Biogeosciences
Discussions

Interactive comment on "Responses of soil microbial communities and enzyme activities to nitrogen and phosphorus additions in Chinese fir plantations of subtropical China" *by* W. Y. Dong et al.

Anonymous Referee #3

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GENERAL COMMENTS Dong and coauthors present a nice study investigating the effects of nitrogen and phosphorus addition to Chinese fir forest soils, focusing on soil enzyme activities and microbial community structure based on PLFA analyses. This paper is well written and clearly organized. The introduction nicely lays out the importance of understanding how nutrient additions affect soil enzyme and microbial activity, and the how previous studies have found a range of effects, leaving a complex puzzle of which studying nutrient effects in coniferous forest soils is an important piece. Overall, this study shows differential effects of different nutrient additions on soil chemistry

and microbial enzyme activities in coniferous soils, with clear differences in enzyme activities and microbial communities between nitrogen and phosphorus addition regimes. While this paper is strong overall, I recommend a number of minor revisions prior to publication. Most important is justification of some of the methods and brief discussions of drawbacks or assumptions of the PLFA analyses. Additionally, some of the conclusions may be overstated, overemphasizing the role of Gram-positive bacteria in controlling soil enzyme activities. Provided the authors address these points I believe this manuscript will be appropriate for publication in Biogeosciences upon revision.

SPECIFIC COMMENTS

-p. 6 lines 7-9: Why were these three enzymes selected for enzyme activities? How are they important? Make sure a reader not intimately familiar with the PLFA literature understands why these three enzymes were selected for activity measurements and what these enzymes actually do.

-p. 10 lines 24-28: This paragraph is vague and should be removed. True, G+ bacteria outnumbered G- bacteria in fertilized treatments, but also in controls, and this ratio does not appear to change with fertilization (Fig. 3 e,f and p. 8 lines 6-7). So there does not seem to be any effect on G+ bacteria over G- bacteria, but rather effects on both populations as the whole bacterial population increases. This does not seem like evidence that G+ bacteria have "stronger environmental adaptability" than G- bacteria, a phrase that does not say anything specific anyway.

-p. 11 lines 20-23, p. 12 lines 11-12: Be careful of overinterpreting these data. True, all three enzyme activities are correlating with G+ PLFAs, but Table 3 also shows at least 2 of the enzyme activities are also correlated with total PLFAs and strongly correlated with bacterial PLFAs and actinomycete PLFAs in addition to G+ PLFAs. Therefore it does not seem reasonable to conclude the correlation between enzyme activities and G+ PLFAs means enzyme activities are regulated by G+ biomass, as much of the activity could just as likely be regulated by other bacterial (including actinomycete)

biomass as well.

-In general, how are PLFA profiles or abundance related to other techniques commonly used to measure microbial diversity and abundance? Is it possible to infer any taxonomic information from PLFAs other than G+, G-, and actinomycetes? These are very broad groups of bacteria. If not, the conclusions of the study are not affected, but this should be noted as a drawback of this method somewhere in the introduction or discussion.

-Finally, many studies of soil microbiology have found archaea to be an important and active component of soil microbial communities. Is there a reason archaea are not included in this study? Has previous work suggested they are not important members of coniferous soil communities, or did the methods employed here simply not allow for their detection? Again, if this is a methodological issue, it does not discount the results of this manuscript, but this is a potentially important caveat to the data present here and should be mentioned somewhere in the manuscript.

TECHNICAL COMMENTS

-p. 1 line 26: Define "PLFA" in the Abstract.

-p. 3 line 11, p. 11 line 3: Is "gram bacteria" supposed to be either gram-negative or gram-positive? All bacteria are either gram positive or gram negative, so does "gram bacteria" just mean "bacteria"?

-p. 8 line 10: Assuming "F/B ratio" is fungal/bacteria ratio; define in line 5 if so.

-Table 1: For ease of reading, include brief descriptions of treatments in the table legend. While they are defined in the text, it is a lot of acronyms to keep straight, and a one sentence reminder in the legend will make this table much clearer.

-Figure 2,3,4: In the legends, make a note about what the lowercase letters mean (as is done for Table 1 legend, for instance) so a reader glancing only at one specific figure will know what these letters represent.

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