

SOIL Discuss., referee comment RC1
<https://doi.org/10.5194/soil-2021-146-RC1>, 2022
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Comment on soil-2021-146

Anonymous Referee #1

Referee comment on "Identification of thermal signature and quantification of charcoal in soil using differential scanning calorimetry and benzene polycarboxylic acid (BPCA) markers" by Brieuc Hardy et al., SOIL Discuss.,
<https://doi.org/10.5194/soil-2021-146-RC1>, 2022

This paper tests the potential for differential scanning calorimetry (DSC) to be able to quantify char in soils in the presence of soil organic matter using a range of soils with and without historical inputs of char from 19th century charcoal kilns. A subset of the results have been benchmarked against BPCA analyses of the same samples. The results suggest that DSC does have considerable potential as a rapid low-cost tool for charcoal/biochar quantification in complex soil matrices. The results also suggest that a range of correction factors likely exist for converting BPCA analyses to 'total' char amounts.

This is a very well conducted, thoughtful, and well explained study that does add another technique to the BC/char/biochar analytical toolbox. It is particularly useful because it provides a rather nuanced view across the entire continuum of pyrogenic products rather than focusing on a narrow analytical window like many techniques. I have very little to criticize in the work, with the caveat that I am not an expert in the application of either DSC or BPCA analysis. I have made a number of grammatical and typographical suggestions on the pdf attached.

Some small points:

L59 – text in relation to NMR is not really necessary here?

L132 – the carbonate correction is not clear – elaborate

L155 – not clear what 'vertical drop' means here

L230 – not sure which direction the difference is here from the text alone – clarify

L231 and elsewhere – dots or commas to indicate decimal places?

L271 – not entirely sure 'crystallinity' is the term to use here, but I guess its OK?

L272 – stability also depends on ash content (McBeath, A.V., et al. 2015. Influence of feedstock properties and pyrolysis conditions on biochar carbon stability as determined by hydrogen pyrolysis. *Biomass and Bioenergy*, 73, pp.155-173.)

L392 – with regard to EGA – define acronym at first use, and – I wonder if you would simply get a different set of issues related to differing O₂ access?

Please also note the supplement to this comment:

<https://soil.copernicus.org/preprints/soil-2021-146/soil-2021-146-RC1-supplement.pdf>