

## ***Interactive comment on “Soil responses to manipulated precipitation changes: A synthesis of meta-analyses” by Akane O. Abbasi et al.***

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The authors present a useful meta-analysis of meta-analyses on the response of a wide variety of soil factors to increased or decreased precipitation. I believe that the authors have collated published data in a manner that merits publication, but I believe that the results of the study could be significantly improved if a consistent manner to combine and interpret data across meta-analyses could be employed, rather than the method of treating each meta-analysis as an individual unit for comparison. I appreciate that the authors do bring up the sample sizes of each meta-analysis when discussing them and weight the inferences drawn from larger studies more heavily, but I wonder if there is a more effective way to combine the results from the various studies to draw conclusions. Could meta-analyses that presented the same variables have the

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effect sizes for that variable combined to produce one effect size for the response of the variable to changes in precipitation more generally across studies? This would require knowing the standard deviation of each variable within each meta-analysis, but would make for a much simpler presentation and interpretation of the data, as well as a more valid weighting of the results.

That is my main request that would require significant alterations to the text and the figures, but I do have some more easily implemented concerns, as well. I wonder if would it be possible to change the abbreviations “IP” and “DP” to something like “up arrow P” and “down arrow P,” respectively. This would be easier for the reader to follow in the text, though you might then also want to think about using “W” instead of “P” to refer to precipitation/water to avoid then making it look as though phosphorus content is what is being discussed. Is there also a consistent way to talk about results that had a trend with precipitation, i.e. where something was reduced when precipitation was reduced and increased when precipitation was increased? For instance, saying a variable is positively correlated with precipitation across treatments or negatively correlated with precipitation across treatments? This might also be easier for readers to follow. Finally, I wonder if it also might make more sense to group enzyme results with microbial biomass, as they are a microbial response and that way you don’t have to spread their discussion out over multiple sections. This is just a suggestion, however.

My specific comments are as follows:

94 – Did you also use Hedge’s  $d$  for just these variables, or did you then use it for all variables?

122 – This is a place where it would help to be more explicit with your results given that you are saying they are in-line with an expectation, and you can use whatever way you decide to talk about consistent trends with precipitation (for instance, the response of belowground NPP to both decreasing and increasing precip).

127 – If these are general trends across meta-analyses, then how do differences in

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soil type explain these results more than the differences in nature of the C pool being measured?

149 – Are there any hypotheses as to why Rh is affected by decreased precip in boreal forest and wetlands, but not in tropical or temperate forests? How about for the effect of increased precipitation in forests and grasslands, but not in wetlands?

151 – It is unclear what the conclusion to be drawn from this sentence is.

185 – This is an example of where your presentation and discussion of results would benefit greatly from being able to combine effect sizes across meta-analyses for like variables.

192 – This is a difficult sentence to parse, I'm not sure how best to remedy it but perhaps something like "However, the product of mineralization and N<sub>2</sub> fixation is NH<sub>4</sub><sup>+</sup>, and it increases under DP according to one of three meta-analyses even though fixation could be suppressed."

225 – This brings up something that is a bit lacking in discussion of these meta-analyses – are any of them biased or targeted in some fashion, or are they all global? And would a geographic analysis of where all the study sites employed in all of the meta-analyses reveal some obvious blind spots or areas that have been over-represented in the literature? These would be valuable conclusions to be able to make as a result of your study.

237 – It may be worth bringing up timescale of studies here for reference relative to P-weathering rates.

255 – It seems that you may be able to draw the conclusion that moisture appears to be generally limiting for microbes in soil.

260 – What direction was this response?

271 – I am not sure that this is the best way to phrase this result, as it appears more

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that changes in precip don't favor one over the other.

281 – In what direction could the ratio be altered?

283 – How would the mycorrhizal symbiosis change the dynamics? A bit more detail would be useful to the reader.

287-292 – This section feels sparse, and would be well-served to also bring up ecosystems or geographic regions that have been under- or over-sampled, as mentioned in a previous comment. Also, what about the paucity of studies that have measured bacterial:fungal biomass responses to increased precipitation?

301 – Some more discussion of what this blind spot in terms of N-process rates means for inferring conclusions about the N-cycle in soil would be useful to the reader to understand why this is valuable fruit to pursue.

317 – Do you have any suggestions as to what types of data formatting / archiving you ran into that was helpful or a hindrance? You have an opportunity to say some things from this pulpit, take advantage!

322 – I'm not sure this statement is quite true given the response of microbial biomass and the crude measures of microbial community assayed – it is fair to say that the ratio of fungi to bacterial biomass is insensitive, but that is not the same as the community being resistant.

Figures – Could you bold the symbols used to indicate the direction of the effect to make them stand out more? Also, if you are not going to use the raindrops to denote precip effects on each flow-figure then don't use it on any of them.

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