Atmos. Chem. Phys. Discuss., 13, C9574–C9576, 2013
www.atmos-chem-phys-discuss.net/13/C9574/2013/

Atmospheric Chemistry and Physics
Discussions

Interactive comment on "On the link between the Amazonian forest properties and shallow cumulus cloud fields" *by* R. H. Heiblum et al.

Anonymous Referee #1

Received and published: 2 December 2013

General comments:

This is an interesting paper that examines the relationship between land cover type and the frequency of occurrence of the formation of shallow cumulus in one region of the Amazon. Several aspects of the presentation are poorly described or misrepresented and require major revisions. I suggest the inclusion of multiple years and subdivision of the analyzed domain to demonstrate the reproducibility of the results.

In the bigger picture I'm left wondering what implications this work might have on cloudiness, precipitation, and climate given the clear trend towards ever expanding deforestation in the Amazon. This is beyond the scope of the work but some comment in the conclusions would add relevance to the paper.

Specific comments:

line 10, pg 30018: 'Five basic characteristics where shown to contain most of the information: cloud fraction, mean and standard deviation of distances between cloud centroids, and mean and standard deviation of cloud areas.' This seems unsurprising but the authors should demonstrate that this is indeed the case. For example how do they quantify information? Why don't they think that other properties like cloud water path (or reflectance) contain useful information? This seems rather arbitrary as it stands.

Lines 14-22, pg 30018: I suggest a table demonstrating the statistics for the three subjectively defined regimes and their frequency of occurrence.

Line 26, pg 30018: Again we need more information to see this for ourselves.

Line 22, pg 30021: superfluous 'the'

Line 2, pg 30022: 'possibly indicating invigoration of convective clouds by biomass burning aerosol'. Is the difference statistically significant?

Line 25, Pg 30021: Can the published Koren et al. model for cloud fraction versus AOD in this region explain the 2010-2011 differences?

Line 3, pg 30022: Yes there is lower AOD but that does not necessarily imply that the results from 2011 are less likely to be influenced by aerosol effects. In fact wouldn't you expect larger aerosol sensitivity at low AOD values than at high AOD values. You are essentially arguing that a partial derivative with respect to AOD is small using the magnitude of AOD. Why? Does the 2011 data not support your conclusions. If so then tell us. For that matter why not look at other years as well. Limiting this study to 2010 leaves me wondering how real the conclusions are.

Line 7, pg 30022: These are regional correlations of the seasonal mean maps, correct? More explicit explanation of the time and space scales would be appreciated.

Line 17, pg 30022: It seems silly to describe the data as parabolic (a very specific function) without testing the fit of a parabola or without the guidance of some physical model that would predict a parabolic dependence.

Line 20, pg 30022: I disagree that the data can be considered decoupled from meteorology or AOD. In what sense do you mean this? meteorology and AOD certainly have regional variations which were not controlled for in any proper statistical or physical manner here. correlations with other variables within the study boundary with other variables (i.e. AOD, geopotential height, RH, etc...) should be shown.

Line 21, pg 30023: 'To test the significance of the linear trend above'. You are not testing significance, which would involve the calculation of some statistical confidence interval. Instead you are demonstrating the scale dependence of the relationship. A better test of the significance might follow from sub-division of your domain into smaller domains or the additional examination of other years (see above comments). Are results reproducible from year to year and as the domain is chopped up?

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 30013, 2013.