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Comment

Interactive comment on “Relationship between Amazon biomass burning aerosols and rainfall over La Plata Basin” by G. Camponogara et al.

Anonymous Referee #1

Received and published: 1 November 2013

This manuscript examines relationship between Amazon biomass burning smoke and rainfall over La Plata Basin using aerosol measurements from AERONET, rainfall from TRMM satellite, and meteorological fields from NCEP-DOE reanalysis. Authors attempted to infer aerosol influence from the observed relationship by investigating effects of some meteorological variables. The topic is of great interest to the community. The paper could potentially add useful piece to the discussion of influences of Amazon smoke on clouds and precipitation. However the quality of paper needs to be significantly improved.

General comments: (1) The paper as written doesn't reads well. Authors should do readers' favor by polishing the writing.

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(2) This is an observation-based analysis of aerosol-cloud-precipitation interactions. So the relationship derived from observations is a combined effect of different mechanisms. There have been many studies on the influences of Amazon smoke aerosols on cloud and precipitation (e.g., acting as CCN/IN – microphysical pathway, changing atmospheric stability and altering regional circulations – dynamical pathway, among others). This paper interprets the observed aerosol-precipitation relationships from a perspective of the microphysical pathway. This is not adequate. Certainly in certain conditions one mechanism may play dominant role while others are just secondary, which however needs to be analyzed in the paper.

(3) Following comment (2) above, authors should rewrite paragraphs 1-3 in the introduction. As written, the dynamical pathway is not discussed at all.

(4) Description of data (section 2.1-2.3): No data is perfect. It is necessary to discuss issues/uncertainties associated with individual data sets and how the issues might affect your analysis. Appropriate references are needed. For example, how reliable is TRMM precipitation over land? Will the uncertainty affect your results? Are you using daily or instantaneous AERONET AOD observations?

(5) Description of analysis methods (section 2.4-2.7): This could be made more clearly. For example, “the AOD and rainfall time series can be correlated for each time lag. The best correlation was taken as an indication of the optimal time interval”. How did you correlate AOD and rainfall time series? Does “the best correlation” refer to maximum positive number or minimum negative number? You used mean wind at 850 mb to infer the time lag. Do you have lidar observations to support that the smoke is transported southward at 850mb? You also need to say why rainfall fraction is used in your analysis. Why was the wind shear not considered in your EOF analysis (the important role of wind shear is highlighted in the introduction)?

(6) Most of figure captions are too simple, and in some cases not clear. For example, Figure 8 has a caption that is very similar to that of Figure 9 (the only difference is Fig.

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9 has “AOD”). These captions don’t really tell the difference between the two figures. Figure 5 shows “Enhanced satellite images...” What does “enhanced” mean? What does the color represents? Also it is hard to see where your study region is.

Other comments:

p.23996, l.12-13: “agriculture” could be changed to “agricultural practices”

p.23997, l.10: “suppress precipitation”. I believe that you need to add “warm” before “precipitation”.

p.23997, l.13-16: this sentence doesn’t read well.

p.23997, l.12: add “from observations” after “... to isolate the aerosol effect”

p.23998, l.15: delete “Mesoscale Convective Systems”

p.23999, l.25: add “from AERONET” after “Aerosol Optical Depth (AOD) data”.

p.24001, l.16-17: “what are “others aerosol sources”? (“others” should be “other”)

p.24003, l.15: “in” should be “on”

p.24004, l.22-24: “Next section will investigated.” ?

p.24005, l.10: “Differences between rainfall fractions” It is ambiguous.

p.24005, l.16: “-2.5 Pa/s”. This is inconsistent with figure 9. In the figure, your p-velocity ranges from about -0.05 to -0.45.

p.24006, l.5-8: This sentence (also next paragraph) is hard to grasp. Please rephrase.

p.24007, l.4: again this mysterious number “-2.5 Pa/s”

p.24007, l.20: what is “the scale interaction”? Have you explained it earlier in the paper? Maybe I have missed something.

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