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Biogeosciences Discussions

Interactive comment on "The impacts of recent drought and fire in lowland Bolivia on forest loss and regional smoke emissions" *by* Joshua P. Heyer et al.

Anonymous Referee #1

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General comments: The authors of this manuscript presented a comprehensive analysis on the relationships between drought, fire, and smoke, using multiple sources of observations. The topic is interesting and relevant to the scope of Biogeosciences. The results have values for both atmosphere and land communities. However, the authors need to address several major issues described below.

Specific comments:

1. Correlation analyses for different time scales need to be separated and clarified. The authors performed pearson's correlation tests for two types of data: mean-monthly data and mean-fire season data. The correlations from mean-monthly data are mostly

from the covariation in seasonal cycles, while the correlations from mean-fire season data are mainly from interannual variability. However, these two types of analyses are not clearly differentiated, sometimes they are even directly compared in the manuscript. This leads to unnecessary confusions and incorrect interpretations.

For example, in Page 9, line 212-214, the authors state "Nevertheless, many relationships were significant. Based on these relationships, Bext visibility data is used as a proxy of longer-term (i.e., 1982–2015) regional fire activity in lowland Bolivia'. The first sentence is referring to the correlations between monthly Bext and MODIS variables. I don't think these correlations validate the assumption that 'Bext can be used as a proxy of long-term regional fire activity'.

Page 9, line 233-234: What are exactly the 'normal's mean in 'lower-than-normal' and 'higher-than-normal'? A logical guess is that the 'normal' refers to the monthly climatology, and this sentence is about explaining the interannual variability. But this will be contrary to Table 1 cited the later part of the sentence, which is all about seasonal variability.

There are several other occasions of such confusions not listed above. I suggest the authors go over the manuscript and clear all cases.

2. There's something wrong in Figure 5. In several places of the text, you talked about Fig. 5a and Fig. 5b (e.g., in Page 8, line 200-201). But I only see one panel in Figure 5. Since I couldn't locate the positions for forest loss (white color pixels?) in Figure 5, I am basically unable to review the whole section of 3.5, as well as the first paragraph in section 4.1.

Technical corrections:

Page 2, line 48-50: This sentence is difficult to understand. Page 3, line 66-69: Again, I don't quite understand this sentence. Please rephrase it. Page 3, line 76: The spatial resolution of MODIS active fire product should be 1km, not 500 meters. Page 5, line

121: Better to change ‘13°S x 15.3°S, 62.2°W x 59.5°W’ to ‘13°S - 15.3°S, 62.2°W - 59.5°W’. Page 7, line 175: ‘Fig. 3f’ is about MERRA2 data, not MODIS data. Page 8, line 208: Where did you show this: “the positive relationship between lowland Bolivia MODIS C6 active fire data and mean-September Bext”? Page 20, Figure 1: You combined these biomes into several groups “cerrado, SDTF, METF and seasonally inundated wetland biomes” in the text, and discussed your results mainly based on the group classifications. Why didn’t you the grouped vegetation types in Figures 1 and 4?

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