

Interactive comment on “Short Communication: Humans and the missing C-sink: erosion and burial of soil carbon through time” by T. Hoffmann et al.

Anonymous Referee #2

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This manuscript provides a well balanced and insightful overview of the role of human induced soil erosion over contemporary to Holocene timescales. Whilst no major new insights are presented, this aspect alone represents a valuable source of information for the scientific community.

The manuscript then highlights the key gaps in terms of assessing the dynamics of C storage in soils, sediments and floodplains and suggests that advances in geochronological approaches, involving integrated biogeochemical and geomorphological techniques, allow progress towards addressing the overall question whether human induced soil erosion leads to C emissions or sequestration.

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This specific suggestion is then contextualised with an example in which cumulative emissions during the Holocene have been modelled for the lower Rhine basin (Fig. 4), set against Holocene carbon storage data (Fig. 3) which is based on Hoffman et al. 2013. This contextualisation, however, is not as convincing as it could be as there is insufficient detail provided here as to how the data have been derived, what the uncertainties are, and how comparable the two distinct datasets are.

Figure 2, which provides lifetime vs sequestration for selected C pools is also a useful illustration supporting the arguments made in the manuscript, however, the same limitation applies. It is not clear why these specific examples have been selected, how representative these are as a whole and what limitations/ uncertainties the data presents. Some information is given in the supplement (in which it appears wrongly to be referred to as Figure 1), but this information does not address the issues raised above.

In summary, this manuscript represents a valuable, if incremental, advance by highlighting key gaps in our knowledge regarding C sequestration through soil erosion and by suggesting one way forward to address this. This is illustrated with examples, which heavily draw heavily on the authors' own previous work.

I recommend publication, however, suggest to be more specific (in the text or figure captions) about the supportive data presented so that the paper can be read and understood without having to consult a variety of previous sources. Furthermore, it would be useful to set the examples used here into context in terms of their applicability to other climatic and geomorphological settings, and in comparison with natural (non-human induced) soil erosion processes.

Interactive comment on Earth Surf. Dynam. Discuss., 1, 93, 2013.

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