Incorporating solar radiation into the litter moisture model in the Canadian Forest Fire Danger Rating System

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The Canadian Forest Fire Danger Rating System (CFFDRS) is used throughout Canada, and in a number of countries throughout the world, for estimating fire potential in wildland fuels. The standard fuel moisture models in the CFFDRS are representative of moisture in closed canopy jack pine or lodge pole pine stands. These models assume full canopy closure and do not therefore account for the influence of solar radiation and thus cannot readily be adapted to more open environments. Recent research has seen the adaptation of the CFFDRS's hourly Fine Fuel Moisture Code (FFMC) model (which represents litter moisture) to open grasslands, through the incorporation of an explicit solar radiation term. This current study describes more recent extension of this modelling effort to forested stand situations. The development and structure of this new model is described and outputs of this new model, along with outputs from the existing FFMC model, are compared with field observations. Results show that the model tracks the diurnal variation in actual litter moisture content more accurately than the existing model for diurnal calculation of the FFMC in the CFFDRS. Practical examples of the application of this system for operational estimation of litter moisture are provided for stands of varying densities and types.