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Charcoal in the soil and the Earth System

A. C. Scott
Department of Earth Sciences, Royal Holloway University of London, Egham, United Kingdom (a.scott@es.rhul.ac.uk)

Charcoal occurs in the natural environment as either a result of wildfire or volcanic processes. Charcoal is one of a range of pyrolysis products that may be included in the term black carbon. This paper outlines aspects of charcoal formation (both natural and experimental) and briefly considers the taphonomic processes leading to a final assemblage. This is done using examples from recent fires and through experimentation. In particular, it is shown that the temperature of charcoal formation may influence the rate of subsequent decay. This has significance for biochar studies. While charcoal may remain near the place of it's formation and be buried in soils it still may be affected by physical and chemical changes that result in fragmentation and subsequent loss to the soil. Charcoal may also be washed out of the fire site by overland flow particularly if the rain occurs soon after the fire. Charcoal is abundant in many sedimentary rocks deposited in a wide range of environments, from terrestrial to marine. Charcoal has a long fossil record and is found in rock sequences from the late Silurian onwards. Charcoal provides evidence of the deep time history of wildfire. There is an intimate relationship between the history of oxygen in the atmosphere and periods of extensive wildfires. High atmospheric oxygen levels (around 30%) in the late Palaeozoic and Cretaceous had a profound effect on the Earth System. The use of charcoal for plant evolution studies, fire history studies, vegetation studies, anatomical studies, climate and atmospheric studies and the wider importance of charcoal for the Earth and Biological Sciences will be considered (Scott 2010, Glasspool and Scott in press). Charcoal is information-rich but yet is an under-utilized resource.
References:
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