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Fuel, wildfire danger and behaviour modelling: state of the art and medium-term prospects

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Fire dynamics play an essential role in the emissions of greenhouse gases and char formation from vegetation fires. Fire dynamics are controlled by multiple factors, being the most important ones the biomass characteristics and the atmospheric and topographical conditions under which the fire is spreading. The study and characterization of these factors and their link to fire behaviour has allowed the researchers in this field to: classify vegetation types and to define vegetation models that give us information on how the fire will behave in such structures; develop mathematical models for fire behaviour prediction and forecast fire danger in order to be able to take preventive actions. All this information can be used to quantify and classify black carbon and GHG released from forest fires and to predict fire severity. This paper provides a summary of the current state of the art on fuel and fire behaviour modelling and on the most advanced fire danger rating systems. We particularly pay attention to the advantages and drawbacks of the different fuel, fire behaviour and fire danger models and we finally discuss the future envisaged research directions that this field may take in the medium-term.