

Interactive comment on “Preface: Impacts of extreme climate events and disturbances on carbon dynamics” by J. Xiao et al.

Anonymous Referee #1

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This is a good preface to a great special issue. It might be a bit longer than needed and I'd recommend cutting it down in a few places to provide only a brief, broad framing for the issue and then quickly getting to the narrative. You do a nice job of organizing and connecting the works with a set of succinct highlights of each paper's contribution. The writing could be pithier, more precise, and clearer in a few places here and there. A number of suggestions are offered below that may help.

L16: suggest cutting “as evidenced by thetopics.”

L17, L19: replace “advancements” with “advances”

L19: cut “, but are not limited to,”

L27: awkward, ambiguous wording: “disentangle their relative effects” to “disentangle

C1

their [separate and combined] effects”

L30 to 33: wordy, should be stated more succinctly

L 36 to 80: I found the use of IAV in MODIS GPP to be a somewhat awkward fit for the papers in the issue. Furthermore, I suggest reducing much of the text from lines 36 to 80, and quickly getting to the content of the present special issue.

L 41: “Some tropical regions (ie...)” is awkward, maybe “IAV is particularly high in tropical regions such as ...”

L 62: This is a fairly general set up and is not specific to the papers of this issue. You might cut or shorten this section, not because it's incorrect or irrelevant but only because a special issue preview might be best to quickly get to the review of the papers therein.

L 64: “long-term observations” is vague, lacks a citation as example, and the sentence structure suggests that EC is long-term.

L 65: Why cite Dong et al. 2011? This seems unrepresentative.

L 89: poor sentence structure, maybe “We highlight the findings in this special issue by grouping manuscripts that emphasize ...”

L92 to 96: This is somewhat awkward, almost seeming to undermine the usefulness of the works that are presented. I'd recommend saving the comment about need for work on interactive effects for the discussion of future research directions. Also, L92-93 seems redundant with L27, and has the same issue raised above regarding “relative effects”.

L 110: extreme low precipitation is a key facet of drought, not its opposite. Should this be modified to read “extreme [high] precipitation...” ?

L 111 to 115: The setup to this paper's highlight seems to suggest that the study focuses on non-drought conditions. Why then does Line 114 note that soil respiration

C2

would decrease if soil moisture continued to decrease? The narrative reasoning is incongruous here and should be fixed.

L 120: Replace “positive” and “negative” with something clearer. What is a “positive” response of a biome? Is it higher GPP, higher Respiration, higher NEP, higher biodiversity?

L 139 to 143: This statement does not seem to be justified. Winter and spring are not key seasons for metabolic activity in irrigated croplands so the leading statement about smaller effects on the overall annual carbon balance seems to be misleading.

L 143 to 144: “Combined...” This comment about the importance of timing and magnitude does not appear to be a synthesis statement, pertaining to only one study of those highlighted in the special issue.

L 145 to 147: “[However], extreme temperature events occur[ing] in the growing season could substantially alter carbon fluxes, while those events occur[ing] during ...”

L 145 to 147: This statement seems to correct or more correctly state the one above (L139 to 143).

L 155: Include citation to: Ghimire B, Williams CA, Collatz GJ, Vanderhoof M, Rogan J, Kulakowski D, Masek JG (2015) “Large Carbon Release from Bark Beetle Outbreaks across Western United States Imposes Climate Feedback”, *Global Change Biology*, doi: 10.1111/gcb.12933.

L 159 to 160: clarify “benefit of herbivory to undamaged trees” and also, does this include understory non-tree species?

L 161 to 163: It seems the study highlighted here only looked at MPB and if so, how could it suggest that the impacts of herbivore outbreak depend on the type of herbivore?

L 166: It seems redundant to include NEP and “carbon exchange between the land

C3

and the atmosphere” given that NEP typically includes CO₂ and that non CO₂ carbon-containing molecules are rarely emphasized and do not seem to have been emphasized in the studies included in this special issue.

L 166: It might make sense to clarify what is meant by “subsequent changes in NEP” by noting the relevant processes such as respiration of disturbance-killed biomass, and any changes to net primary productivity.

L 173 to 174: Check the units on your trend, which should be Tg C yr⁻¹ yr⁻¹... 8 to 18 Tg C yr⁻¹ is pretty big. Should this be over an interval of time?

L 207: The geographic domain of the Zhou et al. study should be reported. Was it global? Was it in North America or Europe? The Amazon? The quantitative figures reported must be region specific.

L 220 to 223: this statement is very general and does not offer much in the way of findings.

L 222: “vulnerable” seems to be an odd term. All forests would be vulnerable only some are targeted because of economic value and modes of production.

L 224: This heading “time since disturbance” does not appear to be a good fit for the studies highlighted below. You might think about a different heading / grouping.

L 228: “near the site” is vague and unclear.

L 230: This paper does not seem to belong under the heading “Time since disturbance”. Can it be better linked to the flow of the preview?

L 232: Replace “found” with “supported the notion that”. This is not a new finding, really, and is model based, so it seems somewhat out of place to state that it was “found”.

L 234: Maybe connect these sentences... “carbon sink conditions, highlighting the importance of ...”

C4

L 239 to 245: suggest cutting this paragraph. It seems out of place and is redundant with things already mentioned elsewhere, including an earlier highlight of the Wang et al. 2014 study. It has a discussion of its own with citations to works outside of the scope of the special issue and thus seems out of place.

L 252: which two? Wang et al. is not described as supporting this statement, so the statement seems to apply only to the Bond-Lamberty et al. 2015 study.

L 256: Should there be a new heading here? Maybe “Challenges and Opportunities”?

L 265: “conforming” to “confirming”

L 274; “will likely help” to “are helping to”, and cite (e.g. Williams et al. 2014). Williams CA, Collatz GJ, Masek J, Huang C, Goward S (2014) “Impacts of disturbance history on forest carbon stocks and fluxes: Merging satellite disturbance mapping with forest inventory data in a carbon cycle model framework”, *Remote Sensing of Environment*, 151:57-71, <http://dx.doi.org/10.1016/j.rse.2013.10.034>.

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