

Reply to reviewer RC3

Specific comments

Lines 28-30: I think it's a bit confusing to switch between "T-SOCs" and "SOCS" here, I would just get rid of the term "T-SOCS" altogether and just use SOCS.

Answer: I think there is no confusion. T-SOCS is the total SOCS in the site. SOCS is obtained in each increment in each profile; that is why we can easily identify that 60% of the SOCS was stored below the first 25 cm from the soil surface

Line 40: I think this might be a better opportunity to define SOM here than to just vaguely mention it.

Answer: SOM was defined

Lines 48-52: I think removing "organic C" and replacing it with SOC in each case might make this passage less confusing and wordy.

Answer: Suggestion was adopted

Line 67: I think you need to insert specify why we care about these natural factors, you should specify that these are natural factors that contribute to SOC degradation/loss.

Answer: Suggestion was adopted

Lines 69 – 75: This entire passage should be revised. This can easily be shortened and you need to refer to soils (or soils in dry areas specifically) instead of using "their.

Answer: Modifications were done

Lines 185-191: In this section I would suggest not stating that SOC values are either high or low, and simply report the values here.

Answer: In order to be clear, a new figure 3 was added

Lines 199-202: There are some interpretations here that should be moved to the discussion section.

Answer: I think that we can leave this part like this since this interpretation help us to discuss in discussion section.

Line 202: I assume the word "globally" is used to refer to your entire dataset? Please remove this word and replace it with "overall," or something similar as it is confusing.

Answer: Suggestion was adopted

Lines 208-210: I'd suggest just stating that clay content increased with depth instead of referring to the surface/base of the profiles.

Answer: Suggestion was adopted

Line 244-246: Suggesting that SOM is not homogenous is a given, I suggest this sentence be removed.

Answer: Suggestion was adopted

Line 250-254: Again I think you can just state that SOC was highest in the top 25 cm, I don't think this needs to be substantiated by citations as it is usually the case.

Answer: Suggestion was adopted

Line 304-311: Is the latitudinal gradient in the study area great enough to exert an effect on SOC?

Answer: There is a high variation of climate characteristics in our northern part of the country along the latitude. This variation has repercussions on soil forming factors and consequently on the composition and the nature of soils even in short distance.

Lines 331-336: This should be changed from "high" to "higher latitude," but I would recommend removing the discussion on latitude entirely. Instead, the authors can explain regionally how precipitation/temperature/vegetation/elevation vary, and then discuss how this relates to regional SOC storage.

Answer: I change "low latitude" to "lower latitude" and "high latitude" to "higher latitude".

Line 346-349: What led to this idea regarding parent material? Why does this contradict previous findings on dryland ecosystems?

Answer: I think this is due to the fact that in the tropical area, weathering is essentially geochemical, and climate is the main driving of chemical reactions depending on the intensity of rainfall.

Section 4.1: This section (and the discussion overall) is lacking any references to values, tables, figures, etc. as there is not a single instance of this. As it stands the discussion simply states soil properties were high, low etc. I think the authors could help the flow of the manuscript by reporting values in the text and re-orienting the readers on where they can find the relevant data.

Answer: We leave references to tables and figures since they were referenced in detail in section 3 (results).

Section 5: I wonder if the data supports some of the assertions in this section. Are data from four soils enough to conclude that climate is controlling SOC storage in the region? I also think the section ends abruptly and is lacking in highlighting the study's importance – what are the broader implications of this work?

Answer: Some data were added in the section

Figs. 3&4: Why haven't you included uncertainties here? Instead of using linear regression you might consider box and whisker plots.

Answer: Modifications were made in these two figures including also the RC1 comments

Table 1: I think the list of dominant plant species here makes the table too cluttered and should be moved to the supplement if possible.

Answer: Dear Sir, we choose to leave the list of plant species here.

Table 2: I think these descriptions can be summarized in the text and this table can also go in the supplement.

Answer: Dear Sir, we also choose to the table with those characteristics.

Technical comments

Line 14: Suggest using the word “region” in place of “part” here.

Answer: Suggestion was adopted

Lines 19-21: Shorten this to simply state “Three replicates were collected at each site...”

Answer: Modifications were made

Line 20: Remove “the.”

Answer: Suggestion was adopted

Line 35: “Represents”

Answer: Suggestion was adopted

Line 36: Remove “their” here.

Answer: Suggestion was adopted

Line 41: I think you should specify that it is a CO2 (or simply C) sink.

Answer: Suggestion was adopted

Lines 41-43: This sentence seems a little out of place here and I suggest you remove it.

Answer: Dear Sir, I think it is linked the ecosystem evoke in the sentence below. That is why I leave the sentence.

Line 44: Do you mean 50% by weight? Is this even necessary to mention?

Answer: "by" was added and I think it is necessary to mention.

Line 47: Remove “their”

Answer: Suggestion was adopted

Lines 52-54: I wouldn’t recommend beginning a sentence with but or using the word “nowadays.”

Answer: "But" was removed

Line 63: Remove “the” and just say “SOC content.”

Answer: Suggestion was adopted

Lines 64-67: I think these two sentences can easily be merged together.

Answer: Dear Sir, we choose to maintain the two sentences

Line 79: The authors switched back to using carbon instead of C here.

Answer: Changes were made

Line 81: Again, use “studies” or something similar in lieu of “ones.”

Answer: Changes were made

Line 95: Use commas or scientific notation when reporting the extent of the study area.

Answer: Changes were made

Line 169: We need some more context here – what are these averages?

Answer: Dear Sir, these are average values obtained from the three replications.

Lines 177-178: This is an interpretation of C:N values and should be moved to the discussion.

Answer: suggestion adopted

Line 187: I would remove the term “zigzag.”

Answer: I think this word is correct because it permit to note that there is differences in the evolution SOC with depth

Line 191: Using “this content” is vague, just say “SOC content” or just SOC.

Answer: suggestion was adopted

Line 230: Why mention this here?

Answer: we mention here that the studied soils are the most common under dryland ecosystems in order to make known that the studied soils are sufficiently representative of the dryland

Lines 234-237: This should be moved to the introduction.

Answer: I think it is important to mention the role of SOM here in order to better understand the relation with nitrogen in the following sentences.

Line 268-271: Odd word choices here “parental” and “departure,” please revise.

Answer: modifications were made

Lines 354-355: I don’t think it’s important to mention the soil taxonomy here.

Answer: I think that it is important because the added adjective "Haplic" and "Dystric" permit to have an idea on the min soil characteristics

Lines 361-362: This sentence should be revised for clarity.

Answer: Modification were made