

Interactive comment on “A meta-analysis on the impacts of partial cutting on forest structure and carbon storage” by D. Zhou et al.

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Comments and our Responses to Dr. Ensheng Weng:

[Comment 1] In this paper, the authors synthesized the published data about the effects of partial cutting on forests and their recovery patterns across the globe. The data synthesized by the authors are valuable for evaluating forests' responses to partial cutting, a typical disturbance in forest management, and some patterns revealed in this study are really interesting, such as the different responses of radial growth rates for different forest types. (It's my second time to review this manuscript actually. I'm happy to see it has been substantially improved.) But I still think the authors emphasized their analysis on the mean responses too much. The mean responses may mix the signals of those individual studies, which were clear in each of them in the original papers.

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For example, in the abstract, they said that “the growth of DBH elevated by 112% after partial cutting, compared to the 10 uncut control, while stand BA and volume reduced immediately by 34% and 29%, respectively. On average, partial cutting reduced AGBC by 43 %, increased understory C storage by 392 %, but did not show significant effects on C storages on forest floor and in mineral soil”. The mean values presented here are just a summary of what have been reported in literature that used in this synthesis. They don't have much information. So, I don't think much more knowledge was added with these statistics. From a meta-analysis research, one can find out some interesting general patterns. But it does not mean the general patterns can be represented by averaging all studies. There are some interesting analyses in the lines 1_11, page 794 about DBH growth rates vs. forest types/climatic zones and can be a case for the interesting patterns found in this study. But the Table 2, which showed these analyses, is not straightforward, though it is understandable and clear. It would be great if the authors can add one or two new figures showing how the forests respond to partial cutting differently and why. I'm also wondering if the forest types and climatic zones affect recovery time (since it is supposed that tropical forests should recover faster than temperate and boreal forest because of their high growth rates after partial cutting.) It's worth two more figures to show these patterns if there are any.

[Response 1] Nice comments and observation. Following your suggestions, two new figures (Figs 4 and 5 in the revision)(see Figs 1 and 2) were added in Section 3.2 to address the impacts of forest type and climate on forests response to partial cutting. The following text was added in the results of the revision (lines 250- 281 on pages 9-10). “Factors other than CI and RY also contributed to the observed variations in both forest structure and C pools (Table 2). For the two variables with sufficient observations (i.e., DBH growth and stand BA), our results show that the positive effect of partial cutting on DBH growth was more intensive in the broadleaf trees than in conifer ones compared with the uncut controls ($r=0.22$, $P<0.01$) (Fig.4 and Table 2) probably because of the greater light improvement for the remaining trees in broadleaf forests compared to coniferous forests after partial cutting (Hale, 2003). Nevertheless, the

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changes in stand BA after partial cutting did not differ significantly with forest type (Fig. 4 and Table 2), most likely due to its strong dependence on cutting intensity (Scheller et al., 2011). We found the increase in DBH growth was lower in subtropical forests than that in most others ($r=-0.24$, $P<0.01$) (Fig.5 and Table 2), which can also be mainly explained by relatively lower light enhancement for the remaining trees in subtropical forests compared to other forests after cutting practices (Hale, 2003). In addition, the changes of DBH growth and stand BA were overall weaker in boreal forests relative to most other regions (Fig.5 and Table 2), probably due to the lower vegetation productivity under this climate condition. It's interesting to notice that the definition of CI was closely linked to the relative changes in DBH growth, stand BA, volume, and AGBC, indicating CI definition can strongly influence study results."

[Comment 2] Line 9, Page 788: results shows → results show

[Response 2] Revised.

[Comment 3] Line 14, page 788 and other places in this paper: the abbreviation of "Cutting intensity" (CI). It's fine. But I just feel a little bit uncomfortable with CI. It's too close to the "confidence interval". (It's just a suggestion. The authors can use "I", or "C" to represent "cutting intensity" and "Y" or "T" to represent "Recovery year".)

[Response 3] Yes, CI is mostly used as the abbreviation of confidence interval. It did take us some time to try to come up with a better one and we found it's easy to mistake "I" as the word "I" like I am, and the "C" as carbon. So we kept CI but trying to use whole word "cutting intensity" if possible. Thank you for your understanding.

[Comment 4] And, for most "CI" and "RY" in discussion, it would be easier for readers if using "cutting intensity" and "recovery years".

[Response 4] Most "CI" and "RY" were changed into "cutting intensity" and "recovery years" in discussion.

[Comment 5] Lin3 25_26, page 796: "the resilience of ecosystem structure". I think

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it's just a recovery, or growth of the trees here. Partial cutting is not a very severe disturbance usually, especially for plantation.

[Response 5] Changed into "forest recovery" as suggested.

[Comment 6] In figure 3 (page 813) the panel (Volume) is very similar with the panel (AGBC). It is consistent with my expectations since $AGBC = \rho \times Volume$ and the wood density ' ρ ' varies little for the same species with different ages. But in figure 2 (page 812), why the panel (Volume) the panel (AGBC) are so different?

[Response 6] We really appreciate that you noticed the inconsistency between Figures 2 and 3. We made a mistake that we should not have taken by misplacing the same lines and scatterplots for both volume and AGBC in Figure 3 when we polished figure panels in Adobe Photoshop CS4. We have carefully checked through the descriptions on this figure in the main text and found all related text was based on the right figure and therefore was correct, as we prepared high resolution figures at the last stage of the revision (i.e., the main text, tables, and refs etc. have been carefully revised before polishing the figures in Adobe Photoshop CS4 finally). We fell very sorry about that. In this revision, we replaced the old figure 3 with an accurate new figure 3 (see Fig.3). You are definitely right that wood density ' ρ ' varies little for the same species with different ages. However, the panels for volume and AGBC were different in both figures 2 and 3. The reasons for the different responses of volume and AGBC could be that the significant impact of cutting intensity complicated their responses to cutting over time (i.e., age). In addition, the uneven data distributions of Volume and AGBC, for example, there are data available for volume but not for ABGC for some sites and vice versa for the others, make it difficult to validate general relationship between volume and AGBC as you expected. Thank you for your understanding.

References:

Hale, S.E.: The effect of thinning intensity on the below-canopy light environment in a Sitka spruce plantation, *Forest Ecol. Manag.*, 179, 341–349, 2003.

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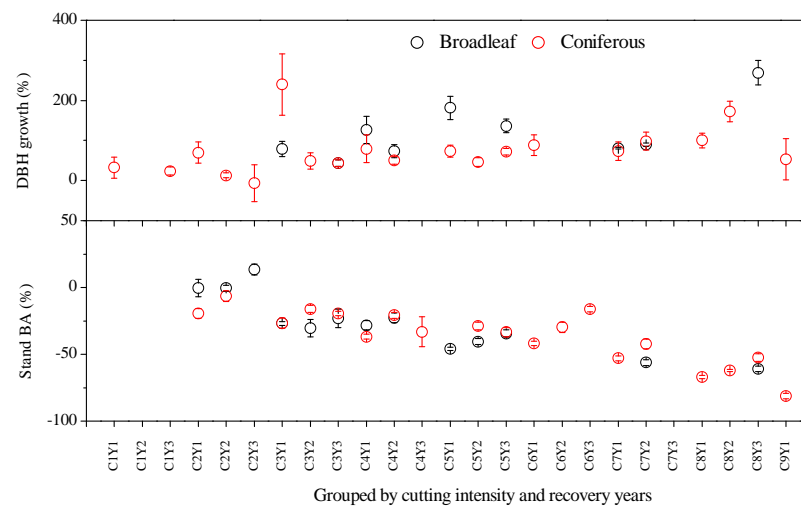
Scheller, R.M., Hua, D., Bolstad, P.V., Birdsey, R.A., and Mladenoff, D.J.: The effects of forest harvest intensity in combination with wind disturbance on carbon dynamics in Lake States Mesic Forests, *Ecol. Model.*, 222, 144–153, 2011.

Please also note the supplement to this comment:
<http://www.biogeosciences-discuss.net/10/C543/2013/bgd-10-C543-2013-supplement.pdf>

Interactive comment on *Biogeosciences Discuss.*, 10, 787, 2013.

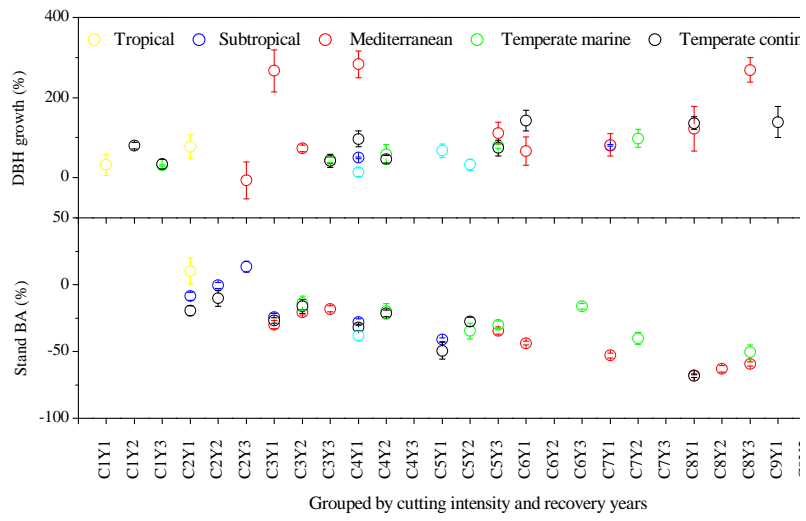
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Figure 1



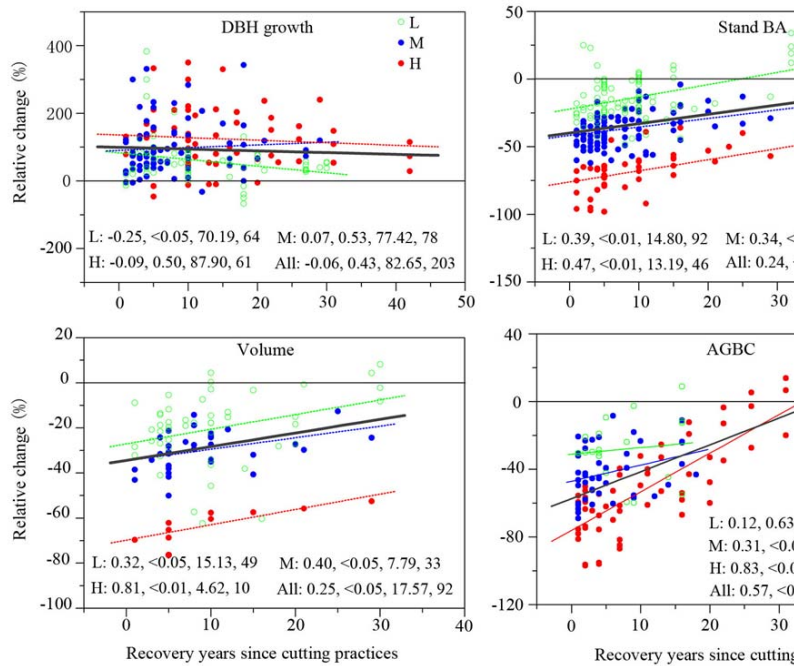
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Figure 2



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Figure 3



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