

Interactive comment on “Massive carbon addition to an organic-rich Andosol did not increase the topsoil but the subsoil carbon stock” by Antonia Zieger et al.

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Anonymous Referee #3 Received and published: 29 November 2017

Dear reviewer #3, we thank you for taking the time to provide us with your feedback on our manuscript. We carefully considered your comments. Our responses and suggestions for possible changes are given below each comment. We upload the revised manuscript at the end of the discussion together with changes suggested by other reviewers.

The manuscript brings interesting conclusions about the carbon storage capacity of

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andosols. The analyzes are well documented and lead to the description of interesting mechanisms to explain an important carbon storage capacity in the subsoil when the topsoil binding capacities are exhausted.

The manuscript would need a thorough English proofreading.

Author response: A professional English proofreading will be carried out.

Comments and suggestions:

1) The authors could reformulate the title to state the positive result first (C storage in subsoils).

Author response: We change the title to “Massive carbon addition to an organic-rich Andosol increased the subsoil but not the topsoil carbon stock.”

2) Page 2, L.3: “Soil holds more organic carbon (OC) than there is carbon in the global vegetation and atmosphere combined”: the authors should provide reference(s) from scientific literature.

Author response: We provide the reference: Lehmann, Johannes, and Markus Kleber. “The Contentious Nature of Soil Organic Matter.” *Nature* 528, no. 7580 (Dezember 2015): 60–68. <https://doi.org/10.1038/nature16069>.

3) Page 2, L. 12: “the main factor”: the authors should be more specific (of what?).

Author response: We change the sentence to: “Paustian et al. (1997) consider the OC stocks to increase linearly and limitless with increasing organic input.”

4)Page 4, L. 9-10: the authors could discuss the fact that higher vegetation in the sawdust site may have consequences on carbon intakes from the soil. Could the fact that vegetation is higher be due to sawdust additions?

Author response: Unfortunately, we have no data of possible differences in plant biomass and plant community composition. We calculated a worst case scenario to ex-

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clude possible differences in C input with litter between the sites. The scenario shows, that differences in input of plant-derived C between sites are insignificant relative to the sawdust input. We clarify the purpose of the scenario calculation in the manuscript.

5) Page 4, L. 16-19: a schema or photo of a soil profile would help to understand how horizons were delimited. It could be added as an appendix.

Author response: We provide pictures of the soil profiles in the appendix or if suitable in the "materials and methods" section.

6) Page 5, Table 1: For each element presented in the table, the number of data that were pooled to calculate the mean value could be specified in the table (eg : "BD, g.cm⁻³, n=2" or "C/N, n=5). Standard deviations (rather than standard errors) should probably be used in tables. In column BD, why isn't the standard error/deviation specified?

Author response: We add a row in the table showing the number of data that were pooled. We add the standard error of BD. According to Altman and Bland (2005) and Reinhart (2015), the standard deviation (SD) is a measure of variability and describes the spread of individual data points. The standard error (SE = SD/sqrt(n)) is a type of standard derivation, which describes how far the average for this sample might be from the true average. As we are more interested in the latter, we choose the standard error.

Altman, Douglas G, and J Martin Bland. "Standard Deviations and Standard Errors." *BMJ* 331, no. 7521 (October 15, 2005): 903.

Reinhart, Alex. *Statistics Done Wrong: The Woefully Complete Guide*. No Starch Press, 2015.

7) Page 9, Table 2 / Page 11, L.7: How was the "representative" profile chosen?

Author response: The representative soil profiles were selected to meet the following criteria: five horizons within the upper 1 m, largest OC concentration in the topmost horizon, similar amounts of acid oxalate-extractable Al, Fe, and Si, and having different

bulk OC concentrations in the third horizon. This is already lined out in section "2.7 Data analysis". We add the decision basis to the caption of Table 2.

BGD

8) Page 13, L. 3 / Page 14, L.5: The authors should explain how values can exceed 100 wt%.

Author response: We add following sentence to section 4.1.: "Values exceeding 100wt% are probably caused by random errors of measurements and some sodium polytungstate not entirely removed by sample washing."

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9) Page 13, L. 5-6 / Page 14, L.6: Could the authors explain why normalizations were performed?

Author response: We change the sentence to: "The OC concentrations are related to the respective fraction mass."

10) Paragraph 4.4: The authors should emphasize more on the fact that the very low number of data used for comparing the sites may also be responsible for the absence of significative differences.

Author response: We agree with you and include the calculation of statistical power and its results to the manuscript

11) Page 23,L.30: The authors could add a sentence on the potential of mineral phases for carbon storage.

Author response: We add a sentence in the conclusion accordingly.

12) Page 24, L. 5-7: the absence of significative difference could also be due to the fact that the number of data was to small to detect it.

Author response: We emphasize this accordingly.

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