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IX International Conference on Forest Fire Research and 17th International Wildland Fire Safety Summit: introduction to special issue (Part 1)

Domingos Xavier Viegas[A,*] and Luís Mário Ribeiro[A]

For full list of author affiliations and declarations see end of paper

*Correspondence to:
Domingos Xavier Viegas
Univ Coimbra, ADAI, Department of Mechanical Engineering, Rua Luís Reis Santos, Pólo II, 3030-788 Coimbra, Portugal
Email: xavier.viegas@dem.uc.pt

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ABSTRACT

The ninth International Conference on Forest Fire Research (ICFFR) was recently held in Coimbra, Portugal, bringing together scientists and fire managers from around world to advance and update knowledge in the area of fire management. The conference was held jointly with the International Association of Wildland Fire's 17th International Wildland Fire Safety Summit (IWFSS). Here we introduce Part 1 of a special issue series arising from the 2022 ICFFR/IWFFS joint meeting. This issue of the *International Journal of Wildland Fire* contains eight papers covering a wide variety of 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. All papers in the issue are published Open Access.

Introduction

The International Conference on Forest Fire Research (ICFFR) was initiated in 1990 to provide a forum for scientists working across all areas of the complex problem of fire management and to promote international cooperation in this research area. The conference has been held every 4 years since then, retaining the original format, and continues to attract the interest and participation of scientists and practitioners from around the world. The conference has always been held in Portugal, six times in Coimbra, two in Luso and one in Figueira da Foz.

The combined ninth ICFFR and 17th IWFFS, held in Coimbra from 14 to 18 November 2022, was attended by 364 delegates from 30 countries. The 318 abstracts submitted for presentation were authored by 58 scientists from different specialties and were evaluated by a Scientific Committee led by Dr Mike Flannigan. From these submissions, 241 abstracts were accepted for oral presentation, 51 were accepted for presentation as posters and the remaining were either rejected or withdrawn.

The major conference themes were:

- Decision support systems and tools
- Fire at the wildland–urban interface
- Risk assessment
- Risk reduction
- Risk adaptation
- Wildfire management and safety

Conference presenters were invited to submit full papers describing their research presented at the conference to be considered for publication in a special issue of the *International Journal of Wildland Fire*. Submitted papers were evaluated through the Journal's standard peer review process with the support of several Guest Editors,

including some of the members of the Scientific Committee of the conference. The resulting three-part special issue will be published fully Open Access.

Contents (Part 1)

In this first issue, of three planned, eight papers are published. They cover a broad range of topics, representative of all papers presented at the conference.

Pimont *et al.* (2023) address the potential future expansion, seasonal lengthening and intensification of fire activity under climate change in southeastern France. Using projections of future fire activity in southeastern France the authors project that very large increases in fire activity would arise mostly from an intensification within the already fire-prone region and during the core of the current fire season rather than from an expansion of the fire-prone region or from a lengthening of the fire season. Castel-Clavera *et al.* (2023) attempt to disentangle the factors correlated with the spatio-temporal patterns of wildfire activity in southeastern France that were considered in the previous paper. They applied Bayesian models to separate the contributions of climatic and non-climatic drivers to fire activity in Mediterranean France. They determined that recent fire-weather increases were related to increased fire probability in the west; but in the east, the effects of fire weather were over-compensated by reduced probability of escaped fire.

Zhang *et al.* (2023) studied the role of helicity and fire-atmosphere turbulent energy transport on potential wildfire behaviour. The authors showed that temperature perturbations resulting from solar heating of Earth's surface can induce buoyancy-driven wind turbulence. Using experimental numerical simulations, this work investigated how wind turbulence under different atmospheric conditions can change energy transfer within the fire area and subsequently impact fire behaviour.

Katurji *et al.* (2023) studied atmospheric turbulent structures and fire sweeps during shrub fires and their implications for flaming zone behaviour. Based on multi-modal observations of fire behaviour and overlying atmospheric turbulence carried out for four wind-driven experimental fires in gorse shrub vegetation they used novel image velocimetry analysis to outline the dynamics and scales of motion of fire sweeps in relation to overlying atmospheric coherent turbulent structures, the authors present results that are useful for evaluating coupled fire–atmosphere model simulations.

Weise *et al.* (2023) compared two methods to measure oxidative pyrolysis gases in a wind tunnel and on small prescribed burns. The authors measured the gas composition by Fourier transform infrared spectroscopy and verified that it differed between wind tunnel and field fires. They found also that the relative amount of the primary fuel gases (CO, CH_4) was not significantly affected by fire location.

Suzuki and Manzello (2023) compared the morphology of particulate emissions from human-made cellulosic fuels to those from natural vegetative fuels. Recognising that in wildland–urban interface fires, particulates from combustion of natural vegetative and human-made fuels may have deleterious effects on the environment, the authors took particulate samples during both flaming combustion and smouldering combustion states and found that the morphology of the generated particulates was greatly influenced by the state of combustion for both types of fuels.

Qin *et al.* (2023) performed a laboratory study of the smouldering of a deep layer of peat fire and showed that smouldering can persist for weeks. The authors recognise that smouldering fire in peatland is one of the largest wildfire phenomena on Earth that can burn slowly deep underground without flame. They performed extensive laboratory experiments on deep peat soil samples to study burning, propagation and emission physics of deep smouldering wildfires in peatland.

In the last paper in this issue, Fernández-Guisuraga *et al.* (2023) addressed the important problem of managing burnt wood in the medium term (4 years) after a large fire, to enhance soil multifunctionality in north-west Spain. They found that post-fire treatment consisting of leaving burnt logs and felled branches in close contact with the forest floor promotes the ability of the soil to sustain high values of multiple functions (e.g. carbon and water regulation, soil fertility, nutrient cycling) simultaneously in the medium term after wildfire, as compared to straw mulching application.

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Conflicts of interest. DXV was the Chairman and 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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Author affiliation
[A]Univ Coimbra, ADAI, Department of Mechanical Engineering, Rua Luís Reis Santos, Pólo II, 3030-788 Coimbra, Portugal.