LEVERHULME WILDFIRES
SUMMER CONFERENCE

LEVERHULME
Centre for **Wildfires, Environment** and **Society**

LEVERHULME WILDFIRE SUMMER CONFERENCE 2026: PROGRAMME

The Leverhulme Wildfires Summer Conference 2026 brings together researchers, policymakers, practitioners and other experts from diverse disciplines to share our understanding of landscape fires, their drivers and impacts – and explore how societies can live with fires in a rapidly changing Earth system.

Through a mix of presentations, panel discussions, workshops and interactive sessions, participants will examine the drivers and impacts of changing fire regimes and explore how scientific insight can better inform action. The programme highlights emerging approaches to proactive preparedness, advances in fire detection and prediction, and the need for inclusive and equitable fire management that integrates scientific, Indigenous and practitioner knowledge. It also considers how adaptive policies, governance arrangements and economic incentives can support more resilient landscapes and communities.

By fostering dialogue across disciplines and knowledge systems, the conference aims to identify practical pathways for integrating research, policy and management in order to navigate the complex ecological and societal challenges posed by fire.

THEMES

Theme A: What controls landscape burning, and how can we better anticipate and detect these events?

What are the relative roles of climate variability, long-term climate change, vegetation and fuel dynamics, and human activities in shaping fire regimes? This session explores drivers of fire across scales – from laboratory experiments and local landscape processes to global Earth system patterns – and considers how improved observation, detection, and predictive capabilities can support earlier awareness and proactive preparedness.

Theme B: How does fire interact with atmospheric composition, the carbon cycle, and climate?

As fire regimes intensify and shift, how do they alter atmospheric chemistry, air quality, carbon cycling, weather patterns, and long-term climate trajectories? And how do climate and weather, in turn, impact fire regimes? This session examines both present-day feedbacks and their implications for future Earth system dynamics, including how improved monitoring and modelling of fire–atmosphere interactions can enhance prediction and societal preparedness for emerging risks.

Theme C: How do fires impact biodiversity, ecosystem services, and human health and well-being?

Fires reshape habitats, species interactions, ecosystem services, and the health and livelihoods of communities. This session explores ecological and social consequences of fire, identifying vulnerabilities, thresholds, and opportunities for resilience, with particular attention to how impacts and risks are distributed across societies and landscapes.

Theme D: What consequences and trade-offs arise from fire management and preparedness strategies?

Efforts to suppress or control fire often have unexpected social and ecological knock-on effects, producing difficult trade-offs among competing policy objectives and social values. This session seeks to clarify those trade-offs and evaluate the effectiveness of proactive preparedness and management approaches, and considers their implications for long-term environmental and societal resilience.

Theme E: How can fire policymaking and management be made more integrative, equitable and adaptive?

Fire policymaking must navigate competing goals, interests and knowledge systems in ways that are perceived as fair and that produce effective outcomes. This session explores how policymaking and management can better integrate ecological and social sciences, Indigenous and local knowledge, and practitioner expertise to improve decision-making, legitimacy and measurable social and ecological outcomes, while also examining the role of adaptive governance and economic instruments, including markets, in shaping fire management strategies.

Theme F: What futures for fire in the Earth system are plausible – and which should we aim for?

This session examines plausible trajectories of fire–climate–landscape interaction under alternative climate change, economic development and governance scenarios. It considers how advances in prediction, preparedness, and adaptive policy frameworks could shape future fire regimes, and asks what normative visions of a “good” fire future (for safety, biodiversity, carbon and cultural livelihoods) should guide policy and how they might be achieved.

Oral Presentations

Session 1 - Theme A (Day 1, 11:00-12:30)

What controls landscape burning, and how can we better anticipate and detect these events?

Prof Guillermo Rein, Imperial College London (Leverhulme Centre for Wildfires, Environment and Society)

Title: Heatwaves and Firewaves: the Urban Wildfires in London

Prof. Guillermo Rein

Abstract: In the summer of 2022, a series of heatwaves caused an unprecedented wave of wildfires across the UK. London, in particular, was badly affected. Its green spaces wilted, and the drying vegetation provided the fuel for wildfires. The London Fire Brigade (LFB), one of the largest firefighting organisations in the world, was overwhelmed. On 19th July 2022, it experienced its busiest day since World War II. Our work represents a first attempt to examine and quantify the link between heatwaves and wildfires in a city. We combine fire incident data from the LFB and meteorological data from the Met Office, from 2009 to 2022, identifying vapour pressure deficit (VPD) as a key driver of wildfires in the urban habitants of Greater London. Wildfire activity is characterised using the number of recorded wildfires, and the time spent at incidents by the LFB's fire pumps. We find that VPD is able to explain up to 61% of the variation in number of London wildfires. Relative humidity, and maximum daily temperature are only able to explain 44% and 42% of the variation respectively. We find that the Met Office's definition of a heatwave, defined for the purpose of public health, is unsuited to describe the process of vegetation drying, and propose a new definition using data from the Met Office, based on vapour pressure deficit. Further, using the time spent at incidents by the LFB's pumps, we define and identify the concept of a firewave, in order to foresee the potential arrival of another wave of extreme wildfires in London and prepare accordingly. It is hoped that the results will be of operational value to the LFB, and lay the foundation for further work investigating the role of heatwaves and VPD in increasing wildfire hazards in cities and other urban environments worldwide.

Miss Esther Brambleby, University of East Anglia

Title: Human ignitions expand the global extratropical forest fire niche

Miss Esther Brambleby

Abstract: Extratropical forest fire (EFF) regimes are shifting under interconnected climatic and human influences. Climate change is driving increases in extratropical lightning activity and fire-conducive weather, while human activities simultaneously shape fire through changing land use and additional ignitions, both intentional and accidental. These shifts can have global implications through increasing greenhouse gas emissions and endangering long-term carbon stores. Despite this, datasets with ignition causes attributed for individual fires are constrained to few regions, precluding the large-scale assessment of how humans contribute to overall fire activity as well as how the size and impacts of human-ignited fires differ from those associated with lightning ignitions. Here, we present a new dataset of human and lightning ignited EFFs from 2019–2024 and compare fire regime characteristics between ignition sources. We find that human influence on fire ignition is spatially heterogeneous, ranging from a key ignition source in Mediterranean forests, woodlands and scrub (94%) to a minority role in boreal forests and taiga (27%). Human activity has modulated the modern EFF niche by increasing the spatial extent of fire occurrence, tripling the average fire season length, with activity peaking in spring (contrasting peak lightning ignitions in summer), and expanding the range of flammable conditions to include cooler, wetter environments.

Dr Andrew Clelland, Imperial College London (Leverhulme Centre for Wildfires, Environment and Society)
Title: From “Why?” to “Where next?”: Using machine learning and AI to understand wildfire drivers and conduct short-term forecasting

Dr Andrew Clelland

Abstract: Wildfires are driven by a complex interplay of environmental, climate, and anthropogenic factors that vary across space and time. Improving understanding of these drivers, as well as the ability to anticipate fire activity, is critical for effective management and response. A two-part approach that leverages machine learning and AI models to address these challenges is presented. Firstly, data-driven models are used to identify and quantify the key drivers of wildfire activity across multiple spatial (global to regional) and temporal (monthly to daily) scales. By analysing patterns across 34 meteorological, environmental, and anthropogenic variables, shifts in the relative importance of different drivers with scale are highlighted, offering new insights into wildfire dynamics. Secondly, a short-term (1–5 day) wildfire “nowcasting” framework is developed that combines traditional environmental predictors with real-time social media signals. These human-generated data provide timely information on emerging fire activity, complementing conventional datasets that may be subject to reporting delays. Integration of these sources within an AI-based modelling framework demonstrates improved predictive capability for near-term wildfire occurrence. Together, this work illustrates how the combination of physical and social data through machine learning and AI models can both deepen understanding of wildfire behaviour and enhance short-term forecasting, with potential applications for early warning systems and operational decision-making.

Prof. Ian Sue Wing, Boston University
Title: Housing Density Amplification of Wildfire Ignition Risk: Evidence from the U.S. West

Prof. Ian Sue Wing

Abstract: Rapid development in the US West both inside and outside the wildland urban interface (WUI) has significantly impacted wildfire regimes, altering land cover and increasing ignitions. We combine large datasets of property records and fire events across ten western US states from 2000-2020 to empirically investigate the effects of housing density on fire frequency. Our main finding is that human-caused wildfire ignitions exhibit a positive and concave association with housing density. Importantly, in contrast to prior results that show that wildfire frequency first increases and then declines with population density, we find the housing-wildfire association to be monotonic: effects continue to be statistically significant and positive at even the high densities characteristic of major city suburbs. We also demonstrate that this association is driven by ignitions that result in fires that are small in extent (suggesting rapid suppression), attributable to development in areas that lie outside the WUI, have lower-than-average precipitation, high complexity in land-use regulations, high housing demand, and suburban sprawl with low barriers to residential development. Geographic projections based on our results highlight the concentration of anthropogenic ignition risk at the exurban and suburban fringes of large metro areas, portending events such as the catastrophic 2025 Los Angeles wildfires. Our results raise questions about the specific human activities in the sphere of activity around houses are the major drivers of ignitions. Work in progress seeks to investigate this issue using roadway-level traffic estimates.

Prof. Stefan Doerr, Centre for Wildfire Research, Swansea University
Title: Developing FireInSite: an accessible tool for predicting ignition probability and fire behaviour in the UK and Atlantic Europe.


Prof. Stefan Doerr

Abstract: Wildfire risk is increasing in many regions of the globe, including in humid temperate climate zones, but we lack operational tools to support wildfire management decision-making in regions like the UK and NW Europe. To address this gap, we developed FireInSite, a user-oriented web-based system for predicting fire behaviour (https://www.fireinsite.org). It forecasts the probability of ignition, surface fire rate of spread, flame length and fireline intensity for any user selected location for a range of key regional fuels. By integrating geolocated weather forecasts up to 5 days ahead, topographic data, and in-built UK specific fuel models, it removes barriers for users like the need to gather data from multiple sources before being able to predict fire behaviour. FireInSite can be used for (i) real-time decision support by providing key fire behaviour parameters during active fires, (ii) planning for fire prevention and suppression, (iii) assessing the potential effects of fuel load reduction, (iv) analysing past fires using historical weather records back to 1970, (v) exploring daily values of vapour pressure deficit for any location back to January 2015, and (vi) as a training/educational tool for fire behaviour. FireInSite has been built on over four years of intensive data collection of fuel moisture, fuel flammability, and energy contents measured across the UK for key fire prone vegetation types. These have been used to develop fuel models that describe the fire prone fuel types of the UK and comparable humid Atlantic landscapes for the first time. We also developed machine learning–based fuel moisture prediction models for the relevant live and dead fuels. In addition to 'showcasing' the tool, this presentation will report on the steps involved in predicting landscape burning, including the user community input that shaped the development of FireInSite as an operational, planning and training end-user tool.

Session 2 - Theme B (Day 1, 13:30-15:00)

Theme B: How does fire interact with atmospheric composition, the carbon cycle, and climate?

Dr Candice Charlton, Technical University of Crete (Leverhulme Centre for Wildfires, Environment and Society) and Climate Studies Group Mona, Jamaica
Co-authored by Luiz Galizia, AXA Climate, and Apostolos Voulgarakis, Technical University of Crete/Imperial College London
Title: From Forecast Skill to Fire Impact: How Reliable Are Seasonal Fire Weather Predictions in Australia?


Dr Candice Charlton

Abstract: Recent extreme fire seasons in Australia highlight the need for value added seasonal forecasts that improve fire management. The Fire Weather Index (FWI), produced using ensemble prediction systems, provide probabilistic estimates of fire-conducive meteorological conditions months in advance. However, their reliability and relevance for predicting actual fire impacts across regions and lead times that support strategic fire management remain uncertain, particularly in Australia, where diverse eco-climatic conditions influence fire activity. Here, we evaluate seasonal ensemble forecasts of FWI over Australia for 2017–2024 using deterministic and probabilistic metrics, including the coefficient of determination (R^2), Continuous Ranked Probability Skill Score (CRPSS), Ranked Probability Skill Score (RPSS), and Receiver Operating Characteristic (ROC)-based measures. Ensemble reliability is assessed by comparing forecast spread and forecast error across regions and lead times (1–5 months). To investigate the relationship between forecast fire weather and fire impacts, we compare forecast FWI with observed burned area (BA) using R^2, Kendall's rank correlation (τ) and composite analyses of burned area across forecast FWI categories to assess the ability of seasonal forecasts to discriminate periods of elevated fire activity. The results are meant to inform the existing forecast value and gaps rather than its overall precision, given the one-dimension coverage of just using fire weather forecasts for burned area prediction.

Mr Théo Rouhette, Basque Centre for Climate Change (BC3)

Title: Towards fire-enabled mitigation pathways in the land sector: modelling burned area and fire emission feedbacks in integrated assessment models

Mr Théo Rouhette

Abstract: While climate change mitigation often relies on ambitious mitigation potentials from the land sector, most Integrated Assessment Models (IAMs) underrepresent dynamic feedbacks from climate-driven disturbances such as wildfires. In particular, representing the impacts of forest fires is becoming increasingly important to avoid overestimating the permanence of land-based carbon sinks as these are expected to intensify in the future. The talk will introduce IAM-FIRE (Integrated Assessment Model – Fire Impacts & Risks Emulator), a novel framework that enables the projection of wildfire burned area (BA) and carbon emissions (CE) directly from IAM outputs. IAM-FIRE combines a spatial climate emulator, land-use downscaling, vegetation productivity modelling, and an empirical fire model to generate global annual wildfire impacts for arbitrary socioeconomic and emissions scenarios at 0.5° resolution for the period 2020–2100. Calibrated against GFEDv5 observations and using inputs from the Global Change Analysis Model (GCAM), BA and CE projections are reported for four scenarios: SSP1-2.6, SSP2-4.5, SSP3-6.6 and SSP5-7.6. The model reproduces historical global trends for both total BA – including the observed global decline since the early 2000s – and forest BA. Projected fire trajectories differ strongly among scenarios: by 2100, total BA range from 441 Mha.yr-1 under SSP1-2.6 to 794 Mha.yr-1 under SSP3-6.6. Corresponding total CE show a similar divergence by 2100 ranging from 1.8 PgC.yr-1 in SSP1-2.6 to 3.6 PgC.yr-1 in SSP5-7.6. Socioeconomic development exerts a dominant suppressing effect on wildfire impacts while climate change and CO_2-driven increases in vegetation productivity amplify fire risk. Compared with CMIP6 and FireMIP, IAM-FIRE exhibits greater sensitivity to radiative forcing and a stronger role for human-driven fire suppression, highlighting structural uncertainties in fire projections. By enabling dynamic exploration of fire–climate–land feedbacks in IAMs, IAM-FIRE can support improved assessments of mitigation permanence and climate risks in future integrated scenarios.

Dr Matt Kasoar, Imperial College London (Leverhulme Centre for Wildfires, Environment and Society)

Title: All You Need Is Model

Dr Matt Kasoar

Abstract: Recent years have seen a troubling rise in extreme fires, and wildfires have become one of the most visible indicators of a climate crisis. But predicting the future of fire regimes globally, and what this might entail for climate feedbacks, air quality, carbon sequestration, ecosystem health, loss and damage, and other downstream impacts, remains one of the most uncharted frontiers in climate modelling. Fire is increasingly recognised as a crucial earth system feedback which until recently had largely been omitted from climate modelling, yet current fire models have many deficiencies that challenge drawing robust conclusions from their projections. This talk reviews the current state of the art in representing landscape fire in global climate models, and the gradual efforts to include fire in our climate projections of the future as well as to understand its historical role. It will attempt to summarise what our current models are good for, and what the outstanding challenges and limitations are and how these might be addressed, to understand whether our models are able to answer the questions that we want – and increasingly need – to ask of them.

Prof Ana Bastos, Leipzig University

Title: Fire-climate feedbacks under global environmental change

Prof. Ana Bastos

Abstract: Fire is a key Earth System process, controlling forest dynamics and structure, surface hydrology and energy partitioning, and biogeochemical exchanges at time scales from years to centuries. With increasing temperatures under climate change, fires are expected to become more intense and frequent – a trend that is already being observed in some regions of the globe. Since fires can release large amounts carbon to the atmosphere immediately, and regrowing sinks take long time to compensate these losses, changes in fire regimes can contribute to destabilize the global carbon cycle, potentially amplifying global warming. In addition to their impacts on carbon, fires influence nutrient allocation and nutrient cycling, which in turn can feedback to vegetation dynamics over longer time scales. For example, fires can contribute to nutrient mineralization, making it more readily available for plants, but also enhance surface runoff and soil erosion, which may result in nutrient loss. Understanding these interactions is crucial to project the coupled vegetation-fire dynamics under changing climate conditions, as they might result in non-linear feedbacks. Here we will discuss recent advances in quantifying fire regime changes, attributing those to both climatic and non-climatic factors and highlight ongoing modelling initiatives aiming at better quantifying feedbacks between fire and climate.

Dr Jose Gomez-Dans, King's College London (Leverhulme Centre for Wildfires, Environment and Society)

Title: Wildfire intensity is rising even where burned area is not: evidence from two decades of satellite observations

Dr Jose Gomez-Dans

Abstract: A number of studies show that global burned area has declined since 2000, largely driven by reductions in African savanna burning. This reduction however, masks a more troubling trend: across boreal forests, temperate regions, and Australia, the most energetically extreme fires are becoming more frequent and more intense, even as the total area they burn remains stable or shrinks. Using the complete 2003–2024 record from NASA's MODIS satellites, we characterise not just how much area is burnt due to fires, but how intense the fires burning it are. We do this by fitting a statistical model to the distribution of Fire Radiative Power (a satellite-derived measure of the rate of instantaneous energy release from active fires) across a global 100 km grid. This allows us to separately track changes in typical fire behaviour and in the extremes, which standard burned-area metrics are blind to. We find a consistent global signal: the statistical distribution of fire intensity is reweighting away from its centre and towards its upper tail. Fires of typical intensity are becoming less common in many regions; fires of exceptional intensity are becoming more so. This decoupling between fire extent and fire energy release has direct implications for emissions accounting, smoke and air quality modelling, ecosystem resilience, and the design of fire management and suppression systems, which are dimensioned for typical rather than extreme events.

Session 3 - Theme C (Day 1, 15:30-17:00)

Theme C: How do fires impact on biodiversity, ecosystem services, and human health and well-being?

Dr Imma Oliveras Menor, Institute de Recherche pour le Developpement & University of Oxford

Title: Bridging the Gap: A Collaborative Synthesis for Quantifying Fire Impacts on Biodiversity and Ecosystem Processes

Dr Imma Oliveras Menor

Abstract: Evidence-based fire management requires robust quantification of the impacts of vegetation fires on biodiversity and ecosystem processes. In recent decades, the number and diversity of methods and indicators for assessing fire impacts on biodiversity have increased considerably. While this expansion reflects scientific progress, it also creates real-world challenges for fire managers, practitioners, and decision-makers, who often face difficulties in selecting appropriate and realistic methods. To address this gap, we present a collaborative effort—supported by the FIRE-ADAPT consortium—that provides a structured synthesis applicable across diverse ecosystems. This framework organizes fire monitoring into four complementary categories: impact, recovery, landscape balance, and risk. It moves beyond simplistic metrics like burnt area size, and emphasizes the need to characterize fire regimes through dimensions such as frequency, intensity, severity, and seasonality, which are essential for understanding complex ecological responses. The synthesis presents a series of protocols that cover a broad range of taxonomic groups and components, including fungi, plants, invertebrates, vertebrates, and various ecosystem processes. We highlight that because biodiversity responses are often taxon-specific, they require tailored methodological approaches. These protocols are supported by case studies demonstrating their applicability across Mediterranean, tropical, and subtropical biomes. Finally, this synthesis identifies critical gaps in current research, notably in direct impact assessment, landscape-scale monitoring, and ecological fire risk. We provide some guidelines to ensure that fire management remains grounded in the best available science.

Dr Mark Grosvenor, King's College London (Leverhulme Centre for Wildfires, Environment and Society)

Title: Understanding the composition and health impacts of PM2.5 from biomass burning

Dr Mark Grosvenor

Abstract: Biomass burning remains a major contributor to ambient and household air pollution in Southeast Asia, yet important uncertainties exist with understanding the composition, sources, and health impacts of emitted particulate matter ($PM_{2.5}$). Our research aims to improve understanding of smoke components and source attribution to better characterise exposure and potential health risks, with a particular focus on rural communities in the Lao People's Democratic Republic. Observations from our in-situ sensor networks indicate that cooking on biomass fires generates pronounced twice-daily spikes in $PM_{2.5}$ concentrations at the village scale. While these peaks may not be captured in larger scale atmospheric models, they represent significant localised exposure, especially indoors and for individuals in close proximity to cooking fires. Seasonal variation in fuel types further influences emission profiles throughout the year. Source apportionment techniques using PM2.5 filter samples and multiple chemical analytical methods can assist in disentangling the multiple sources of PM2.5 to better understand the health impacting contribution of biomass burning to the overall air quality impacts of PM2.5. In parallel, we are developing sample collection methods of particulate matter for immunobiological analysis, allowing laboratory investigation of how particles from different fire sources influence immune cell development. A key driver of these differences is the role of atmospheric aging, as chemical transformations between fresh and aged smoke may alter toxicity and health outcomes. Together, this integrated approach links source attribution, chemical composition, and biological effects to advance understanding of biomass burning impacts on human health.

Mr Ed Huckle and Mr Andrew Kibble, UKHSA

Title: Raising awareness of the public health impacts of wildfires in the UK

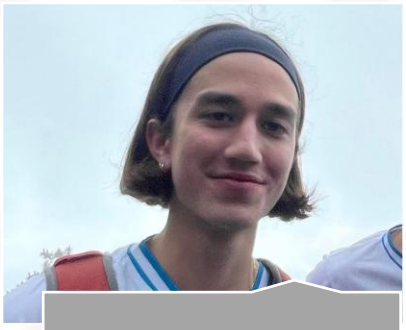
Mr Ed Huckle

Mr Andrew Kibble

Abstract: Climate change is likely to increase the frequency, severity, and geographical extent of wildfires in the UK, resulting in more people being exposed to their adverse impacts. Wildfires pose a range of hazards to communities, including direct exposure to fire, smoke inhalation, and secondary impacts on water quality and soil stability. Smoke from wildfires contains a complex mixture of toxic air pollutants that can cause or exacerbate respiratory and cardiovascular conditions. Beyond physical health impacts, wildfires can significantly affect community health and wellbeing, leading to increased stress, reduced quality of life, anxiety, and behavioural problems. The combined effects of wildfire smoke with other environmental stressors, such as high temperatures, ozone, dust, and pollen, may further increase health risks. Evidence indicates that certain individuals and population groups are more susceptible to the health effects of wildfires than others. Community planning and preparedness can play a crucial role in identifying areas and populations that may be less equipped to respond to, and recover from, wildfire events. Following the publication of the wildfire chapter in the UKHSA Health Effects of Climate Change report and the Climate Change and Mental Health: Thematic Assessment report, UKHSA has identified several gaps in the current evidence base. In response, a focused programme of work has been developed across several key priority areas. Current initiatives include the development of a wildfire toolkit for public health professionals, improving public-facing messaging, particularly through social media, on wildfire risks, and supporting efforts to strengthen community resilience to wildfires. UKHSA is working collaboratively with government and non-government stakeholders to raise awareness of the public health hazards associated with wildfires and to improve understanding of their impacts on communities.

Mr Chris Ho, Imperial College London (Leverhulme Centre for Wildfires, Environment and Society)

Title: Deprivation and fire-related air pollution exposure in Africa



Mr Chris Ho

Abstract: Smoke from landscape fires is a major source of air pollution in Africa. Socioeconomically disadvantaged populations may be more sensitive to the health impacts of air pollution, yet little is known about whether they experience disproportionate exposure to fire-related air pollution across Africa, and whether the source of their exposure is local or transported pollution. Here, we compiled 18 years of data on fire-related fine particulate matter ($PM_{2.5}$) concentrations, fire emissions, and socioeconomic indicators across 52 African countries. We used a regression model with pollution and emissions data, and decomposed fire $PM_{2.5}$ into contributions from local burning (within 100 km) and transported smoke (100-2000 km). We then quantified country-specific relationships between deprivation and $PM_{2.5}$, in aggregate as well as separately for rural and urban areas and local and transported pollution. Transported smoke contributed 88% of fire $PM_{2.5}$ exposure across Africa on average. Associations between deprivation and total fire $PM_{2.5}$ were highly heterogeneous, with more deprived areas experiencing either higher or lower exposure depending on the country. There was a more consistent association with deprivation when considering only local burning: more deprived regions experienced higher exposure to local fire $PM_{2.5}$ in 23 countries, compared with 8 countries where more affluent regions had higher exposure. These findings suggest that local and national fire management could help to reduce exposure inequalities in fire-affected areas, but regional coordination is essential to address the larger health burden of smoke from landscape fires.

Ms Ariba Shahab, BioDscan Ltd.

Title: Silent Pollinators, Burning Landscapes: Detecting Post-Fire Biodiversity Collapse and Its Cascading Consequences for Ecosystems and Communities

Ms Ariba Shahab

Abstract: Wildfire restructures habitats, fragments pollinator networks, degrades ecosystem services, and imposes lasting health and livelihood burdens on vulnerable communities yet the full cascade of these impacts remains chronically underquantified. This study addresses that gap through a cross-landscape programme spanning UK upland heathland and peatland systems (Scottish Highlands, Dartmoor) and savanna-forest transition zones in sub-Saharan Africa (Zambia, Tanzania). Combining satellite burn severity mapping, household livelihood surveys across fire-affected habitats, and ecosystem service quantification, we show that fire reduces pollinator abundance by 40–70% in the first post-fire growing season, suppressing pollination-dependent crop yields by 15–28% within 10 km of burn perimeters. Smoke-driven $PM_{2.5}$ concentrations exceed WHO thresholds by 2–4 times, driving up to a 22% rise in respiratory hospital admissions, while fire-affected households in sub-Saharan Africa lose an average of 31% of annual income burdens falling disproportionately on women and smallholder farmers. The study's central innovation is the first systematic deployment of the BioDScan cyber-physical IoT platform in post-fire landscapes. Using real-time computer vision and machine learning species classification, BioDScan enables continuous automated pollinator detection throughout recovery providing temporal resolution impossible with conventional surveys. Threshold detection modelling (TITAN) identifies non-linear recovery tipping points across both landscape systems. We propose integrating automated IoT-based pollinator monitoring within UK Biodiversity Net Gain frameworks and national fire risk policy, offering a scalable, equitable pathway to fire resilience across both high-income and developing country contexts.

Session 5 - Theme D (Day 2, 09:30-11:00)

Theme D: What consequences and trade-offs arise from fire management and preparedness strategies?

Dr Kapil Yadav, Royal Holloway, University of London (Leverhulme Centre for Wildfires, Environment and Society)

Title: Reframing Fire as Disaster: Continuities and Shifts in Wildfire Governance in India and South Africa

Dr Kapil Yadav

Abstract: This talk examines how recent disaster risk reduction (DRR) efforts to manage wildfires are reshaping existing fire governance approaches. While DRR frameworks often present themselves as new interventions, in practice they frequently reinforce earlier fire-suppression logics, even as they introduce new tools and preparedness strategies. This raises important questions about what forms of fire management are prioritised and where space remains for preventative approaches that engage with fire as part of everyday landscape practices. By highlighting both what remains the same and what has changed under the DRR agenda, the talk explores how wildfire risk is being redefined and managed. Drawing on case studies from India and South Africa, I show how disaster-oriented frameworks are reshaping fire governance, often privileging preparedness and response while leaving limited room for approaches centred on prevention and human–fire relations. In both cases, the continued emphasis on fire response is sustained by different objectives: in India, it supports the state's territorial control over forests, while in South Africa, it is linked to preventing losses for the insurance sector in areas of concentrated economic capital. At the same time, disaster risk reduction frameworks bring new actors into fire governance, such as disaster management agencies and multilateral organisations, who join existing institutions in shaping how wildfire risk is understood and managed.

Dr Aline Naawa

Title: Climate finance, fire management and resilience in West African savannahs: assessing trade-offs between risk reduction, livelihood security and ecosystem resilience

Abstract: Wildfires remain a major challenge in West African savannah landscapes, affecting ecosystems, livelihoods, and rural economies. This study examines how climate finance influences wildfire preparedness and management in northern Ghana and explores the consequences of different intervention pathways for communities and ecosystems. The research draws on household surveys, stakeholder interviews, policy analysis, and wildfire data to assess the outcomes of preparedness and management strategies supported through public and climate-finance initiatives. Particular attention is given to the interaction between formal interventions and local fire-use practices that have long shaped savannah landscapes and livelihood systems.
A multi-criteria trade-off assessment framework is used to evaluate wildfire preparedness strategies against four key objectives: wildfire risk reduction, ecosystem resilience, livelihood security, and social equity. The framework enables comparison of the benefits and costs associated with alternative approaches, including fire suppression measures, community-based fire management, landscape restoration programmes, and climate finance mechanisms designed to support wildfire preparedness and recovery. The analysis highlights several important trade-offs. Investments in prevention and preparedness can reduce wildfire risk but may limit resources available for post-fire recovery. Climate-financed restoration and carbon-focused interventions may support environmental objectives while restricting traditional fire-use practices that underpin local livelihoods. However, access to climate finance interventions is often uneven. Communities with limited institutional capacity, weaker representation, or fewer financial assets may face barriers to participation, raising concerns about equity and the distribution of resilience benefits. The study argues that wildfire preparedness cannot be assessed solely in terms of risk reduction. Effective fire governance requires balancing environmental goals, livelihood needs, and equitable access to financial support.

Dr Michel Valette, Imperial College of London (Leverhulme Centre for Wildfires, Environment and Society)

Title: Between Collective Risk and Individual Practices: Community Brigade and Fire Management Trade-offs in Capoto/Jarina Indigenous territory, Brazil.

Abstract: Capoto/Jarina, an Indigenous territory located in Brazil's Cerrado/Amazon transition zone, experienced a steep increase in wildfire risks due to climate change, regional deforestation and resulting environmental degradation over the last two decades. The rising unpredictability of rain season onset and changes in the vegetation have rendered traditional fire use, central to livelihoods and cultural reproduction, increasingly dangerous. In 2024, the territory experienced its most severe drought and wildfire on record, burning an estimated 22.8% of its total area. In response to this evolving wildfire risk, Capoto/Jarina's inhabitants have developed individual and collective adaptation strategies. The community fire brigade, established in 2004 and formally integrated into Brazil's national Integrated Fire Management programme in 2024, emerged as a cornerstone of these adaptation efforts. In the aftermath of the 2024 wildfires, the brigade had taken on a more active role in conducting or supporting controlled burning across most swidden plots throughout the territory. Despite notable success, this trajectory of formalisation and centralisation of fire management raises frictions. Increased reliance on the fire brigade reduces flexibility of burning dates, reinforces dependence on support from external institutions, and concentrates local fire knowledge among a narrower group of fire-users. At the territorial scale, the collective prioritisation of wildfire risk reduction sometimes clashes with the livelihood and cultural objective of fire use amongst the 13 communities that make up Capoto/Jarina, raising questions of equity and governance. Through the case study of Capoto/Jarina, this presentation explores the role played by the fire brigade for fire management in Indigenous territory, a pivotal component of Brazil’s recent Integrated Fire Management policy. It surfaces some of the tensions between collective aspiration to reduce wildfire risk and individual livelihoods and cultural objectives, as well as between cultural continuity and adaptation to a quickly changing environment.

Dr Patrick Ball, Inigo

Title: Wildfire Exposure Management in Insurance through Physically Grounded Tail-Risk Scenarios

Dr Patrick Ball

Abstract: Since 1970, North American wildfire insured losses have increased with an annual growth rate of 14%, driven by expanding development in the wildland–urban interface and the impacts of climate change (Swiss Re, 2025). The Los Angeles fires in January 2025 were both the costliest insurance event of 2025 and the most expensive wildfire ever recorded - with economic and insured losses of $58 and $41 billion, respectively (Aon, 2026). As a result, insurers increasingly recognize the need to closely monitor their exposure in high-risk regions and to rigorously stress test their portfolios against possible tail events. Inigo has partnered with Pinepeak to create scenarios of a similar severity to the Los Angeles fire in Colorado and California. Simulations are generated using Pinepeak's FLAMESIGHT platform, which combines a stochastic wildfire spread simulator (based on a hybrid Lagrangian-cellular automaton approach) with high-resolution representations of terrain, fuels, and weather. We present two simulations and highlight an alternative approach to managing insurance wildfire risk. .

Session 6 - Theme E (Day 2, 11:30-13:00)

How can fire policymaking and management be made more integrative, equitable and adaptive?

Prof. Kate Schreckenberg, King's College London (Leverhulme Centre for Wildfires, Environment and Society)

Title: Equity and Justice in Integrated Fire Management

Prof. Kate Schreckenberg

Abstract: The increasing frequency, severity and visibility of catastrophic wildfires have brought Integrated Fire Management (IFM) to the forefront of global policy agendas. Recent international initiatives—including the Kananaskis Wildfire Charter, the United Nations Environment Assembly draft resolution on global wildfire management, and the Call to Action on Integrated Fire Management and Wildfire Resilience launched ahead of COP30—promote IFM as a holistic approach integrating science, policy, Indigenous and local knowledge, and modern technologies. Although often framed as novel, IFM has a longer history and has functioned as a flexible framework encompassing diverse approaches to fire governance across ecological, social and cultural contexts. This paper argues that as IFM becomes increasingly institutionalised within global and national policy frameworks, issues of equity and justice require more explicit and systematic attention. Although contemporary IFM discourse acknowledges the importance of participation, traditional fire use and local livelihoods, it often underplays underlying power relations, trade-offs between objectives, and the uneven distribution of costs and benefits among different stakeholders and rights-holders. Evidence from wider environmental governance research suggests that without explicit attention to justice, interventions risk reproducing entrenched inequalities rooted in technocratic and top-down land management paradigms. Drawing on interdisciplinary literature and fire-specific case studies, we identify key dimensions of equity and justice relevant to IFM, including distributional, procedural, recognition and restorative aspects, and demonstrate how these dimensions are interconnected. We then propose a set of guiding principles, presented as a practical checklist, to inform the co-development of more equitable and just IFM initiatives. These principles are illustrated through a case study from Brazil, highlighting both opportunities and challenges in applying justice-oriented approaches to fire management. We conclude by discussing when, how and by whom these principles might be applied, contributing to both policy-relevant guidance and conceptual debates on fire governance in complex social–ecological systems.

Prof. José Miguel Pereira, Forest Research Centre, School of Agriculture, University of Lisbon
Title: From fire exclusion to integrated fire management in Portugal

Prof. José Miguel Pereira

Abstract: The evolution of fire management in Portugal since the late 20th century reflects a gradual shift from a suppression-dominated paradigm toward an integrated, risk-based governance model. During the 1980s and 1990s, fire policy largely emphasized reactive suppression, despite growing evidence that socio-economic changes such as rural abandonment, fuel accumulation, and landscape homogenization were increasing fire danger. A major institutional milestone was the implementation of the National Plan for Forest Protection Against Wildfires (PNDFCI) in 2007, which formalized a national framework structured around prevention, preparedness, and suppression. The PNDFCI promoted fuel management, risk mapping, and coordination across agencies, yet its operational focus remained strongly oriented toward firefighting capacity. Subsequent large fire events, including those of the 2010s, exposed persistent limitations in addressing underlying drivers of fire regimes, such as land-use change and climate variability. The catastrophic 2017 wildfire season marked a turning point, triggering systemic reforms and the creation of the National System for Integrated Rural Fire Management. This new framework underpins the National Plan for Integrated Rural Fire Management and its National Action Programme, which adopt a holistic approach spanning prevention, landscape management, community resilience, response, and recovery. Emphasis has shifted toward proactive fuel reduction, including prescribed burning, and evidence-based decision-making supported by integrated governance structures. Scientific research has played a key role in this transition. The Forest Research Centre of the University of Lisbon has contributed to advancing knowledge on pyrogeography, fire risk assessment, and fuel management planning, informing policy and operational practices. Overall, Portugal's fire management evolution illustrates a paradigm shift from reactive suppression to integrated fire management, increasingly grounded in scientific evidence and focused on long-term landscape resilience.

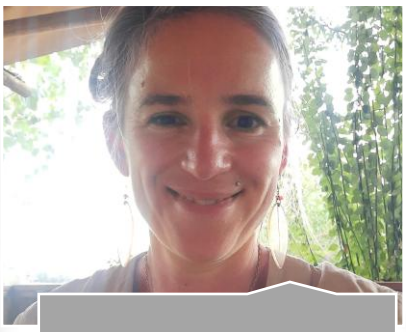
Dr Maximilian Stiefel, King's College London (Leverhulme Centre for Wildfires, Environment and Society)
Title: Planning Before the Fire: Equity, Adaptation, and the Effects of Community Wildfire Protection Plans in the United States

Dr Maximilian Stiefal

Abstract: Wildfire policy is increasingly asked to do several things at once: reduce risk, protect lives and property, steward ecosystems, and distribute the burdens and benefits of adaptation fairly. Yet fire management is often evaluated in fragments by agency, jurisdiction, treatment type, or event. We present ongoing work that builds a spatial panel of wildfire exposure, preparedness, and community characteristics across the United States to ask how planning institutions shape adaptive capacity before fire occurs. We focus on Community Wildfire Protection Plans (CWPPs), a policy instrument intended to coordinate federal, state, local, and community priorities around wildfire risk. Using geospatial panel data with wildfire incident records, wildland-urban interface classifications, fuel treatments, social vulnerability measures, built-environment characteristics, and political and fiscal context, our analysis examines where CWPPs emerge, which communities they cover, and whether adoption is associated with measurable changes in wildfire management and outcomes over time. This research speaks to integrative, equitable, and adaptive fire policymaking by linking ecological risk, institutional planning, suppression and fuel treatment activity, and community context within a common empirical framework. Bringing these dimensions together allows us to examine wildfire planning alongside the biophysical, institutional, and social conditions that shape where policy is implemented and how it may matter. Equity is central: is planning capacity directed toward communities most exposed to wildfire risk, or toward those already best positioned to organize, and do socially vulnerable communities experience different effects? Rather than treating wildfire governance as a one-time intervention, the analysis understands it as an evolving relationship between changing hazards, public institutions, and local capacity. Evaluating wildfire policy requires looking beyond whether management 'works' on average. We also need to ask where planning happens, for whom it creates capacity, and how evidence can help design wildfire governance that learns across landscapes while remaining accountable to unequal capabilities.

Dr Rachel Carmenta, University of East Anglia

Title: Climate driven fire futures for Indigenous Peoples and local communities across the forested tropics: a biocultural approach to enhance equity and justice



Dr Rachel Carmenta

Abstract: Flammability is rising, including across the worlds tropical rainforests. These previously fire-free biomes are particularly susceptible to degradation through fire because their species assemblages have developed in relatively extended fire return intervals in the pre-Colonial era. Whilst fire-based agricultural practices by Indigenous Peoples and local communities in tropical forests have existed, and indeed shaped, these landscapes over millennia, today new and diverse actors use fire adding to ignition sources and under different sets of incentives for fire management and control. The background conditions of climate change and forest degradation (e.g. fragmentation, logging, drought) further enhance the conditions for rainforest fires and place a burden on IP&LC who need to navigate contexts of increased risk, often with limited external support and perversely also in receipt of stigmatisation and blame. Yet, as forests are degraded through fire, so too are the ways in which forests can contribute to the culture and human wellbeing of these groups. IP&LC are often interconnected with their forest territories in complex and multiple interacting pathways that feed in to all dimensions of human wellbeing and that have proven consonant with nature. In this context it is imperative to consider the feedbacks forest fires pose to these people nature connections, and identify the fire futures potentially faced by Indigenous Peoples and Local Communities across their territories under climate scenarios. Such a biocultural approach to understanding the full set of impacts of tropical rainforest fires is essential for increasing justice, improving understanding of loss and damages, and hopefully also generating support for action. This talk draws on a body of research and presents new analysis to explore these topics.

Mr Amos Chege Muthiuru, King's College London (Leverhulme Centre for Wildfires, Environment and Society)

Co-authored by James Millington, Kris Cha and Emma Tebbs, King's College London

Title: Integrating Indigenous people and Local Knowledges into wildfire Management Frameworks: Assessing Practices, Barriers, and Policy Pathways in Multiple-Use Landscapes

Mr Amos Chege Muthiuru

Abstract: The frequency and intensity of extreme wildfires are increasing in many regions globally, highlighting the limitations of conventional fire suppression approaches in managing fire-prone landscapes. Community-Based Fire Management (CBFiM), which incorporates cultural burning practices, has emerged as a promising alternative for reducing wildfire risk, regulating fuel loads, and mitigating greenhouse gas emissions. However, adoption of CBFiM remains constrained by fire suppression policies, limited inclusion of Indigenous Peoples and Local Communities (IPLCs) and their traditional knowledge, and a lack of participatory governance systems. This study mapped IPLC fire use and perceived causes of wildfires, identified barriers to effective fire-based land management, examined challenges to integrating IPLCs and their knowledge into existing fire management frameworks, and explored pathways for improving their inclusion in Tsavo Landscape, southern Kenya. Data were collected through questionnaires and participatory workshops involving 141 respondents, including IPLC members and fire managers. Results show that wildfires are considered a medium-to-high concern, with significant differences between IPLCs and fire managers regarding perceived wildfire causes and levels of concern. Key barriers to traditional fire use practices and prescribed burning include concerns about fire escaping control, limited awareness, restrictive legal frameworks, and emerging carbon-related restrictions. Most respondents agreed that traditional knowledge and fire practices are inadequately incorporated into current fire management systems due to insufficient awareness, institutional exclusion, and limited funding. The findings highlight the need for legally supported community stewardship, targeted financing, capacity building, and sustained dialogue between IPLCs and fire managers to develop adaptive, inclusive, and resilient integrated fire management frameworks.

Session 7 - Theme F (Day 2, 14:00-15:30)

Theme F: What futures for fire in the Earth system are plausible - and which should we aim for?

Prof. James Millington, King's College London (Leverhulme Centre for Wildfires, Environment and Society)
Co-authored by Dr Ol Perkins, University of East Anglia, previously King's College London
Title: A global assessment of the benefits and limits of controlled burning for climate change adaptation

Prof. James Millington

Abstract: Controlled burning in landscapes has been practiced for millenia for many purposes. Looking to the future, intentional and controlled burning of landscape vegetation has been suggested as a strategy to adapt to climate-altered fire regimes. Here, we present the first quantitative global assessment of controlled burning using the JULES-INFERNO dynamic global vegetation model coupled to the WHAM! agent-based model that can represent alternative fire management approaches. This new online coupling includes novel representations of human fire use seasonality and fireline intensity. JULES is modified so that modelled fireline intensity now drives fire-induced vegetation, accounting for climate, fuel and human management. Hence, the WHAM-JULES-INFERNO ensemble can assess the human and climate drivers of future fire intensity, and also fire-vegetation feedbacks resulting from contrasting management approaches. We explored two Shared Socio-Economic Pathway (SSP) scenarios with biophysical forcings from three ISIMIP 3b earth system models, simulated to 2100 globally at a spatial resolution of 0.25°. We complemented the SSP scenarios with two fire management scenarios implementable via WHAM! "IFM-max", in which the world turns to increased controlled burning through Integrated Fire Management; and "Suppression-max", in which controlled burning is abandoned and the world focuses on fire exclusion and suppression. We find that controlled burning can play an important role in constraining future fire hazard and intensity. However, we also find that the simulated impact of controlled burning is smaller than general land management changes resulting from economic conditions of the SSPs. Our results suggest that incremental changes in land and fire management may be insufficient relative to the combined impacts of socio-economic and climate change. Transformative changes in the fundamental relationships between economic development and fire suppression will need to grapple with integrating low-intensity fire in capital-intensive land systems on an increasingly flammable planet. .

Dr Rut Domènech, Universitat de Lleida
Title: Managed fire as a pathway to ecologically desirable fire futures

Dr Rut Domènech

Abstract: Extreme wildfires are no longer exceptional events: they are a growing global reality driven by climate change, land abandonment, and decades of active fire suppression and exclusion. Addressing this crisis requires a fundamental shift from reactive firefighting towards proactive fire management. Effective management demands more than a return to past burning practices; it requires asking: which ecosystems does fire create, and are they the ones we need for the future? Historical burning traditions were shaped by very different objectives: producing pasture, managing territory, and supporting agrarian livelihoods. Today the urgency is different, centred on ensuring human safety and guaranteeing the survival of species and ecological processes under accelerating climate change. Fire is not merely a threat to be suppressed: it is a natural perturbation that many ecosystems use to adapt, regenerate, and reorganise under climate change. Drawing on analyses from California and Catalonia, two fire-prone landscapes with contrasting governance histories but converging challenges, this talk examines how managed burning can be ecologically calibrated to serve contemporary objectives. Burning better means burning smarter: knowing when to burn is as important as knowing where and why. A central focus is the development of safe prescribed burning windows within which fire crews can operate effectively while meeting both safety and ecological goals. This requires fire behaviour science calibrated for prescribed and managed fire, which differs fundamentally from wildfire behaviour in its prescriptions, weather conditions, and ignition patterns. Under mid-century climate projections, these windows are likely to narrow significantly, with profound implications for when, where, and how managed fire can be deployed. The talk concludes by arguing that the window for building a desirable fire future, ecologically grounded, climatically informed, and socially supported, is open now but will not remain so indefinitely. The choices made this decade will shape landscapes and communities for generations.
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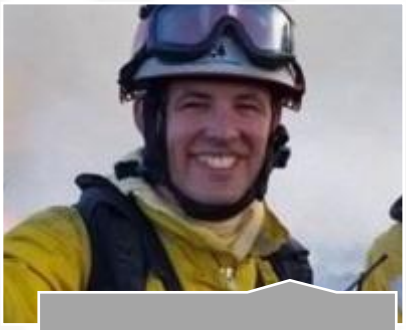
Ms Sophy Greenhalgh, Imperial College London (Leverhulme Centre for Wildfires, Environment and Society)
Title: Shaping UK Wildfire Futures: Governance Pathways, Land-Use Change and Learnings from the Mediterranean

Ms Sophy Greenhalgh

Abstract: Wildfire risk is increasing across historically low-fire regions such as the UK, driven by climate change, land-use change, and evolving socio-ecological dynamics. Recent extreme fire seasons suggest the UK may be entering a period of rapid transition in fire regimes. This talk explores plausible UK wildfire futures against the backdrop of limited wildfire management experience. Mediterranean fire governance evolution is used to demonstrate paradigms which the UK might follow. Rather than treating these as transferable models, Mediterranean experience is used as a set of pathway analogues, illustrating how governance choices shape long-term fire regimes. A key driver across both contexts is rural land abandonment and the reconfiguration of land management, leading to increased fuel continuity and more fire-prone landscapes. In the UK, this intersects with tensions between conservation policy and agricultural change highlighting fire risk as an outcome of competing land-use objectives alongside escalating climatic pressures. Drawing on UK practitioner insights, I discuss some early findings on the governance landscape of the UK alongside emerging adaptive elements, including anticipatory approaches, cross-sector integration and the potential for enhancing community-led capacity. Shaping fire in the UK will depend on moving beyond reactive policy toward more coordinated governance that focusses on land management and public engagement as well as enhancing a whole roster of wildfire fire capabilities that can support more resilient socio and ecological outcomes.

Mr Rob Gazzard, Forestry Commission
Title: Embedding Integrated Fire Management into UK approaches



Mr Rob Gazzard

Abstract: Launched at the 8th International Wildland Fire Conference in Porto in 2023 the concept of Integrated Fire Management (IFM) is the next evolution to ensures communities and landscapes are resilience to the increasing threat of wildfires. Across the United Kingdom approaches to addressing wildfire are emerging and provide direction on the actions and measures needed to mitigate and adapt to the parallel climate change and biodiversity emergencies. Understanding the components of IFM is important factor to ensuring its is fully implemented as well as the unique requirements of different parts of the United Kingdom, due to geographical, political and cultural needs.The presentation will cover approaches across England, Wales, Scotland and Northern Ireland, in strategies, action plans and wildfire management plans. This will span the forestry, development and resilience planning to ensure challenges in the Rural Urban Interface are addressed. It will also cover the lessons learnt and how the concept can be further developed.

Dr Kayla De Freitas, University of Guyana (Amerindian Research Unit) (Leverhulme Wildfires, Environment and Society alumni)

Title: Envisioning Adaptive Fire Futures: Indigenous Fire Knowledge and Co-Produced Governance in the South Rupununi, Guyana

Dr Kayla De Freitas

Abstract: Fire futures in neo-tropical savanna regions are often framed through narratives of wildfire risk, suppression, and climate-driven intensification. Such approaches frequently overlook Indigenous fire stewardship systems that have long shaped fire–landscape interactions and mitigated extreme wildfire events. In the South Rupununi, Guyana, a collaborative partnership between the South Rupununi Conservation Society (SRCS), University of Guyana (UG), South Rupununi District Council (SRDC), and Royal Holloway, University of London (RHUL) is working to reframe plausible fire futures through integrative, locally grounded research. We examine alternative governance pathways beyond top-down suppression and fragmented management, focusing on adaptive, community-led systems and their potential to shape future fire regimes under changing climatic and socio-economic conditions. Drawing on ecological monitoring and participatory research across communities such as Sawariwau and Shulinab, we show that Indigenous burning practices create fine-scale fire mosaics that support biodiversity and reduce the likelihood of large, high-intensity wildfires. However, these systems are increasingly challenged by climate variability, shifting livelihood practices, and external wildfire pressures. Rather than treating Indigenous and scientific knowledge as separate domains, this research develops methodological and governance bridges. These include co-produced monitoring protocols, integration of fire-use mapping with ecological datasets, and the use of adaptive fire calendars that respond to seasonal variability. These tools enable grounded scenario-building and strengthen anticipatory capacity in wildfire management policies. We argue that desirable fire futures should not be defined solely by fire exclusion, but by maintaining socially and ecologically functional fire regimes. From an Indigenous-informed perspective, a “good” wildfire future sustains biodiversity, supports cultural livelihoods, and reduces catastrophic fire risk through intentional, adaptive burning practices.

Poster Presentations

Theme A

What controls landscape burning, and how can we better anticipate and detect these events?

1. **Gian Luca Spadoni, University of Turin - AMAP lab**

Title: The influence of land conversion on fire regimes in the Brazilian Cerrado

Abstract: The Cerrado, the world's largest tropical savanna, comprises a diverse mosaic of vegetation types with varying responses to fire. Fire has historically played a key role in shaping the structure, ecological processes, and biodiversity of its non-forest ecosystems, acting both as a natural disturbance and as a management tool used by Indigenous peoples. Today, however, the Brazilian Cerrado faces increasing pressure from large-scale land conversion and changes in fire regimes, including shifts in frequency and seasonality, threatening biodiversity, local livelihoods, and climate regulation. While land conversion is known to drive fire occurrence, its contribution to total burned area remains unclear. This study addresses this gap by analysing the period 2003–2020, quantifying both native vegetation loss due to land conversion and the extent of fires originating in recently converted areas. Focusing on the Cerrado regions of Mato Grosso and MATOPIBA, we combined geospatial data on vegetation loss (PRODES Cerrado), fire activity (Global Fire Atlas), and land use (MapBiomas). Fires were classified as Devegetation-Related Fires (DRF), ignited within or near areas converted within the previous two years, or Independent Fires (IF). We also examined differences in seasonality, fire size, and distribution across land tenures, including Indigenous Territories, Protected Areas, and private lands. Over 18 years, DRF burned approximately 20 million hectares—about 25% of the remaining native vegetation—and accounted for 12% of total burned area, comparable to the 15 million hectares converted during the same period. Although Protected Areas and Indigenous Territories limited land conversion, they remained affected by DRF. These findings highlight the urgent need to reduce land conversion and strengthen integrated fire management strategies in the Cerrado.

2. **Jinchang Deng, Nanjing University of Information Science & Technology**

Title: Identification, Spatiotemporal Evolution, and Risk Assessment of Underground Coal Fires Based on Time-Series Satellite Thermal Anomalies

Abstract: Underground coal fires (UCFs) are persistent and concealed hazards that cause severe environmental degradation, resource loss, land subsidence, and threats to mining safety. Their long duration and subsurface nature make accurate detection and dynamic risk assessment particularly challenging. This study develops a remote sensing–based framework to characterise the spatiotemporal evolution of UCFs and evaluate suppression effectiveness in the Midong coalfield, Xinjiang, China, using time-series Landsat-8 Thermal Infrared Sensor data from 2013 to 2020. Land surface temperature was retrieved using the Radiative Transfer Equation, revealing clear thermal anomalies, with fire areas exhibiting temperatures up to 7.4°C higher in summer and 5.8°C in colder seasons compared to surrounding regions. Four thermal thresholding methods were evaluated, including Mean+2SD, Hotspot Analysis (HSA), Exploratory Data Analysis, and a Fractal model. Due to strong spatial dependence, HSA achieved the best performance in delineating fire boundaries and identifying hotspots. To further reduce false alarms caused by solar radiation and surface heterogeneity, a Hotspot Sequential Frequency Extraction method was introduced to identify persistent high-frequency thermal anomalies. Spatiotemporal dynamics were quantified using the Coal-fire Thermal-island Intensity Ratio (CTIR) and Sequence Overlap Dynamic Analysis, capturing rapid early-stage expansion followed by significant post-suppression decline, with reductions of up to 74% in affected areas. The Thermal Anomaly Density Centre was proposed to track fire migration, revealing complex multi-directional propagation patterns. Results highlight strong geological controls on fire distribution, with fractures guiding spread, while mining activities accelerate propagation and targeted interventions promote rapid attenuation. The study elucidates the complex coupling mechanism of anthropogenic and natural factors on UCF evolution, specifically characterizing their joint impacts on heat release, spatial distribution, and migration. This framework also demonstrates broad applicability for monitoring peat fires and other smouldering wildfires, providing a generalised solution for integrated environmental management and dynamic fire risk mitigation.

3. **Alexander Castagna, Imperial College London**

Title: Modelling the probability of smouldering ignition of vegetation from hot metal particles ejected by power lines

Abstract: Power line failures can cause wildfires, particularly in regions like California, Australia, and Portugal, where high-wind conditions have led to the clash of power line conductors, ejecting metal particles that can ignite nearby vegetation. While ignition by particles has been the focus of experiments before, its modelling remains understudied. This paper presents a computational model to predict ignition by particles, focusing on smouldering as the critical stage before flaming. Particle trajectory and cooling in flight are simulated stochastically using equations of motion and heat transfer, while ignition of vegetation is modelled through a pseudo-one-dimensional thermochemical medium with Gpyro. Using weather and fuel data from California as a case study, results show that for wind speeds up to 20 m/s, aluminium particles with a diameter of at least 6.5 mm, ejected from a 20 m high power line, land at temperatures above 740 °C and can ignite grass and shrub fuel beds, creating an at-risk zone of 274 m around the conductor clash point, extending up to 52 m from the power line. Fuel moisture is the primary factor influencing ignition, followed by particle size. This modelling study contributes to close the gap in modelling ignition by particles and offers insights for mitigating wildfire hazards from power lines.

4. **Lazaros Papachristodoulou, RiskLabs**

Co-authored by Alexander Kruse, RiskLabs; Frixos Papachristodoulou, Imperial College London; and Guillermo Rein, Imperial College London

Title: Sensitivity Analysis of the Nelson Dead Fuel Moisture Model for Regional Calibration in Wildfire Predictions

Abstract: Wildfires now burn more than twice as much tree cover annually as they did two decades ago, with wildfire smoke estimated to cause over 1.5 million deaths worldwide each year. Accurate prediction of fire behaviour is therefore essential for effective preparedness and suppression. Dead fuel moisture content is a critical determinant of wildfire behaviour, controlling ignition probability, rate of spread, and fire intensity, making its prediction a core input to fire danger rating systems worldwide. The Nelson model constitutes the most widely adopted mechanistic formulation for dead fuel moisture prediction, serving as the physical basis of operational fire danger rating systems across North America. Nevertheless, it was developed and calibrated exclusively under North American climatic conditions, and its transferability to other regions and fuel types has not been systematically assessed. This study benchmarks the Nelson model against open-access experimental measurements of 10-h timelag fuels from British Columbia, Canada, and Saxony, Germany. Validation shows high predictive performance ($R^2 = 0.738$, RMSE = 0.056 g/g) in British Columbia, where conditions resemble those of the original calibration region, but significantly degraded performance in Saxony ($R^2 = 0.581$, RMSE = 0.098 g/g), with systematic over-prediction persisting across multiple months. To identify which of the 30 tuneable parameters of the model govern this discrepancy, a two-stage global sensitivity analysis was conducted, combining Morris elementary effects screening with Sobol variance decomposition. The analysis reveals that output variance is dominated by two physical processes. The most variance is observed through the variation of water storage within the stick (through density, maximum moisture, fiber saturation moisture and rainstorm moisture), and the sensitivity analysis indicates that these parameters are highly coupled with each other. Furthermore, the second most significant physical process is the bound water diffusion kinetics, which are governed by an Arrhenius relation. For calibration to climates and fuel types beyond North America, experimental characterisation of the aforementioned parameters is recommended, enabling accurate dead fuel moisture prediction in support of wildfire danger assessment.

5. **Zahra Mousavi, University of Exeter**

Title: The influence of traditional UK moorland vegetation management mosaics on fire spread

Abstract: Wildfire occurrence in UK moorlands is increasing under climate change, raising concerns about carbon loss, and the effectiveness of fire management. In these landscapes, fire spread is strongly governed by fuel continuity and long-established practices such as controlled burning, cutting, and mowing have created heterogeneous vegetation mosaics that may influence fire behaviour. However, the effectiveness of different spatial configurations of these managed patches remains poorly quantified. This study evaluates how management-induced fuel patchworks affect wildfire spread. We developed 5 hypothetical landscape mosaics containing different sized patches of recently managed

vegetation in different arrangements across the landscape. We included two vegetation management approaches, 1) burning or mowing with brash removal, leaving essentially non-burnable patches and 2) heather brash filled patches that were burnable. These patches were set within a 0.5m tall heather vegetated landscape based on field observations from the Peak District. We simulated fire behaviour in the landscapes using FlamMap under multiple wind speeds and directions generating maps that indicate the point of the arrival of the fire front across the landscape and how long the fire takes to traverse the entire area. We show that patchworks function primarily as fire-slowing features rather than absolute barriers, altering fire spread patterns, increasing fire arrival times and in some cases leaving areas unburned. The findings highlight that management-driven mosaics can enhance landscape fire resilience. This research provides a starting framework for land managers to design fire-smart landscapes, offering a science-led approach to adaptive management and enhanced wildfire resilience in the UK's uplands.

6. **Sarah Wild, Wildfire Analytics, University of Alberta, Canada**

Title: Directional Vulnerability Assessment Identifies Potential Wildfire Pathways

Abstract: This poster presents award-winning MSc research (Wild, 2025) that asked whether the Canadian model of directional vulnerability to wildfire exposure could be effectively applied in the British context, given differences in scale, ecosystem, land-use patterns and fire regimes. The work built on the approach developed by Beverly and Forbes (2023), who used radial graphs to represent the directional vulnerability of communities to wildfire exposure. Using the fireexposuR package in R, GIS tools and land cover data, the study generated wildfire exposure assessments at national and regional scales, together with directional vulnerability graphs for a selected case study area. While wildfire exposure modelling has been developing in Canada, it remains unused in Britain despite growing concern over the increasing frequency and severity of wildfires. The original model produces outputs that support spatially strategic fuel management and land-use planning, and this research explored whether it could similarly support wildfire hazard assessment in Britain. By presenting these outputs in a visual format, the poster makes a complex spatial assessment more accessible to audiences with an interest in understanding wildfire hazard. Overall, it highlights the potential value of directional vulnerability assessment for improving understanding of wildfire exposure in Britain and for informing future research and applied practice.

7. **Abdullah Rehman, King's College London (Leverhulme Centre for Wildfires, Environment and Society)**

Title: Resolving Sub-Metre Fuel Heterogeneity in the Wildland–Urban Interface for Structure-Level Fire Risk Assessment

Abstract: Impacts of wildfires on communities and structures in the wildland-urban interface (WUI) are increasing globally, driven by climate change and expanding urban development. As prevention and mitigation become increasingly critical, there remains a lack of widely applicable methodologies capable of resolving structure-adjacent fuels and quantifying their role in fire spread and structure loss. Most wildfire and WUI fire spread models rely on fuel maps at spatial resolutions of approximately 30 m. These are insufficient to represent the granular and heterogeneous fuels present within the Home Ignition Zone (HIZ), forcing abstraction of critical fire spread mechanisms. We develop a scalable remote sensing pipeline for sub-metre resolution mapping of residential and vegetative fuels in the WUI using satellite or aerial imagery, supporting rapid and globally applicable community assessment. A hybrid methodology combines zero-shot object segmentation using the Segment Anything Model (SAM) with Simple Linear Iterative Clustering (SLIC) to refine object boundaries. Segmented objects are classified as residential fuel subclasses, vegetative fuel subclasses (dry or live), or non-combustible surfaces using spectral analysis and a random-forest classifier. The approach is evaluated across 12 major WUI fire events across five continents between 2015 and 2025, using pre- and post-fire imagery. Baseline results demonstrate high-quality object masks and a classification accuracy of approximately 78%, with ongoing work exploring alternative model architectures. An initial structure-level risk analysis is conducted for the 2017 Pedrógão Grande fire in Portugal using the generated fuel maps. Fuel distributions within the HIZ surrounding each structure are analysed alongside structure separation distance. A structure loss prediction model based on a random-forest classifier is developed, achieving a baseline accuracy of approximately 75%. Feature importance analysis identifies the presence of dry vegetation within 10 metres of the structure as the strongest predictor of structure loss, which has direct implications for community mitigation and risk reduction.

8. **Sina Mehrdad, Imperial College London (Leverhulme Centre for Wildfires, Environment and Society)**

Title: Event-Driven Wildfire Detection via Social Media and Targeted Satellite Analytics

Abstract: Wildfires evolve rapidly and demand timely localization for effective emergency response, which requires real-time monitoring systems. However, global, continuous satellite scanning with advanced machine-learning-based fire detection models can be computationally prohibitive at scale. Social media offers a complementary source of information by providing early, localized observations (text, images, video) of wildfire events. These signals, however, are often noisy, incomplete, and weakly georeferenced. We propose a hierarchical, event-driven framework that fuses multimodal social media streams (from TikTok, BlueSky, and others) with Earth observation data (from MODIS, Sentinel, Landsat, and others) to enable efficient and timely wildfire localization. Our pipeline operates in three stages. First, multimodal social content is processed to extract weak geolocation cues along with associated uncertainty, yielding a coarse probabilistic region of interest (ROI). Second, the inferred ROI is used to query a satellite basemap to identify candidate regions and substantially reduce the search space for subsequent analysis. Third, near-real-time satellite imagery within the candidate ROI is analysed for wildfire signatures, such as smoke plumes and thermal anomalies, using modern detection models, producing a refined location estimate and enabling rapid confirmation. The key contribution is a computationally scalable fusion strategy that transforms unstructured, real-time social sensing into actionable priors for targeted satellite analytics. We outline case study designs to evaluate localization accuracy and detection latency. We also present an initial prototype of the real-time fire detection retrieval component as a step toward a fully integrated end-to-end system.

9. **Isodora Xenaki, University of Reading (Leverhulme Centre for Wildfires, Environment and Society)**

Title: Understanding the interacting drivers of past and present wildfire regimes through data analysis and modelling

Abstract: Landscape fires are a perennial component of the biosphere that have shaped the continuity of atmospheric biochemical cycles and ecosystem evolution over geological timescales. Although many modern ecosystems depend on fire, wildfires also pose significant ecological and societal hazards. Hence, the accurate prediction of their global spatial and temporal patterns is vital. However, fire prediction models exhibit biases in their current representations, highlighting the need to understand more deeply how fires interact with climate, vegetation, and human drivers. Past burnt area modelling has relied on simulated inputs, raising the question of whether we can model Holocene fire patterns using the available paleo databases. In this study, we develop a Generalized Linear Model using inputs that can be obtained from paleo records to reconstruct Holocene regional and global burnt area patterns and quantify the importance of predictors by region and timescale.

10. **Minxue Tang Imperial College London (Leverhulme Centre for Wildfires, Environment and Society)**

Title: Modelling Wildfire and Gross Primary Production in SE Asia: Bridging Simulations, Observations and Risk Assessment

Abstract: This study focuses on modelling Gross Primary Production (GPP) and wildfire dynamics in Southeast Asia (SEA), bridging advanced simulations with observational data to improve understanding of the risks of drought, heatwaves and fire in the region. Wildfires in SEA are increasingly destructive due to climate change and human activities, making accurate predictions of fire risk essential for effective management. GPP, which drives fuel availability for wildfires, is a key variable in assessing fire risk. This study utilises the simple yet powerful P model to estimate GPP, integrating process-based modelling with remote sensing data for enhanced accuracy. Then, the fire risk model developed by Haas et al. (2022) was used to estimate wildfire risk, using estimated GPP from the P model, fire weather, and socio-economic factors. The study evaluates the current models by comparing their outputs with observed GPP from eddy-covariance flux towers and observed burnt area from the Global Fire Emissions Database (GFED5). The work further extends to future projections of GPP and fire risk under various climate scenarios, leveraging large climate ensembles from the Multi-Model Large Ensemble Archives (MMLEA: Deser et al., 2020; Maher et al., 2025), and future predictions of leaf area index (LAI) from Zhou et al. (2025). This combined approach aims to provide a robust framework for predicting wildfire risk in a rapidly changing climate, supporting decision-making processes related to ecosystem management, climate adaptation and carbon sequestration in SEA.

Theme B

Theme B: How does fire interact with atmospheric composition, the carbon cycle, and climate?

11. **Maria Velásquez-García, University of Leeds**

Title: Satellite-observed formic acid levels in South American wildfire plumes during long-range transport across the Atlantic Ocean

Abstract: Formic acid (HCOOH) is a prevalent organic acid that influences rain acidity, aerosol chemistry and aerosol hygroscopic properties. Its levels in the atmosphere are yet not well constrained, as larger sinks are accounted for than sources. Particularly in the fire plume, HCOOH seems to maintain higher levels, as if it were only emitted. The literature consistently points to heterogeneous and aqueous-phase reactions as possible explanations. In this matter, satellite observations have been of great use in evaluating global-scale models. However, the ability of satellite observations to characterise HCOOH within fire plumes and elucidate its sensitivity to meteorological drivers, particularly those linked to potential secondary production, remains insufficiently explored, given the multiple challenges this entails. Here, we adopt an exploratory approach that combines IASI satellite retrievals with ERA5 reanalysis data to examine the relationships between humidity and HCOOH under fire-plume conditions, recognising that moisture may modulate both secondary production and deposition. As a case study, we analyse the long-range transport of South American fire plumes over the Atlantic Ocean during 2024. Fire plume evolution is characterised using Lagrangian retro-trajectory analysis, particularly analysing elevated plumes that traversed the Atlantic. Satellite-based observations suggest that drier atmospheric conditions are associated with a comparatively larger net HCOOH signal during plume transport, although the underlying mechanisms cannot be uniquely determined from observations alone. To further probe potential chemical pathways under contrasting humidity regimes, we perform a sensitivity analysis using alternative chemical mechanisms within the UKCA box model. Together, these results illustrate the potential of satellite observations to explore HCOOH chemistry in the atmosphere and within biomass-burning plumes.

12. **Will Maslanka, King's College London (Leverhulme Centre for Wildfires, Environment and Society)**

Title: Satellite-only estimation of CO emissions from the 2019-2020 Australian Black Summer megafires using the Fire Radiative Energy Emission (FREM) Approach

Abstract: The 2019–2020 Australian Black Summer megafires burned over eight million hectares of vegetation, releasing an unprecedented quantity of greenhouse gases into the atmosphere. We present an expanded Fire Radiative Energy Emission (FREM) approach that derives emission coefficients directly from satellite observations, linking Fire Radiative Energy (FRE) observations from Himawari to carbon monoxide (CO) observations from Sentinel-5P. This satellite-only framework removes the need for uncertain fuel consumption estimates used in both the Global Fire Emission Database (GFED) and the Global Fire Assimilation System (GFAS). A dataset of 508 cloud-free fires and associated plumes from 2019 across six Australian fire-prone biomes (low woodland savanna, grassland, shrubland, evergreen and deciduous broadleaf forests, and sparse vegetation) was compiled to derive biome-specific emission coefficients. These coefficients, combined with a fire-bias correction and hourly Himawari FRE observations, were used to estimate emissions across Australia from 2019 to 2024, with emphasis on the Black Summer period (Nov 2019 – Jan 2020). FREM emissions were compared with existing inventories (GFAS v1.2, GFED v4.1s, GFED v5.1, and the Fire Energetics and Emissions Research, or FEER). The FREM inventory reproduces spatial and temporal emission patterns consistent with pre-existing inventories, while retaining sensitivity to fire intensity and temporal variability. However, saturation of the Advanced Himawari Imager sensor during extreme fire events leads to underestimation of CO emissions, highlighting a limitation for high-intensity fires.

13. **Manolis Grillakis, Technical University of Crete (Leverhulme Centre for Wildfires, Environment and Society)**

Title: Diverging Post-Fire Hydrological Responses in ISIMIP3a Fire-Enabled Models

Abstract: Wildfires fundamentally reshape hydrological regimes, yet global-scale assessments of these impacts remain scarce. Using simulations from seven state-of-the-art fire-enabled land surface models within the ISIMIP3a framework, we evaluate how fire disturbances influence runoff across diverse biomes. Our results reveal regional divergences, with models consistently simulating post-fire runoff coefficient decreases in boreal and temperate forests while showing increases in the tropics and subtropics. This inter-model variability is primarily driven by contrasting terrestrial carbon cycle responses. Specifically, models that simulate sustained losses in net primary productivity (NPP) reproduce the expected reduction in evapotranspiration and subsequent increase in runoff. Conversely, models exhibiting rapid NPP recovery effectively restore evapotranspiration fluxes, mitigating the hydrological signal. While the ensemble aligns well with observational benchmarks in high-latitude forests, it underestimates the magnitude of fire-runoff interactions in equatorial regions. This study highlights significant structural uncertainties in current modeling and emphasizes that accurately constraining post-fire vegetation recovery trajectories is essential for reducing uncertainty in global water cycle feedbacks.

14. **Chrysanthi Elpida Zervaki, Technical University of Crete (Leverhulme Centre for Wildfires, Environment and Society)**

Title: Wildfires and their Emissions under Future Climate Change Scenarios in Southeast Asia and Australia

Abstract: Wildfires constitute a major environmental hazard with significant impacts on ecosystems, climate, air quality, and human health. In recent decades, climate change has been associated with increasing wildfire frequency and intensity in many regions worldwide. It is also contributing to more frequent and intense extreme wildfires and smoke haze events in Southeast Asia and Australia, leading to serious health consequences. This study investigates the complex interactions between climate variability and wildfire dynamics, focusing on assessing burned area and CO2 emissions under various future climate pathways in Southeast Asia and Australia. To achieve this, the research utilizes the JULES-INFERNO (Joint UK Land Environment Simulator – INteractive Fire and Emission algoRithm for Natural envirOnments) framework. The model integrates high-resolution meteorological variables, vegetation characteristics, and both natural and anthropogenic ignition drivers to diagnose fire occurrence. Model validation is performed against MODIS satellite observations of burned area for the period 2006-2025, with the model being driven by the MSWX Multi-Source Weather dataset (0.1° resolution) for that period. Future wildfire activity is projected under three Shared Socioeconomic Pathways (SSP1-2.6, SSP2-4.5, and SSP3-7.0) for the period 2030-2100. These simulations leverage high-resolution regional climate datasets, including NARCliM2.0 (up to 4 km resolution) for Australia and the Singapore V3 dataset (up to 2 km resolution) for Southeast Asia. These simulations enable the analysis of how changing climatic conditions influence wildfire dynamics and emissions. Future projections provide insights into changes in wildfire frequency and intensity, associated CO2 emissions, and subsequent impacts on air quality and human health, improving our understanding of wildfire–climate interactions under different climate scenarios.

15. **Outi Kinnunen, Finnish Meteorological Institute**

Title: Wildfire model development for peatlands in Finland

Abstract: In the boreal region, peatlands play an important role in the global carbon budgets. Wildfires cause greenhouse gas emissions and reduce carbon uptake in peatlands causing net carbon loss. In Finland, peatlands covers 30% of the land and they are drained for various uses. Climate warming further dries out peatlands making them more flammable and increasing fire risk. Our goal is to implement peatland fires to the process-based ecosystem model JSBACH-SPITFIRE by taking into account the specific characteristics of peatland vegetation and soil. Finally, our target is to improve the accuracy of wildfire carbon emissions estimates in Finland and later over northern latitudes. In the model the litter decomposition is slowed down in water-logged peat layers. The wildfire risk depends on fuel properties and weather, and ignitions are caused by humans or lightning. The burned fraction and greenhouse gas emissions are based on the number of fires, fire duration, postfire mortality and the rate of spread. We

have analysed the observed peatland wildfires from Finnish rescue services fire statistics and compared them with model results. We found that the model underestimates the number of fires in densely populated areas, but is similar in other areas. We have made the sensitivity analysis of fuel moisture, number of fires and burnt area parameters in the JSBACH-SPITFIRE model. The preliminary results in different vegetation zones of Finland show that implementation the peatland vegetation and soil makes difference to wildfire variables in comparison to upland fires. Recent large fires in Finland are located in drained peatlands. Research on peatland wildfires is crucial for improving burnt area and greenhouse gas emission estimates from fires, especially for operational use.

16. **Romy Franz Bodenham, wildFIRE Lab University of Exeter**

Title: A new approach for mapping the severity of organic soil carbon loss in peatlands

Abstract: Peatlands are the largest natural terrestrial carbon store, yet many temperate regions that host large stores of peat are becoming increasingly fire prone. This results in significant peat and carbon losses and calls for modernised solutions to assess burn severity. Satellite-based difference normalised burn ratio (dNBR) is effective for mapping burn severity in forested ecosystems, however northern peatlands are often characterised by shrubs and grassy fuels, for which the loss of height during fires is often within typical error margins of satellite height vegetation. Here we develop an image pixel clustering approach, using the Gaussian Mixture Model (GMM), to classify areas of like peat loss due to smouldering fires using google earth pro satellite imagery of the Saddleworth Moor wildfire of 2018. We contrasted the spatial extent of severities using the GMM method and the dNBR approach. After analysing one satellite swath, we find the percentage area coverage for each burn severity varies between the GMM approach and dNBR. For example, the GMM approach characterises 43.42% of the area as “high” severity, compared with 1.49% by the dNBR. Results suggest that this method can identify the spatial extent of peat that is severely burnt through to unburned areas at high resolution and also generate a new perspective compared with previous methods. We believe that this approach will better support the estimation of carbon loss due to smouldering peat fires, and we hope to yield a new solution for understanding of post burn landscapes where peat soil is damaged or lost.

17. **Carly Reddington, University of Leeds**

Title: Linking climate, wildfire, land use, and air quality in the Brazilian Amazon

Abstract: Wildfire activity across the Brazilian Amazon is driven by complex interactions between climate variability, vegetation dynamics, and human land-use change, with important implications for regional air quality and human health. While previous studies have shown that droughts, heatwaves, and deforestation increase fire risk, substantial uncertainty remains in how these drivers interact and how such processes are represented in Earth system models. Here, we address this gap by combining multi-decadal, multi-sensor fire observations with climate, land-use, and air-quality data within a unified and interpretable machine-learning framework. This observation-constrained approach is used to characterise the drivers of wildfire activity and their impacts across the Brazilian Amazon, building directly on and extending existing evidence that fire activity is jointly driven by climate variability and human land-use change. We then use the resulting observation-constrained sensitivities to evaluate a process-based fire model (INFERNO). The approach is transferable across models and regions and provides actionable constraints for improving representations of fire in Earth system models.

Theme C

Theme C: How do fires impact on biodiversity, ecosystem services, and human health and well-being?

18. **M. Amin Khan, Indian Institute of Technology Indore**

Title: Geospatial Analysis of Forest Fire Dynamics and Community Perceptions of Socio-Economic Impacts in Hoshangabad Forest Division, Central India

Abstract: Forest fire is one of the main drivers of forest degradation in India, especially within its extensive deciduous forest belt, which remains highly vulnerable due to increasing human pressures. The Hoshangabad forest division in

central India, dominated by teak-bearing deciduous forests, has experienced a significant rise in fire frequency and spread in recent years. However, limited scholarship examines how these fires shape the socio-economic, cultural, and livelihood realities of forest-dependent communities and local people. This study uses a mixed-methods approach to analyse the spatial and temporal dynamics of forest fires and to document community perceptions of their socio-economic impacts. Using remote sensing and GIS techniques, this study maps fire distribution, identifies fire-prone zones, and produces risk zonation maps that integrate ecological and socio-economic indicators. Subsequently, comprehensive household surveys and qualitative interviews reveal that, while communities recognise recurring fires, their perceived impacts on non-timber forest products (NTFPs), agriculture, livelihoods, and forest resource access are often linked with broader structural pressures such as irregular rainfall, market volatility, and governance constraints. The findings highlight both environmental and institutional drivers of fire incidents, highlighting the need for community-centred mitigation strategies. The study offers evidence-based recommendations to enhance resilience, protect local livelihoods, and promote sustainable forest management in Central India.

19. **Mr Dominic Meeks, University of Cambridge**

Title: Quantifying the exposure of terrestrial vertebrates to stand-replacing fires

Abstract: Climate and land-use change are driving an increase in extreme wildfires and altering patterns of recurrent fire across forest ecosystems. Stand-replacing forest fires remove canopy vegetation and can induce long-term changes in structure and habitat condition, particularly in environments with limited historical exposure to wildfire. Until now, the extent of fire-related stand replacement in the habitat of forest-dependent species had yet to be quantified at a global scale across multiple taxonomic groups. Using satellite-derived data, we examine geographic and temporal variation in the exposure of 13,464 forest-dependent terrestrial vertebrate species to stand-replacing fires from 2001-2024. We consider impacts across three forest habitat groupings that reflect the frequency of recurrent fire in these forest habitats: wildfire-frequent, wildfire-occasional, and wildfire-rare. Among all studied species, 71.9% experienced stand-replacing fires within their suitable forest habitat. Across the wildfire-rare forests of the Brazilian and Bolivian Amazon, 250-325 species experienced ≥1% burn within their available habitat, and in the wildfire-frequent forests of Southeastern Australia, 40-60% of fire-exposed species experienced fire in ≥10% of their available habitat. From 2001 to 2024, the annual mean area of burned habitat increased markedly (terrestrial vertebrates: 99.8 km2 in 2001 to 2013.1 km2 in 2024), as did the annual number of fire-exposed species (3976 species to 5977 species). Across habitat groups, assemblages of threatened species exhibit a considerably steeper increase in cumulative mean percentage of burned habitat than non-threatened assemblages. This research points to the need for direct conservation interventions for species with impaired post-fire recoveries, in combination with upscaled integrated fire management to reduce the incidence of extensive severe wildfire events and preserve habitat refugia across multiple scales.

20. **Gladin Jose, Office for National Statistics** [Banner presentation]

Title: Standards for Official Statistics on Climate-Health Interactions (SOSCHI) – Wildfires

Abstract: Countries worldwide are experiencing increasing health impacts related to climate change, including those arising from wildfire-driven environmental exposures. These impacts highlight the urgent need for globally standardised, reliable and comparable climate and health statistics to assess how climate-related hazards affect human health and well-being across regions. Heat exposure, air pollution, extreme weather events and changes in vector ecology are placing growing pressures on human health, underscoring the importance of robust statistical frameworks to support evidence-based decision-making. The Standards for Official Statistics on Climate-Health Interactions (SOSCHI) project is a four-year international collaboration, led by UK Office for National Statistics (ONS) and funded by Wellcome Trust. SOSCHI provides a transparent, globally applicable statistical framework comprising a set of standardised indicators to measure key pathways through which climate hazards impact human health and well-being. Within this framework, wildfires are recognised as a growing public health concern, and SOSCHI has developed a dedicated wildfire health indicator focusing on human exposure to wildfire-related PM2.5. The indicator focuses on wildfire-specific PM2.5 due to its well-established association with human health, its relative data availability and capacity to be consistently estimated across countries using satellite observations, atmospheric modelling and

monitoring systems. This indicator and its methodology have been endorsed by United Nations and incorporated into the Global Set of Climate Change Indicators and Statistics, recognising both the urgency of wildfire related exposures and their significant impacts on human health.

21. **Nicolas Deere, University of Kent**

Title: Impacts of fire and prospects for recovery in tropical peat forests

Abstract: Uncontrolled fires place considerable burdens on forest ecosystems, compromising our ability to meet conservation and restoration goals. A poor understanding of the impacts of fire on ecosystems and their biodiversity exacerbates this challenge, particularly in tropical regions where few studies have applied consistent analytical techniques to examine a broad range of ecological impacts over multiyear time frames. We compiled 16 y of data on ecosystem properties (17 variables) and biodiversity (21 variables) from a tropical peatland in Indonesia to assess fire impacts and infer the potential for recovery. Burned forest experienced altered structural and microclimatic conditions, resulting in a proliferation of nonforest vegetation and erosion of forest ecosystem properties and biodiversity. Compared to unburned forest, habitat structure, tree density, and canopy cover deteriorated by 58 to 98%, while declines in species diversity and abundance were most pronounced for trees, damselflies, and butterflies, particularly for forest specialist species. Tracking ecosystem property and biodiversity datasets over time revealed most to be sensitive to recurrent high-intensity fires within the wider landscape. These megafires immediately compromised water quality and tree reproductive phenology, crashing commercially valuable fish populations within 3 mo and driving a gradual decline in threatened vertebrates over 9 mo. Burned forest remained structurally compromised long after a burn event, but vegetation showed some signs of recovery over a 12-y period. Our findings demonstrate that, if left uncontrolled, fire may be a pervasive threat to the ecological functioning of tropical forests, underscoring the importance of fire prevention and long-term restoration efforts, as exemplified in Indonesia.

22. **Eleni Dovrou, University of Crete**

Title: Chemical interactions and effects of reactive wildfire plume pollutants in adults and children

Abstract: Wildfire events present a rising frequency in recent years, especially in regions dominated by elevated temperatures, dry and windy conditions. During such events, the generated fire plume contains a mixture of gaseous and particulate species, driving the chemical processing during the initial and aging stage and generating a hazardous mixture for living organisms. Reactive species, such as peroxides, along with high particulate loadings near the fire-affected zones can be directly inhaled and participate in reactions within the respiratory, cardiovascular and nervous system. In this work we evaluate the effect of these pollutants and their major secondary products formed in the inhaled air on the human respiratory, circulatory and nervous system. The interconnection between inhaled air and the trachea, lungs, circulatory and nervous system is simulated using an initial box model approach followed by direct coupling framework. Data obtained from recent wildfire events, specifically Greece 2023 and Los Angeles 2025, representing varying fuel types and seasonal conditions were analyzed and incorporated as input parameters into the newly developed model. The interactions of inhaled species and potential formation of aqueous-phase products were examined, revealing elevated levels of reactive oxygen species and organosulfates in the respiratory and circulatory systems. Summer fire events showed a 40-70% increase in reactive species production within the examined systems, with stronger impacts observed in children. These findings highlight the importance of investigating seasonal differences (summer vs winter) and the role of vegetation type as fuel in shaping pollutant toxicity. Such understanding is essential for identifying the species posing higher risk and for developing targeted protective and mitigation strategies.

23. **Hafizha Mulyasih, Imperial College London (Leverhulme Centre for Wildfires, Environment and Society)**

Title: Arctic Fire Behaviour: Experimental Findings on the Influence of Low Temperatures on the Smouldering of Peat

Abstract: Smouldering combustion of peat is a persistent, low-temperature burning process that contributes significantly to global carbon emissions despite often being overlooked. Peatlands store nearly one-third of the world's soil carbon,

yet smouldering fires can release up to 0.5 gigatonnes of carbon annually. In high-latitude regions, rapid warming and permafrost thaw are increasing the vulnerability of peatlands to ignition, enabling long-lasting subsurface fires, including "zombie fires" that survive winter and reignite in warmer conditions. However, the mechanisms governing smouldering persistence under transient temperature variations remain poorly understood. This study experimentally investigates how changing thermal conditions influence the critical moisture content required for self-sustaining smouldering in peat. A controlled combustion chamber was developed to simulate Arctic-like freezing and thawing environments by independently regulating air, soil, and boundary temperatures. Peat samples with moisture contents of 100% and 110% were subjected to varying temperature regimes and transient cooling periods to assess combustion stability, spread rate, and reactivation potential. Results show that smouldering persistence is strongly dependent on both moisture content and temperature. At ambient conditions (21 °C), 100% moisture samples sustained combustion, while 110% moisture often led to extinction, indicating a critical moisture threshold near this level. Under frozen and near-freezing conditions, combustion was significantly suppressed, with reduced spread rates and lower peak temperatures. However, smouldering frequently persisted at depth, even during extended cooling periods, and reactivated upon rewarming. Airflow was also found to play a critical role, with reductions in oxygen supply rapidly decreasing surface temperatures while allowing subsurface combustion to continue. Overall, the findings demonstrate that smouldering peat can endure transient freezing and oxygen-limited conditions, providing a physical explanation for overwintering fires in Arctic regions. These insights highlight the importance of incorporating dynamic thermal and airflow effects into predictive models of peat fire behaviour and carbon emissions under climate change.

24. **Mira Liu, Scripps and Pitzer Colleges**

Title: Surface-active antibiotic production as a multifunctional adaptation for post-fire microbes

Abstract: Wildfires induce changes in soil chemistry, nutrient availability, and physical structure, impacting biodiversity and ecosystem structure and function. Ecosystem responses to wildfires largely begin at the microbial level. However, specific strategies that microorganisms use to thrive in burned soils remain largely unknown. Through bioactivity screening of bacterial isolates from burned soils, we discovered that several Paraburkholderia spp. isolates produced a set of unusual rhamnolipid surfactants with a natural methyl ester modification. These rhamnolipid methyl esters (RLMEs) exhibited enhanced antimicrobial activity against other postfire microbial isolates, including pyrophilous Pyronema fungi and Amycolatopsis bacteria, compared to the typical rhamnolipids made by organisms such as Pseudomonas spp. RLMEs also showed enhanced surfactant properties and facilitated bacterial motility on agar surfaces. In vitro assays further demonstrated that RLMEs improved aqueous solubilization of polycyclic aromatic hydrocarbons, which are potential carbon sources found in char. Identification of the rhamnolipid biosynthesis genes in the postfire isolate, Paraburkholderia kirstenboschensis str. F3, led to the discovery of rhlM, whose gene product is responsible for the unique methylation of rhamnolipid substrates. RhlM is the first characterized bacterial representative of a large class of integral membrane methyltransferases that are widespread in bacteria. These results indicate multiple roles for RLMEs in the postfire lifestyle of Paraburkholderia isolates, including enhanced dispersal, solubilization of potential nutrients, and inhibition of competitors. Our findings shed new light on the chemical adaptations that bacteria employ to navigate, grow, and outcompete other soil community members in postfire environments.

25. **David Chapoloko, eConservannah Initiative and University of Cape Town**

Title: Fire Regimes, Coppice Dynamics, and Biodiversity Loss in Miombo Woodlands Under Increasing Anthropogenic Pressure

Abstract: Fire is a key ecological process in Miombo woodlands, yet changing fire regimes and rising anthropogenic pressures are reshaping vegetation dynamics in ways that challenge both conservation and management. This study examines how fire frequency, time since last fire, vegetation density (EVI), and charcoal harvesting interact to influence coppice regeneration and tree species diversity in a recovering Miombo system in Zambia. Using a combination of field-based sampling (61 plots; 91 species; 254 coppicing stumps) and remote sensing fire datasets (2012–2023), we quantify relationships between fire regimes and vegetation responses. Coppice growth, density, and length were analysed across three dominant species (Isoberlinia angolensis, Brachystegia spiciformis, Brachystegia longifolia), while species diversity

patterns were assessed using multivariate ordination and diversity partitioning. Results show that increased fire frequency is associated with reduced tree species richness (declining from 75 to 29 species across the fire gradient) and shifts in species composition toward fire-tolerant taxa. Charcoal harvesting further exacerbates biodiversity loss, with strong declines in both gamma and beta diversity in areas of high disturbance. Notably, vegetation density moderates fire effects on coppicing, with positive growth responses under high EVI but negative responses in more open systems. These findings highlight critical trade-offs in fire management: while early-season burning may reduce fire intensity, increased fire frequency can undermine regeneration and biodiversity. The study underscores the need for integrated fire management strategies that account for ecological thresholds, human land use, and vegetation structure in order to support resilient Miombo landscapes under growing socio-environmental pressure.

26. **Umar Muhammad, University of Greenwich**

Title: From Fire Events to Systemic Shocks: A Comparative Analysis of Global Mega-Wildfires and Their Cascading Impacts on Agri-Food Systems

Abstract: Wildfires are increasingly emerging not as isolated ecological disturbances, but as systemic shocks that cascade across interconnected environmental, socio-economic, and governance systems. This paper presents a comparative analysis of five recent mega-wildfires: Australia (2019-20), Canada (2023), and the United States, Spain, and Portugal (2025), to examine how fire impacts propagate beyond burned landscapes into agri-food systems, livelihoods, and wider socio-economic stability. Using the Resilience and Impact Assessment Framework (RIAF), the study develops a cross-case analytical approach to assess the scale, distribution, and transmission of wildfire impacts across three domains: environmental (ecosystem degradation, soil and water systems, biodiversity loss), socio-economic (livelihood disruption, labour displacement, food price volatility), and systemic (supply chain disruption, trade implications, and governance responses). Particular attention is given to agri-food systems, where wildfires disrupt production, processing, logistics, and market access, often with delayed and geographically dispersed consequences. The comparative analysis reveals both convergence and divergence across cases. Common patterns include the amplification of pre-existing vulnerabilities (e.g., land-use pressures, climate exposure), cascading disruptions across supply chains, and uneven distribution of impacts across regions and actors. However, significant differences emerge in institutional response capacity, integration of fire management with agricultural policy, and the extent to which adaptive governance frameworks mitigate long-term impacts. The findings highlight that wildfire impacts are not confined to fire-prone regions but are increasingly transboundary and systemic, requiring integrated approaches that connect fire management with food systems, land-use policy, and climate adaptation strategies. The paper argues for a shift from reactive fire suppression toward anticipatory, systems-based resilience planning, incorporating cross-sector coordination, early warning systems, and adaptive governance. By reframing wildfires as systemic risk events, this work contributes to advancing interdisciplinary approaches to fire science and offers actionable insights for building more resilient landscapes, food systems, and societies in a rapidly changing Earth system. (Word count: 296)

27. Toby Wainwright, King's College London (Leverhulme Centre for Wildfires, Environment and Society)

Title: Extreme Fire Sourced Haze in Mainland Southeast Asia: Using a New AQ Network to Evaluate the Outputs of Air Quality Models Fed with Satellite Data of Fire Emissions

Abstract: Atmospheric models indicate that air quality in parts of Northern Southeast Asia ranks among the world's worst during the dry season due to smoke from agricultural biomass burning. However, High-cost in-situ monitoring systems ideal for validation are lacking in low- and middle-income countries (LMICs) like Laos, where such measurements are nearly absent, hindering validation of these extreme model outputs. To fill this crucial data gap, a network of PurpleAir sensors, corrected for locally pyrogenically sourced fine particulate matter (PM2.5), was deployed. Sensors were installed in 2023 in Laos, Northwestern Vietnam, and along the Northern Thailand–Myanmar border. Uncertainties in model performance remain in Northern Southeast Asia due to limitations in satellite fire detection, such as missing small agricultural fires, cloud-obscured fires, or fires outside satellite overpass times. Additionally, generalised emission factors and coarse model resolutions can underestimate local PM2.5 exposure. This network is among the first of its kind to accurately quantify surface-level fire-sourced PM2.5 in the region, providing fire season data from 2023 through to 2026. The network data confirmed the severity of local air quality degradation during the fire season and

highlighted both positive and negative biases in different global air quality models. We investigated reasons for discrepancies between the sensor network dataset and model output in the region.

28. **Guy Godiraone Yuyi, Botswana University of Agriculture and Natural Resources**

Title: Firebrand Production in Southern African Environments

Abstract: Firebrands are a primary mechanism driving fire spread and structural ignition during wildland–urban interface (WUI) fires (Manzello & Suzuki, 2023). Extensive experimental research on firebrand production and ignition has been conducted internationally, with significant advances achieved in Japan, North America, and Europe (Almeida et al., 2021; Manzello et al., 2007). However, much of this work is based on vegetation species (mostly pine) and fuel configurations that are not representative of WUI environments in southern Africa. This study addresses this "North-South Gap" by quantifying firebrand generation from two (2) African tree species found in Botswana (semi-arid) and South-Africa (mediterranean) through controlled tree-burning experiments in using water-quench collection arrays and digital image processing, ImageJ to characterize firebrand morphology. The data will be further utilized to determine the characteristics of firebrands as well as characterization of home's susceptibility to firebrand attacks.

29. Iulian-Alin Rosu, Technical University of Crete (Leverhulme Centre for Wildfires, Environment and Society)

Title: Smoke from Canada's extreme 2023 wildfires caused 2.8% drop in solar power generation and cost energy systems almost two billion dollars

Abstract: The record-breaking 2023 Canadian wildfires led to extreme emissions of aerosols and trace gases, with plumes extending across the Northern Hemisphere. This study highlights the potential impact of such emissions on photovoltaic (PV) energy production across North America (NA) and Europe using a state-of-the-art Earth system model. Comparisons between our simulations with and without wildfire emissions show substantial radiative and temperature anomalies during May–September 2023, with radiative impacts leading to PV production deficits. The results indicate a total 5-monthly modelled PV generation loss of -6.38 ± (-8.86) TWh (one standard deviation) across NA and Europe (2.8% of total 5-monthly PV generation). The carbon burden of this solar power production loss is estimated at 2.083 ± 2.656 Mt CO2 (one standard deviation), with a total economic deficit of $1.88 ± 2.71 billion (one standard deviation). Despite greater NA modelled PV losses, the associated monetary deficit is higher in Europe. These findings emphasize that energy systems and policies must be resilient by design to drops in PV generation during large-scale wildfire events, and that resilience of PV production can be challenged by large-scale wildfire events, highlighting the need for integrated transnational and intercontinental strategies in climate mitigation, energy security, and wildfire prevention.

30. **Luke Richardson-Foulger, King's College London (Leverhulme Centre for Wildfires, Environment and Society)**

Title: Investigating Fire-Induced Metal Exposure Pathways in Contaminated Regions in the Northern Boreal

Abstract: Landscape fires threaten to mobilise toxic metals and metalloids through smoke emissions and post-fire ash redistribution. Such metals can be breathed in by local populations, enter drinking water, or spread to nearby regions potentially harming local flora and fauna. This is of particular concern in industrial (or formerly industrial) regions of the boreal/arctic where legacy metals are highly concentrated in the ground, and ongoing climate impacts are making previously undisturbed regions of contamination subject to intense wildfire. Such metals include arsenic, iron, lead, cadmium, and so on. It is currently unknown whether contamination actually impacts the amount of the contaminant released – perhaps unintuitively, current fire emission/exposure models predict fixed emission rates regardless of contamination. We demonstrate a strong correlation between the initial soil (fuel) concentration of given metals and the subsequent presence in smoke and ash. This is shown to increase exposures to heavy metals among fire crew by at least 3 - 4 times when operating on contaminated landscape fires. The results highlight the need for spatially refined estimates of emissions based on local geology.

31. **Sarah Baker, Swansea University**

Title: Carbon Emissions from the UKs most severe peatland fire

Abstract: Emissions from wildfires that burn degraded peat are suggested to be two to five times greater than for burning of pristine peatland. Estimates of 10-25kg/cm2 are suggested that equates to up to 1000 years of peat accumulation, highlighting the scale of damage that can be done to carbon stores by peat fires. The year 2025 was the hottest year on record in the UK and the driest spring since 1974, which saw its greatest ever recorded burned area of ~50,000 ha, almost double that of previous years. On the 11th of August 2025 a fire broke out on Langdale Moor, North Yorkshire, UK, by the 25th of August the fire had covered 25 km2. The flaming surface fire transitioned into the peat to such an extent that it revealed unexploded ordnance from WW2 leading to a threat of detonation of old munitions, making firefighting operations challenging. Here we report field observations from Langdale Moor before any rain had the chance to alter the recently burned landscape making observations and taking peat consumption measurements. We analysed the burn severity and soil carbon loss across the moorland landscape and reveal that the fire at Langdale Moor release 37kt of soil carbon into the atmosphere. However, recent vegetation management in some areas across the site left small islands of unburned landscape saving almost 7 kt of soil carbon loss highlighting the need to develop appropriate fuel management strategies for these landscapes that continue to support the unique biodiversity of these moorland habits.

Theme D

Theme D: What consequences and trade-offs arise from fire management and preparedness strategies?

32. **Cathy Smith, Royal Holloway University of London (Leverhulme Centre for Wildfires, Environment and Society)**

Title: Implications of short-term funding for Community Based Fire Management: lessons from case studies in Brazil, Guyana and Belize

Abstract: In recent decades, international organisations and governments have funded projects worldwide that seek to enrol communities where fire is commonly used to support local livelihoods, in fire suppression and management activities. While such 'community-based fire management' (CBFiM) initiatives are widely regarded as important (being included, for instance, in the 2025 'Call to Action on Integrated Fire Management and Wildfire Resilience' launched at COP30), little research has followed their outcomes over the longer term, or after funding ceases. Here, we compare donor-funded CBFiM projects across three Indigenous territories in Brazil, Guyana, and Belize. Our findings suggest that, where strong local rationales for continuation are absent, CBFiM is heavily reliant on sustained external funding to compensate community members for their time. Furthermore, pre-existing local fire governance practices and knowledge may be eroded when projects concentrate responsibility for fire management among small groups of, typically male, community members. When project funding ceases, communities may then find themselves in a position of ambiguity over how to organise fire management going forwards. This calls for careful consideration of the longer-term implications of short-term funding for CBFiM.

33. **Ben Phillipson, University of Exeter**

Title: Mapping Moorland Flame Length Potential Using New Approaches to Remotely Identify fuels

Abstract: Wildfires pose an increasing threat to ecosystems, carbon stores, and property, yet land managers often lack data to assess where on a moorland fire risk is highest and where a wildfire would be most intense. This poster presents a novel remote sensing methodological pipeline that can be used to generate maps of flame length potential, that we show here for a case study area in the Cairngorms National Park. The method developed combines a new approach to analysis RGB satellite imagery with a novel shrub height model derived from airbourne LiDAR scanning. We developed a semi-supervised machine learning approach, calibrated against field vegetation surveys as model training sites to identify fuel types from PlanetScope satellite imagery. This identified three broad vegetation fuel types in the case study area– grass, grass–shrub mixture, and Calluna. The LiDAR-derived vegetation height data was then used to refine

these into seven distinct fuel models to predict fire behaviour. We used BehavePlus to model flame length assuming dry summer weather conditions and grouped the flame length estimates into categories from the fire and rescue service national operational guidance. Most of the moorland vegetation produced flame lengths of 1.5–3.5 metres under these conditions, with localised areas producing flame lengths exceeding 3.5 metres – classified as extreme intensity fire requiring indirect attack under Scottish National Operational Guidelines. Fire maps generated using this method offer land managers and fire services a valuable tool for identifying high-risk areas or regions to prioritise fuel management interventions.

34. **Jishnu Borgohain, Ashoka University**

Title: The Relational Life of Fire: Tracing Indigenous Fire Entanglements in Central India

Abstract: Fire is one of the fundamental ecological factors that influences most of the terrestrial ecosystems. Since the colonial era, fire has often been viewed as a damaging disturbance in forest and grassland ecosystems, and therefore, fire suppression policies have been routinely implemented as a mechanism for biodiversity conservation. However, previous studies show that indigenous fire use promotes biodiversity, reduces the risk of large wildfires, and is rooted in relationships of care and responsibility between communities and their land. Yet current fire policies continue to reproduce colonial patterns of fire exclusion by ignoring indigenous fire knowledge and its deeper relational worldview. Consequently, ecosystems face not only ecological crises but also epistemic losses. Here, we review colonial archival records, ethnographic studies, and folklore, focusing on major indigenous communities (Adivasi), such as the Gond, Baiga, and Korku from the hills of Central India. Preliminary results suggest that Adivasi communities consider fire not merely as a tool for landscape management but also as a part of a relational worldview. For instance, the Maria Gonds negotiated the timing of fire with the clan deity Verma Pen about rain, which reflects an entangled relational worldview of the Maria Gonds. Evidence from the Baiga community suggests that fire is a protector for the livestock and humans from predators, a healer for the forest from disease, and a mediator between hunters and animals. Further prohibition of Indigenous fire use in Central India replaced carefully timed spring burns with late summer wildfires that are believed to trigger Sal (Shorea robusta) borer epidemics, vegetation overgrowth, and cattle mortality today. By highlighting the relational worldview of Indigenous fire, the study aims to broaden the conventional approaches to understand fire dynamics and governance and establish dialogue between Indigenous and Western knowledge systems to foster a convivial human-fire relationship emerging from Central India.

35. **Panagiotis Kalogeropoulos, Imperial College London.**

Co-authored and presented by Lorenzo Sabug Jr. (ICL)

Title: Design of an Autonomous Swarm of Drones for Tracking Vehicle Traffic during a Wildland-Urban-Interface Wildfire Evacuation

Abstract: This study investigates applying the principles of autonomous drone swarming to the problem of patrolling a road network during a Wildland-Urban-Interface fire evacuation. We propose a rapidly deployable, autonomous swarm of drones with the goal of autonomously scanning and transmitting live vehicle count per-unit-distance of the affected road network, helping identify congestion and traffic jams for analysis, planning, and emergency action. The WUINITY wildfire evacuation simulator is used to model the evacuation traffic environment and to evaluate the swarm algorithms in simulation ahead of real-world deployment. We compare our model, based on Ant Colony Optimization, multi-stigmergy, and graph reduction, to a base case of rasterization and equal dispersion of the drones across the evacuation area. We conclude that our Ant Colony Optimization Algorithm consistently outperforms rasterization when measuring for the average amount of vehicles that have been recently scanned by the swarm.

Theme E

How can fire policymaking and management be made more integrative, equitable and adaptive?

36. **Manoarivelo Sariaka Falianja, Université d'Antananarivo**

Title: Raffia in the Line of Fire: A Qualitative Documentary Analysis of Bushfire Governance and Public Responses in Madagascar

Abstract: This paper examines how bushfires are framed in public action concerning raffia landscapes in Madagascar. It is based on a preliminary observation drawn from a focused documentary corpus: recent public communications from the ministry in charge of the environment mainly emphasise contingency planning, awareness-raising, fire control measures, and local mobilisation, while management documents relating to wetland areas in western Madagascar, where raffia is an important resource, present fire as a major driver of ecological degradation and resource pressure. The study adopts a qualitative documentary approach. To ensure feasibility, the corpus is deliberately narrow and includes national legal texts on vegetation fires, recent public communications from the ministry in charge of the environment, and management and diagnostic documents relating to two sites in western Madagascar, particularly the Mahavavy-Kinkony Complex and Antrema. Documents are analysed through thematic coding and framing analysis, with attention to attributed causes of fire, assigned responsibilities, public policy instruments, the place given to local livelihoods, and the visibility of raffia in the institutional treatment of the problem. The exploratory hypothesis is that there is a mismatch between an institutional framing centred on fighting fire and management documents that place greater emphasis on resource governance, ecological degradation, and community participation. The paper discusses the implications of this mismatch for more integrative, equitable, and adaptive fire governance.

37. **Irene Mamani Velazco, University of East Anglia, School of Global Development**

Title: From ally to threat: Reconfiguring fire use in peasant communities amid forest fire risks.

Abstract: After Indonesia and Brazil, Bolivia is the third country in the world to lose the most Amazonian Forest due to wildfires. In 2019, the country recorded a record 4 million hectares of forest affected by wildfires, and by 2024, that figure had tripled. The fires have not only ravaged the lands of large agricultural companies and forests, but also the lands of small farmers and Indigenous communities. Paradoxically, the uncontrolled fires spread to rural areas where farmers historically had safe control over the use of fire for agriculture. This environmental crisis has led to strict enforcement of nationwide fire bans, including in farming communities. While environmentalists have widely praised the policy, only a few have defended the traditional use of fire by rural populations, and often uncritically, idealizing indigenous practices as inherently safe under collective or cultural control. Ultimately, both perspectives overlook the complex, evolving relationship between farmers and fire in an increasingly warming world. Within this framework, this study seeks to describe the convergence of anthropogenic and environmental factors that contribute to the potential loss of control over traditional fire use in Amazonian communities in Bolivia. Through fieldwork that combines socio-territorial data and testimonies from farmers and indigenous peoples, the author seeks to answer two fundamental questions: Why has fire ceased to be an ally and become a threat to rural actors who have tamed it for generations? What are the changes in peasant management of traditional fire use when there are fire threats? Understanding the complex challenges faced by farmers helps identify the critical points for building an inclusive fire management system that integrates scientific and indigenous knowledge. Finally, this study calls for the use of a decolonial perspective in addressing forest fires.

38. **Alice Hsu, University of East Anglia**

Title: Tending the Fire: Fire management practices and priorities in the European Mediterranean and Latin America from the FIRE-ADAPT consortium using the Global Person Generated Index

Abstract: Global flammability has changed rapidly in the past century, driven by a combination of anthropogenic factors, including climate change, land use changes, and fire suppression policies. These changes have led to extreme, record-

breaking fire activity in recent years with detrimental environmental, social, and economic consequences, exposing the shortcomings of present fire management paradigms and prompting calls for Integrated Fire Management (IFM), a holistic approach which considers ecological, socioeconomic, and cultural factors in fire management, while also providing opportunities for adaptive and iterative learning. However, operationalizing adaptive learning requires tools for first identifying the key domains within fire management, and then assessing which of those domains are underperforming. Here, we use an adaptation of the Global Person Generated Index (GPGI), a subjective, multidimensional wellbeing metric, to assess the performance of fire management across Europe and Latin America. By allowing participants to define, rank, and rate their own conceptualizations of key fire management actions, we generate an emic understanding of fire management actions while also identifying areas to prioritize. Our results demonstrate that the GPGI is effective in eliciting specific management actions that can meaningfully elaborate and enrich existing recommendations in IFM frameworks. While importance and satisfaction ratings did not yield statistically significant differences across domains, the domain prevalence - the frequency with which participants mentioned an action relating to a domain - may be a useful proxy for determining priority fire management domains. Based on the prevalence, our results indicate that actions pertaining to Public Awareness, Engagement, and Participation are a potential area for prioritization in IFM.

39. **Fanhui Dong, University of Leeds**

Title: Community involvement in wildfire risk reduction: a case study in Yellowknife, Northwest Territories, Canada

Abstract: Wildfire risk in high-latitude areas presents unique challenges due to fuel accumulation, low humidity, remoteness and limited resources. As wildfire impacts on communities intensify, expectations grow for governments to recognise and address community needs by supporting wildfire risk reduction. Simultaneously, communities are encouraged to engage in wildfire preparedness and assume greater individual responsibility. However, drawing from a social contract lens, these dynamics may generate disparities in perceived roles, responsibilities and expectations between governments and communities. A conceptual approach based on social contract theory is proposed to reveal transformations and tensions across governments and communities, including governance structures, resource distribution, collaboration approaches, and socio-cultural inclusion in wildfire risk management. Using the City of Yellowknife, Northwest Territories, Canada, as a case study – grounded in experiences from the 2023 wildfire evacuation – the study draws on 23 semi-structured interviews with representatives from levels of government, non-government organisations, and key community stakeholders. These interviews explore how participants perceive, practise, and anticipate their roles and responsibilities in wildfire risk reduction. The empirical findings, combined with an in-depth policy review, reveal tensions and transformations associated with increasing community involvement in wildfire risk governance. The study argues that a meaningful transition toward decentralised wildfire risk reduction requires careful consideration of fairness, flexibility, inclusion, and long-term adaptive thinking.

40. Will Hayes, University of Royal Holloway (Leverhulme Centre for Wildfires, Environment and Society)

Title: Living with Change in Ireland's Uplands: Fire, Land Management and Rural Futures

Abstract: Ireland's upland landscapes are undergoing rapid and uneven change, shaped by shifts in agricultural policy, rural demographics, and land management practices. This research examines how fire use, grazing, and vegetation management are changing in Ireland's southwest uplands, and what this means for wildfire risk and rural livelihoods. The study draws on in-depth semi-structured interviews and landscape-based discussions with upland farmers and land managers. Results and Discussion Findings highlight significant shifts in traditional burning practices. Historically, small-scale, patch burning was used collectively to manage vegetation and maintain grazable land. Today, farmers describe a decline in controlled burning due to reduced labour, ageing populations, and fears of penalties. At the same time, reduced grazing and land abandonment are contributing to increased fuel loads, including the expansion of Molinia, gorse, and scrub. This is creating more continuous and flammable landscapes, increasing wildfire risk. In some cases, burning still occurs, but is often less coordinated and less controlled, reflecting a loss of intergenerational fire knowledge and changes in community-based land management. These dynamics are closely tied to broader socio-ecological changes, including weakening local governance structures and tensions between policy expectations and lived farming realities. Conclusions Changing fire practices in Ireland's uplands reflect wider transformations in land use, knowledge

systems, and rural life. The decline of controlled burning, combined with vegetation change and undergrazing, may be increasing wildfire risk in these landscapes. Understanding fire not only as a hazard, but as a historically embedded land management tool, is critical for developing more context-sensitive and socially grounded approaches to upland management and fire governance.

41. **Kate Schreckenberg, King's College London (Leverhulme Centre for Wildfires, Environment and Society)**

Title: Equity and Justice in Integrated Fire Management - Draft Principles

Abstract: The increasing frequency, severity and visibility of catastrophic wildfires have brought Integrated Fire Management (IFM) to the forefront of global policy agendas. Recent international initiatives—including the Kananaskis Wildfire Charter, the United Nations Environment Assembly draft resolution on global wildfire management, and the Call to Action on Integrated Fire Management and Wildfire Resilience launched ahead of COP30—promote IFM as a holistic approach integrating science, policy, Indigenous and local knowledge, and modern technologies. Although often framed as novel, IFM has a longer history and has functioned as a flexible framework encompassing diverse approaches to fire governance across ecological, social and cultural contexts. As IFM becomes increasingly institutionalised within global and national policy frameworks, issues of equity and justice require more explicit and systematic attention. Although contemporary IFM discourse acknowledges the importance of participation, traditional fire use and local livelihoods, it often underplays underlying power relations, trade-offs between objectives, and the uneven distribution of costs and benefits among different stakeholders and rights-holders. Drawing on interdisciplinary literature and fire-specific case studies, we identify key dimensions of equity and justice relevant to IFM, including distributional, procedural, recognition and restorative aspects, and demonstrate how these dimensions are interconnected. We propose a set of draft guiding principles, presented as a practical checklist, to inform the co-development of more equitable and just IFM initiatives. We conclude by opening up discussion on when, how and by whom these principles might be applied, contributing to both policy-relevant guidance and conceptual debates on fire governance in complex social–ecological systems.

42. **Kate Faber, University of Copenhagen**

Title: Characterizing fire relationships of the in the Ethiopia highlands by narratives and satellites

Abstract: While remotely sensed satellite data can detect where and when fires are occurring, it cannot fully capture the complexities of human-fire relationships. By combining satellite data with national and local narratives, we aim to understand the complexities of relationships between fire, humans, and forest ecosystems in the Erica forest of the Bale Mountains National Park in Ethiopia. MODIS burned area products and Landsat based fire severity maps show the current fire regime trends as seen from "eyes in the sky." While narrative frame analysis is used to understand the problems, causes, solutions, and attitudes surrounding fire according to on-the-ground sources of both national media sources and local communities. Both perspectives are important for informed fire policy and management, especially in protected areas with long histories of anthropogenic fire use.

43. **Alex Mines, Imperial College London (Leverhulme Centre for Wildfires, Environment and Society)**

Title: Colorado's Resilience Gap: How Wildfire Risk Mitigation is Struggling to Translate to Insurability in the Wildland-Urban Interface.

Abstract: Structural risk to wildfires within the Colorado Wildland-Urban Interface has escalated rapidly over the last decade. In turn, public, private, and community fire practitioners have galvanised to establish a robust ecosystem of risk reduction and mitigation programmes that seek to protect communities from the socioeconomic impacts of wildfires. Despite such risk mitigation efforts, structure insurability within the high-risk WUI has continued to diminish in accessibility and affordability, undermining a principal incentive for homeowners to reduce their wildfire risk and maintaining community economic exposure to fire hazards. In turn, this presented study aimed to examine the governance structures and communication dynamics embedded within the Colorado wildfire risk mitigation network which amplify or minimise insurability in the State's WUI. Data was collected through conducting a series of semi structured interviews with stakeholders operating in wildfire structural risk reduction in the Colorado WUI. Notable

interviews have included fire practitioners, insurance brokers, and mitigation coordinators. Thematic analysis was then utilised to examine inter-stakeholder communication and institutional relationships. Preliminary results suggest stakeholder disconnects between insurer and risk mitigators. Official channels to communicate effective structural risk reduction to insurers are limited, resulting in potentially effective risk mitigation practices remaining unquantified despite state-driven discount initiatives. Furthermore, insurer acceptability of communicated risk reduction also presented a significant schism to premium reductions for risk mitigation practices, suggesting a conflict of perceptions and preferences of what constitutes an effective and credible wildfire risk mitigation tool. Findings suggest the future expansion of accessible coverage for homeowner fire risk mitigation will require formal structured communication channels between insurance institutions and mitigation experts. Additionally, future research is required into future risk mitigation practices that can synergise and align with different stakeholder interests and effective insurability.

44. Angel Goldsmith, King's College London (Leverhulme Centre for Wildfires, Environment and Society)

Title: Managing Wildfire Risk Through Spatial Planning in South Africa's Wildland-Urban Interface in the Western Cape Province

Abstract: Wildfires in wildland–urban interface (WUI) areas pose an increasing risk in South Africa's Western Cape Province, as demonstrated by events such as the 2017 Knysna fires and recurrent Table Mountain wildfires. Similar trends are evident globally, particularly in Mediterranean-climate regions including Spain, Portugal, and Australia. Internationally, land-use planning and building regulations are promoted as proactive approaches to wildfire risk reduction by limiting exposure and reducing structural vulnerability in settlements near fire-prone landscapes. This study employs a qualitative mixed-methods approach to examine how spatial planning and building regulation policies intended to manage wildfire risk are implemented across South Africa's WUI and how their effectiveness varies between settlement types. The research focuses on the Western Cape, characterised by recurrent drought and highly flammable fynbos vegetation. Two municipalities, the City of Cape Town and Knysna Local Municipality, were selected as case studies, with neighbourhoods representing formal suburban areas, townships, and informal settlements. Data were collected through semi-structured interviews, focus groups, and document analysis. Participants included officials and practitioners from planning, fire and emergency services, disaster management, environmental management, forestry, insurance, and non-governmental organisations, as well as community members. Findings indicate that the effectiveness of planning and building regulations in reducing wildfire risk is uneven. Although planning frameworks increasingly recognise wildfire risk, they rarely integrate it into land-use decisions or building standards. In formal suburban areas, regulatory compliance coexists with significant exposure due to limited requirements for defensible space and fire-resilient design. Township areas face infrastructure and resource constraints, while informal settlements remain largely outside formal planning systems. Broader challenges, including fragmented governance, weak intersectoral coordination, and competing institutional mandates, continue to hinder preventative wildfire risk reduction strategies in South Africa's WUI. Keywords: South Africa, wildland–urban interface, land-use planning, fynbos.

45. Elliot Convery-Fisher, Royal Botanic Garden Edinburgh

Title: Toward more integrated fire management in Madagascar: lessons from the Fitantanana Maharitra Holovainjafy project

Abstract: Fire is commonplace across Madagascar's forest-grassland mosaics, yet governance remains suppression-dominated, and success is measured in terms of counts rather than consequences. By criminalising routine community burning and failing to distinguish low-intensity fire from impactful fire events (high-severity or asset-damaging), the national strategy misallocates effort. A more sustainable course is integrated fire management that supports ecosystem resilience and livelihoods by using ecosystem-appropriate fire, reducing impactful events, and protecting restoration assets and communities. Here we report experiences and lessons from the Fitantanana Maharitra Holovainjafy project, a multi-site effort across six protected areas that span diverse environments and social settings. Our aim is to support an integrated fire management approach by building social-ecological evidence base and management capacity to inform and support national policy change. Three linked elements structured the work. A South Africa learning exchange built a

shared baseline on prescribed burning, risk reduction, and monitoring. Participatory mapping then brought protected-area teams together to identify and rank needs, converge on co-owned priorities, and draft fire management plans. Finally, a fire-refugia mapping workflow was created to guide reforestation siting and protection actions and to support decision-making by managers. Comparing sites enabled a shared understanding of where and when different interventions are appropriate and can be sustained, yielding simple decision rules and a short list of recurring enabling conditions. We found that co-production accelerates uptake, cross-site synthesis reveals generalisable rules while preserving place-specific exceptions, and enabling conditions determine the potential for change. Despite persistent barriers in law, coordination, and funding, we aim to develop a practical yet theoretically grounded roadmap for moving from suppression toward integrated fire management in Madagascar.

46. Rahina Sidiki Alare, King's College London (Leverhulme Centre for Wildfires, Environment and Society)
Title: Pathways towards equitable integrated fire management in Northern Ghana's savanna landscape

Abstract: There is growing evidence that anthropogenic climate change, fire suppression policies and landuse change are reshaping the dynamics of fire regimes across the globe, contributing to increasing wildfire risks and the emergence of new conflicts in wildfire risk management. As these risks intensify, managing them within an increasingly complex and multi-layered governance system raises critical equity concerns, particularly regarding what is considered equitable in both decision-making processes and their outcomes. Using Northern Ghana as a case study, this study adopts a mixed-methods approach to assess current fire governance challenges, associated inequities, and pathways towards more equitable and inclusive integrated fire management. The findings revealed that traditional fire practices are often framed as harmful, leading to an emphasis on fire suppression and carbon mitigation while overlooking the adaptive role of indigenous burning and the fire-adapted nature of savanna ecosystems. Additionally, fire governance is shaped by structural inequalities, including insecure land tenure, gender disparities, and overlapping authorities, which marginalise women, migrants, and herders in decision-making processes. Additionally, the costs and risks of fire management are unevenly distributed, with local communities, especially women, bearing disproportionate burdens, including exposure to snake bites. The study argues that an equitable fire management in Northern Ghana must move beyond suppression-centred approaches towards integrated strategies that recognise fire as both a livelihood resource and a landscape management tool. It also argues that equity in IFM must move beyond recognising participation of all social groups, including marginalised groups, to actively confronting the structural barriers that limit their participation and agency. It further requires redistributing the costs and burden associated with wildfire management, ensuring that conservation and risk reduction do not disproportionately affect those who depend most on fire for their livelihoods.

Theme F

Theme F: What futures for fire in the Earth system are plausible - and which should we aim for?

47. Monika Moreu Vicente, King's College London (Leverhulme Centre for Wildfires, Environment and Society)
Title: Envisioning Fire Futures in the Serranía de Cuenca

Abstract: Extreme wildfire events are becoming increasingly frequent and severe across Mediterranean landscapes, driven by shifts in socio-economic factors, land use and climate variability. In rural areas, land abandonment has altered vegetation structures, leading to greater fuel accumulation and continuity. Meanwhile, rural communities have lost the knowledge and practices that once supported livelihoods and helped reduce wildfire risks. In response to this change, wildfire management has become an urgent priority. As a result, there is a growing shift towards methods that view fire as an ecological process, focusing on strategic fuel management and landscape resilience, moving away from previous top-down approaches. In the Serranía de Cuenca, a mountainous region in central Spain, rural depopulation has driven initiatives to attract economic activities, such as ecotourism, rural revitalisation and conservation. While this presents renewed opportunities for innovation, investment and local engagement, it is creating complex governance structures that interact across different scales, sectors and interests, complicating coordination and decision-making at the territorial level. Therefore, this study examines how rural transformation is shaping stakeholder

perspectives and attitudes towards landscape fire management and engages stakeholders in envisioning future management pathways for the territory. A combination of semi-structured interviews and participatory focus group activities was used to identify stakeholder narratives and facilitate discussions on past and future land use trends, as well as differing values, concerns and visions for future landscape management in the Serranía de Cuenca. These visions were synthesised into landscape fire scenarios that represent preliminary alternative pathways for the region. The scenarios will provide a foundation for future landscape fire modelling and support the evaluation of trade-offs associated with preferred pathways.

48. **Elisabed Gedevanishvili, Imperial College London (Leverhulme Centre for Wildfires, Environment and Society)**
Title: Wild, Domesticated, and Managed Fire: a Case of Armenia

Abstract: Fire regimes vary in the spatial and temporal dimensions through which they emerge. They spatialise and temporalise differently. In other words, how and when present, past, and future gets to exist for a fire regime, closely depends on other normative systems and regimes, such as climate change (Knox, 2020). Tools, that aim to bringing forth futures through environmental governance by harmonising global time and space, already exist. In the case of fire these mainly are fire-suppression (Norgaard, 2022) and, more recently, integrated fire management (Oliveras Menor et al., 2025; Schinko et al., 2023). In practice these measures seem to be contradictory or ambiguous in the ways they either perpetuate historical inequalities in the case of the former, or advocate for just management in the case of the latter. Regardless, for either to come into place, risk and a socially reproduceable future need to exist. When these two arrive and are thought of, is the starting point for this paper. Practically speaking, the paper tries to understand: On what terms and when is the future mitigated in the present for wildfires? How are these futures 'wild' and 'domesticated'? By asking these questions, the paper examines (1) how wildfire governance exists and is constructed temporally and (2) how is wildfire governance conceptualised in regard to risk (Essen et al., 2023; Vigna et al., 2021). To ground these questions, the proposed paper turns to wildfire governance in Armenia's broader move towards environmental governance and what has been dubbed as 'modernisation' (interview with a forester, April 2026). It interrogates preliminary research done about wildfire governance in a nation-state where forest and grassland fires have intensified in recent years and efforts for mobilising funds for forest and wildfire governance have significantly increased.

Art Exhibition: Biographies

The conference art exhibition brings together a diverse group of professional artists and scientists working at the art-science interface, exploring wildfire through creative and interdisciplinary perspectives. Showcasing a wide range of media - including digital imagery, sound, photography, tapestry, and drawing - the exhibition highlights how artistic practices can deepen understanding of fire as both a natural process and a societal challenge. Through these varied forms, the works invite reflection, curiosity, and new ways of engaging with wildfire research.

Fjodors Aleksejevs

University College London

Fjodors Aleksejevs

Born in Latvia, I came to art from the sides of nature and physics, which I studied in London. Currently I research geophysical imaging, simultaneously creating art inspired by subliminality, metaphysics, weirdness of nature.
Website: https://www.behance.net/sainfeden
Instagram: @sain_feden

Freddie Crossley

Independent Artist

Freddie Crossley

Freddie Crossley is an award-winning interdisciplinary artist. In the expanded field of ceramics, food and performance, his work explores the epic in the domestic and how we live with loss and global crisis between our bodies, in conviviality and in the intimacy of our homes. In his making, material and craft become a catalyst for reimagining our relationship to the world around us.
Freddie is an alumnus of the Royal College of Art and the University of Cambridge. He was a Märit Rausing Scholar in 2024, a finalist for the Ingram Prize in 2025 and Anglo-Swedish Scholar at Konstfack, Stockholm 2026. He is currently resident artist at Urban Potters, London.
My work is an invitation: through the things that we live with and the things we will never see again, I am making work for you, with my body for yours.
Website: https://freddiecrossley.com; Instagram: @freddiecrossley

Shane Finan

Artist in residence FIRECULT, international research project

Shane Finan

Shane Finan (he/them) assembles artworks and projects from interactive contemporary technologies, found objects, and traditional artistic media. Their work is as both artist and creative producer on collaborative projects. It is research based and explores the impact of technologies on rural places. Shane always collaborates, most recently working with and learning from artists, plankton, environmental scientists, fungi and biologists. In recent projects, Shane considers how histories and folklore in Ireland shape our understanding of technology. This includes developing stories about aiteann (gorse) in fire and land management in the 1600s-1800s (FIRECULT, Ireland/UK, 2025 and Mermaid Arts Centre 2026). Recent awards include the Arts Council of Ireland Individual Bursary Award (2023), Artists Workspace Scheme (2024, 2023, 2022), Agility Award (2022, 2021, 2020). Other awards include South Dublin County Council In Context Public Art Award (2026), Creative Ireland funding (2024, 2020), Culture Ireland funding (2021, 2018). Website: www.shanefinan.org

Adriana Ford

Imperial College London and King's College London (Leverhulme Centre for Wildfires, Environment and Society)

Adriana Ford

Adriana Ford leads the *Wildfires at the Art–Science Interface* initiative at the Leverhulme Centre for Wildfires, championing creative approaches that bridge scientific research and artistic practice. She is an advocate for art-science collaboration, with a particular interest in how creative expression can enhance understanding of environmental challenges. Adriana also founded the *Breast Cancer Art Project*, a creative health initiative through which she has exhibited work in multiple venues, including Tate Modern. Alongside her professional work, she is a self-taught artist specialising in wildlife portraiture, and has recently contributed a commissioned illustration for an upcoming scientific book on the social life of bats. Social media: https://www.linkedin.com/in/adrianaford/

Jonathan W. Y. Gray + forestscapes

King's College London / Public Data Lab

Jonathan Gray

Jonathan W. Y. Gray (@jwyg) explores the roles of digital data, methods and infrastructures in shaping how we know and live together. He is the author of Public Data Cultures (Polity, 2025). At King's College London, he is Reader in Critical Infrastructure Studies at the Department of Digital Humanities and Co-Director of the Centre for Digital Culture. He is also co-founder of the Public Data Lab; research associate at the Digital Methods Initiative (University of Amsterdam) and the médialab (Sciences Po, Paris); and has taught with the School for Poetic Computation in NYC. More about his work can be found at jonathangray.org.

Website: https://jonathangray.org/ / https://publicdatalab.org/projects/forestscapes/
Social media: https://jonathangray.org/#socials

Alice Hsu

University of East Anglia

Alice Hsu

Alice is a PhD student at the University of East Anglia studying prescribed fire and fire management. Before starting her PhD, she did her MS in California, where her interest in fire science began. In addition to fire, Alice has always been passionate about science education and communication; she brings these two together in a range of outreach materials aimed at changing the public's relationship with fire and the landscape. Her outreach specifically strives to inspire interest in fire ecology while tackling the nature-culture divide. Her materials span fire-themed Pokemon cards, tree identification, fire ecology themed crafts, and a large personal pine cone collection she will proudly show anyone who asks (or doesn't!).

Mira Liu

Scripps and Pitzer Colleges, independent printmaker and textile artist

Mira Liu

Mira Liu is a microbial chemical ecologist with a PhD in Chemistry from the University of California, Berkeley. A self-taught printmaker and textile artist, Mira has been creating since childhood, when her grandmother taught her to knit and sew. Living in California for over a decade, she has witnessed firsthand the increasing frequency and intensity of wildfires, inspiring both concern and a commitment to understanding their impacts on ecosystems and humanity. Mira uses her artistic practice to translate complex scientific stories into visual and tactile experiences. Her ongoing work explores natural dyes and pigments through both scientific and artistic lenses. She aims to engage broader audiences, particularly young people, with the wonders of science and the urgency of environmental change. Website: https://mira.starstar.website/

Byuka Makodru

Independent Artist

Byuka Makodru

Byuka Makodru (they/them) is a trans, migrant artist-curator based in London. They worldbuild across media through immersive performances, community rituals, film, visual arts and speculative fiction writing.

Their practice explores folk futurism through multispecies myth-making, queer gothic lore and animist witchcraft. They co-curated ‘Burned House Horizon’ an Arts Council England-funded exhibition on queer future ancestry and speculative archaeology (Mimosa House and QUEERCIRCLE, 2024-25), and they are the founder and lead researcher/facilitator of Lunarrr Playgroundz - a ritual healing space for the queer community.

They explore how their work can be both a vigil for the dead and a spellcasting circle for our most vulnerable prayers. Social media: @fortunetailedbeast

Garance Maurer

Independent Researcher, Artist and Designer

Garance Maurer

Garance Maurer is a researcher, artist and designer specialized in textiles. Practicing movement, earthly motions that invite her to explore the relationships we maintain with various environments, she's traversing landscapes and disciplines and being transformed by them, combining fieldwork with the creation of materials, colors, universes, shapes, moments and stories. Graduated from ENSCI-Les Ateliers in Paris, she researches alternative narratives and practices of care anchored in a site-specific approach, ecosocial justice and ecofeminist perspectives.
Since 2022, Garance has been researching fire ecologies and practices of good fire, as a counterpoint to the megafires of the Pyrocene, across Mediterranean climate regions. She is exploring this topic with residencies (Villa Albertine, Nouveau Grand Tour and MATCH) and is part of the Fire School (L'école du feu) as associated-artist in Marseille where she is based, and is involved in NODFYR a european association based between Spain and Portugal, dealing with the capaicity building and lobbying around prescribed burns in Europe. Tending alterity, collective practices, and community knowledge, she co-founded the Collectif Trouble, and is an active member of Floating University Berlin.
Photo credit: Garance Maurer (c) Sebastian Díaz de León
Website https://garancemaurer.com/; Instagram: @graour_garance

Alan McFetridge

Artist, Photographer and Founder, Centre of Ecological Philosophy

Alan McFetridge

Alan McFetridge is a New Zealand born artist, photographer and researcher based in London. His work explores the relationship between people, landscape and ecological change, with a particular focus on wildfire. For more than a decade he has undertaken field research across Canada, Australia, Greece, the United Kingdom and New Zealand, documenting landscapes shaped by fire and working alongside scientists, Indigenous knowledge holders and affected communities. His projects combine photography, archives, testimony and writing to explore how fire transforms both place and culture. McFetridge is the founder of the Centre of Ecological Philosophy and has exhibited internationally. His work has been presented through exhibitions, publications and public talks, including at Johns Hopkins University and the Association for Art History Annual Conference. His ongoing project Fire North investigates wildfire as both an ecological force and a cultural phenomenon in a rapidly changing world.
Website: www.alan-mcfetridge.com

Farrer Owsley-Brown

King's College London (Leverhulme Centre for Wildfires, Environment and Society)

Dr Farrer Owsley-Brown

I've recently finished my PhD on remote sensing of landscape fire and am now working as a postdoc at King's. In autumn 2025, our team conducted an airborne campaign in the Amazon called CarbonARA, which was funded by the European Space Agency. Our objectives were to investigate changes in the carbon cycle in this region, primarily looking at differences between the undisturbed rainforest and disturbed areas, where fire is often used for clearance or management. Although we are scientists, this conference presented an opportunity to show some photographs that we captured of this amazing region in an artistic context.

Website: https://wildfire.geog.kcl.ac.uk/team-post/mr-farrer-owsley-brown/

Exquisite Corpse

The collaborative Exquisite Corpse exhibition brings together eleven members of the Leverhulme Centre for Wildfires, Environment and Society: **Jay Mistry (facilitator), Adriana Ford (facilitator), Verena Achterberg, Abigail Croker, Elisabed Gedevanishvili, Matt Kasaor, Hafizha Mulyasih, Kate Schreckenberg, Rahinatu Sidiki Alare, Cathy Smith** and **Michel Valette.**

Leverhulme Centre for Wildfires, Environment and Society
Contact: wildfire@imperial.ac.uk

Organising Committee: Adriana Ford, Kapil Yadav, Elisabed Gedevanishvili and Mia Griffin