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Biogeosciences Discussions

Interactive comment on "Only small changes in soil organic carbon and charcoal concentrations found one year after experimental slash-and-burn in a temperate deciduous forest" *by* E. Eckmeier et al.

Anonymous Referee #2

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General Comments.

The title of the paper could be modified. I suggest; Minor changes in soil organic carbon and charcoal concentrations identified in a temperate deciduous forest a year after an experimental slash-and-burn.

Overall the standard of writing in the manuscript needs to be improved, at the moment many sentences are confusing. Suggestions of possible alterations regarding specific sentences are indicated below. Sentences that are too long could be divided into two

to make reading easier. Subjective comments should be clarified with the use of actual values. There is overuse and inappropriate use of conjunctions, for example, page 602, line 6; “however, also” is not correct. Must use one or the other, not both. I can appreciate that English is not the first language of the corresponding author, therefore further consultation with co-authors who have significant publication backgrounds would help to improve the writing quality of this manuscript.

More detail could be made by the authors regarding the Neolithic slash-and-burn techniques and how accurately they were recreated during this study. While it has been stated that no previous studies have been undertaken regarding charcoal production in deciduous forests, there have been several studies on boreal forest burns in Scandanavia (Pitkanen 1999; Ohlsen and Tryterud 2000) that may serve as useful comparisons to the results presented here.

The paper would benefit from the inclusion of more data. What percentage of the mass burnt was converted to charcoal? What effect would an increase or decrease of the mass burnt have on the changes in SOC and charcoal after one year? The author refers to work by Spielvogel et al. (2004), who identified a correlation between soil lightness and aryl C content. Does the relationship between aryl C and L* (r =-0.87) presented here relate to that study, or is it part of this one? This needs to be clarified. If aryl C was quantified for this soil, then this data should be added and discussed.

The authors state in the materials and methods that total carbon (TC) and nitrogen (TN) were both analysed; however, TN results and C/N ratios while presented in Table 2 are not mentioned in either the results and discussion. If these results are irrelevant to the theme of the paper then why include them. My preference is for the inclusion of this data to the results and discussion. Do changes in N (and C/N) have any correlation with SOC or charcoal? How does N change over the year and with depth?

Page 599. Line 4. Need to clarify as to why the trunks and large branches (diameter $>$10 cm) were removed from the site prior to the burn event. Is this a normal part of the

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Neolithic slash-and-burn procedure? A study by Tinker and Knight (2000) showed that a large charcoal component was produced from the burning of coarse woody debris (diameter >10 cm) for a North American boreal forest. The charcoal produced from this coarser material would generally be larger fragments than what is derived from the finer biomass and thus would more than likely change the dynamics of the SOC and charcoal within the top 5 cm of the soil. Could these larger fragments be transported by earth worms in a similar fashion to the smaller ones?

It is stated that charcoal stocks can not be compared between sample sets due to large variation in bulk densities. This is followed by a sentence that states only 2.3% of the macro-charcoal on the soil surface was stored in the 0-5cm depth after one year. Is this not a comparison of the charcoal stocks? A clear explanation of the charcoal stocks that can not be compared and those that can is required in the manuscript.

Specific Comments.

The specific comments below are examples of the problems regarding grammar and sentence structuring that are repeated throughout the manuscript.

Page 596. Line 22. The first sentence of the introduction is not clear and could be altered to two separate sentences. For example; Anthropogenic burning was common during the Holocene and was probably used as a tool for hunting, herding and farming. Charcoal records for Central European deciduous forests indicate high spatial and temporal variation of such burning events.

Page 597. Line 5. Biomass burning releases an estimated 2.5 Pg atmospheric carbon per year (van der Werf et al. 2006) and produces a “substantial” amount of charcoal. This comment is subjective, better to state an amount for charcoal production, even if it is a range.

Page 597. Line 23. Replace accountable with a more appropriate word like “responsible” in the sentence; black carbon might be ‘accountable’ for the dark colour of Cher-

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nozem humus horizons (Schmidt et al. 2002).

Page 597. Line 25. Need to add “is” to the sentence; Haplic Luvisols consisted of black carbon, that is derived from Holocene anthropogenic burning.

Page 598. Line 21. Overuse of adjectives, i.e. The 3.5 ha large area, can be expressed simply as The 3.5 ha area.

Page 601. Line 5. Sentence could be improved to; on the other-hand, the charcoal C concentrations decreased in the 2.5-5cm depth interval, providing a constant charcoal C concentration throughout the top 5cm of the soil profile.

Page 601. Line 12 to 17. This part of the text is unclear and could possibly be altered to; This monitored slash-and-burn event resulted in 5200 kgha-1 of charcoal remaining on the forest floor (Eckmeier et al. 2007) and 120 kgha-1 in the 0-5cm soil depth one year after burning.

Page 612. Why when replicates are said to be 20 does n = 14, 14, 17, etc in Table 2?

The reference Zackrisson et al. 1996, does not appear to be cited in the manuscript.

This manuscript presents some interesting insights into charcoal and SOM processes within the surface soil. However, it requires the addition and discussion of more data and an improvement in writing quality in order for it to be suitable for publication.

Interactive comment on Biogeosciences Discuss., 4, 595, 2007.