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IX International Conference on Forest Fire Research and 17th International Wildland Fire Safety Summit Special Issue

Contents

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Foreword: IX International Conference on Forest Fire Research and 17th International Wildland Fire Safety Summit: introduction to special issue (Part 3)

Luís Mário Ribeiro, Domingos Xavier Viegas and Miguel Almeida
International Journal of Wildland Fire **32**, 819–822

Part 3 of the special issue that resulted from the 9th International Conference on Forest Fire Research includes 15 papers on various aspects of wildland fire research. Part 1 and 2 were published in January and March 2023, respectively. All papers in the special issue are published Open Access.

KAPAS II simulation of peatland wildfires with daily variations of peat moisture content

Dwi M. J. Purnomo, Sebastian Apers, Michel Bechtold, Parwati Sofan and Guillermo Rein
International Journal of Wildland Fire **32**, 823–835

This paper presents a cellular automata model to simulate flaming and smouldering wildfires in peatlands over long duration, which, for the first time, considers daily variations in peat moisture. The model reveals that smouldering burned area varies widely depending on the daily variations in moisture.

Evaluation of new methods for drought estimation in the Canadian Forest Fire Danger Rating System

Chelene C. Hanes, Mike Wotton, Laura Bourgeau-Chavez, Douglas G. Woolford, Stéphane Bélair, David Martell and Mike D. Flannigan
International Journal of Wildland Fire **32**, 836–853

Drought in fire danger rating is often estimated using weather-based models. The following study explores the potential to supplement drought estimates with soil moisture content measurements from electronic soil moisture probes, and estimates from land surface models that include remotely sensed soil moisture within the boreal forests of Canada.

A satellite-based burned area dataset for the northern boreal region from 1982 to 2020

José-Andrés Moreno-Ruiz, José-Rafael García-Lázaro, Manuel Arbelo and Pedro A. Hernández-Leal
International Journal of Wildland Fire **32**, 854–871

This work describes the development and validation of a burned area product at a spatial resolution of 0.05° (~5 km) for the boreal region between 60°N and 72.5°N from 1982 to 2020. This satellite-based dataset constitutes unique long-term burned area information of interest for fire and carbon dynamics studies.

Wind vector change and fire weather index in New Zealand as a modified metric in evaluating fire danger

Siena Brody-Heine, Jiawei Zhang, Marwan Katurji, H. Grant Pearce and Michael Kittridge
International Journal of Wildland Fire **32**, 872–885

Vector wind change was explored with station and gridded data over New Zealand and compared with the Fire Weather Index. Vector wind change was used to create a modified Fire Weather Index that incorporates sudden wind changes into fire danger prediction.

Testing simple approaches to map sediment mobilisation hotspots after wildfires

Joana Parente, João Pedro Nunes, Jantiene Baartman and Dante Föllmi
International Journal of Wildland Fire **32**, 886–902

This study tests three different erosion prediction tools to identify areas with erosion rates above the 95th percentile, in the first year after a fire, and which required recalibration based on fire characteristics.

Modelling sorption processes of 10-h dead *Pinus pinaster* branches

Sérgio Lopes, Sandra Santos, Nuno Rodrigues, Paulo Pinho and Domingos Xavier Viegas
International Journal of Wildland Fire **32**, 903–912

Forest fuel moisture content is an important parameter that determines fire risk; therefore, its accurate prediction has great importance. Sorption processes of 10-h *Pinus pinaster* branches were studied based on field and laboratory work, resulting in a model that showed a high moisture content prediction ability.

Effects of fuel bed structure on heat transfer mechanisms within and above porous fuel beds in quiescent flame spread scenarios
Zakary Campbell-Lochrie, Carlos Walker-Ravena, Michael Gallagher, Nicholas Skowronski, Eric V. Mueller and Rory M. Hadden
International Journal of Wildland Fire **32**, 913–926

Effects of fuel structure on physical phenomena controlling flame spread is complicated by the porous nature of wildland fuels. This study experimentally investigates heat transfer in pine needle fuel beds (across a range of fuel structural conditions) in order to characterise these effects and the resulting variations in fire behaviour.

Influence of fuel structure on gorse fire behaviour
Andres Valencia, Katharine O. Melnik, Nick Sanders, Adam Sew Hoy, Mozhi Yan, Marwan Katurji, Jiawei Zhang, Benjamin Schumacher, Robin Hartley, Samuel Aguilar-Arguello, H. Grant Pearce, Mark A. Finney, Veronica Clifford and Tara Strand
International Journal of Wildland Fire **32**, 927–941

We carried out controlled gorse burning experimentsusing specialised drone-mounted instrumentation to measure fire movement and duration. We then compared the results with detailed maps of vegetation height measured before the experiment. The results provide new insight on the role of the arrangement of vegetation in the development of wildfires.

Nature-based solutions to wildfires in rural landscapes of Southern Europe let's be fire-smart!
Adrián Regos, Silvana Pais, João C. Campos and Judit Lecina-Diaz
International Journal of Wildland Fire **32**, 942–950

The FirESmart project sheds light on how renewed EU agroforestry policies could benefit open habitat dwelling species while providing further fire suppression opportunities. If these policies continue to fail, the use of fire can enhance ‘climate-smart’ strategies such as ‘rewilding’ or ‘tree-planting’ in mountain areas across Southern Europe (https://youtu.be/x7ouTIBp_E).

Field and laboratory analysis of the junction fire process in the catastrophic fire of Pedrógão Grande in June 2017
Domingos X. Viegas, Carlos Ribeiro, Miguel Almeida, Paulo Pinto, Luís M. Ribeiro and Álvaro Silva
International Journal of Wildland Fire **32**, 951–967

Two fires that started near Pedrógão Grande in June 2017 were affected by the presence of a thunderstorm in the region, spread out of control and merged, producing a very fast spreading fire. A laboratory scale study of this fire showed good qualitative and quantitative agreement with the full-scale observations.

Influence of combined hydric and thermal stresses on *Rosmarinus officinalis* and *Cistus albidus*
Rawaa Jamaladdeen, Bruno Coudour, Fabienne Dédaldéchamp, Laurent Lemée, Florence Thibault, Jean-Pierre Garo and Hui-Ying Wang
International Journal of Wildland Fire **32**, 968–978

Wildfires are a growing threat, especially in Mediterranean climate areas during periods of drought. However, knowledge about the effect of wildfire stresses on plants remains lacking. This work addresses the effect of combined hydric and thermal stresses on *Rosmarinus officinalis* and *Cistus albidus*, which are widely consumed in Mediterranean wildfires.

A comparative study of the combustion dynamics and flame properties of dead Mediterranean plants
A. Sahila, H. Boutchiche, D. X. Viegas, L. Reis and N. Zekri
International Journal of Wildland Fire **32**, 979–988

Combustion characteristics of dead Mediterranean vegetation were studied in the absence of wind. Anomalous relaxation of the fuel's mass accompanied by anomalous diffusion of gas particles was observed during flaming combustion. The fuels’ combustion characteristics (burning rate, flame height and temperature, gas velocity) and relaxation properties were analysed and compared.

Burnover events identified during the 2018 Camp Fire
Eric D. Link and Alexander Maranghides
International Journal of Wildland Fire **32**, 989–997

A post-fire case study of the 2018 Camp Fire identified 23 entrapment and burnover events that threatened the life safety of evacuating civilians and responding emergency personnel. The high number of events within one fire incident suggests this may be a more frequent issue specifically in the context of WUI fires.

Intermittent fireline behaviour over porous vegetative media in different crossflow conditions
Abhinandan Singh, Reza M. Ziazi and Albert Simeoni
International Journal of Wildland Fire **32**, 998–1010

Fundamental fire behaviour during flame spread across a pine needle bed was investigated, focusing on the dynamic nature of fire and how this impacts fire spread using cameras, temperature, and velocity. Intermittent flame spread is observed in the form of leaps caused by point ignitions due to flame contact.

Evaluating wildfire vulnerability of Mediterranean dwellings using fuzzy logic applied to expert judgement

Alba Àgueda, Pascale Vacca, Eulàlia Planas and Elsa Pastor

International Journal of Wildland Fire **32**, 1011–1029

A tool for the quantitative assessment of dwellings vulnerability to wildfire at the wildland–urban interface is presented. Structural vulnerabilities and fire spread through the fuels present on the property are tackled through a fuzzy logic approach informed by expert opinion. The tool is tested against real-world data taken from two case studies of WUI fires in Spain.

El Pont de Vilomara fire (Spain, July 2022) impacted the wildland–urban interface. See Águeda *et al.* pp. 1011–1029. Image by Sergi Boixader.