

## ***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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Received and published: 18 December 2014

Dear Claudia et al. We are happy to see that our method development was put to good use. The large dataset that you generated using the BC marker method is impressive. Moreover, the finding that the majority of post-fire BC persists in the litter and is probably easily transported elsewhere before incorporation into the soil could be of high interest to the BC community. We have a few technical comments: (1) The usage of a B5CA/B6CA ratio and interpretations about condensation could be better introduced and explained. For example, in the abstract, B5CA/B6CA is described as “less condensed to more condensed BC”, which is not fully correct because it actually is just a ratio of less carboxylated to more carboxylated building blocks of a part of BC (B3CA, B4CA exist, too) after BC digestion. There was a lot of work done recently,

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also by ourselves (Wiedemeier et al. 2015, Organic Geochemistry), where BPCA ratios (e.g. BPCA/TOC and B6CA/BPCA) could successfully and directly be linked to the aromaticity and condensation assessments of other methods. The paper that you cited (Rodionov et al. 2006) does not explicitly make this link nor mention BPCA ratios. Moreover, the postulated link in the manuscript between BPCA ratios and degree of processing is still a topic of research and the link between the ratios and age seems rather hypothetical (p 16803). (2) The fully factorial design of the study allows for a lot of statistics. However, as it is currently presented, it is hard to check if the used statistical methods (ANOVA and post-hoc (F-test?)) really aid data interpretation. Mentioning the number of replicates (also in figures/captions), conducting and showing the residual analysis and model plausibility of ANOVA (in supplement), including a table showing all data including BC (maybe in supplement or extending table 1), and a more transparent handling of statistics could enhance the credibility of the findings. For example, F-values do not add much information when p-values are shown and it is pretty risky to state that burn intensity and layer affect %C when their interaction is significant (p. 16807& table S1). (3) Generally, we think that the manuscript could considerably profit from focusing on the main story (post-fire BC distribution) while additional information can be given in the supplement and/or omitted. Shortening would be particularly useful in the Materials and Method section as it is very long, very descriptive and mostly published elsewhere in detail (e.g. density measurement, elemental, BPCA and statistical analysis). Moreover, the “BPCA method validation” has been published before (in our method paper and supplement), yielding the same CV’s and linearities on a variety of materials and can therefore be omitted or put into the supplement as a “BPCA setup check”. In contrast, some sections could potentially be slightly expanded, for example: Based on the entire BPCA distribution patterns (figure 3), could you distinguish litter BC from soil BC and what are the implications? Or why did you prefer slope as a factor instead of landform (0° can be on a peak or in a valley but with very different erosion characteristics)? We hope these few thoughts can contribute to your interesting and solid work. Best wishes, Ulrich Hanke and Daniel Wiedemeier

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Interactive comment on Biogeosciences Discuss., 11, 16799, 2014.

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