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Interactive comment on “Individual- and stand-level Stem CO₂ efflux in a subtropical *Schima superba* plantation” by L. W. Zhu et al.

Anonymous Referee #1

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General Comments

This paper present interesting and quite novel data on a major portion of ecosystem carbon dioxide flux – stem respiration – from a subtropical plantation. Stem respiration is very difficult to measure and, particularly, to scale up to ecosystem-wide flux estimates. So their efforts are welcome, and will be of interest to a significant portion of the Biogeosciences readership, but i have some significant reservations. I recommend that the paper is accepted subject to major revision. My main issues are: (1) The whole manuscript needs to be checked over by a native English speaker. There are numerous spelling and grammar errors; (2) The statistical methods are not described at all in the methods section and their description of the tree measurements is unclear so it is difficult interpret the results of their statistical tests; (3) The discussion is very long, and

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at times it is not clear what all the discussed papers/results have to do with their study. Several times, what should be presented as reasonable possible explanations of their observation based on other studies come across as conclusive statements of fact. On a related topic, large sections of the results and discussion are devoted to temperature responses of stem respiration but this seems unwarranted given that they appear to find only an extremely weak relation between respiration and temperature (Figure 6), with the exception of a mysterious statement on Page 3302, Lines 17-19.

Specific Comments

Page 3290, Line 8) “scaling scalar” seem strange/redundant, i suggest you change to “as the scalar for”.

Page 3290, Line 15) I wonder if you should remove this sentence, since it raises quite a lot of questions/confusion which you don't have space to address in the abstract. For example, it's not immediately obvious why vertical variation in fluxes would cause stand-level values to be underestimated. Also, it's difficult to say whether your stand-level fluxes are really underestimates, the one assumption you've identified (all stems respire at the same rate as that measured at 1.3 m) would push it in that direction but other, unmeasured factors could counterbalance this.

Page 3290, Line 19) Could help either here or at the start to have a short sentence with the big picture context of the study, as justification/motivation.

Page 3290, Line 21) Remove first “the”. This sentence seems a bit bizarre, global change research is a massive field, forest carbon is an important component but surely not the main focus? I expected the Zach et al (2008) reference for this statement to be some general review of global change/forest research but it's a very focused study of stem respiration along an elevational transect in Ecuador...how does this reference support your statement?

Page 3290, Line 26) Replace “ecosystem” with “ecosystems”.

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Page 3291, Line 3) Remove first “the”.

Page 3291, Line 4) Remove “the”.

Page 3291, Line 6) Remove “the”. This seems quite vague, specify what about the sampling is the main constraint to understanding: equipment, methods, capturing within-tree, between-tree or forest stand variability, or temporal change?

Page 3291, Line 7) Remove “the”.

Page 3291, Line 13) This statement seems quite bold and not well referenced, i’m sure you wouldn’t have to look far to find examples of substantial seasonal changes in foliar respiration

Page 3291, Line 15) Again, the apparent lack of inter-annual variability in stem respiration probably reflects the general lack of much data on this rather than evidence for a real biological pattern. Do you have references besides Zha et al. For this statement?

Page 3291, Line 21) Change to “the most reasonable”.

Page 3291, Line 24) Change to “efflux by other researchers (Ryan”.

Page 3291, Line 26) Remove “the”.

Page 3291, Line 27) Change to “were the main”.

Page 3292, Lines 3-4) See also Robertson et al. 2010. Global Change Biology.

Page 3293, Line 7) Change to “within the IRGA”.

Page 3293, Line 9) I think this should be “acquire”. Remove “an”.

Page 3293, Line 13) What do you mean by “unshade”, would “clear” or “transparent” be more appropriate.

Page 3293, Lines 18-20) “pretty little” is too colloquial here. I suggest “stems varied little. The canopy”. Replace “density” with “dense”. Line 20 is unclear, i suggest you

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change to “in similar temperature around the circumference of stems. So”

Page 3293, Lines 26) Replace “monitored” with “monitored”. Remove “the”

Page 3294, Line 7) Replace “ennvironmental” with “environmental”.

Page 3294, Line 16) Change to “diameter. Analysis of the”.

Page 3295, Line 15) Change to something like “was standardized to a common”.

Page 3295, Line 22) If you already present equations for all the other key calculations, it makes sense to explicitly describe your formula for calculating SVI. Presumably you needed some estimate of stem diameter both at the tree base and under the branches, did you use some taper function to derive these from DBH? What was the rationale for not including branch area, do other cited studies include branch area in their stand-level stem respiration estimates? This seems potentially important for interpreting differences among studies.

Page 3296, Line 1) Show the allometric equation here. This is a potentially useful/interesting piece of data.

Page 3296, Line 3) Because you present no description of statistical analysis i assume that none was done, is this right?

Page 3296, Line 18) Replace “Jarivs” with “Jarvis”.

Page 3296, Lines 14-16) This looks mistaken, like you got the results the wrong way around. The 4a (stem surface area) plot doesn't look significant, whereas 4b (stem volume)

Page 3296, Line 20) This doesn't quite make sense, plus distinctive is misspelt. I suggest you change to “As shown in Fig 5,Es presented a distinctive daily”.

Page 3296, Lines 21-22) Coefficient is misspelt. Differences in SE don't necessarily indicate a difference in coefficient of variation (CV). If you want to make this point, why

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don't you just calculate CV directly (mean/standard deviation).

Page 3296, Line 24) December is misspelt. These easy mistakes shouldn't make it into a submitted manuscript. I'll ignore further mistakes like this, get the text checked thoroughly.

Page 3296, Line 24) How much value is there in standardizing stem respiration to a specific temperature, given the very low r^2 between stem respiration and temperature (< 0.043)?

Page 3297, Line 7) What does the sample size of 3 come from. You say that stem temperature was recorded on 6-8 trees (page 3293, line 27)

Page 3297, Line 11) Remove "The"

Page 3299, Line 18) This sentence doesn't make clear sense. This paragraph in general has lots of grammar errors.

Page 3299, Line 28) Well, as long as there is a linear relationship between temperature and respiration, which there might not be (though i agree it's very unlikely). So, the certainty in this sentence seems unwarranted

Page 3300, Line 3-13) All these potential explanations are fine, but could they explain the amount of change you observe over a relatively small change in stem height. Is there any data in the literature you can find to support this?

Page 3300, Line 7-10) This is about leaf respiration, is this relevant for interpreting your stem respiration results?

Page 3301, Line 6-7) This is quite a strong claim, do you have anything to support it?

Page 3302, Line 7) This is not clear, perhaps change to "the lack of any clear rainfall seasonality. Woody".

Page 3302, Line 13) Does that "pretty significant" mean significant, or almost signifi-

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cant, or what?

Page 3302, Lines 17-19) Impressive. Why not show this data, how is this calculated differently to Figure 6?

Page 3302, Lines 7-8) Again, this is a nice possible explanation, you have zero evidence for this so this statement should be much more cautious.

Page 3303, Line 24) It would be nice to have a conclusion here to synthesize your key findings and place them into a wider context. As it is, the text ends quite abruptly.

Table 2) How were these significances derived, what were your replicates and sample size?. Did you make multiple replicate measurements from the same tree, or are you taking the separate trees as replicates? If the latter, you should just present means for all the trees rather than presenting the data for individual trees.

Figure 2) Annotate this figure to describe the key elements of the equipment, for those of us not experienced with the method.

Figure 3) It would be easier to interpret, and would make your arguments about respiration seasonality clearer if you had the same measurement from different seasons on the same scale, so that the reader could immediately spot that December was colder and drier. If the data abnormality on 2nd August was caused by power failure why didn't levels return to normal afterwards? Also, the x-axis is wierd, why divide up by 20:00 and 04:00 or 19:00 and 03:00, and differently in the two panels?

Figure 4) It would useful to fit a regression line through these scatterplots, and present the linear equation for the line and r^2 .

Figure 5) See first comment for figure 3.

Figure 6) The rationale for fitting a single line to the group of data works if you expect all the individuals within the group to behave similarly. But here, particularly in December, it looks like there is one portion of the group with a very distinct pattern of response,

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with similar slope but much higher intercept. Is this a particular tree or something?

Figure 7) See first comment for figure 3.

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