Biogeosciences Discuss., 12, C3179–C3183, 2015
www.biogeosciences-discuss.net/12/C3179/2015/

Biogeosciences
Discussions
Open Access

Interactive comment on "Transpiration in an oil palm landscape: effects of palm age" *by* A. Röll et al.

Anonymous Referee #2

Received and published: 26 June 2015

General comments

This study presents a study on the transpiration rates in palm oil stands of different ages. With palm oil plants becoming more and more an important feature of the tropical landscape, and data on transpiration rates of these sites being rare, I think this manuscript is an important contribution of results to the scientific community researching tropical landscapes and tropical ecosystem functioning. What is impressive about this study is the inclusion of 15 different field sites, as well as combining two different methods for measuring (evapo)transpiration rates. By including this many sites, they were able to show at what stand age transpiration does not increase anymore. Overall I think this is a well described and comprehensive study that provides valuable information to the community studying palm oil plant functioning. There are a few weaknesses

to this study as well: the (eddy flux) measurements were not carried out in parallel, so we will have to assume both periods are comparable (authors could add a table for example with the meteorological data per site per measuring period). Furthermore, I think including only 4 trees per site in the sap flux measurements is not so much, although the fact that all trees have the same age in a plant will reduce the variance between trees of a stand. In addition, I think the authors can emphasize the urgency and importance of their study and research questions more.

As for the presentation, I think some parts of the discussion could be written in a way that they are less of a repetition of the results, and answer to the research objectives more explicitly. Please find my more detailed comments below.

ABSTRACT:

P 9210 line 21: "Confronting sap flux and eddy-covariance derived water fluxes" I would use a different word than 'confronting'.

P 9211 line 4-6: I do not understand this sentence, it's too vague.

INTRODUCTION:

P 9212 line 27: Not clear to what "On the other hand" contrasts with. In line 19 you announce two possibilities: Water use can increase or decrease with age stand, and you start by listing the reasons for the latter. Then (line 25) you give reasons for expecting no difference, and in line 27 with a reason to expect differences. It's better to already mention in line 19 that there are three (increase, no difference, decrease in transpiration) rather than two different scenarios to expect. As it reads not, the 'On the other hand' in line 27 threw me off as a reader and I had to reread a couple of times.

P 9213line 15: Although I think objective 2 is interesting, it's not made clear from the discussion before why we need to know the ratio between evapo-transpiration and transpiration.

P 9213line 21: "It assesses potential hydrological consequences of large-scale oil palm

expansion on main components of the water cycle." Your results and Discussion underdeliver on this, you do not scale this to landscape scale or discuss the consequences of expansion of oil palm plants for the region. So better not to promise this in the introduction. Alternatively you could re-write the Discussion so it can incorporate such an assessment.

METHODS: P 9215 line 16: Why use three sunny days and not the average of five days? Would that make a difference and have you tried comparing how important the inclusion of three or five (or four or six) sunny days is?

P 9215 line 22: Are the values behind the $\pm$ standard errors or standard deviations? Please indicate with SD or SE.

P 9215 line 27: How was palm height measured?

P9216 line 21: This reads like a repetition of the sap flux measurements mentioned under part 2.2?

P9216 line 24: Similarly here, it's like you are describing the measurements again, and therefore repeating what you mentioned in the previous paragraph. I would suggest shortening this part and focusing on what's important: The error in both measurements, and why it gives you confidence that the difference will show the contribution of the soil and other vegetation. The description of this measurement now reads as if it was added to the original paragraph in an afterthought.

RESULTS:

P9219 line16: this non-significant relationship is that per site or with all the data from all the sites together? Can you clarify?

P9219 line22: 'possibly indicate a slight decline'. That sounds quite uncertain. For the rest of paragraph 3.2: a lot of results are given in the text, why not summarize them in a table or a figure? That would make it easier to refer to later in the Discussion as well.

DISCUSSION

P9221 line13: I actually don't think the observed range compares that well with the one you mention from the Acacia plantation. Yes, for the other studies you refer to, but the Acacia plants seem quite higher on average. They are in the same order of magnitude, but 3.9 mm a day is a lot higher than 2.5 mm a day. So I would leave the Cienciala study out of the list of comparable rates.

P9222 line1-13: This could be explained more explicit and why it is of interest to your research objectives. Also, you seem to have more replicates in the medium aged group, how do you know if the variability in this group is not a consequence of having more replicates, rather than the sites being more variable (Would have more replicates in the older and younger stands not have shown a similar variance in those age categories?)

P9223 line 2-7: It would be good to be more explicit in how you think the management would influence evapo-transpiration or transpiration. What would be the mechanics behind it? Different soil structures because of higher maintenance intensity? Would fertilized palms open their stomata more? Also the trade- off could be highlighted more, I think that is actually an interesting part of the results and discussion.

P9223 line 9-15: You repeat the results first, which is not bad per se, but I think you can write the point you are trying to make a bit 'snappier'.

Overall, I think that the paragraph 4.2 repeats a lot of results and compares them with other studies without making a clear statement or conclusion. The Discussion, in my opinion, is the place to put the results in context. What do these results mean how we think of how these sites function in the tropical landscape? The answer to that question remains quite implicit like this.

P9226 line 27: I don't think the hysteresis is that unusual, and you give the examples before, that this actually happens in other vegetation types as well. So I would remove the word 'unusual'.

P9228line 1-8: This reads as an afterthought to the previous paragraph, better to integrate it.

For paragraph 4.3 I have the same comments as for 4.2 in general. I like how many studies you compare your results with, but what is your real message, what does this say about these sites that we need to know? I would recommend rewriting both these paragraphs in a way that this becomes clearer.

Interactive comment on Biogeosciences Discuss., 12, 9209, 2015.