

Interactive comment on “Changing patterns of fire occurrence in proximity to forest edges, roads and rivers between NW Amazonian countries” by Dolors Armenteras et al.

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Anonymous Referee 2 Received and published: 24 February 2017 This paper used multiple datasets to examine the patterns of NW Amazon fire occurrence in response to the proximity to roads, rivers, and forest edges. A major contribution from this study is that it revealed the differing relationships between fires and forest fragmentation in different countries of this region. Overall the manuscript is well written and suitable for publication on Biogeosciences. My main concerns are in the method and discussion sections. Major comments: Need more explanation on the statistical tests used in this study. For example, what is ANOVA test? Is it a specific test method, or a general referral to a collection of statistical methods for the purpose of Analysis of Variance

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(ANOVA)? A reference to a paper or a program set would be good. The ‘null model’ of CFD should be explained better so that readers can understand without resorting to Kumar et al. (2014). What’s meaning of ‘D-statistics’ in Table 1 and Table 2?

Yes, ANOVA refers to one way Analysis of Variance tests. We will indicate this in the Methods section. We will change the text for: We explored the effect of accessibility on fire occurrence by analyzing the proximity of detected fires to rivers and roads. We calculated the distance of each fire hotspot (the point coordinates were the center of the 1 km pixel) to the closest river and road. We followed the approach presented by Kumar et al (2014), we built Cumulative Frequency Distributions (CFD) per country of each set of distances to quantify the annual probability of occurrence of fire within a given distance of each transportation mean. Kumar et al (2014) built a grid spacing of 0.5 km as reference To evaluate the observed distributions of distances to road or river networks we followed the procedure layout by Kumar et al. (2014). A regularly-spaced 1x1 km square grid was created across the study area, including Colombia, Peru, Ecuador, Venezuela and Brazil. Next, distances from all locations in this grid to the road or river networks were calculated. These distance distributions represented our null models (i.e. the distance distributions that would result if there was no association between fires and those networks), against which observations should be compared. Finally, we applied a non-parametric Kolmogorov-Smirnov test to check for differences between the CFD of the observed distances and that of the corresponding null model on a per-country level. The two-sample Kolmogorov-Smirnov statistics (hereafter, D-statistics) measures the maximum distance between the two CFD curves being compared. That D-statistics index can vary from zero (both CFD curves show a complete overlap, i.e. they match exactly) to one (the two CFD curves do not overlap

Tables have been modified and will be included in the Supplementary Information as follows

Appendix. Pairwise distances between CFD curves for countries in Figures 4.

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Table A1: Distances between CFD curves in Fig. 4A.

Brazil Colombia Ecuador Peru Colombia 0.01 Ecuador 0.39 0.38 Peru 0.11 0.10 0.29
Venezuela 0.21 0.20 0.20 0.10

Table A2: Distances between CFD curves in Fig. 4B.

Brazil Colombia Ecuador Colombia 0.29 Ecuador 0.20 0.30 Peru 0.09 0.23 0.15

Table A3: Distances between CFD curves in Fig. 4C.

Brazil Colombia Ecuador Peru Colombia 0.03 Ecuador 0.08 0.06 Peru 0.03 0.01 0.05
Venezuela 0.03 0.01 0.07 0.02

Table A4: Distances between CFD curves in Fig. 4D.

Brazil Colombia Ecuador Colombia 0.15 Ecuador 0.48 0.40 Peru 0.32 0.24 0.21

Some results deserve more discussion. The authors discussed the country-level differences in interannual variability of fires, mostly on climate perspective. However, as the authors pointed out later in the paper, a large portion of the fire occurrences in this region is associated with human activities. The socioeconomic path and its impacts on fires may vary by country to country. For example, the differences shown in Fig 2B could also be due to different levels (and starting time) of the REDD efforts, in addition to climate/weather impacts.

Yes, indeed the socioeconomic conditions of the countries must influence the dynamics, however the analysis of policies such as REDD and its adoption at country level usually takes some years to occur, and even more years to see the results and be able to make a 'correspondence analysis' between deforestation and the implementation of policies and strategies related to it. Further to undertake a policy assessment of REDD efforts a multiannual analysis including deforestation rates would be needed and we believe is out of the scope of this particular paper.

Results shown in Figs 4 and 5 are the centerpieces of this study, in my opinion (The first

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part of this study, i.e., the regional differences in fire occurrences, is quite obvious and well studied before). So I suggest the authors should put more efforts in the discussion of these results. For instance, are these relationships changing in different years, or at different stages of the fire season? Other than the cumulative frequency (CDF), I would also like to see the observed fire density patterns as a function to the distance to rivers/roads/forest edges.

Thank you for your interesting suggestion. The yearly analysis although extremely interesting will need to consider other variables affecting fires such as climate and also the ignition variability and types of fires that were out of the scope of this particular paper but we hope further research will add more knowledge into.

In the supplement we present some further histograms but we believe this is a bit repetitive to be included in the document:

Minor suggestions: P5L85 - I suppose "65W" should be "80W-65W"? We will correct this, thank you.

P5L88 - "2,140.936 km2" looks like a typo. Should be changed to "2,140,936 km2" Corrected, thank you.

P5L89 - Similarly, "1,558.324 km2" should be "1,558,324 km2" Thank you for the comment, we will correct this.

P5L89-91 - Please use the same format for all areas, i.e., either using 'XXX,XXX' or 'XXX XXX', but do not mix these two formats. OK. Thank you for the comment, we will correct this.

P5L98 - Please be more specific on the active fire data used. There are different MODIS active fire products available on FIRMS. Please explicitly state the product name. We used the MODIS thermal anomalies product MCD14DL, we will clarify this.

P5L99 - There's a surplus ')' in this line. Thank you for the comment, we will correct this. P5L110 - One "interannual" should be "intra annual"? Thank you for the comment,

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we will correct this.

P6L119 - Another surplus ')' here. Thank you for the comment, we will correct this.

P14 - Is it possible to show major roads and rivers in this figure?

The Figure will get really dense; we will incorporate this new Figure 1.

P16 - The figure in this page is the same as Fig 3 in p17. Yes, a mistake. We will correct it

P19 - In Fig 5A, I think it is not needed to draw data corresponding to distance values of > 8000m. Looks like the cumulative frequencies in all countries have already approached 1. We will modify the figures as seen in the supplement

Please also note the supplement to this comment:

<http://www.biogeosciences-discuss.net/bg-2016-532/bg-2016-532-AC3-supplement.pdf>

Interactive comment on Biogeosciences Discuss., doi:10.5194/bg-2016-532, 2017.