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Biogeosciences Discussions

Interactive comment on "The effect of resource history on the functioning of soil microbial communities is maintained across time" *by* A. D. Keiser et al.

Anonymous Referee #1

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This nice manuscript investigates whether soil inocula from grassland and hardwood sites vary in their ability to degrade plant material from grassland and hardwood. It is specifically tested whether the impact of soil microbial communities on decomposition converges or remains similar over time. In particular I like the linking of soil microbial community composition with function (decomposition rate). This is a very nice approach, which is very novel as far as I know.

Comments:

1) The articles focuses on soil microbial communities. However, it is possible that smaller soil organisms such as collembolan, nematodes or protozoa passed the 2 mm

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Interactive Discussion

Discussion Paper

sieve. Is there any evidence that these animals were present in the microcosms. The conclusions from this work may be affected by this (e.g. Site B (Figure 1) appears to be an outlier. Is it possible that this was caused by the presence of other soil organisms (e.g. nematodes or protozoa etc) at that site (e.g. soil organisms that may have died after the first round))? I think it is important to mention such alternative options in the discussion. 2) Inoculum from site B differed greatly from other soil inocula (see Figure 1). Is there any explanation for this? Please discuss (see also point 1). 3) It would be interesting to test whether the variance among communities after round 1 (or even better at the start of the experiment) is larger than the variance among communities after round 3. 4) Is there a specific reason to only use 1 gram of litter? This is a very small amount (this may affect survival of a range of soil organisms. Moreover, the amount of soil inoculums (0.5 gram) added to the litter (1g) is large (33%) compared to the amount of litter. 5) The plant material was sterilized before the experiment was started. I can imagine that sterilization softens the plant material, thus reducing potential differences between inocula sources. Hence, potential differences in decomposition rate between the grass and Rhododendron (hardwood environment) may be underestimated. I would add a line to the discussion, mentioning this. 6) Table 1 and Table 2 list the community composition of fungi and bacteria in the microcosms. The microbes are grouped per phylum or subphylum. I can imagine that most groups are dominated by only a few taxa. Can these taxa be characterized as “r” strategists or are there also “K” strategists involved? Moreover, is the microbial community composition observed in the experimental microcosms comparable to those observed in the field (e.g. when a similar number of sequences is being compared?). Or is there strong selection for specific microbes in these experimental microcosms? 7) I am not sure whether microbial populations already reached carrying capacity/equilibrium as doubling times for some microbes are very slow (e.g. it has been shown for some of those involved in the N-cycle to takes months). Hence, it is unlikely that microbes with a slow doubling time are at maximum population density after 300 days. It is probably difficult to account for this in experimental microcosms, but it is worth mentioning this in the discussion (e.g.

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together with a phrase about r & K strategists). 8) The results presented in Figure 4 do indicate that there is evidence that initial functional differences are maintained between inocula. What is unclear to me is whether this is due to differences in microbial community composition between grassland and hardwood, or whether this is related to differences in colonization capacity of the same microbes (e.g. grassland microbes are still “primed” for grassland also after two generations of hardwood substrate). The key question is here which microbes determine system functioning (in this case decomposition). In view of this it is surely worthwhile to determine microbial community composition for the second part of the experiment (Hypothesis 2) for future work.

Interactive comment on Biogeosciences Discuss., 8, 1643, 2011.