



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

Contents

Volume 32 Issue 11 2023

Foreword: IX International Conference on Forest Fire Research and 17th International Wildland Fire Safety Summit: introduction to special issue (Part 4)

Mike Flannigan, Domingo Xavier Viegas and Luís Mário Ribeiro
International Journal of Wildland Fire 32, 1489–1491

Performance of operational fire spread models in California

Adrián Cardil, Santiago Monedero, Phillip SeLegue, Miguel Ángel Navarrete, Sergio de-Miguel, Scott Purdy, Geoff Marshall, Tim Chavez, Kristen Allison, Raúl Quilez, Macarena Ortega, Carlos A. Silva and Joaquín Ramírez
International Journal of Wildland Fire 32, 1492–1502

Fireline production rate of handcrews in wildfires of the Spanish Mediterranean region

Macarena Ortega, Francisco Rodríguez y Silva and Juan Ramón Molina
International Journal of Wildland Fire 32, 1503–1514

Numerical simulation of the aerial liquid drops of the Canadair CL-415 and the Dash-8 airtankers

Corentin Calbrix, Alexei Stoukov, Axelle Cadière, Benoit Roig and Dominique Legendre
International Journal of Wildland Fire 32, 1515–1528

Assessing the role played by meteorological conditions on the interannual variability of fire activity in four subregions of Iberia

Sílvia A. Nunes, Carlos C. DaCamara, José M. C. Pereira and Ricardo M. Trigo
International Journal of Wildland Fire 32, 1529–1541

Laboratory benchmark of low-cost portable gas and particle analysers for smouldering wildfires

Wuquan Cui, Simona Dossi and Guillermo Rein
International Journal of Wildland Fire 32, 1542–1557

Systematising experts' understanding of traditional burning in Portugal a mental model approach

Mayara Emilia Barbosa Souza, Abílio Pereira Pacheco and Jorge Grenha Teixeira
International Journal of Wildland Fire 32, 1558–1575

Physics-based modelling for mapping firebrand flux and heat load on structures in the wildland-urban interface

Amila Wickramasinghe, Nazmul Khan, Alexander Filkov and Khalid Moinuddin
International Journal of Wildland Fire 32, 1576–1599

Part 4 of the special issue that resulted from the 9th International Conference on Forest Fire Research includes 10 papers on various aspects of wildland fire research. Parts 1, 2 and 3 were published in January, March and June 2023, respectively. All papers in the special issue are published Open Access.

This work analyses the performance of automated fire spread models used in California operationally to predict initial fire spread across landscapes. The models are accurate enough to be used in real-time operations to support preparedness and response actions, although new enhancements are desirable, especially to simulate fires in timber areas.

This study aims to assess handcrew fireline production rates empirically on wildfires in southern Spain. Handcrew fireline production rate increases with direct attack, fuel types with low loads, aerial support and fire containment success. However, it decreases with longer working times and larger fire and crew sizes.

A numerical investigation of liquid (water and retardant) drop from Canadair CL-415 and Dash-8 airtankers is presented. Numerical simulations are reported for the tank discharge as well as for the description of the liquid cloud, characterised by vertical penetration of the liquid, its lateral expansion and the process of atomisation.

A statistical model is used to assess the role played by atmospheric conditions on wildfire activity in the Iberian Peninsula as measured by the Fire Radiative Power (FRP) released by vegetation fires. The largest effects are observed in the regions where climate change is expected to have a pronounced impact.

We compared measurements from three low-cost portable air quality sensors with research-grade instruments for gas and particle emissions in smouldering wildfires. We found that two sensors, KANE101 and SDS011, can be used in the field after calibration, and increase understanding of using low-cost and portable emission sensors for wildfire measurements.

Traditional burning is used worldwide, but the improper and negligent use of fire has led to association of this practice with rural fire ignitions and negative impacts. A mental model approach was used to systematise motivations, alternative solutions, associated risks, potential impacts and activities leading to a successful burn.

A physics-based study was conducted to quantify firebrand and radiative heat flux on structures in *Eucalypt* forests. A logarithmic relationship was found between radiative heat flux and firebrand flux. The results assist in improving building construction requirements to mitigate wildfire risk on houses at the wildland-urban interface.

Parametric evaluation of heat transfer mechanisms in a WUI fire scenario

Cesare Fiorini, Hélder D. Craveiro, Aldina Santiago, Luís Laím and Luís Simões da Silva

International Journal of Wildland Fire **32**, 1600–1618

On the interaction of wind, fire intensity and downslope terrain with implications for building standards in wildfire-prone areas

Ali Edalati-nejad, Maryam Ghodrat and Jason J. Sharples

International Journal of Wildland Fire **32**, 1619–1632

Effects of the wildfires in August 2021 on the air quality of Athens through a numerical simulation

Tobias Osswald, Carla Gama, Ana Patrícia Fernandes, Diogo Lopes, Vassiliki Varela and Ana Isabel Miranda

International Journal of Wildland Fire **32**, 1633–1645

WUI fires are becoming more catastrophic as they are associated with the effects of climate change and human activities. Understanding heat transfer mechanisms from forest fires and how structures ignite is crucial for the definition and implementation of new strategies and techniques, enabling a Performance-Based Design (PBD) approach.

Numerical simulations were used to investigate the impacts of wind, fire intensity and downslope inclination interactions on the heat exposure of an idealised building structure. At higher wind speeds, buildings on steeper downslopes were at higher risk of wildfire impacts. These results are at odds with current Australian building standards.

Air quality deteriorates significantly during wildfire events. The numerical modelling system WRF-APIFLAME-CHIMERE was applied to estimate the impact of the 2021 August wildfires on the air quality of Athens. Calculated values indicate concerning levels of air pollution during the wildfires with potential impacts on health.



16th INTERNATIONAL CONFERENCE ON
FOREST FIRE RESEARCH
& 17th International Wildland Fire Safety Summit



International
Association
of Wildland Fire

11–18 November 2022 - Coimbra, Portugal
www.adai.pt/icffr



Artist impression of the spread of wildfire smoke from wildland to urban areas. See Cui *et al.* pp. 1542–1557. Image by Cecily Liu.