

Strategies for effective soil carbon sequestration through synergies in pyrogenic carbon, charcoal and biochar research

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Pyrogenic carbon (PyC) from natural and anthropogenic sources are of major global importance as a net sink for CO₂. Wildfire which affects 300 Mha globally accounts for most natural PyC and may be an increasing source in the future. Charcoal (i.e. PyC derived from wood pyrolysis) and its by-products have been produced in rural and industrial settings and used for fuel and in agriculture for millennia. Modern production of PyC from waste biomass for use as a beneficial soil additive (biochar) could increase the global PyC sink and, in a managed way, contribute to global carbon abatement.

The drivers for research of biochar, charcoal and wildfire PyC research differ in their context and history. Consequently work has been carried out largely in isolation, despite significant commonality in formation, function and relevant properties.

This session will highlight synergies by which definition of effective soil carbon storage strategies can be accelerated. The purpose is to achieve common understanding of terminology, techniques and resources present in each community, with the overall objective of facilitating carbon sequestration by effective PyC production and use in soil.

The purpose of the session is to: (i) catalyse new cross-disciplinary collaboration, (ii) define a proposal for a future dedicated meeting and (iii) compile recent integrative work as a special issue in an international journal.

Examples of suitable topics for abstract submission include:

- Studies of the material stability of PyC in the natural environment, drawing on studies of the relationship between biomass carbon composition, biomass mineral elements, thermal history, depositional environment, perturbation on rates of loss; these could be comparative or quantitative; they might cross-infer between biomass that has been historically charred naturally or deliberately and those economic for large-scale biochar production.
- Insights into the fundamental process of ageing on the degradation of PyC from biological, chemical and physical perspectives and a range of emergent methods.
- Studies of the scale of the natural charcoal cycle, current patterns of charcoal production and use in fuel and soil, from spatial, economic and sustainability perspectives may be included.
- Movement of charcoal through and across soil by erosive or hydrologic transport, including identification of its long term environmental sinks.
- Advances in laboratory techniques for defining and distinguishing different types of charcoal and distinguishing charcoal from other forms of black carbon.