

Interactive comment on “Changes in soil carbon stocks in Brazil due to land use: paired site comparisons and a regional pasture soil survey” by E. D. Assad et al.

Anonymous Referee #2

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Major land use changes have taken place in Brazil over the last decades. Understanding effects on soil carbon stocks and quantifying stocks in different biomes is therefore of high importance. The article provides a dataset of soil carbon stocks in different land uses for Brazil. Despite the high relevance of the topic the paper needs to be improved substantially before being published. I fully agree with the comments made by reviewer 1 and want to stress the importance of further improving the consistency and English of the manuscript (see comments below).

Page 2, 3: The introduction needs to be improved as some parts are hard to understand and are not consistent yet (jump from soil composition to land use change, tillage systems, agricultural policies). Moreover references are lacking (Trumbore 1995 represent C2288

sents 50% of the first page). I would suggest skipping the first paragraph and start directly on the importance of land use change as a driver of soil carbon changes in Brazil in order to highlight the relevance of your research and introduce the motivation for the article.

Page 2, line 11: don't use “carbon saver”

Page 2, line 15: jump in text from land use change to extensification (give examples) to intensification (I would not call no-till an intensification option).

Page 2, line 20-27: only 1 quote, again Trumbore 1995

Page 2, 28: rephrase and improve motivation for the article (“not yet enough studies”)

Page 3, line 12: you never mention the Baseline in paper again. Does it refer to initial carbon stocks under native vegetation? Please elaborate

Page 3, line 24: replace “made” with “make”

Page 3, line 20-25: can be merged with paragraph above and information on MAT and MAP can be put in the study area section 2.1. otherwise repetition later

Page 4, line 9-12: merge with section 2.1. (Funding information could go in the acknowledgements?).

Page 6, line 28: wrong decimal according to Table 2 -19.6

Page 7, line 5: on page 6 line 7 you write for the top soil that values are “decreasing to -19.5 in the CPS and to -17.7 in pastures” compared to natural vegetation and that “the same tendency was observed for the 0-30 cm interval”, but on page 7, line 5 you say the opposite (“native vegetation soil was significantly lower”). Please explain

Page 7, line 8: numbers don't match with Table 2, probably C4 and C3 plants mixed up either in the text or table

Page 9, line 10: How was this done exactly? Please explain in detail.

Page 9, line 26: quote missing

Page 10, line 4: Can you provide more information on the regression analysis and coefficients (3.4 controls of carbon stocks)? Numbers can't be found in Table 4

Page 10, line 14-15: Results are in line with literature however a small sentence with a reference could be added e.g. Post W. M., Emanuel W. R., Zinke P. J., Stangenberger A. G. (1982) Soil carbon pools and world life zones. *Nature*, 298, 156-159.

Page 10, line 19-22: the sentence is confusing as it indicates that the following sentence ("this trend was confirmed. . ." also refer to nitrogen. Please clarify.

Page 11, line 6-13: Can you explain why pasture carbon contents in your study are lower than those in cropland? Are most pasture areas degraded?

Page 11, line 18: Couldn't the shallow sampling depth influence results as agricultural soils accumulate carbon in the topsoil especially under conservation tillage? Why did you choose a sampling depth of 30cm? Overall there is a need to increase sampling depth beyond the topsoil in order to avoid artificial redistribution effects in the soil see: Baker J. M., Ochsner T. E., Venterea R. T., Griffis T. J. (2007) Tillage and soil carbon sequestration—What do we really know? *Agriculture, Ecosystems & Environment*, 118, 1-5

Page 12, line 5: improve sentence

Page 12, line 8: not clear which studies "the other two studies", is it Zinn et al.?

Page 12, line 10-12: difficult to understand

Page 14, line 8-11: From your analysis you cannot conclude that "suitable management practices may exert an important factor in carbon accumulation in the soil" as you didn't include different managements as a dimension in your analysis. However, a sampling of pastures sites according to management would be very interesting and allow for such conclusions.

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Page 14, line 14: 3 different outcomes? I agree that we need more paired site comparison however, please elaborate the last paragraph a bit further to make it easier to understand

Table 2: What does N refer to? I guess number of samples. Explain abbreviations in Tables.

Figure 2: No unit and title of x-axis

Title of Figure 4 and 5 mixed up

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