

Biogeosciences Discuss., referee comment RC1
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Comment on bg-2022-6

Anonymous Referee #1

Referee comment on "Assessing the effects of no-till on SOC dynamics throughout the soil profile after grassland renovation and conversion to silage maize" by Josue De Los Rios et al., Biogeosciences Discuss., <https://doi.org/10.5194/bg-2022-6-RC1>, 2022

General comments

This article deals with an issue of great importance globally - i.e., the impact of grassland conversion on SOC and ways to mitigate SOC losses. Despite concerns over its adverse impacts on GHGs, conversion of grasslands to croplands continues to be widespread in many parts of the world, and absent adequate policies to limits such conversions better understanding of how land management can mitigate the SOC losses is important. The study methods and data analysis are generally of good quality, and the manuscript is clearly written. My recommendation is publication following minor revisions.

Specific comments

- Line (L) 9: Should replace "global warming" with more general "climate change" (which also includes e.g. changes in precipitation, sea level, and even cooling at some times/locations).
- L9: "of" missing at end of line
- Repeated use of the term "whole profile" implies that samples were taken all the way to bedrock, which does not seem to be the case. This term should be clarified as referring specifically to "a depth of 0.9 m", and replaced with this more precise phrase wherever convenient.
- L23 SOC increases under GC indicate that the plot is still responding to historic disturbance or LUC. Implications of this need to be considered in the discussion.
- L76 "most likely as a result of historical erosion and sedimentation processes" - and/or downslope transport of DOC
- L77 "To exclude these site-specific effects, this study only reports results from the upper half of the experimental site". This was an unfortunate choice (that can't be

remedied now). Better would have been to include slope location as an explanatory variable in the analysis. The exclusion of lower sites introduces a new confounding effect (similar to measuring only topsoil, but excluding subsoils in the earlier studies cited). I.e. an increase in SOC on the upper slopes could be accompanied by a corresponding decrease in downslope soc, if the greater accumulation on higher ground is partly accounted for by reduced transport processes. This possibility and how it affects potential interpretation of the results (i.e. quantification of this effect was not possible within the current study and would require further research to account for differential transport processes between treatments) needs to figure in the Discussion. The paragraphs on L260-75 would be a relevant place to raise this issue.

- Section 2.2.2: I appreciate how thoroughly the biomass inputs were assessed, and commend the authors on this. Too few studies show this level of thoroughness, which is important.
- L303 "maintain SOC stocks" should be replaced with "to mitigate losses of SOC stocks"
- Fig 1: needs error bars on the data points and a confidence interval or s.e. ribbon on the regression lines