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Atmospheric Chemistry and Physics Discussions

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

**Anonymous Referee #3**

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This paper attempts to address an important issue regarding whether and how aerosols from biomass burning in the Amazon affect precipitation by MCSs downwind in the La Plata Basin. This issue has huge implications for aerosol-precipitation interactions and regional climate studies in particular. The authors used remote sensing data from both ground and space sensors to address this issue along with reanalysis meteorological fields. The subject is suitable for the audience of ACP. The authors are aware of the major obstacles in studying this particular issue of aerosol-precipitation interactions from an observational side. They used multiple statistical tools to deal with these difficulties and arrived at conclusions that may be interesting for ACP readers.

However, the analysis in this manuscript lacks enough depth to clearly show the significance and validity of their major conclusions. I would recommend the authors to make



efforts to address my following concerns before this manuscript is published in ACP.

The introduction section is not focused enough for this manuscript. The authors are knowledgeable, but since the focus of this study seems to be the relationship between aerosols and strong convective systems it would be more appropriate and beneficial for readers if the authors can do a more focused introduction on this particular subject. By doing so, my opinion is that the authors can lay a better ground for later discussions and also help readers to be prepared for in-depth materials.

In presenting their results, the authors are recommended to give more information on what is being presented, how it is derived and what are the associated statistics if available. A related issue is that the author accumulated many cases of MCSs (Figure 1) and they said that they plant to use multiple ways to study the relationship. However, in the results section bin-plots are only presented for a case study, if I understand correctly. For 2-d histogram plots it would help if the authors can provide data on the frequency of each grid. Also, somewhere in the text lagged correlation is mentioned, but no information is given what is the character of the lag.

The case study is interesting, but several questions remain open. The authors mentioned a concern on whether aerosols are indeed interacting with clouds in the text. Here no solid evidence is presented that aerosols from the north are indeed swallowed into the whole MCS system. This is important because after all the analysis is done to data averaged over large domains. In addition, no correlation statistics are presented and no information is available regarding how the AOD bins are chosen and what is the justification. Lastly, when doing the plots little information is available regarding how the study period is chosen. For example, an MCS system only last several hours and no aerosol data should be taken into the analysis when MCSs are not formed yet because aerosols would not affect precipitation when clouds are not their yet. –>

Using EOF as a tool to analyze data may be helpful for the purpose as the authors mentioned. The motivation is strong but the justification is not enough. EOF analysis

is merely a statistical tool. To justify any physical interpretation of EOF results, strong physical arguments have to be made. Even one accepts the usage of EOF analysis in this context. The results presented here do not provide strong indications if aerosols affect precipitation in either EOF mode. In mode 2, the authors seem to suggest that aerosols are consistently suppress rainfall because the association of negative rain rate with positive aerosol anomalies. What is missing in the discussion seems to the omega anomalies. The whole point of this exercise is to remove impacts from meteorology and isolate aerosol signals. Yet, in each mode significant variations in either omega or RH are present, which makes the interpretation hard.

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Interactive comment on Atmos. Chem. Phys. Discuss., 13, 23995, 2013.