

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

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(i) It is clear from the data presented that unburnt litter has a lot less pyrogenic carbon than litter from the burnt sites, which means that the pyrogenic carbon from previous fires has gone ‘somewhere’. The authors seem to favour erosional loss as the dominant mechanism for the difference, but its not clear to me why this mechanism is favoured over biotic/abiotic degradation/mineralization (possibly followed by leaching), given the 40-100 year fire return interval, which leaves plenty of time for both degradation and erosion. I don’t think its possible to pick between these possibilities based on the data presented, so I would recommend expanding the text to elaborate on the possibility that degradation also a plausible mechanism for loss. Over a few years, with resampling of the sites, it may well be possible to demonstrate that erosion is dominant in this

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environment, but this can’t be uniquely concluded to be the dominant mechanism from a single post-fire sampling. This probably also means softening/modifying some of the conclusions in the abstract as well as parts of the discussion.

Text on the potential for biotic and abiotic degradation mechanisms to contribute to BC losses in this system was added (pg 16813, new paragraph for loss mechanisms following discussion of potential rate of incorporation), and reference to preliminary data discussing the contribution of erosion on BC contents in the CLP was added as well as a reference that describes particulate black carbon export from the CLP following the HPF (Wagner et al. 2015). We have also softened the concluded loss mechanism in the abstract and discussion.

(ii) As I understand it, the BPCA technique likely under-estimates to pyrogenic carbon because the technique cannot completely break down large polyaromatic compounds. This is implied on pp16806 line 27 where conversion factors are mentioned but it should be explicitly stated that to stocks are likely under-estimated by a significant amount - its not a problem for the comparisons in this paper, because like is being compared with like, but it is important in terms of comparing this data with other techniques.

Text added to address this comment (page 16811 at the end of the first paragraph of the discussion) and reinforce the idea that BPCAs are markers for BC comparative analyses, but their measurement underestimates ‘true’ BC stocks.

(iii) The BPCA analyses were calibrated through an analysis of a ‘laboratory biochar’. Please provide further information on the characteristics of this char, and the degree to which it might be representative of natural bushfire chars

The laboratory char was combusted pine wood and details on its production have been added to the supplemental information.

(iv) can you add any information on the likely temperatures achieved in the fire at different intensities? This bears particularly on the recalcitrance of the pyrogenic carbon

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produced in the fire at different intensities, and probably on its observability by BPCA analysis. For example, it is possible that there was 'more' total PyC made during the high intensity fire, but less of it measured by BPCA analysis because a higher proportion was not liberated for analysis (ie a correction factor closer to 5 than 2.27. This might explain in part the apparent similarity of stocks between the medium and high intensity burn sites in the litter layer.

As for most of wildfires, we unfortunately do not have any data on the temperature of the fire, although the BPCA pattern is related to the highest temperature achieved, suggesting that, given the similar B6CA content and B5CA:B6CA ratio in moderate and highly burned litter, the temperatures of the fires may have been similar. Text to address this comment has been added (p 16814).

(v) it seems important to include information about whether the sites chosen are all sites of erosion rather than colluvial accumulation, the latter potentially being sites enhanced burial of pyrogenic carbon from previous fires?

It is true that the sites we sampled could experience erosion or accumulation, but given that our study was designed to test the effect of slope rather than landscape position we are unable to evaluate the effect of erosion versus accumulation in a balanced, replicated way. We've added text to the discussion of experimental design (p 16804) and discussion on the effects of slope (p. 16812) that addresses this comment.

Smaller things: Page 16801 line 2 – change in which to during which 16803 – 4 – highly is probably not the right word here 16803 – 7 – I think you means BPCA-C? 16803 – 13 – delete first occurrence of the 16811 – 25 – how many rain events of what magnitude? 16813 – 10 – this is a place where the erosion argument is made a bit strongly and could be reworded – there are others.

The suggested changes were made.

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