurnal behavior near the surface, and all I get is Figure S1, showing wind speed, temperature and RH. Since an RH plot looks like the upside-down rendering of the temperature plot over the diurnal cycle, one would do better showing the specific humidity. Better still, plot the temperature and specific humidity hourly medians on the same plot, reserving the right vertical axis for specific humidity and saturation specific humidity. (It's not that difficult, though the latter has a slightly nonlinear scale, of course.) More important is some indication of the diurnal variation of wind direction, so that the reader can understand how the breeze baroclinicity affects directional wind shear.

âĂć A focus on the river breeze overshadows the other effect of the rivers, mainly that the flow is channeled. (Kindly write 'channeling' rather than the word 'canalization', which, though a word in English and happily a cognate to its Portuguese counterpart, is almost never used.) How might the dispersion of the pollution plume change as it goes over the river, where surface fluxes must diminish as compared to over the land? Make some estimates of the buoyancy flux over the river and compare with the direct measurements over the land.

Specific comments.

1. Abstract, line 3. Did I miss something? Where do the authors discuss how the chemical composition of the plume changes downstream?

2. Abstract, lines 9-13. If the authors' model result indicates that any breeze circulations might be confined below the 150-m level, was the design of the project, with flights limited to 500 m altitude, flawed? Also, was any effort done to consider lighter-wind vs. strong-wind conditions. One might think the breeze circulations would be more apparent in the former case. Please comment.

3. Abstract lines 25-27. The authors conclude that "..most pollution was transported at heights well above the effects of the river breezes. . ." What then does this indicate about the wisdom of locating the vast DOE ARM resources at a single site at the surface, downwind? Please comment on this and elaborate about what these sentences mean. How is the pollution 'information' communicated to the surface? Answering this question brings you straight back to trying to understand the differences between the CBL over land and whatever is present over the rivers.

4. Line 48. Prof. Maria A. F. Silva Dias, has been cited for some time as "Silva Dias". Please follow this pattern, so that readers looking up cited papers will not get confused.

5. Line 166. On what time scale can one conclude that "carbon monoxide was mostly inert on the time scale of the simulations. . ."? Here are some competing scales: a) Mixing in the convective boundary layer zi/w*, where w*, the convective velocity scale that depends on the surface buoyancy flux. This might be different over the river & over the land; b) the time it takes the air to advect from Manaus to the point of measurement; and of course, c) time of day (time since the surface layer became convective, though one might argue that over the river that layer was convective all night.

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