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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 #1

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General comments:

This paper is about soil carbon stocks under different land uses in Brazil. The topic is very relevant as there is not yet much information and data available about soil carbon stocks in Latin America. Especially for Brazil it is important to get a good quantification of the soil carbon stocks, because of its large area and the important land use change that have occurred over the last decennia. Therefore it is important to publish this data set. However, the paper needs to be improved, both for the English grammar and for the methodological description and interpretation of the results, see comments below. Therefore I recommend a major revision.

Main comments:

In the introduction or in the methodology should be explained why isotopic analyses were included, what is the relevance

Why is there an uneven distribution between native vegetation (forest), pastures and crop livestock systems, I would expect one of each for each paired site.

In the discussion is mentioned that the state of management of pastures is important for the soil carbon stocks. It would be good to include this aspect in the paper, from the soil sampling on pastures there should also be information about the grassland status, making some groups of e.g. very degraded, degraded, well managed pastures and relate these the soil carbon stocks would be very interesting and more useful than the comparison with the other literature values, as these are not directly comparable.

Conclusion: it is stated that at some pasture and CPS sites higher soil carbon stocks were found compared to the native vegetation which could be due to the management practices. However, this is a too strong conclusion, since the spatial variability in soil carbon stocks can be very large, thus conclusions should not be based on the individual sites, but only on the aggregated averages. I agree with the conclusion that paired sites should be used for assessing carbon stock changes due to land use change, but it would be better to take more samples at each paired site to account for the local variability of the soil carbon stocks.

Specific comments:

Page 2, line 3-4: improve sentence

Page 2, line 8: don't use term soil plasticity here

Page 3, line 10: not clear to what the GHG reductions refer, total GHG emissions from Brazil, or from agriculture?

Page 4: how where the locations selected, for the regional sampling it states that it was

done randomly, but this should explained how, and also for the paired sites

Page 4, line 15-17: It is unclear how the sampling has been done. How many samples for carbon and texture were taken? And is it 60 cm depth? This should be described better.

Page 4, line 18: ground is not the correct wording

Page 5, line 11: Strange symbol for carbon, besides use carbon content instead of concentration

Page 5, line 13: This is indeed quite important and some further explanation about why this is done would be useful, see e.g. paper of Wendt and Hauser (2013)

Page 5, line 21-27: This is unclear, how do you know that the lowest value is for sure from a C3 source and the highest from a C4. Please elaborate this a bit more, preferably with another reference.

Table 1: What is meant with the column years?

Table 1: In case of crop-livestock systems there are often more land uses described (e.g. pasture and soybean), how was sampled? What I understand is that only at one location is sampled, thus on a specific land use. This should be better explained

Table 2: the values for the confidence intervals seem to be expressed wrongly

Table 4: Caption too long, explanation should be included in the main text

Figure 2: Title and units of the x-axis are missing

Figure 4 and 5 are switched

Figure 5: The axis for sand content runs until -20

Page 8, Line 26: What is Ns, this is not included in Table 4

Page 9, line 11: Linear interpolation of C stocks from 0-20 to 0-30 cm is very tricky,

especially for native vegetation, where most of the carbon is often located in the top of the soil

Page 9: Make more clear how many samples were included from the other studies and how they were compared to the samples from your study, was this done at the sample level, or the biome level?

Section 3.4: I assume this section only refers to the regional pasture results? Make this clear, otherwise land use should be included as explaining variable as well

Page 10, line 4: here is referred to Table 4, but there is nothing in that Table about MAT and sand content

Page 10: include the r2 for both equations ïĂ■ In the caption of Figure 4 is referred to equation 3, this should be equation 5

References

Wendt, J.W., Hauser, S., 2013. An equivalent soil mass procedure for monitoring soil organic carbon in multiple soil layers. European Journal of Soil Science 64, 58-65.

Interactive comment on Biogeosciences Discuss., 10, 5499, 2013.