EGU23-17040, updated on 01 Jun 2023
https://doi.org/10.5194/egusphere-egu23-17040
EGU General Assembly 2023


# Impact of biomass ash content on biochar carbon speciation and stability

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Amending biomass with wood ash (2-10%) is a novel strategy in biochar production to increase the amount of biomass carbon retained in the solid phase (biomass to biochar) during pyrolysis by up to 35%. Thereby, the carbon sink potential of industrial biochar production could be substantially increased, when such ash-amendments would be used on large scale. Also, this research enables insight on the impact of ash-derived minerals on the resulting carbonaceous compounds during pyrolysis. In addition to pyrolysis conditions and initial biomass carbon speciation, the content of alkali and alkaline earth metals (AAEM) in the biomass ash phase may be another important factor determining the speciation of the resulting pyrogenic carbon. Here, we will present data on the thermal stability analyzed with differential scanning calorimetry and the carbon speciation of ash-amended biochars investigated with 13C and 1H Nuclear Magnetic Resonance spectroscopy.

Differential scanning calorimetry revealed a lower thermal stability of these ash-amended biochars compared to biochars without an ash amendment, which may indicate the formation of carbon species of lower persistence during pyrolysis induced by the added minerals. While the persistent carbon pool of biochar is made of numbers of fused aromatic carbon rings, the semi-persistent carbon pool is including aliphatic, small aromatic and heteroaromatic carbon frameworks. Therefore, analyzing the differences in carbon speciation of ash-amended biochars compared to non-amended biochar gives a closer insight on the impact of AAEM and other ash components on pyrogenic carbon speciation and how resulting biochars may persist in soil.