Predicting fire impact from plant traits?

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Fire can considerably increase the landscape's vulnerability to flooding and erosion, which is in part caused by fire-induced soil heating, vegetation removal and resulting hydrological changes. While the magnitude of these fire effects and ecosystem responses is frequently studied, there is still little attention for the fundamental mechanisms that drive these changes. One example is on the effect of plants: while it is known that plants can alter the fire environment, there is a major knowledge gap regarding the fundamental mechanisms by which vegetation mediates fire impact on soil and hydrology. Essential to identifying these mechanisms is consideration of the effects of vegetation on flammability and fire behaviour, which are studied both in ecology and traditional fire science. Here we discuss the challenges of integrating these very distinct fields and the potential benefits of this integration for improved understanding of fire effects on soil and hydrology. We furthermore present results of a study in which we assessed the spatial drivers controlling the proportion of live and dead fuel in a natural park in northern Portugal, and evaluated the impacts on the spatial variability of fire behaviour and potential soil heating using BehavePlus modeling. Better understanding of the role of (spatial variability in) plant traits on fire impact can facilitate the development of risk maps to ultimately help predict and mitigate fire risk and impact across landscapes.