

Earth Syst. Dynam. Discuss., referee comment RC1  
<https://doi.org/10.5194/esd-2021-35-RC1>, 2021  
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## Comment on esd-2021-35

Anonymous Referee #1

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Referee comment on "Soil organic carbon dynamics from agricultural management practices under climate change" by Tobias Herzfeld et al., Earth Syst. Dynam. Discuss., <https://doi.org/10.5194/esd-2021-35-RC1>, 2021

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The manuscript describes a modelling study to analyse historical and future fluxes of soil organic carbon and its sequestration potential on global croplands. The authors describe in detail the various simulation steps to calculate historical SOC stocks and projected SOC changes under different management and climate scenarios. The estimated SOC stocks are compared to previous estimates. Model results are sensitive to assumptions about different amounts of residue remaining in the field, while different tillage and climate change scenarios have a small impact on estimated SOC stocks. The authors reach the conclusion that carbon sequestration potential as a climate change mitigation strategy is low and that SOC stocks are mainly declining by the end of the century. This article is of high scientific value and I recommend it for publication without any substantial revision.

In general, this manuscript is well written and simple enough to understand. I have noticed some model input values whose origin I do not understand. It would improve the understanding of the model if the following were more clearly explained

Line 82 -83

What is the 40/60 ratio based on that determines how much C is released into the soil or emitted into the atmosphere?

Line 87

Similar to above, where does the 50% come from?

Line 156

What does tillage intensity set to 0.9 mean?

Line 300

"a third" instead of 1/3

Finally, spelling out the management scenarios in the text would improve readability rather than using the abbreviations (T\_NR, NT\_NR, etc.), although I understand that this can be handled according to personal preference. In addition, spelling out the management scenarios in Table 3 would save time for the reader who may not have the abbreviations in mind.