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

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ABSTRACT

The 9th International Conference on Forest Fire Research, organised by the Forest Fire Research Center of the Association for Developmental of Industrial Aerodynamics every 4 years since 1990, was held in November 2022 in Coimbra, Portugal. The conference was held in conjunction with the 17th International Wildland Fire Safety Summit, sponsored by the International Association of Wildland Fire. The number and quality of the submissions for this joint event was very high, and the authors were encouraged to submit a full paper to a special issue of the *International Journal of Wildland Fire* (IJWF). Given the large number of submissions, the Journal decided to publish the special issue in four parts. Part 1 was published in January 2023, with eight papers, Part 2 in March 2023, with 10 papers and Part 3 in June 2023 with 15 papers. This fourth part presents 10 original papers, in three areas: Decision Support Systems and Tools (3), Risk Assessment & Reduction (3) and the Wildland Urban Interface (4). All the papers in this special issue are published Open Access.

Introduction

The 9th International Conference on Forest Fire Research (ICFFR) held in Coimbra, Portugal, from 14 to 18 November 2022, brought together scientists and fire practitioners from around the world to advance and exchange knowledge on fire management. For the second time in its history, the conference was held jointly with the International Association of Wildland Fire's 17th International Wildland Fire Safety Summit (IWFSS).

The combined 9th ICFFR and 17th IWFFS was attended by 364 delegates from 30 countries. The 318 abstracts submitted for presentation were evaluated by an International Scientific Committee, composed of 58 internationally recognised scientists. From these submissions, 241 abstracts were accepted for oral presentation and 51 were accepted for presentation as posters.

These submissions were distributed across six topics within the scope of wildland fire research and management: (1) decision support systems and tools, (2) fire at the wildland-urban interface, (3) risk assessment, (4) risk reduction, (5) risk adaptation, and (6) wildfire management and safety.

In January 2023, the first set of papers, published as Part 1 of the special issue in Volume 32, Issue 1 of IJWF (Viegas and Ribeiro 2023), covered topics including seasonal fire activity and spatio-temporal fire-weather patterns under climate change, the role of atmospheric conditions on fire and flaming zone behaviour, analytical techniques for measuring oxidative pyrolysis gases, particulate morphology of fires in the wildland–urban interface, deep peat fire smouldering and the impact of post-fire treatments on soil.

In March 2023, the second set of papers, published as Part 2 of the special issue in Volume 32, Issue 3 of IJWF (Almeida *et al.* 2023), covered topics related to modelling of ignition probability, fire behaviour modelling, wildfire hazard mapping, fire management policies, imagery and mapping, and wildland-urban interface.

In June 2023, the third issue was published as Part 3 of the special issue in Volume 32, Issue 6 of IJWF (Ribeiro *et al.* 2023) that address simulation of peatland wildfires, heat transfer in porous fuels, the Canadian Forest Fire Danger Rating System, burn over events, nature-based solutions, post fire erosion, fire behaviour, fuel properties and combustion dynamics, decision support systems and the wildland urban interface.

This fourth issue includes 10 papers that address multiple subjects, including fire spread models, fireline production, air tanker drop characterisation, Fire Radiative Power, low-cost and portable air quality sensors, traditional burning, radiant heat flux, a heat transfer in the WUI, numerical simulation of heat exposure and modelling air quality. The contents of these papers are summarised below, organised according to the original Conference Topics in which they were included.

Contents (Part 4)

Decision support systems & tools

Cardil *et al.* (2023) analyse the performance of automated fire spread models used in California operationally to predict initial fire spread across landscapes. Results suggest that the models are accurate enough to be used in real-time operations to support preparedness and response actions, although additional enhancements are needed especially to model fires in forests.

Ortega *et al.* (2023) assess handcrew fireline production rates empirically on wildfires in southern Spain. Handcrew fireline production rate increase with direct attack, fuel types with low loads, aerial support and fire containment success. However, fireline production rates decrease with longer working times and larger fire and crew sizes.

Calbrix *et al.* (2023) present a numerical investigation of liquid (water and retardant) drop from Canadair CL-415 and Dash-8 airtankers. Numerical simulations were performed for the tank discharge as well as for the description of the liquid cloud. These results may help to optimise airtanker performance.

Risk assessment & reduction

Nunes *et al.* (2023) use a statistical model to assess the role of atmospheric conditions on wildfire activity in the Iberian Peninsula as measured by the Fire Radiative Power (FRP). The largest effects were observed in the regions where climate change is expected to have a pronounced impact.

Cui *et al.* (2023) present laboratory investigations to compare the measurements of three low-cost and portable air quality sensors with research-grade instrumentations for gas and particle emissions in smouldering wildfires. They found two sensors, KANE101 and SDS011, that can be used in the field after calibration. This study provides a better understanding of how low-cost and portable emission sensors can be of use for wildfire measurements.

Souza *et al.* (2023) provide a comprehensive understanding of traditional burning in the Portuguese context and offer a baseline to support stakeholders and policymakers in managing traditional burning's social and environmental impacts in the future. A mental model approach was used to systematise motivations, alternative solutions, associated risks, potential impacts and activities leading to a successful burn.

Wildland urban interface

Wickramasinghe *et al.* (2023) use a physics-based approach 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 will help improve building construction requirements to mitigate wildfire risk on houses at the wildland–urban interface.

Fiorini *et al.* (2023) show that 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.

Edalati-nejad *et al.* (2023) use numerical simulations 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.

Osswald *et al.* (2023) show that 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.

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Conflicts of interest. MF was the Chairman of the Scientific Committee, DXV was the Chairman, LMR was the Co-Chairman of the IX ICFFR and 17th IWFSS. The authors declare they have no further conflicts of interest.

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