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‘Fire and Forest Meteorology’

Edited by TJ Brown, BE Potter and MD Flannigan

This issue is dedicated to Sue A Ferguson

Preface

Timothy J. Brown, Brian E. Potter and Mike D. Flannigan
International Journal of Wildland Fire **16**, iii

Climatological and statistical characteristics of the Haines Index for North America
Julie A. Winkler, Brian E. Potter, Dwight F. Wilhelm, Ryan P. Shadbolt, Krerk Piromsopa and Xindi Bian
International Journal of Wildland Fire **16**, 139–152

A 40-year climatology of a widely-used fire weather index, the Haines Index, is provided for North America to assist fire managers in interpreting and evaluating wildland fire forecasts for their location.

Impact of climate change on area burned in Alberta's boreal forest
Cordy Tymstra, Mike D. Flannigan, Owen B. Armitage and Kimberley Logan
International Journal of Wildland Fire **16**, 153–160

What impact will climate change have on fire activity in Alberta's boreal forest? The present paper attempts to answer this question by using a fire growth simulation model called *Prometheus* to estimate the area burned for three climate change scenarios. The Canadian Regional Climate Model was used to generate the model input weather streams. A trend towards an increasing area burned was estimated.

Modelling the probability of sustained flaming: predictive value of fire weather index components compared with observations of site weather and fuel moisture conditions
Jennifer L. Beverly and B. Mike Wotton
International Journal of Wildland Fire **16**, 161–173

Data from experimental test fires in 10 different fuel categories were used to compare models of the likelihood of sustained flaming based on site weather and fuel moisture measurements with models based on fire weather index components. Results indicated that fire weather index components are highly effective at predicting the probability of sustained flaming.

Fire-growth modelling using meteorological data with random and systematic perturbations
Kerry Anderson, Gerhard Reuter and Mike D. Flannigan
International Journal of Wildland Fire **16**, 174–182

Random and systematic perturbations in meteorological observations and forecasts are applied to a fire-growth model to quantify the effects of their uncertainty. The study shows that random perturbations captured fire shape changes due to small-scale variations lost in the hourly data, while systematic perturbations corrected for the over-prediction of daily fire growth based on typical weather forecasts.

Coupled influences of topography and wind on wildland fire behaviour
Rodman Linn, Judith Winterkamp, Carleton Edminster, Jonah J. Colman and William S. Smith
International Journal of Wildland Fire **16**, 183–195

Ten simulations were performed with the HIGRAD/FIRETEC model to explore the potential extent of the coupling between the fire, atmosphere, and topography. The ten simulations include five topographies and two ambient wind speeds. Analyses of these simulations reveal where point-functional models might be sufficient, and where topographically modified wind fields or coupled fire and transport models are necessary.

Local-scale modelling system to simulate smoke dispersion
Joana Valente, Ana I. Miranda, António G. Lopes, Carlos Borrego, Domingos X. Viegas and Myriam Lopes
International Journal of Wildland Fire **16**, 196–203

The main purpose of this paper is to present a fire behaviour system, developed to estimate fire progression, smoke dispersion and visibility impairment, at a local scale, and to evaluate its performance comparing results with measurements from experimental field fires.

Application of the Nelson model to four timelag fuel classes using Oklahoma field observations: model evaluation and comparison with National Fire Danger Rating System algorithms
J. D. Carlson, Larry S. Bradshaw, Ralph M. Nelson Jr, Randall R. Bensch and Rafal Jabrzemski
International Journal of Wildland Fire **16**, 204–216

This paper describes the application of a next-generation dead fuel moisture model, the ‘Nelson model’, to four timelag fuel classes using an extensive 21-month data set of dead fuel moisture observations. Including all observations, the Nelson model showed improvement over National Fire Danger Rating System (NFDRS) algorithms for each fuel size class (1-h, 10-h, 100-h, and 1000-h); however, NFDRS outperformed the Nelson model for 1-h fuels when observed fuel moisture values were at or below 30%.

Fire danger rating in the United States of America: an evolution since 1916 Colin C. Hardy and Charles E. Hardy <i>International Journal of Wildland Fire</i> 16 , 217–231	This paper traces the evolution of fire-danger rating in the United States, including discussions of significant development milestones, innovative instrumentation, and a succession of analog fire-danger meters, or calculators. Pioneering work began as early as 1916, and efforts continue today towards implementation of a ‘purely analytical system’.
Relationships between seasonal patterns of live fuel moisture and meteorological drought indices for Mediterranean shrubland species G. Pellizzaro, C. Cesaraccio, P. Duce, A. Ventura and P. Zara <i>International Journal of Wildland Fire</i> 16 , 232–241	Seasonal patterns of live fuel moisture content and their relationships with changes of environmental conditions (i.e. rainfall, air temperature and soil moisture) were analyzed. Seasonal trends of moisture content were compared with five meteorological drought indices. The capability of these indices to describe moisture variations of each species was evaluated.
Precipitation associated with lightning-ignited wildfires in Arizona and New Mexico Beth L. Hall <i>International Journal of Wildland Fire</i> 16 , 242–254	Natural wildfire ignitions are often attributed to ‘dry’ lightning, or lightning with little or no precipitation. This study used gridded precipitation data to compare the amount of precipitation associated with natural wildfires and the amount of precipitation associated with lightning strikes that were not associated with natural wildfire events.
