

Interactive comment on “Nitrogen inputs and losses in response to chronic CO₂ exposure in a sub-tropical oak woodland” by B. A. Hungate et al.

Anonymous Referee #1

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The paper entitled “Nitrogen input and losses in response to chronic CO₂ exposure in a sub-tropical oak woodland” describes various measures of nutrient cycling and measures in response to CO₂ enrichment. The experimental site is recovering from a hurricane allowing also insights into CO₂ enrichment of regrowth. Major, and somewhat counterintuitive findings are that N fixation of vines present in the ecosystem shows a declining response to CO₂, and the author attribute reduced recovery and penetration into deeper of an ¹⁵N tracer in the CO₂ enriched site to enhanced leaching. In conjunction with reduction of other nutrients, the author suggest a limitation of other nutrients than N with this long(er) term high CO₂ exposure.

I would like to congratulate the authors for a well and efficiently written manuscripts.
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My suggestions below should be considered as minor revisions.

1) I like that the authors attempt to control for potential fractionation during fixation, by incorporating the ¹⁵N signal of a non-fixer. However, it is not clear to me how the authors arrived at the equation on page 67. Perhaps helpful to the reader would be either a reference or a bit more detail on how the authors arrived at the equation. It is otherwise hard to judge whether the assumptions made are correct.

2) I would like to know from the authors why they decided on analyzing leaf litter for herbivory instead of live leaves. Is there a potential that the herbivory damage was done after litterfall?

3) ¹⁵N tracer recovery. Is there a possibility that N leaching and movement into the depth in the CO₂ enriched site might have been caused from increased water use efficiency? Less transpiration would increase percolation and the potential of tracers to move with water?

4) I would like to suggest that the authors mention in the discussion the major findings in their earlier paper when they talk about ecosystem N accumulation. From my reading of Hungate et al., 2013, N accumulated in the above ground pools at the cost of the belowground pools. This helps to better understand the overall ecosystem response. It seems that the live vegetation is mining for nitrogen (and other nutrients), yet the ¹⁵N tracer experiments and the N fixation data suggests otherwise. A nuanced discussion of this will be a benefit for modeling community.

Reference Hungate, B. A., P. Dijkstra, Z. Wu, B. D. Duval, F. P. Day, D. W. Johnson, J. P. Magonigal, et al. 2013. Cumulative response of ecosystem carbon and nitrogen stocks to chronic CO₂ exposure in a subtropical oak woodland. *New Phytologist* 200:753–766.

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