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Interactive comment on "Physicochemical changes in pyrogenic organic matter (biochar) after 15 months field-aging" *by* A. Mukherjee et al.

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Authors: We thank the reviewer for your generous time in reviewing this manuscript. We have made many changes to the manuscript in response to your criticisms and suggestions (revised manuscript file with track changes provided in 'Response to Reviewer #1'). In the below, we answer your comments point-by-point:

Reviewer 2 Comment #1: The paper addresses an interesting topic of research: how aging modifies the physicochemical properties of biochar. Even if the aim of the study is relevant and the results could be worthy of publishing, the paper presents some important limitations: The abstract and the introduction are a bit pretentious. The paper is presented as the "missing link" in biochar research. This is not in accordance with the actual results, which consequently leads the reader to disappointment. For instance,

the last sentence of the introduction states: "The overarching goal of this project was to understand how biochar amendments of different types affect soil chemistry and thus, fertility and C sequestration over longer timescales and to identify the types of biochar which may be better suited to specific purposes or soil types", unfortunately, this generalist objective is not achieved with this study. Authors' response: We are sorry that this was the tone picked up by the reviewer. We have carefully looked over the wording in these sections and cannot find any statement which, to us, reads as pretentious or presents the work as 'the missing link' to any greater extent than any other scientific which should always have the goal of filling some gap in understanding in a field. We also don't feel we can be faulted for stating our overarching goal, regardless of whether you think that goal was in whole or in part achieved.

Reviewer 2 Comment #2: Some of the most important conclusions (highlighted in the abstract) are based on measurements without replication. Although there is a considerable number of analysis and some general trends could be discussed, the study is statistically weak. For instance, CEC, AEC and NMR analysis were only performed in one of the treatments (they lack experimental replication and only have analytical duplication).

Authors' response: This is discussed in detail in the responses to reviewer #1. In short, most conclusions were based upon duplicate analyses of samples from duplicated treatments. It is not at all uncommon for NMR analyses to not be duplicated due to the cost and time required for these.

Reviewer 2 Comment #3: The most important drawback is the lack of novelty of the results and conclusions that can be extracted from the paper.

Authors' response: This is discussed in detail in the responses to reviewer #1. In short, we strongly object to this statement and feel that both the method and many of the results are indeed novel.

Reviewer 2 Comment #4: There are many hypotheses and speculations with no data

to support those hypotheses. Moreover, a big part of the results have been already published somewhere else.

Authors' response: This is discussed in detail in the responses to reviewer #1. In short, we feel there are both some strong some speculative conclusions in the manuscript, that latter always couched with terms such as 'likely' and 'suggest that'. We have revised the text to make these distinctions even more clear where we could. However, it is impossible to respond to criticisms that are made without reference to any specific claim or section of the text. We also do not agree that these results have been published previously. While there have been a few studies that used controlled field-incubations of biochar, none that simultaneously looked at multiple soil and biochar types, none that simultaneously incubated biochar alone and biochar-soil mixtures and none that used the additive approach to quantify interactive effects. As for findings, previous studies did not see microbial colonization of biochar surfaces whereas we did. We also see a number of clear chemical shifts during aging that have not been observed previously such as the development of AEC (among all treatments – 8 samples), and increases in substituted aromatic funtional groups (all 4 samples examined.

Interactive comment on Solid Earth Discuss., 6, 731, 2014.