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IX International Conference on Forest Fire Research and 17th International Wildland Fire Safety Summit: introduction to special issue (Part 2)

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ABSTRACT

The ninth International Conference on Forest Fire Research, together with the 17th International Wildland Fire Safety Summit was held in November 2022. This joint conference brought together several hundred presentations in the field of wildfire research. This special issue of the *International Journal of Wildland Fire* includes several papers describing work presented at the conference. Due to the large number and variety of papers submitted, the special issue is being published in several parts. Part 1 of the special issue was published, in January 2023, with a set of eight papers. This Foreword to Part 2 of the special issue introduces 10 new papers on various topics that include: modelling of ignition probability, fire behaviour modelling, wildfire hazard mapping, fire management policies, imagery and mapping, and wildland–urban interface. All papers in the special issue are published Open Access.

Introduction

The ninth International Conference on Forest Fire Research and the 17th International Wildland Fire Safety Summit were held jointly in Coimbra (Portugal) from 11 to 18 November 2022. The conference included 241 oral presentations, 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.

All abstracts submitted to the conference were reviewed by the conference Scientific Committee, which included 58 members from diverse countries and areas of specialisation. Authors whose papers were accepted for oral presentation at the conference were invited to submit full-length research papers for publication in a special issue of the *International Journal of Wildland Fire* (IJWF). This invitation resulted in a large number of submissions, and the number of papers accepted for publication after peer review has been so high that the special issue is being split into several parts to be published throughout 2023.

In January 2023, Part 1 of the special issue was published as Volume 32, Issue 1 of IJWF (Viegas and Ribeiro 2023). This issue included eight papers covering a wide variety of topics: 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.

Part 2 of the special issue includes 10 papers, which are summarised below.

Contents (Part 2)

Fire behaviour assessment and modelling

Granström *et al.* (2023) exposed incident commanders to questionnaires and tabletop exercises for different standardised fire scenarios to enlighten them on interpretation of

fire behaviour, fuel complexes, weather, and landscape structure in tactical decisions. These studies concluded that the knowledge of incident commanders, which is mainly based on experience and less on formal education, is reasonable for smaller fires. However, for larger or more complex fire events, the tactical competences of incident commanders is poor which demonstrates the need for more training in this type of scenario.

In Ribeiro *et al.* (2023), based on the episode of the Pedrógão Grande Fire (Portugal), the interaction of two non-symmetric fire fronts was analysed. They found that the rate of spread for small rotation depended on the slope angle and the initial angle between them. It was also reported that in the interaction of non-symmetric fire fronts, the convection mechanism dominates when the angle slope is high, while radiation assumes greater relevance for lower slopes.

Hassan *et al.* (2023) used laboratory tests of fire propagation in symmetric converging fire fronts to perform simulations using the FIRESTAR3D three-dimensional physics-based fire model finding that this physics-based model is capable of simulating junction fire propagation. These studies have shown that the angle between fronts is critical in determining the rate of fire spread, which in turn is dominated by convective processes on slopes, while radiation dominates on non-sloping terrain.

Rodrigues *et al.* (2023) developed a machine learning based model to forecast and map the likelihood of ignition at a daily timescale. By the analysis of a sample of more than 17 million lightning strikes, they concluded that negative-polarity lightning strikes commonly caused more fire events.

Wildland–Urban Interface

Ganteaume *et al.* (2023) modelled fire behaviour at WUI with a fluid dynamic simulator (FDS) using accurate vegetation distribution and comparing the results with past fire behaviour using different scenarios of vegetation management. The application of the model used, which showed good performance in the simulation of fire behaviour at the WUI, allowed confirmed the benefits of fuel management near built-up areas.

Quarles *et al.* (2023) performed full-scale laboratory experiments to understand the factors that influence ember accumulation near a building including building geometry, such as flat walls and corners, building wind angle, and wind speed. These studies showed the great effect that wind had on the exposure of buildings to firebrands and that the main location of deposition and accumulation of firebrands was close to the buildings.

Barbosa *et al.* (2023) carried out field experiments with LPG cylinders exposed to fire using forest fuels to evaluate the effects of explosions and jet fires, as well as the efficiency of safety devices to protect the LPG cylinders from heat transfer. They analysed fireball radiation characteristics and the projection distance of the cylinder fragments resulting from the explosions.

Spatial analysis and planning

Tedim *et al.* (2023), based on questionnaire responses sent to municipalities and technical data provided by technical forestry offices, analysed a Portuguese legislative directive called SGIFR: Integrated Wildfires Management System, identifying weaknesses in the approach proposed, as well as its short and long-term impacts.

Trucchia *et al.* (2023) implemented and tested a data-driven approach to study thirteen countries in the Eastern Mediterranean and Southern Black Sea basins, to identify the main wildfire drivers that define the areas more susceptible to impactful wildfire events.

Garcia *et al.* (2023) proposed a multilayer segmentation method based on level sets to segment aerial images with scattered fire areas to measure a fire perimeter and determine the location of a fire front. The methodology proposed is not still able to perform real-time segmentation however it can be useful when annotated datasets are not available.

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

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