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Biogeosciences Discussions

Interactive comment on "Effects of long-term mowing on the fractions and chemical composition of soil organic matter in a semiarid grassland" *by* Jiang-Ye et al.

Anonymous Referee #1

Received and published: 19 December 2016

General comments:

Li et al. studied the long term effect of different mowing management practices on SOM properties in semi-arid grassland soil of Inner Mongolia. The authors used FTIR and 13C-NMR spectroscopy to characterize SOM. Further they analyzed certain SOM fractions and bulk soil parameters.

The topic of land management intensity effects on SOM fits well to the scope of the Journal. The used methods are adequate to characterize SOM and their combination should be of particular interest. The results are interesting; however, there are some issues which need improvement before publication of the manuscript.

Specific comments:

1. From the abstract it does not become clear that C and some N parameters are of interest; abbreviations are not mentioned (NMR ratios, MBC) or are introduced without using them (CK).

2. The introduction needs to provide more information on (the used) SOM fractions and other characteristics (e.g. O-alkyl C) and what can be deduced from them. What information do we gain from FTIR and 13C NMR? What is stable what is labile SOM and which one is good for what?

3. The authors should stick to abbreviations of mowing treatments rather than trying to word it. This will a) be more precise (e.g. line 204) and b) will make it easier to read the text.

4. Instead of 'CK, unmown' I suggest the abbreviation M0 for the control.

5. I'm wondering whether storage at 4°C is not too warm for samples taken from a region with an annual mean temperature of 0.5°C (line 57)?

6. Only 1 replicate was analyzed by FTIR and NMR but a) it does not become clear which one it was (start or end of time line?, mixture of replicates?); b) this unfortunately has to result in an interpretation without statements on 'significant difference'.

7. The discussion is nicely separated into interesting headlines. However, the authors do not meet the reader's expectations in the text then. This may be due to a) not clearly separating between discussion about SOM N and SOM C and b) not discussing the mowing practices results in a certain order and c) trying to draw conclusions from tables which cannot be deduced from those E.g. Table 8: It is not clear which data are shown: are these r values for all samples taken together or is this just one mowing frequency, and if so, which one? Shifts due to mowing frequency cannot be seen from this table. The authors would need to create graphs of relationships (e.g. SOM and WSOC) in which points represent mowing treatments. Only from those results conclusions could

be drawn on mowing effects.

8. Instead of intensively discussing the calculated SOM ratios etc. the authors elaborate on N mineralization, microbial community structure and mycorrhizal fungi. These are important factors but they need to be better imbedded into the main topic of interest: SOM. Too much speculation or repetition of results from previous studies should be avoided.

9. It would be helpful, if result values were compared to literature results for similar grassland systems.

10. In my opinion plant species, richness and productivity of the different mowing treatments are very important parameters in the context of this manuscript and should be shown as well. An interesting question then may be answered more easily: How does different vegetation affect SOM characteristics/are the differences in SOM due to differences in vegetation parameters?

11. The English needs some improvement in particular with regard to tenses.

More detailed comments:

Introduction

Line 38: It does not become clear in which context 'particle size' plays a role in this manuscript.

Line 49: Baumann et al. 2013 do not show any element or FTIR analyses; however, Baumann et al. 2016 do (Geoderma 278, 49–57).

Material and Methods

It does not become clear for which analyses air dried soil was used and for which field moist soil was used.

Line 65ff: unclear; when did the experiment start, when did it end?, what are the 5

treatments, what are the 3 treatments?

Line 69: I suggest to present months without exact days since they vary anyway.

Line 76: replace 'transformed' by 'transported'

Line 77: delete 'soil sample'

Line 79: Was the soil dried until constant mass or for 16h?

Line 84: who/what is 'they'?

Line 86: give 'g' instead of 'rpm'

Line 87: give details for the TOC analyzer

Line 89: change to freeze-drying

Line 94: supplementary material and C/N are not visible to me

Line 108: insert 'state 13C' before 'NMR'

Line 111: separate hexamethylbenzene properly, if necessary

Results

Only 'effects' or 'no effects' should be described but not 'little effects' if there is no statistical difference (e.g. line 120).

Line 11: define $P<0.05$ here and delete if from results and discussion sections.

Line 135: remove citation form here

Line 150 ff: move to discussion

Line 163-167: delete

Line 169: how was the 1 replicate prepared, please state here

Table 6: delete '%' in caption

Line 194: do you mean ‘microbial biomass’ or ‘MBC’?

Discussion

Often the sentences are just lined up without any connection (e.g. line 204ff). Please create a story.

Line 204: what is a ‘the overall and significant increased trend of SOM’? unclear; do you mean SOM content? Increased with what? Is it a trend or is it significant?

Line 206: do you mean number of plant species?

Line 211: not deducible from Table 8

Line 228: only refer to M1/2 and M1

Line 233: delete ‘charcoal’ as it is not relevant here; ‘concentration’ of aromatics was not analyzed

Line 234: or enhanced by plants with higher aromatic content?

Line 239: Table 3 does not show microbial biomass

Line 248 ff: move ratio explanation to methods section

Line 277: can the previous studies be confirmed by own results?

Line 280: what is SON?

Line 286: what are mycorrhizal fungi doing in the context of this manuscript?

Line 302: M2 shows a higher stability of SOM: would this perhaps be better for storing C in soil?

References

Cardinale et al. 2012 is missing

Chong et al. 2014 is missing or misspelled

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