

Interactive comment on “Aggregates reduce transport distance of soil organic carbon: are our balances correct?” by Y. Hu and N. J. Kuhn

Anonymous Referee #9

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General comments

The manuscript “Aggregates reduce transport distance of soil organic carbon: are our balances correct?” uses a unique experimental approach to determining how soil tertiary structure influences carbon transport by erosion. The work considers how two sets of competing mechanisms, erosion and deposition, impact soil organic matter protection and destabilization in aggregates. This seems to be a much more realistic view of how transport processes occur in soil with a solid attempt to integrate knowledge of various mechanistic processes that are typically handled separately by scientists. The paper is extremely well presented and clearly identifies pitfalls in the approach while relating the importance of the findings. I have very few concerns.

Specific comments

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The methods are relatively novel, offering a new approach that seems to suit the purposes of these research questions better than conventional soil separation techniques. One of the few ways I think this paper could be improved would be by including a slightly more involved explanation of the Equivalent Quartz Sizes approach and the settling tube apparatus. The authors appropriately cite their earlier work introducing these techniques and I understand their (or the journal's) reluctance to include extraneous text. However, it is difficult to understand what the authors did without reading the Hu et al 2013b paper.

I was somewhat skeptical of the extrapolations the authors made from their findings from one experiment to the global impact of erosion and deposition. However, they were careful to note the shortcomings of such projections. For example, they note in the Methods section that although they used a suitable soil for the purposes of the study, more soils need to be investigated. In addition, they discuss that the respiration rates of the soil fractions were estimated from very brief observations, but the authors note that these are instantaneous respiration rates that don't represent long-term decomposition processes. It might be seen as a weakness, but the fact that they are even considering how aggregate protection plays into the carbon balance of erosion is a strength of the paper.

Section 3 L15–20: Can the authors provide evidence that SOC in the various classes didn't differ over time? E.g. means and variation for the timepoints or a P value if this was explicitly tested?

Technical concerns

Page 8839 L6: typo in "eroded"

Figures: I appreciate the use of box and whisker plots, as well as the thorough captions.

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