

Interactive comment on “Processes regulating progressive nitrogen limitation under elevated carbon dioxide: a meta-analysis” by J. Liang et al.

M. Lerdau

mlerdau@virginia.edu

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Liang et al.'s attempt to quantitatively review the literature surrounding progressive nitrogen limitation is welcome, and Biogeosciences is a good venue for this effort. The finding that N-fixation appears to alleviate PNL is interesting. Below I offer some suggestions on the ms. that, I hope, will improve it.

1) It would be nice to see some more attention to the possible underlying reasons for variability among the studies. Initial conditions, for example, might explain some of the variance. I would encourage the authors to look especially at

A) soil texture (major player in the development of SOM under elevated CO₂)

B) P availability (should have an impact on the potential for N fixation)

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C) temperature (see Houghton et al.'s work on temperature and N-fixation)

D) soil age, though these data may not be available

Given the well-studied systems that are included in this ms, I think the authors will be able to find data on some, if not most of these parameters, at least for the FACE studies.

2) I think there may some older studies explicitly on N-fixers that are not included but that could be relevant. I did a quick WoS search on <elevated carbon dioxide> and <nitrogen fixation> and found quite a few greenhouse and growth chamber studies that appear to have enough info on N to have been included in Table S1.

3) One thing I missed in the text (and the fault here could be mine) is a discussion regarding the possible non-independence of samples. When multiple papers are drawn from the same study system, they carry a different significance than when they are come from different systems. If one lab does one experiment on one system and publishes 25 papers, that seems different than 25 labs doing 25 experiments on 25 different systems and each publishing 1 paper. I am not a maven regarding meta-analysis, and this may be a non-issue, but I think it merits discussion.

Overall, however, I think this ms. will make a fine contribution to the literature. -Manuel Lerdau

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