

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.

Anonymous Referee #4

Received and published: 3 December 2017

The manuscript answers the specific question of how much organic carbon (OC) can be stored in a specific type of soil (Andosol), giving experimental support to the theory of a finite OC accumulation potential of soils due to the limited binding capacities of minerals. I found the manuscript well written and well organized. Even though the experimental site was not designed from the beginning for this trial, I agree with the authors saying that it is rare to have such a long history of treatments, and this is particularly valuable when studying carbon dynamics in soil. My bigger concern regards the bulk density (BD) values reported in table 1 and the way they were assessed. As reported in equation 1, BD is of a pivotal importance in assessing the total amount of OC in the soil (Mg/ha), so I think it should be specified with more details how the sam-

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pling was carried out, which volume of soil was considered, which corer and so on. Ten sampling points don't represent a huge number, but for BD just 2 were used, which is really low for such a big area. This observation arises because the BD values reported in table one are really low even for andosols ($< 0.4 \text{ Mg/m}^3$), which causes a relatively low amount of OC per hectare considering the relevant percentage that OC reaches in that soil (up to 21%). For instance, 315 Mg OC/ha found in this study (considering 1m soil depth) are obtainable with a 2.6% of OC in a soil with $\text{BD} = 1.2 \text{ Mg/m}^3$, very typical in mineral soils. Thus, besides improving the description of the sampling methodology, I suggest adding some reference supporting such low BD values. I would also stress this fact more in the discussion chapter, section 4.4: the low BD is likely due to a low content of minerals, which can be “easily” saturated with OC at least in the upper layers. Please provide also some more info about the way in which sawdust was distributed over the years, specifying to which degree can the soil treated with sawdust considered homogeneous within the 3 hectares of the trial. Some technical notes: P1 – L3: please add a reference at the end of the first sentence (storage of organic carbon in soils) P4 - L11: please use the same decimals (1-16 or 0.9 – 16.0 Mg ha⁻¹ year⁻¹) P6 – L9: standard deviation (not derivation)

Interactive comment on Biogeosciences Discuss., <https://doi.org/10.5194/bg-2017-386>, 2017.

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