



EGU Galileo Conference

Fire impacts at the Earth surface across space and time: perspectives for future fire management

BAD BELZIG | GERMANY | 28 MARCH – 1 APRIL 2022



Funded by
DFG Deutsche
Forschungsgemeinschaft
German Research Foundation

GeoX

**INTERNATIONAL
PALEOFIRE
NETWORK**



GFZ
Helmholtz-Zentrum
POTSDAM

Post-fire recovery in a Central German pine forest.
@Centre for Ecomics and Ecosystem, HNE Eberswalde.

Aims and scope

Recent record-breaking wildfires are being observed in the Arctic, boreal forests, the Amazon, the Mediterranean, Indonesia and Australia. Risks and costs due to fire are increasing in many regions while at the same time satellite data show a strong decrease in burned area likely related to human activities. These contradictory findings show the need for a holistic understanding of fire regimes and its drivers and impacts with ongoing and future land management and climate changes. Fire has been a part of the Earth system since the evolution of terrestrial biomass 420 million years ago. Despite being a risk to many human societies today, fire has played an important role in human evolution and as a tool and target in land management for millennia. Its role in biogeochemical cycles and ecosystem dynamics across various spatiotemporal scales is still poorly constrained, partly due to its complex feedbacks with climate and vegetation and multiple ways of how humans influence fire. The influence of fire on the local soil, vegetation, and hydrological properties, the global climate and biogeochemical cycles and the impact on society require inter- to transdisciplinary research approaches, as these components of the Earth system (including humans) are strongly linked.

This Galileo conference aims to provide a discussion-driven meeting to facilitate knowledge transfer between fire science disciplines and to identify research needs to support fire management of the future. Leading fire experts together with scientists and stakeholders from the fire and forest policy domains will discuss in plenary and breakout sessions 1) new joint perspectives on key processes, drivers and impacts of fire in the natural and human-shaped environments and 2) identify major gaps in socially relevant and actionable knowledge to guide future fire research. Participants represent different fire disciplines, temporal and spatial scales, career phases and regional foci.

Conference discussions will build on recently released large-scale syntheses such as the [UNEP report](#) and address key questions such as:

- *What are key processes, feedbacks, and thresholds in fire-climate, fire-vegetation and human-fire interactions? How to consider processes acting across temporal scales?*
- *What are the main challenges to allow a data-informed fire modelling and data-informed fire management?*
- *What scientific knowledge is needed to derive guidelines for a sustainable fire management across biomes? How can available knowledge be transferred between regions to prepare the new fire-prone regions of the future?*



After a surface fire in larch dominated boreal forest. @ E. Dietze, AWI, 2019.

Conference program

Monday, 28 March 2022

Individual arrival to Bad Belzig train station via Berlin and transfer to Hotel Springbachmühle

Tuesday, 29 March 2022

09:00-9:30 Welcome, conference organization and short introduction of participants

Session 1: Fire-climate-vegetation feedbacks

9:30-10:00 **Philip Higuera** *Fire, Climate Change, and the Resilience of Rocky Mountain Forests*

10:00-10:30 **Short Talks** on participant's projects and posters (Janiec, Jackisch, Glückler, Dietze, Drüke) + few min Q&A

10:30-10:50 *Take a break*

10:50-11:20 **Short Talks** on participant's projects and poster (Hapsari, Drobyshev/Robles, Dabengwa, Reichel, Oberhagemann) + few min Q&A

11:15-12:30 Discussions in regional groups (grasslands, Mediterranean, boreal, tropical)

Session 2: Human-fire interactions

14:00-14:30 **Yoshi Maezumi** *10,000 years of Indigenous land use and cultural burning in the Amazon*

14:30-15:00 **Chantelle Burton** *Future fires and their impacts on ecosystems*

15:00-15:40 **Short Talks** on participant's projects and posters (Mukunga, Rohringer, Bonk, Czerwiński, Barhoumi, Unkelbach, Słowiński) + few min Q&A

15:40-16:00 *Take a break*

15:50-17:00 Discussions in thematic groups of your choice

17:00-17:30: Summarizing today's group discussions

Wednesday, 30 March 2022

9:00-9:30 **Jeannette S. Blumröder** *Strategies for developing pyrophobic and climate resilient forests at burned areas – The PYROPHOB Project*

9:30-17:30: **Full-day field trip** to nearby study sites of the **PYROPHOB project** including discussions with PYROPHOB-researchers and local stakeholders

Thursday, 31 March 2022

Session 3: Post-fire impacts on terrestrial landscapes

09:00-9:30 **Tercia Strydom** *Fire effects on soil properties in a large African conservation area*

9:30-10:00 **Sander Veraverbeke** *Climate-fire feedbacks in arctic-boreal regions*

10:00-10:45 **Short Talks** on participant's projects and posters (Doerr, Billing, Mallikarjun, Jiménez-Morillo, Sigmund, Unkelbach, Zhang, Soares, Bowring) + few min Q&A

10:45-11:00 *Take a break*

11:00-12:00 Discussions in thematic groups of your choice

12:00-12:30 Summarizing morning group discussions in plenum

Session 4: Human fire management and fire science communication

14:00-14:30 **Pierre Ibisch** *Forests in the 21st century and the paradigm of ecosystem functionality*

14:30-15:10 **Short Talks** on participant's projects and posters (Egberts, Bhardwaj, Ouattara, Vannière/Lestienne, Boose, Santín)

15:10-16:00 Discussions in thematic groups

16:00-16:20 *Take a break*

16:20-17:00 Continue discussions in thematic groups of your choice

17:00-17:30 Summarizing afternoon discussions in plenum

Friday, 1 April 2022

Session 5: Perspectives for future fire research and knowledge transfer

09:00-10:00 Final presentation of group discussions in plenum

10:00-11:30 Specific outcome planning

11:45-12:00 Closing ceremony including poster prizes for Early Career Scientists

Conference style:

This is a discussion-driven conference. Invited keynote presentations and short talks aim to stimulate discussions. **Keynote presentations** (c. 20 min + 10 min discussion) **and Short Talks** (max. 5 min each) will be **livestreamed** to the world via a **zoom-webinar that require pre-registration by writing an email to gc9fire@gfz-potsdam.de**. Presentations will be recorded and shared later on.

Main themes and contributions

Tuesday: Fire–climate–vegetation feedbacks

Keynote: Philip Higuera et al., Fire, Climate Change, and the Resilience of Rocky Mountain Forests

Piotr **Janiec**, Characterization of the forest fires dynamics in the North-Eastern Siberia (Yakutia) based on the Google Earth Engine (GEE) and Landsat 5, 7 and 8 satellite

Robert **Jackisch** et al., First results of integrated UAV-based LiDAR and multispectral mapping to investigate fire impact on Siberian forests, Yakutia, Russia

Ramesh **Glückler** et al., Thermokarst lakes as long-term wildfire archives: A reconstruction of Holocene wildfire and vegetation dynamics in Central Yakutia, Russia

Elisabeth **Dietze** et al., The rhythm of fire-vegetation-climate interactions and its impact on north-eastern Siberian landscapes over the past 3.6 Ma

Markus **Drüke** et al., Fire prevents the regrowth of the Amazon rainforest after complete deforestation in a fire-enabled Earth system model

K. Anggi **Hapsari** et al., Late Holocene ENSO-related fire impact on Southeast Asian peatlands

Igor **Drobyshev** presenting Daniela **Robles** et al., Signal of Pacific and Atlantic Oceans climate indices detected on tree-ring-based fire history of mixed-pine forests of eastern North America for 1675-1900 AD

Abraham **Dabengwa** et al., The curious case of varying interpretations of fire from charcoal sizes in a Late Holocene mountain grassland sedimentary record, South Africa

Vivien **Reichel** et al., Charcoal transport from source to sink based on modern forest fire intensities and wind patterns in Yakutia, Russia

Luke **Oberhagemann** et al., Accounting for the impact of slope on fire spread in a dynamic global vegetation model

Tuesday: Human–fire relationships

Keynote: S. Yoshi Maezumi, 10,000 years of Indigenous land use and cultural burning in the Amazon

Keynote: Chantelle Burton et al., Future fires and their impacts on ecosystems

Tichaona **Mukunga** et al., Impact of the inclusion of socio-economic variables on data-driven models in predicting global fire ignition occurrences

Lysander **Rohringer** et al., Insights into forest recovery processes after a wildfire in Brandenburg based on Sentinel-2 imagery

Alicja **Bonk** et al., Human activity as the main driver of forest fires in northeast Poland over the last 1,750 years

Sambor **Czerwiński** et al., Fire activity, climatic and anthropogenic drivers of peatland's development during the last millennium, based on the high-resolution palaeoecological records in Western Siberia - preliminary results

Chéima **Barhoumi** et al., Holocene fire activity, vegetation dynamics and human practices in the Orkhon Valley (Mongolia)

Julia **Unkelbach** & Hermann Behling, Reconstruction of Mongolian fire history based on high-resolution multi-site macro charcoal analyses

Michał **Słowiński** et al., The last 1000 years peat record of fire regime in Northeastern Mongolia

Wednesday: PYROPHOB-Fieldtrip

Keynote: Jeanette S. Blumröder et al., Strategies for developing pyrophobic and climate resilient forests at burned areas: The PYROPHOB Project

Thursday: Post-fire impacts on terrestrial landscapes

Keynote: Tercia Strydom et al., Fire effects on soil properties in a large African conservation area

Keynote: Sander Veraverbeke et al., Climate-fire feedbacks in arctic-boreal regions

Maik **Billing** et al., How does nitrogen limitation affect fire regimes in a dynamic global vegetation model?

Stefan **Doerr** et al., Savanna fires, pyrogenic carbon and the global carbon cycle: are we moving in the right direction?

Jhenkhar **Mallikarjun** et al., Nutrient stock recovery during post-fire vegetation succession in humid temperate and Mediterranean ecosystems

Nicasio T. **Jiménez-Morillo** et al., Molecular biomarkers surrogated to water repellency in burned soils

Gabriel **Sigmund** et al., Possible effects of wildfire derived pyrogenic materials on river functioning

Julia **Unkelbach** et al., Holocene vegetation reconstruction in the forest-steppe of Mongolia based on leaf waxes and macro-charcoals in soils

Shudong **Zhang** et al., Experimental evidence that leaf litter decomposability and flammability are decoupled across species

Margarida **Soares** et al., Microbial growth and soil respiration after a boreal wildfire: impact of fire severity and post-fire management

Simon P. K. **Bowring** et al., Pyrogenic carbon decomposition critical to resolving fire's role in the Earth system

Thursday: Human fire management and fire science communication

Keynote: Pierre L. Ibisch, Forests in the 21st century and the paradigm of ecosystem functionality

Linde **Egberts** et al., Interdisciplinary approaches to wildfire risk mitigation in the historical Dutch landscape

Sanjeev **Bhardwaj** et al., Paddy Residue Burning: Linking air quality from field to space over Punjab & Haryana

Boris **Ouattara** et al, Filling Gaps in Landscape Fire Detection, Smoke and Management in Africa

Boris **Vannière** presenting **Lestienne** et al., Climate-driven Mediterranean fire hazard assessments for 2020–2100 on the light of past millennial variability

Yvonne **Boose** et al., BreezoMeter's Fire Polygons

Cristina **Santín** et al., Searching the flames: Worldwide web analysis of public interest in wildfires

Further participants

Balthasar	Cathrina	Senckenberg Deutsches Entomologisches Institut	Germany
Förster	Michael	Technische Universität Berlin	Germany
Grimm	Lennart	Alfred Wegener Institute Potsdam	Germany
Kirschner	Judith	European University Cyprus	Cyprus
Schaaf	Wolfgang	Brandenburg University of Technology	Germany

Supporters of field trip to be added