Magnetic separation reveals overestimation of soil organic matter due to undecomposed particulate residues

General comments

The paper underwent significant improvement since the first round of review. There are still occurrences of misconception and miswording regarding the nature of POM and the legitimate place of undegraded residues in SOM which must be corrected before publication.

Here, you talk about 'false increase' as if it was a common mistake made by people when considering POM. I am not sure many papers pretend that an increase in POM corresponds in any way to stable carbon. If you have some papers in mind that make this mistake, cite and discuss them directly and very specifically. But the mistake would be considering undegraded matter as stable, not considering it as part of SOM.

However, if you want to discuss extensively the nature of POM and belonging (or not) of undegraded residues in SOM, I would advise you submit your reflection as an opinion paper rather than a research article, as it allows for broader discussion of otherwise established concepts.

Specific comments

L18: what do you mean by 'native'?

L30: '(MCS-D and MBc-D)' are not reused later in the abstract itself, so it is not necessary to introduce these abbreviations.

L44: these undecomposed residues are also part of SOM. I would advise to reword the beginning of this paragraph as follows: 'Soil organic matter (SOM) is a complex assemblage of organic compounds formed through the accumulation, decomposition and transformation of plant and animal residues. The decomposed part exhibits a much stronger binding capacity to soil minerals than undecomposed or partially decomposed residues. This strong binding makes it one of the most stable organic fractions in soil and supports its long-term persistence.' In this way, it makes sense to distinguish afterwards between what you will call stabilized/stable SOM and the rest which is still part of SOM. Especially as you highlight the importance of the nutrients supplied by labile SOM: if this SOM can be easily decomposed to provide nutrients, then it is not stable/stabilized.

L66: it is not spurious. It is a real increase in a specific kind of OM that is characterized by a usually shorter residence time and high exposure to decomposition. Please change the wording. Same L70 and L103. Same L260 with 'false increases', as well as L321 in your 3.3 title and in L355; L373 in your 3.4 title; L342 'artificial'; L418 in 3.5 title; L425. It is part of POM and SOM, as you rightfully added it in your discussion.

L97: 'was used to turn'? (missing word?)

L191–194: unless I am mistaken, this is not consistent with what you state L194–201. Please correct accordingly.

L273: I would be very cautious with the use of 'stabilized'. Here in Fig. 1 you just check for degradation. You have no evidence of stabilization. Especially, when talking about stabilization, it is

necessary to indicate which duration you are considering. The evolution of the chemical nature, indicating potential stabilization, only comes with Fig. 2.

L383: do you mean the increase in POC content (instead of SOC)?

L454–458: correct me if I don't understand it well, but you are talking here about the transformations that happen in the magnetic straw residues. If they are magnetic, it means they have not been degraded. However their composition varies? And towards a more stable form?

L524: just as a remark: not only! MAOM also forms with the help of earthworms, for instance. So it can form at shorter timescales.

L530: 'cause MAOM formation' → what do you mean? That because it is not degraded (not eaten because too hard), it will persist in soil until it gets adsorbed onto minerals instead of being respired? Or because micro-organisms will eat it but not digest it, so it will get mixed with minerals more easily after passing through organisms? If you mean the first, then I don't understand the sentence L531–533; if you mean the second, it makes more sense to me, as the Bc will not be eaten at all so will hardly be mixed with minerals. Maybe you could clarify this. However, I'm not sure to understand your sentence L533–535: in MBc-D, you removed the undegraded part, which was mostly in POM, so this should increase the MAOM contribution, compared to Bc where, as you said, the MAOM contribution is smaller. But you now state it is higher for Bc than for MBc-D? Sorry if I'm mistaken.

L545: 'However, most of the short-term increase originated from undecomposed amendment residues retained in the POM fraction rather than from microbially transformed and stabilized organic matter' → I don't see the problem you try to highlight. It is quite logical that the short-term increase originates from the POM, because if it originated from the stabilized organic matter, then it wouldn't be short-term. Also, if it resides in soil for a short period of time, it means it is quickly mineralized, so it does supply nutrients; if it stays in the soil and is not used by micro-organisms, then it doesn't promote microbial activity.

L568: in which studies did you read this interpretation? Why would POM increases be interpreted as SOM stabilization? POM is globally considered as a labile fraction. More POM would mean less stable SOM. Same question L585: you say it is 'persistent recalcitrant materials': pyrogenic carbon is indeed one of the exception to the usual lability of POM, so it will persist in soil, it is not a misinterpretation.