

## ***Interactive comment on “Distribution of black carbon in Ponderosa pine litter and soils following the High Park wildfire” by C. M. Boot et al.***

**C. M. Boot et al.**

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Some detail on already published methods section could be reduced, and I would recommend to refocus and polish the Discussion section: - "... BC incorporation processes at depth via water flow and biotic infiltration processes". I was not sure which " biotic infiltration processes" you consider.

The methods section was reduced and the discussion section was expanded and polished. The clause, "stimulated by soil fauna" was added to clarify "biotic infiltration processes" on pg. 16813.

The attempt to relate the ratio B5AC to B6CA to "age" is not substantiated, but if you think so you should explain why you think so

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This has been removed and reframed in light of the relationship of B5CA:B6CA on heat of formation.

Is the last paragraph of the Discussion section necessary? "The distribution of BC on a landscape .....transport into the soils bias dissolution and translocation". It did not become clear to me how these conclusions relate to your actual results. Or are these (admittedly reasonable) speculations, but still speculations.

The last paragraph of the discussion should be included under the conclusions heading. It provides context for the implications of the study. We studied the distribution of BC on the landscape post-fire, and describe how improving our understanding of distribution is meaningful in relationship to how BC functions in soil. Text was added to justify erosion as a dominant loss mechanism (beginning page 16813 following the discussion of rates of incorporation).

Then some more minor remarks: P 16800 L1: communicate clearly and avoid ambiguous wording, such as "heterogeneous product of burned biomass", "critical component of black carbon cycle" L 10: replace "developed and implemented the BPCA method" simply with "used the BPCA method". I could not see "development" of the BPCA method. It basically reproduces an existing and published method (Wiedemeier et al, 2013). building on previous work (Rodionov et al, 2006, Brodowski et al., Glaser et al.). Adapt wording throughout the text. L15: Explain why you think that none of the post-fire BC has been incorporated to the soil L16: Please explain why you choose to use the ratio B5CA:B6CA, and why you think it can be linked to condensation, age and processing. L25: "is arguably the least understood component of terrestrial C cycle" is spurious, there are many other components (microbial etc.), which we do not understand too well yet. Rephrase.

Recommended sentences have all been rephrased to improve clarity.

P16801 L14: "BC particles are composed of a refractory aromatic core and a reactive, oxidized patina" – this may not always be true, especially when considering fresh char.

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Please rephrase. L11-20: include some more recent publications, e.g. Keiluweit et al., 2010, Wiedemeier et al., 2014 L28: surface topography and geomorphology. Specify why you think that there is a difference between the two.

The statement was rephrased to, “Persistent BC particles in soils are composed of a refractory, aromatic core and a reactive, oxidized patina (Keiluweit et al., 2010; Lehmann et al., 2005) characterized by carbonyl and carboxyl functionalities (Cheng et al., 2008; Cheng et al., 2006).”, and “geomorphology” was removed.

P16802 L11: the list of methods is not extensive, therefore use “or” instead of “and”.

The suggested change was made.

P16803 L4-6: Probably you mean BC stocks and not BPCA stocks L17: Could you add the WRB names for the soils?

The suggested change was made to BC stocks, and the WRB names for the soils were added in the statement, “Soils in the montane forests are Alfisols from the great group cryoboralfs and Mollisols from the suborder ustolls (Peet, 1981).”

P16804-P16807: Shorten significantly 16808: "BPCA method validation" seems to be a simple quality check.

The section was shortened as suggested.

P16810 L6: BPCA are molecular markers, not biomarkers. L7: . . . higher proportion of more condensed BC

The suggested changes were made.

P16814 L20: The conclusion's section is extremely short and probably not complete.

Additional text was added to the conclusions section rephrasing the major findings of the manuscript.

Figure 1 Since you investigate the effect of topography, an elevation map would be

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more appropriate than airborne/satellite pictures.

The satellite pictures aid in showing the distribution of the vegetation so we have left the figure as is. If the editor requires, we can produce an elevation map as well.

Figure 3 Maybe separate litter visually a bit better from the two soil bars in order to guide the reader.

We feel the green color and indication of surface on the graph are adequate for making the litter distinct. None of the other reviewers commented on this, which suggests that the figure is sufficiently clear.

Table S1-S6 Remove the F-values and make sure you show what is mentioned in the caption, e.g. Table S5, B4CA:B6CA is not shown in the table.

F-values have been removed, and captions were updated.

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