

September 13th, 2016

Dr. Miriam Muñoz-Rojas
Topical Editor
SOIL

Dear Dr. Muñoz-Rojas,

I am pleased to submit on the behalf of co-authors, the responses to reviewers' comments on the paper entitled "Soil organic carbon stocks in semi-arid West African drylands: implications for climate change adaptation and mitigation", which was submitted to your journal a couple of months ago. I am really sorry for the delayed feedback due to the fact that I just wrapped up yesterday, a Regional Research Conference to validate the research program, which preparation consumed my time over the past months.

Nevertheless, I look forward to your feedback about the next steps towards the final publication of this article in your journal.

Very truly yours

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Reponses to Reviewer 2' comments

General comment

We thank the referee 2 for the inspiring comments. One of the main objectives of this paper is to bridge the gap of empiric data of soil organic carbon (SOC) stocks that are useful to validate models and figure out options to improve SOC accumulation through smart agricultural managements. This baseline study relied therefore on rapid assessments of three semi-arid landscapes gathering qualitative data on land management and quantitative data on soil organic carbon. One of the difficulties faced in the discussion session was the lack of data in that that region of West Africa, which made it difficult to make specific comparison from which to derive lessons. We have however tempted to fill in that gap by bringing in studies that were undertaken in similar area in West Africa and the tropical world in order to figure out recommendations for improved management to boost SOC storage. We do agree that some pitfalls still remained and are available to work them out to improve the quality of the paper.

Specific comments

Abstract

The point made is well taken.

Introduction

- The focus is small scale farming systems characterized mostly by continuous cropping in areas where land shortage is critical. The common feature of this cropping system in semi-arid landscapes is nutrients' mining through the removal of residues and crop harvest. This will be reemphasized so as to make it clear.
- **In line 67**, we should rather say SOM which contents more than 56% of SOC and provides nutrients....
- **Lines 70-72**. The first part of the sentence will be reworded such to make it understandable.
- **Line 87**. Noted with thanks.

Materials and methods

The information of rainfall pattern which is unimodal will be captured in the appropriate paragraph.

Line 116. The inorganic fertilizers (NPK in most cases) are commonly applied at a rate of 125 kg ha⁻¹ in the semi-arid area as reported by field studies.

Line 154. The whole sentence will be rephrased as it obvious that a word is mission there.

Line 76-77. SOC stocks have been converted to CO₂ equivalents to express the potential of semi-arid lands to mitigate CO₂.

The “semi-natural” land control site is made of woody and shrub savanna and sometimes dry forests that were spared for a significant period of time. They may be well preserved or degraded in some cases with the main differences from cultivated ones being the recurrence of cropping. Due to the difficulty of dating the semi-natural stands, we assumed that they were at least at the same age as the cultivated ones that were recurrently cropped over 20 years in average according to local farmers.

Line 222. Appropriate reference will be put in at the right place as requested.

Lines 247-249. This is an omission.

Line 252. As described above, the “semi-natural” land control site is made of woody and shrub savanna and sometimes dry forests that spared for a significant period of time. Other land uses are characterized in table 1.

Discussion

Indeed, the landscapes under study are heterogeneous and whatever sampling strategy employed couldn't have avoided it. The coefficient of variation (CV) has indeed be used to characterize this issue, which in some cases could override the significant changes in SOC stocks.

Line 302. Comments are well noted.

Line 319-321. Yes, erosion is greater than acidity in explaining the low values of SOC stock. This will be highlighted.

Line 325. Comments made are well captured.

Line 347-349. We take the point and will look for studies with similar rainfall modality for comparison purposes.

Lines 380-381. This is noted. We will try to link up the management options discussed to the socio-economic conditions in the studied areas.

Conclusion

Thank you for the appreciation.