Biogeosciences
Discussions

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Interactive comment on "Bottomland hardwood forest growth and stress response to hydroclimatic variation: Evidence from dendrochronology and tree-ring δ^{13}C values" by Ajinkya G. Deshpande et al.

Anonymous Referee #3

Deshpande et al. present a very clearly written and easy to read analysis of bottomland forest sites that vary in potential soil moisture stress using a dendrochronology and stable isotope approach. Overall, I found the manuscript to be clear and concise. My primary concerns and suggestions are related to concepts that need to be further developed in the discussion (and sometimes other areas) that are not clear or clearly supported from the data presented. Specifically, the authors invoke soil moisture deficits as the mechanism to explain hydroclimate, stable isotope, and growth relationships. However, beyond the observations that the wet site floods more frequently,

there is no measure of soil moisture status among these sites. While I believe the authors that there is variability among the sites, some form of estimation of soil moisture status would strengthen their arguments when invoking it as a mechanistic explanation for their findings. For example, how do the physical properties of the soil reported in table 1 relate to water holding capacity and plant available water (especially given the large difference in clay content). The other area that needs to be more clearly defined and developed is resilience. The authors refer to the resilience of these systems frequently throughout the paper, but resilience is not defined and it is unclear how the data presented fit into a predictive framework for resilience for these systems. For example, the authors do examine possible carry-over effects in 13C from one year to the next, but did not find any relationship. How does this fit into a resilience conceptual framework? Given that the authors emphasize the importance of these ecotone systems, it will greatly improve the impact of the paper to have a concrete framework for resilience and to put their findings within that framework.

Specific comments by line number: 65-70: this is pretty standard methods and not necessary in the introduction

88: most of your examples and the assumptions related to hypotheses are related to stress which would result in declines in stomatal conductance. Why invoke increased assimilation here? Is that a likely driver in this system?

156: why does this say "at least eight" when table 3 indicates that there are only eight? All figures with regressions. It appears that regression lines are only include for significant relationships so it is not necessary to also indicate significance with a *

291: physiological resilience is not defined. How is this different from another form of resilience? What do you mean by this term?

302 – 307: What about the BP site? Anything to report?

332 -333: it unclear where the reader was supposed to gather that growth was more

heterogeneous in the wetter site. Did this play out in 13C? The relationship to water logging is highly speculative. What supports this interpretation?

343: see general comments about resilience.

349-351: this seems to be an incomplete line of discussion. Can you say more?

353: how are dry edaphic conditions defined or measured?

376: "severely detrimental to this ecosystem": I'm very unclear what data indicates what hydrologic change will be severely detrimental. Based on the RWI, all of these sites seem to be broadly growing in a similar way. Are there signs of mortality? In general, how is this statement supported?

402-413: this paragraph needs organizational work. It is unclear from the topic sentence where is paragraph is going. The paragraph is difficult parse until you get to the end.