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Using near-infrared reflectance spectroscopy to investigate the effects of a moorland wildfire in the uplands of the UK

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Reflectance spectroscopy has been used to predict a range of soil parameters including organic matter composition, soil carbon concentrations, and soil respiration. Its use as a low cost, rapid and non-destructive method also makes it highly favourable when investigating soil properties. Reflectance spectra contain information that reflects the composition of the sample. This technique can also be used to investigate modifications to the organic structure by external influences such as fire. Reflectance spectroscopy has also been shown to be a good at estimating maximum temperatures reached during a fire.

Wildfires can burn “cool” burning only vegetation and creating char, but wildfires may also burn into the litter and soils layers and thus release accumulated carbon, i.e. they burn “hot”. In practice wildfires will have both “hot” and “cool” spots. If we are to understand the carbon budget of fires we need to understand the changes in severity within a wildfire and how that relates to the fate of carbon in the biomass, litter and soil.

Here we use diffuse near infrared reflectance spectroscopy as part of a multi-disciplinary approach to understand the effects of a wildfire in the UK uplands. The study has surveyed the site of a wildfire and compared results for soils, vegetation, litter and char with results of laboratory experimental burning in order to understand the processes of burning and the fate of carbon reserves.