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Discussions

Interactive comment on "Relevance of aboveground litter for soil organic matter formation – a soil profile perspective" *by* Patrick Liebmann et al.

Anonymous Referee #4

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This manuscript is well written and organised. At this stage I have comments/concerns regarding some methodological aspects which are elaborated below. Also, the points touched on in the discussion are clear, but don't bring the arguments back (explicitly) to the hypotheses presented in the Introduction.

-How was the highly labelled litter (i.e. the source of the enriched C), produced? Is it homogeneously labelled? This is important because if labelling is not homogeneous only some compound types and pools of C will be traceable, which may not represent the whole plant C well, or bias it against the movement and stabilization of certain litter-derived compounds. This could lead to substantial underestimation/over estimation (?)

of the contributions or surface litter. It would also affect the overall estimation of loss. Given the type of goal, which is mainly one of quantifying contribution (vs. comparing different treatments) this is of high importance and is potentially concerning.

-Question: how were the labelled and unlabelled litter mixed?

-I am assuming that the natural litter added is "fresh" litter? Or at what stage of decay is? And what about the labelled litter? Is it seneced? Fresh? If the two litters were are different stages, this would have implications, because of the differential composition of C pools, depending on the potential scenarios. In this case, what could they be? This is also a consideration for the initial mixed litter.

- I don't understand how the 20mm (do you mean 2 cm mesh?) could prevent the leaching of the naturally fallen litter to reach the soil

- I am confused by the handling of the samples for water extractions. Line 115 says they were soil subsamples were frozen directly after sampling for water extractions, but later one it says field-fresh samples were extracted. The freezing and thawing will have an impact on the C composition of the soil solution from the breaking of the microbial cells, putting cellular contents into solution, potentially. Then also, if the soils were not extracted soon after field collection the C composition of the soil solution and its isotopic composition would potentially change too. With such the low levels of enrichment that reach the sub-soil, these unintended impacts of the handling could alter the results.

-It would be good to explain the general purpose of the investigation of HF surfaces in the methods.

-Not methodological: In the Introduction, some potential reasons for the 13C enrichment with depth are mentioned; there are some new developments about this gradient such as evidence also suggesting there is a contribution also of the microbial composition of the necromass (e.g. Biogeochemistry 2015, 124: 13-26)

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