LEVERHULME

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

# Leverhulme Wildfires Summer Conference 2023

## Talk Abstracts and Speaker Bios

## Centre Leadership and Discussion Chairs

Leverhulme Centre for Wildfires, Environment and Society

### Prof. Colin Prentice

Centre Director, Imperial College London

Colin is Director of the Centre, and Chair in Biosphere and Climate Impacts in the Department of Life Sciences at Imperial College London. He is also an elected Fellow of the Royal Society since 2018. Colin's research focuses on the global terrestrial biosphere and its dynamic interactions with the atmosphere and climate, with his present research informed by the need for a next generation of ecosystem and land surface models. As Director, Colin is responsible for research coordination across the Centre and the science strategy. He is also supervising several projects relating to impacts and feedback between climate, fire and ecology, particularly from an earth system perspective.

### Prof. Sandy Harrison

**Chair of Discussion in Session 1**

Associate Director, University of Reading

Sandy is Professor in Global Palaeoclimates and Biogeochemical Cycles in the Department of Geography and Environmental Science at the University of Reading.
Her research interests include the role of land-surface, terrestrial biosphere and hydrological processes in modulating regional climates, past, present and future; global vegetation modelling, with a specific emphasis on fire disturbance and vegetation emissions; and reconstruction of past climate and environmental changes at continental to global scales environmental changes. Sandy is leading the work on palaeofires at the Centre, focusing on the history of wildfire, vegetation, and climate change.

## Prof. Apostolos Voulgarakis

**Chair of Discussion in Session 2**

Associate Director, Technical University of Crete and Imperial College London

Apostolos is Associate Professor in Climate Change and Atmospheric Environment in the School of Environmental Engineering at the Technical University of Crete (TUC), and AXA Chair in Wildfires and Climate. He is also Professor in Atmospheric Physics in the Department of Physics at Imperial, where he founded our Centre. Apostolos leads *climate.TUC*, the Atmospheric Environment and Climate Change Lab at TUC. His research, and that of his lab, spans a wide range of areas, ranging from global to regional, and from anthropogenic to natural processes, with a particular focus on impacts of climate change on wildfires and the influences of wildfire-generated air pollution on climate.

## Prof. David Demeritt

**Chair of Discussion in Session 3**

Associate Director, King's College London

David is an elected fellow of the Academy of Social Sciences and Professor of Geography the Department of Geography at KCL. He is an expert in environmental policy and risk governance, especially in relation to natural hazards. He also has a research interests in science studies and social theory, especially the philosophy of science and understandings of risk and science. At the Centre, David champions our research on fire at the Wildland-Urban-Interface, and supervises research projects focused on fire risk and governance in China, South Africa and the USA.

## Prof. Jay Mistry

**Chair of Discussion in Session 4**

Associate Director, Royal Holloway, University of Reading

Jay is Professor of Environmental Geography in the Department of Geography at RHUL. Her research interests include environmental management and governance, participatory visual methods and Indigenous geographies. Her work involves supporting local livelihoods and biodiversity conservation, action research using participatory video and Indigenous rights. She is also interested in different types of fire knowledge, and how these can be brought together for more effective and socially just fire management and governance. At the Centre, Jay champions our work relating to indigenous and local fire knowledges and practices.

**Prof. Martin Wooster**
Associate Director, King's College London

Martin is Professor in Earth Observation Science in the Department of Geography at King's College London. He is an expert on satellite Earth Observation (EO) and the quantification of landscape fire, including air quality and wildfire emissions. Martin's key research interest lies in quantifying the role that vegetation fires (biomass burning) play in exchanges of material between the land surface and the atmosphere, and the development of remote sensing approaches to help address this question. The Centre is closely linked with Martin's group, *King's Earth Observation and Wildfire Research Group.*

**Dr Adriana Ford**
**Conference Organiser**
Centre Manager, Imperial College London and King's College London

Adriana is the Centre Manager and oversees operational and logistical needs of the Centre, including supporting the development of the research programmes, leading the Centre communications, and building networks and collaborations. She also leads the Wildfires at the Art-Science Interface initiative, the Equality, Diversity and Inclusion Working Group, and the Arctic Wildfires Working Group, and co-supervises a PhD project on wildfires at the wildland-urban interface.

## Session 1. Large-scale observations and models of fire

**Prof. Fang Li**
Institute of Atmospheric Physics, Chinese Academy of Sciences

Fang Li is a Professor in the Institute of Atmospheric Physics, Chinese Academy of Sciences. She received her PhD from the Institute in 2008, and then worked here as a researcher. Fang's research interests are Earth system modelling and application, with a particular focus on fires, terrestrial ecosystems, human impacts, and land-atmosphere interactions. The fire model she developed is widely used by CMIP6 Earth system models. She currently serves as the co-coordinator of the Inter-Sectoral Impact Model Intercomparison Project (ISIMIP) fire sector, co-chair of the Fire Modeling Intercomparison Project (FireMIP), convener of the EGU General Assembly fire session, lead author of Technical description

of Community Land Model version 4.5 (CLM 4.5) and CLM5, and lead guest editor of an EGU inter-journal special issue entitled "The Role of Fire in the Earth System: Understanding Interactions with the Land, Atmosphere, and Society" across ACP, BG, GMD, ESD, and NHESS.

**Title: The status and challenge of global fire modelling**

Fire is the primary form of terrestrial ecosystem disturbance on a global scale and an important Earth system process. It is influenced by vegetation characteristics, climate, and human activities, and generates feedbacks by affecting biogeochemical cycles, vegetation composition and structure, land–atmosphere water and energy exchanges, atmospheric chemistry and composition, and human health and property. In this presentation, we will review the representation of fire in dynamic global vegetation models (DGVMs) and Earth system models (ESMs), and provide an overview of the performance of current fire models and how fire-enabled DGVMs and ESMs have been used to identify and quantify the drivers and impacts of fire at a global scale. We will also discuss the remaining challenges and opportunities in global fire modeling and its application to address pressing scientific and societal questions.


## Dr Jose Gomez-Dans

King's College London


Jose has a first degree in Electronic Engineering, and a PhD in microwave remote sensing, looking at the fundamental interactions between signals and vegetation. He has since then worked on remote sensing of the cryosphere, land surface (carbon cycle and agriculture) and fire and other disturbance. He is interested in fundamental modelling to understand the EO signal, developing capabilities to blend observations from different sensors and models, and Bayesian methods for data assimilation.

**Title: How to use Earth Observation to tame the flames**

Fire is a global agent of disturbance, and its effects and causes involve the land surface, the atmosphere and human activities. Complex interrelationships happen at different temporal and spatial scales, making global assessments of fire activity challenging. In this talk, I will give a brief outline of some of the some of the available fire-related products, discussing their potential uses in conjunction with fire and dynamic vegetation models to obtain a fuller picture of the global footprint of fire. I will introduce some recently started work in the Centre that aims to build up a facility to assimilate different satellite products so as to improved fire/vegetation models. Emphasis is made on acknowledging the shortcomings and uncertainties of EO products and models.

## Olivia Haas

Imperial College London

Olivia Haas is a third year PhD student based at the Department of Life Sciences at Imperial College London since 2019. Her work focuses on studying the large-scale controls of different fire properties through statistical modelling and specifically how climate, vegetation properties and human activity, as well as their interactions, control the spatial distribution of global fire regimes. She is interested in global fire modelling as well as understanding the underlying relationships that determine the distribution of global wildfires. As such, her main interest lies in relatively simple modelling efforts that provide strong explanatory power.

**Title: Statistical models as a tool to explore the relative importance of climate and CO2 in driving large-scale changes in wildfire regimes**

Olivia Haas*, Imperial College London;* Colin Prentice, *Imperial College London;* Sandy P. Harrison, *University of Reading*

The distribution of global wildfires is driven in part by climate, through its short-term control on fire weather and long-term control on vegetation. However, the amount of $CO_2$ in the atmosphere also plays a key, and often overlooked role in driving the spatial distribution of wildfires independently from climate through its control on plant growth. One of the reasons the relative effect of $CO_2$ is ignored is the difficulty of isolating out its effect, since, amongst other things, changes in atmospheric $CO_2$ are temporally correlated with changes in climate. Here we use three generalized linear models for global burnt area, fire size and fire intensity to show the relative effect of climate and $CO_2$ in driving large-scale changes in wildfire regimes at the Last Glacial Maximum (LGM) as well as under future projected climate change scenarios. Importantly, we show that only by including the effect of low $CO_2$ at the LGM were we able to reproduce spatial patterns consistent with the sedimentary charcoal record, highlighting the importance of accounting for the effects of $CO_2$ on vegetation when considering how future fire regimes may evolve. This work also illustrates how statistical models can be used as a benchmarking tool to determine how different wildfire properties respond to the same forcings in climate and $CO_2$ as well as a way of quantifying the relative magnitude of these effects on wildfires.

## Meng Meng

University of Reading

Meng Meng is a PhD student in the Northeast Normal University and a visiting student in the Department of Geography & Environmental Science at University of Reading under the supervision of Prof. Sandy Harrison. Meng earned her B.S. degrees from the School of Geographical Sciences, Northeast Normal University in 2018. Since then, she has begun her doctoral study. She is mainly interested in fire history and palaeoecology. Her current research interests include 1) Holocene and future changes in wildfires in China; 2) past climate and vegetation dynamics indicated by pollen and phytolith; 3) climate and fire drivers of past forest changes.

**Title: Exploring Holocene changes in wildfires in China using a statistical modelling approach**

Meng Meng, *University of Reading,* Olivia Haas, *Imperial College London,* Esme Cruz-Silva, *University of Reading,* Sandy P. Harrison, *University of Reading*

Sedimentary charcoal records provide information about how fire regimes have changed on timescales of hundreds to thousands of years, in response to changes in regional climate, vegetation properties and human activities. There have been significant changes in all three drivers of fire regimes over the Holocene, the past ca 12,000 years. Thus, sedimentary charcoal records provide an important tool for evaluating how well we understand the controls of fire regimes and our ability to model how changes outside the range of the changes experienced in recent decades have affected fire regimes. In this study, we reconstruct changes in background levels of fire, fire frequency and fire magnitude based on charcoal records from China. We show that there are significantly different patterns of change in all three fire properties between different regions over the past 12,000 years, consistent with the fact that northern and southern China have experienced very different climate and human histories over this time. We then used an existing statistically based global fire model to simulate the spatial and temporal patterns of burnt area, fire size, and fire intensity to investigate the primary causes of these regional differences. The inputs to the fire model include climate variables from transient climate simulations of the response to changes in orbital, greenhouse gas and ice sheet forcing, changes in gross primary production and vegetation type modelled using a light-use efficiency model of primary production and a biogeography model of vegetation distribution driven by these simulated climate variables, and estimates of changes in population density during the Holocene based on historical and archaeological data from the HYDE database. Comparison of the observed and simulated changes of key aspects of the fire regime provide a crucial test of the fire model and, at the same time, a way to explain the fire response to external forcings and internal feedbacks.

## Session 2: Fire as an Earth System Process

**Prof. Juli Pausas**
CIDE-CSIC, Valencia, Spain

Juli G. Pausas is Professor of Research at the Spanish National Research Council (CSIC). His research focuses on ecology and evolution of Mediterranean and other fire-prone ecosystems, and specifically on understanding the role of fire in shaping populations, communities, landscapes, and biomes. More information at: https://www.uv.es/jgpausas/

**Title: The role of fire on Earth**

Fire is a defining characteristic of our biosphere, having appeared when the first plants colonized the land and continuing to occur across the planet at different frequencies and intensities. In this talk, I will briefly review how fire contributes to shaping the Earth system. In short, fire has been and still is an evolutionary force in many plant lineages, explaining a proportion of the variance of our biodiversity. Fire has also shaped many ecosystems and biomes and contributes to the global biogeochemical cycles. Although fire is often considered a degradation agent, this is only the case when it is associated with other perturbations. The ways in which all these functions of fire will be affected by continuous climate change are still debated.


## Prof. Stefan Doerr

Swansea University


Professor of Wildland Fire Science at Swansea University (UK), Director of its Centre for Wildfire Research and Editor-in-Chief of the International Journal of Wildland Fire. He has investigated wildfires over three decades across all fire-affected continents and has held collaborative research positions in Australia, Spain, and the USA, working closely with scientists, resource managers and firefighters. His particular areas of expertise are fire impacts and their mitigation (emissions, landscape carbon dynamics, soils, erosion, water quality and ecosystem services), as well as fire behaviour, global fire patterns and their trends, climate feedbacks and social perceptions of fire.

**Title: Climate change as a driver of extreme wildfires - evidence, trends and projections**


*Stefan Doerr (Swansea University) and Cristina Santin (CSIC - Spanish National Research Council, Mieres, Spain)*


This presentation summarises the evidence, trends and projections for extreme wildfire occurrence around the globe and the respective roles of climate change and land management therein. It is based on a review of the available evidence as of early 2023 underpinning the new report “Taming Wildfires in the Context of Climate Change” published by the OECD, to which the authors have contributed.

## Prof. Claire M. Belcher

wildFIRE Lab, University of Exeter

Claire M. Belcher is Professor and Chair of Wildland Fire at the University of Exeter where she directs the wildFIRE Lab. Her research seeks to understand the evolutionary couplings of fires and ecosystems and the long-term functioning of our planet. Her work focuses on understanding variations in flammability stretching from the evolution of different plant traits through to seasonal shifts. This focus has allowed her to build an experimental lab containing equipment used for assessing flammability and coupling this with instrumented field scale experimental wildfires and prescribed fires. A large part of current research centres around building the components for a UK Fire Danger Rating system, by characterising the flammability traits of UK fire prone plant species and working towards understanding of the application of managed burns and prescribed fires in mitigating fuel loads in northern temperature ecosystems.

**Title: Understanding flammability, past, present and into the future**

Plants are remarkably adaptable and must respond to the environment in which they live in order to survive, and this adaptability has been prevalent throughout plants multimillion year evolutionary history. This adaptability can cause intraspecific and phenotypic variations in a range of plant traits. Ecophysiological adaptations in plants drive variability in leaf chemistry and carbon allocation, which are amongst the most plastic traits and vary both seasonally and in response to longer term environmental changes and stress. However, we know relatively little about how such changes might influence plant flammability. In this presentation I will show results from experimental work that indicate that shifts in both intra- and interspecific leaf chemistry driven by extrinsic factors influence leaf level flammability and that some plants do indeed modulate their leaf level volatile content to control fire.

## Dr Manolis Grillakis

Technical University of Crete

Dr Grillakis is a postdoctoral researcher at the Laboratory of Atmospheric Environment and Climate Change of Technical University of Crete. He has a background in hydrology, land surface modeling, and climate change impact assessment in various sectors. In recent years his research focused on climate effects on wildfires and wildfire danger, and the effects of wildfires on hydrology. Manolis has participated in 20 research programs, (co)authored 55 scientific publications and 65 conference papers.

**Title: Wildfires, climate, and the hydrological cycle**

Wildfires, as an intrinsic Earth system process, have wide impacts on ecological and hydrological systems, altering vegetation dynamics, soil properties, and water availability. In this presentation we showcase the effects of wildfires on the hydrological cycle, as well as links between wildfires and climate. We show that those effects are not unambiguous, but dependent on different system dynamics. We attempt to quantify this effect for different world regions and explain the mechanisms behind the detected signal of changes. Our results reveal connections between wildfires, the background hydroclimatological regime and hydrological impacts after the occurrence of fire as well as links between wildfires, atmospheric composition, and climate.

## Session 3. Fire in relation to land management, conservation, livelihoods and health

**Prof. Bibiana Bilbao**
Universidad Simón Bolívar

Professor - Department of Environmental Studies, Universidad Simón Bolívar, Caracas, Venezuela; MAK'IT, Visiting Scientists Programme 2022-2023, Montpellier Advanced Knowledge Institute on Transitions at Université de Montpellier, France; COBRA COLLECTIVE - United Kingdom, Future Challenges, Local Solutions.

**Title: Fire Management Policies in Latin American and Caribbean: Controversies, Paradoxes and Opportunities in a Biologically and Culturally Megadiverse Continent**

Under the current changing climate and social governance conditions, wildfire occurrence has become a critical issue trespassing academic and technical disputes and reaching sensible socio-political arenas. Latin American and the Caribbean (LAC) Indigenous and rural communities, urban-rural interface populations, firefighters, and ecosystems biodiversity are in the most vulnerable conditions. In the past century, dominant fire management approaches applied in LAC have dwelled on policies that ban the use of fire ('zero fire'), excluding this natural phenomenon from ecosystems. Despite costly investment in human resources and high technical deployment, these suppression policies have not been sufficiently effective. Furthermore, they have tended to exclude local traditional fire practices, which allowed the survival of ancient cultures to preserve forest diversity and represent valid adaptive options to climate change threats. Co-developing new visions and

capacities for integrated and intersectoral management of wildfires instead of just fighting them requires the inclusion of multiple perspectives and actors and including adaptive practices and participation of local communities that inhabit natural spaces. This work discusses inspiring and pioneering initiatives from which essential lessons can be learned and identify challenges and barriers to overcome through collaboration at the regional level in LAC and other regions that share similar challenges.

**Dr Mark Grosvenor**
King's College London

Dr Mark Grosvenor is a Postdoctoral Research Associate with the King's Earth Observation and Wildfire (NCEO) research group and the Leverhulme Centre for Wildfires, Environment and Society. His research currently focuses on the operation of the Fire Emissions Testing Chamber (FETCh) to allow the analysis of gas and particulate emissions from controlled experimental fires. He previously worked at the University of Exeter wildFIRE Lab, where he managed the lab alongside undertaking fire ecology research as part of a European Research Council (ERC)-funded project. Mark's research interests include reconstruction of past environments (mostly through analysis of lake sediments) and more recently contemporary wildfires. He is particularly interested in reconstructions of past fire activity and the impact they have upon the landscape.

**Title: Assessing air quality impacts of agricultural burning in Southeast Asia**

**Angel A. Goldsmith**
King's College London

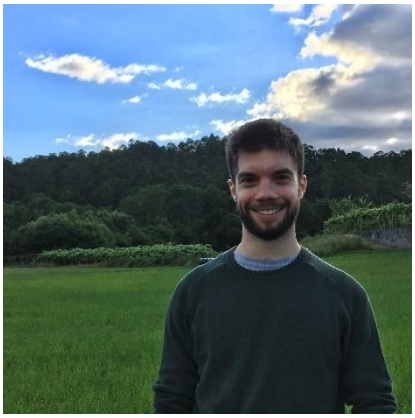
Angel Goldsmith is a current PhD student in the Geography Department at King's College London under the supervision of Prof David Demeritt and Dr Adriana Ford. Also, an early career researcher at the Leverhulme Centre for Wildfire, Environment and Society. Mr Goldsmith attained his undergraduate degree at Nelson Mandela University in Forestry Management and his MSc degree in Forest Sciences from Stellenbosch University. He is passionate about wildfire management, particularly operational research in wildland-Urban interface wildfires, wildland fuel dynamics, and fire behaviour. Lastly, his favourite animal is the mighty crocodile "ingwenya".

**Title: Vegetation management at South Africa's wildland-urban interface**

The implementation of vegetation management contributes significantly to international best practices of wildfire risk reduction in wildland-urban interface areas. However, in the context of South Africa, its practicalities can be strained by the institutional coordination challenges, constant competing land-use objectives, and socioeconomic realities

perpetuated by the legacy of apartheid. In a case study conducted in Knysna this was evidenced by: (1) Elements of institutional disintegration between land-use planning agencies and wildfire management agencies. (2) Competing biodiversity conservation goals of preserving the threatened fynbos ecosystem over vegetation fuels reduction for wildfire safety. (3) Overlap of spatial planning goals with the soaring sprawls of informal settlement construction on firebreaks and fire paths due to housing pressure and disproportional land access. Therefore, adoption of international best practice needs not to overlook the unique cultural-political climate and socioeconomic dynamics that may influence the planning and implementation of an effective vegetation management practice in the wildland-urban interface areas.

**Iván Villaverde Canosa**
School of Geography, University of Leeds



Ivan studies community risk and resilience to wildfire activity in Western Canada. He is currently a PhD candidate in Human Geography at the University of Leeds. His research is focused on understanding how people understand, experience, and respond to wildfire risk in British Columbia, examining the factors that make people more or less vulnerable to the impacts of wildfires. He uses community-based research methodologies, including semi-structured interviews, to understand how we can adapt our communities to wildfire risk.

**Title: Exploring the transboundary risks of wildfire: a case study from rural British Columbia, Canada**

Communities worldwide are facing increasing pressure from wildfires that burn hundreds of miles away. Air pollution, damages to power and communications infrastructure, and road closures are some of the impacts that distant wildfires are having on these communities. With wildfires projected to increase in the years ahead, the indirect impacts of wildfires are expected to only grow, compromising the well-being, livelihood, and cultural fabric of many communities across the world. Despite these far-reaching impacts, there has been limited research exploring how communities perceive, comprehend, and respond to the indirect impacts of wildfires. This presentation aims to bridge this gap by introducing a case study conducted in a rural community in British Columbia, Western Canada. The presentation explores how geographically distant wildfires have impacted this community and identifies the elements that have made it particularly vulnerable to the transboundary risks of wildfire. This presentation will highlight the importance of considering the indirect impacts when developing comprehensive wildfire risk assessments and will identify ways that communities can adapt to them.

# Session 4. Bridging scales and perspectives

**Dr Cathy Smith**
Royal Holloway, University of London

Cathy is a postdoctoral researcher studying human fire use and governance. As well as synthesising information about human fire use at the global scale, she has worked on case study research in Belize, and is currently researching fire use by crofters in Scotland. She previously worked for a community-based fire management project in Belize, and is currently involved as a consultant with a Green Climate Fund project assessing the potential for local people to be employed in prescribed burning projects to offset carbon emissions.

**Title: Ethical questions arising from efforts to collate knowledge about human fire use at the global scale**

People around the world use fire as part of small-scale livelihoods involving agriculture, pastoralism, hunting, gathering and other activities. These practices are often important to fire users, culturally and economically. In some cases, they also reduce wildfire risk, and maintain fire-dependent ecosystems, while they may also pose health risks. We know little about these practices at the global scale, despite their importance. It is difficult to isolate human fires from remote sensing data, and many are too small to be captured. Meanwhile, global fire models represent anthropogenic fires as function of proxies like GDP or population. Over the past 3 years I have been involved with research that has aimed to synthesise knowledge about human fire use at the global scale. I have collated information from published case study research by anthropologists and geographers and distributed a survey about human fire use to experts in many countries (including researchers and practitioners). In this presentation I will describe these methodologies and consider the ethics of this research. In what ways do global datasets about fire use give voice to, or represent, fire users? Is it right to ask people to contribute their knowledge to such a dataset? What are potential uses for these datasets, and how might they benefit or affect fire users?

**Abigail R. Croker**
Centre for Environmental Policy, Imperial College London

Abigail is a PhD student at the Centre for Environmental Policy, Imperial College London, funded by the Grantham Institute's Science and Solutions for a Changing Planet Doctoral Training Programme. She is an affiliated member of the Leverhulme Centre for Wildfires who funded her fieldwork in Kenya in 2022 to explore opportunities for multi-group collaboration and knowledge sharing for developing equitable, effective, and sustainable fire management and policy in savanna-protected areas. Abigail holds a BSc in Ecology and MSc in Climate Change Science and Policy. Prior to starting her PhD, Abigail lectured at Bournemouth University, leading the MSc Green Economy module Green Technology and Renewable Energy. She is interested in social-ecological systems and their dynamic impacts on anthropogenic climate change, having carried out diverse research in the UK, Europe, the Arctic, and sub-Saharan Africa.

**Title: Changing fire regimes in East and Southern Africa's savanna-protected areas: opportunities and challenges for indigenous-led savanna burning emissions abatement schemes**

Late dry-season wildfires in Sub-Saharan Africa's savanna-protected areas are intensifying, increasing carbon emissions, and threatening ecosystem functioning. Addressing these challenges requires local community engagement and support for wildfire policy. Savanna burning emissions abatement schemes first implemented in Northern Australia have been proposed as a community-based fire management strategy for East and Southern Africa's protected areas. Here we critically examine the application of savanna burning emissions abatement schemes in this region, characterizing their contextual and implementation challenges. We argue that the effective transfer of the Northern Australian fire management model is limited by political and institutional barriers, and hindered by the region's recent colonial history, population growth, and consequences of rapid climatic change.

We show that the application of Northern Australian savanna burning methodologies in East and Southern Africa tend to adopt centrally determined objectives and market-based approaches, prescribe early dry season burns, and assume biodiversity co-benefits. These features restrict opportunities for indigenous leadership in fire management and income generation through carbon trading, and present multiple biogeophysical inconsistencies that jeopardize emissions mitigation potential. We suggest that future feasibility and scoping assessments address asymmetries between policy-relevant institutions and local land governance systems, explicitly acknowledging colonial legacies in institutional arrangements across protected areas and hierarchies in agrarian politics that threaten processes of equitable decentralisation in natural resource management. To provide a community-based strategy, savanna burning schemes need to establish context specific legal frameworks and implement free, prior, and informed consent to safeguard the roles and responsibilities of indigenous and local peoples and their distribution of carbon benefits.

**Ol Perkins**
King's College London

Ol is a final year PhD student at King's College London working with James Millington and Tamsin Edwards. Ol's area of interest is human-natural systems modelling, particularly relating to climate change adaptation and mitigation. They recently completed an academic fellowship at DEFRA focused on carbon dioxide removal delivery in the UK.

**Title: Local and regional uncertainty hotspots in global human-fire interactions**
Perkins, O., Kasoar, M., Smith, C., Hall, J., Edwards, T., Voulgarakis, A. & Millington, J.

The Fire Model Intercomparison Project (FIREMIP) found that representations of anthropogenic influences were a central shortcoming in fire-enabled dynamic global vegetation models. Underpinning this was a lack of systematic global understanding of how humans use and manage fire. In response, we have developed WHAM! (Wildfire Human Agency Model) a global agent-based model of human fire use and management. WHAM! is based on the Database of Anthropogenic Fire Impacts (DAFI); DAFI is a meta-analysis of 1809 local-scale case studies of human-fire interactions compiled specifically to form the empirical-basis of global-scale modelling.

Simultaneously, recent advances in fine-scale remote sensing provide novel opportunities to understand anthropogenic impacts on fire regimes. Here, we present a comparison of the new GFED5 burned area product with outputs from WHAM-INFERNO - an offline model coupling consisting of WHAM! and the INFERNO biophysical fire model. We demonstrate strong overall coherence between GFED5 and WHAM-INFERNO, and therefore advances in understanding of human-fire interactions.

We then point to key regions of disagreement, notably the distribution of crop fires in Northern India and Southern China, and differences in the savannas of sub-Saharan Africa. We show how uncertainties in WHAM! point back to spatial gaps in underlying case-study work. Finally, we suggest local and meso-scale priority regions for future work on human-fire interactions.

**Dr Cathelijne Stoof**
Knowledge Hub for Integrated Fire Management, Wageningen University, The Netherlands

Cathelijne Stoof is specialized in pyrogeography - the interdisciplinary study of the distribution and functioning of wildland fire. She is the national delegate of The Netherlands to the EU Expert Group of Forest Fires and coordinator of the Innovative Training Network PyroLife, that trains 15 early career researchers to become our new generation of integrated fire management experts. PyroLife fosters knowledge transfer between countries, risks and people. It thereby combines how the North solves community problems with fire knowledge from the European South, with a strong focus on diversity in terms of interdisciplinarity, science-practice links, geography and gender.

**Title: Making inter- and transdisciplinary connections to bridge scales and perspectives in fire**

Fires in the 'usual' fire countries burning out of control and fires in the 'wrong' countries burning amidst high population density, low awareness and preparedness. The current scope of the fire challenge cannot be solved with the traditional mono-disciplinary approach of fire suppression. There is a critical need to change fire management from fire resistance to landscape resilience: Living with fire. I posit that almost everything has been done before, either in a different discipline, a different country or in a different sector. To achieve integrated fire management, there is a strong need to learn from successes and mistakes elsewhere, through inter- and transdisciplinary knowledge exchange based on four axes of diversity: combining cross-geography, cross-risk, and cross-sector approaches while embracing social diversity. In this talk, I will discuss how we apply this approach in our collaborative research, and what this thinking means for training our future experts.

Tag us on twitter @centrewildfires #leverhulmewildfires2023