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## Quantifying the Pyrocene: How Important is Fire to Life on Earth?

**Claire Belcher**

wildFIRE Lab, Global System's Institute, University of Exeter, Exeter, UK (c.belcher@exeter.ac.uk)

Fire and vegetation have a dual interaction with each other, whilst also both influencing the environment and atmosphere. For example, fire regimes are themselves controlled by atmospheric conditions, atmospheric composition, climate and the type of vegetation. Whilst, the effects of fires, the products and emissions they generate influence biogeochemical cycles and long-term Earth system processes through their impacts on nutrient cycles and by altering the composition and distribution of biomes. Hence fire is more than a simple agent of disturbance and has a multitude of complex feedbacks.

Wildfires have shaped our ecosystems and Earth system processes for some 420 million years. For example the presence of and changes in fire frequency and behaviour on evolutionary timescales has influenced the physiological traits of plants such that many ecologists have interpreted them as adaptations to fire. For example, serotiny in the Pine lineage is believed to have evolved millions of years ago in the Late Cretaceous period, where wildfires were both frequent and intense. Such traits seemingly continue to allow some plants to succeed in fire prone areas. However, humans have entirely altered ignition patterns, with some 95% of fires being started by man; we have altered the connectivity of fuels in landscapes, species composition and fuel structure. Yet we have limited understanding to what extent we have disrupted fire feedbacks to the Earth system. This lies in large part because we have not yet well understood what natural feedbacks fire has had on our planet throughout its history.

In this talk I will explore some of the critical history of fire and some of the processes that fire appears to regulate in order to pose the question - are fires a critical resource that secures the long-term balance of the Earth system that keeps our planet habitable to man?