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# Experimental Approaches to Understanding Ancient Ecosystems Flammability

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Fire is a natural process integral to the order and function of our planet. It produces unique products that interact with its carbon and nutrient balance. Fires are a significant source of atmospheric carbon dioxide and assist in the regulation of the oxygen content of our atmosphere. Natural fires have occurred on our planet for ∼420 million years, where even the first tiny land plants were capable of being ignited and carrying a fire.

Evidence for such fires comes from the record of fossil charcoal found, often abundantly, in ancient sediments. Fossil charcoal provides an exceptional means to record not only probable variations in ancient fire activity but also information about ancient plants, not least owing to its three-dimensional preservation of plant anatomy. However, fossil charcoal like all fossils is subject to taphonomic biases which mean that it is hard to decipher exactly what an abundance of charcoal means in the context of fire histories, ancient fire dynamics and ecosystems flammability.

Fires require 3 basic ingredients; these are an ignition source, fuel to burn and a source of oxygen. We can therefore consider how variations in the past concentration of atmospheric oxygen and how the evolution of different plant groups and the types of fuel that they provide have influenced fire activity throughout geological time. By going back to basics we can design experiments that assess the fundamental behaviour of fire and the flammability of different fuels. Here I will present some experimental approaches that cross-cut a variety of disciplines within the fire sciences which aim to enhance our understanding of the interplay between fuel variations and past atmospheric composition on broad trends in ancient fire activity.