

Interactive comment on “Management induced changes of soil organic carbon on global croplands” by Kristine Karstens et al.

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Dear Dr. Jonathan Sanderman,

thank you very much for your valuable feedback. We already started to improve model and paper draft based on your comments. On your methodological concerns about our “dynamic” implementation of a steady-state modeling approach, we want to provide an immediate clarification to not risk confusion by the other reviewers.

In your review, you stated "My main concern with applying a steady-state model to annual changes is we know that the recent past trajectory of SOC (particularly in the slow and passive pools) will greatly influence the short-term model response to improved management – i.e. the model will take years to decades before SOC stocks start to

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rebuild if the trajectory was negative prior to the change – but this will be completely missed with the steady state application (stocks will start increasing immediately upon change)."

We would like to clarify that the Tier 2 modeling approach within the refinement of the IPCC Guidelines of 2019 is a first order kinetic approach. It was just named by the IPCC authors as "steady-state method", since it is based on steady-state calculation as an intermediate step. Yet, it does not assume SOC stocks in immediate steady state, and does account - depending on the pool type - for longer than annual transition phase to new steady states. We share your confusion about the naming within the guidelines, and will clarify the naming within the revisions.

We will provide a detailed point-by-point response to all your comments soon.

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