

Interactive comment on “Greater soil carbon stocks and faster turnover rates with increasing agricultural productivity” by Jonathan Sanderman et al.

Anonymous Referee #1

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This manuscript provides compelling data and an important contribution to hoarding vs using SOC. Below are some specific comments. One general comment is that the empirical results from this study are likely to be site specific. In other locations, there may be trade offs between different types of SOC. Also, I believe there was a somewhat-recent editorial published on this topic in *Frontiers in Ecology and Environment* by Oldfield et al that might be worth reading if the authors have not.

Line 2: I'm not sure that the belief is that it will offset current emissions as much as it could draw down concentrations. In other words, most of the SOC that could be built up is probably coming from recovering lost C from degraded lands.

Lines 9-15: I certainly agree with this argument in terms of direct, short-term effects

on crop production. But stabilized, "hoarded" SOC can also have positive effects on productivity through changes in soil structure, water holding capacity, and potential to buffer pH. I don't think there's a good sense of the relative importance of nutrients vs. these other properties to crop production.

Lines 16-32: Since this is an empirical, rather than modeling, paper, this paragraph on representing mechanism in SOC models is distracting from the main contribution: testing the using vs hoarding paradigm.

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