

SOIL Discuss., referee comment RC1
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Comment on soil-2021-131

Hans-Peter Schmidt (Referee)

Referee comment on "Inclusion of biochar in a C dynamics model based on observations from an 8-year field experiment" by Roberta Pulcher et al., SOIL Discuss., <https://doi.org/10.5194/soil-2021-131-RC1>, 2021

To the reviewer's knowledge, the paper presents for the first time biochar degradation data from a long-term field trial (8 years). It uses the data to modify the critical RothC-model for soil C fluxes. The paper is well written in good English, and the results are well documented and analyzed.

The reviewer has only one major critic and suggestion: The biochar used in the experiment is a very particular biochar used in many European projects but is not truly representative of biochar on the European and global market. The biochar was made with a gasifier at HTT around 1200°C, while most biochars are made between 450 and 750°C. Despite the high HTT, the H/C ratio is 0.5 and thus very high, likely indicating the adsorption of labile carbon from pyrolytic gases. Moreover, the biochar is very brittle and has small particles sizes.

Discussing these particular properties of the biochar is very important in the context of the paper. Because losing 40% of the biochar carbon through biological or chemical degradation in only eight years is very unlikely and should not be hypothesized without measuring gaseous losses from the system. It is more likely that the friable, fine-grained biochar leached from the upper soil (only the top 40 cm were investigated) in the form of dissolved organic carbon. The latter cannot be claimed with certainty either. However, it should be discussed as the implication for Carbon-sink certification are enormous.

Unfortunately, the reviewer is not sufficiently familiar with the RothC-model and cannot judge with certainty if the modification of the model was done correctly.