

## Reply on RC3

Roberta Pulcher et al.

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Author 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-AC3>, 2022

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Dear Gabriel,

First of all, thank you for your comments, which highlight some interesting open points of our study, and help us discuss them more in detail.

About the first major comment, we must admit we did not measure leaching directly in the field experiment. However, during the first three years of the experiment, we measured both soil respiration and soil content of both naturally occurring SOM and added biochar. The results of the model, together with these measurements, point to the fact that if there was any leaching, it was negligible – at least in the first 3 years of experiment. The soil of the study area has texture 12% clay, 34% silt, e 54% sand, very similar (but with less sand) to a sandy loam soil used in a recent columnar experiment (Schiedung 2020); in that study, only 1% of the biochar was reported as being leached, most of it leached during the first flushing of the column. Finally, we measured the biochar in the soil at different depths, and the concentration of biochar at different depths did not change in time, i.e. we did not measure any downward migration of the biochar in the soil profile.

What happened after the first 3 years of experiment, however, is more debatable, since no soil respiration measurements were available for years 4 to 8. However, we believe the situation would not change much, since the biochar was already aged during the first 3 years. Anyway, we admit that the experiment and the model would benefit from a direct measure of the downward migration; we will enlist this issue in the discussion as a study gap and study need, to be filled in the future. We propose the reviewer that we include all this discussion above in the article discussion.

In a second major comment, you suggest to elaborate on the aggregation of biochar and clay minerals. Indeed, we visually directly observed interaction between them, with the biochar particles completely covered by adsorbed clay particles. However, this visual observation was not quantified. Thus, we cannot say much about a possible stabilizing effect of the clay particles; more so considering our biochar degraded in the soil much faster than we expected. We propose the reviewer we will include this observation and this limitation in the discussion of the article.

Finally, we want to thank you for your suggestions, which we will address fully in the manuscript revision.

Sincerely,  
The Authors