Review of :

Structural effect of liana presence in secondary tropical dry forest using ground LiDAR

For publication in Biogeoscience

General comment:

The author address the very interesting question of the effect of liana presence in on secondary forest regeneration. The use of terrestrial LiDAR is interesting and has high potential in forest structure studies. However the study takes place in an area where forest inventory data are available according to them and they don't use it. Moreover, the structure of the article needs to be improved. The study setup and the hypothesis still need to be explained more clearly. The result section is not structured enough and the discussion should be enriched by quantitative rather than qualitative comparisons. The article does currently not appear suitable for a publication in Biogeoscience and I suggest major revision.

Comments will re-address comment already made by previous referee but not well enough answered in my opinion. I grouped the major comments in 4 sections

Major Comments

1. Site selection and succession stages

A better description of site selection is needed. What forest structure data are used in quantitative terms to distinguish different forest categories? What are their specific land use history? What remote sensing data (airplane photography, satellite optical measures) are used and at which resolution?

Spectral reflectance may change with liana abundance (Castro-Esau, Sánchez-Azofeifa, and Caelli 2004; Kalácska et al. 2007; Asner and Martin 2012), as well as other parameters used to distinguish forest age(canopy height, stem diameter…). As pointed out by previous referees, this might reduce the strength of your conclusions.I think it as to be discussed.

The best option would be to select forest site based on their age. Can you approximate the ages of forest stands selected? The first mention of the forest stand age is line 395. It would be good to have this information in the Table 1.

Are they the plot the same as in (Kalácska et al. 2004)? The PAI values are very low compare to Kalácska et al.'s LAI estimate, especially for late succession. I think it should be discussed because it might explain the weakness of the result concerning PAI alteration by liana presence.

2. Description of liana presence, explanation of its quantification

How where selected stands with and without lianas? Citations made are not enough in my opinion, you should mention in the method what has been measured. Is it a number of lianas bigger than 5cm dbh? What about the basal area of lianas and the crown occupancy index (G. M. F. van der Heijden et al. 2010)? What is a stand with liana? I guess it means a liana presence above certain threshold (1 per stand?). liana presence measures of each stand could be added to the Table 1.

The signification of liana densities should also be discussed? They seems to be quite variable, is it relevant to consider in the same category a stand with more than 30 lianas (or whatever is the measure) and another one with 11 (or even less I suppose if you wrote the result in the form mean ± standard error).

3. Relation between measures issued from terrestrial LiDAR point cloud and ecologically relevant features

Structural features issued from forest inventory data should be related more rigorously to terrestrial LiDAR measurement (RG and PAI). You mention line 243 “we used RG to relate the shape of the PAVD profile to forest biomass”. I don’t see any relation between RG and biomass in the article. I think it would be a great thing to do so, you should at least explain briefly Muss et al’s results (2013). If RG is related to biomass, can you evaluate biomass from RG? Several articles hypothesize a reduction of biomass accumulation due to liana presence. Why not testing this hypothesis and showing the ability of terrestrial LiDAR in doing so? Tree >5cm are measured since 2003 you should also find some trends tree growth which could differ according to liana presence or not. Finally quantifying biomass or basal area would allow a better interpretation of PAI increase. PAI in stands with a lot of liana is supposed to be mainly due to branches while contribution of trunks and Branches is expected to be higher in stands with no lianas.

The comparison of the relation PAI=f(RG) between liana-infested and free of liana patches should be explained more clearly. Hypothesis about PAI evolution in forest stands with liana should also be explained more clearly.

The discussion on the different component of the PAI (wood vs leaves) is interesting and should be more precise. The use of biomass estimation in the different stand as well as carbon turnover would probably feed interestingly the discussion.

4. Forest dynamic

Line 173 You mention the quantification of litterfall. There is no more mention of litterfall in the article! it would be interesting to use litterfall data and forest inventory data to have a proxy of carbon turnover/residence time (Chave et al. 2010). Carbon residence time is expected to be lower in liana presence (van der Heijden et al. 2013; Tymen et al. 2016). Moreover it may be interesting to discuss the relative contribution of leaves and woody parts to the PAI in the different forest stands.

Minor comments

Abstract

Line 15 the potential consequences of liana presence on forest dynamic is not completely unknown see at least Tymen et al. (2016).

Introduction

Line 114 Why making the hypothesis that increase in structural complexity would indicate no effect of lianas ? A comparison between forest stands with and without liana should be enough to show a relation between liana and forest development.

Line 155-159 Forest structure description is not really clear for me

Methods

Line195 Is the ground really flat? If topography is known, it would be a good thing to add elevation lines to the Fig.1. A better option would be to compute the canopy height as a distance to a terrain model (i.e adding to the current calculation the point of measurement height from the ground situated vertically to the focal point).

Line 245-249 I don't' really get this paragraph.

Results

Line 287: I wouldn't say five treatments since there is no experimental manipulation in your study.

Line 291 I disagree with the interpretation of high PAVD as a zone of high biomass. In old growth forest typically, most of the biomass is situated in tree trunk while PAVD is highly driven by leaf repartition and maximal PAVD will thus be at the crown level.

Line 300 When you say PAVD was higher do you mean sum of the PAVD (which is PAI if I well understood)? This result should be shown in Table 1.

Line 304-307 Reformulate sentence. What are PAI treatments? Consider moving this part at the beginning of the result section where PAI along forest succession is described. In my opinion, comparison of PAI values between liana and non liana stands should be clearly exposed at the beginning of the result section. It be interesting to discuss this point in comparison it to biomass accumulation (as well as carbon turnover) differences?

Line 317 Liana density unit?

Discussion

Line 359 Are you able to detect horizontal variations in canopy structure such as canopy height irregularity you mention. They could explain the blurry signal you get.

Line 364 The increase of basal area, vegetation material and biomass accumulation could be shown and quantified thanks to forest inventory data.

Line 378 You could also cite Foster, Townsend, and Zganjar (2008) and Tymen et al. (2016).

Line 386 A reference would be welcome

Line 390 Putz (1984) can also be an interesting reference

Line 390-392 You showed in the result that decrease in liana density was not significant. You should discuss this point.

Pinard, Putz, and Licona (1999) could be interesting to read for the discussion

References

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