JULES Fire Module update

Chantelle Burton (Met Office) & Doug Kelley (UKCEH)
& thanks to Ol Perkins

Processed-based

INFERNO

INFERNO-Peat

HDI

Control burns

PPE

FireMIP ensemble

Burned area attribution

WHAM!

Human agency

eXplainable AI emulator

FWI/FFDI large ensemble

Machine learning

ConFLAME

Extreme fire projections & attribution

Stochastic

Prescribed Observed Burned Area

General updates

Seeking a new fire module lead

Due another fire meeting soon

JULES fire papers

Please add your own here:

https://docs.google.com/document/d/1QBLbIzKZo81WJV-HENoOzEX6y1QgxRIW2zQJ9GMRuB8/edit?usp=sharing

Including **prescribed burning** in fire modelling: A case study from the Brazilian Cerrado using the JULES-INFERNO model (Renata da Veiga et al, Pyrogeography. June 2026)

Assessing the impact of the **Human Development Index** on historical trends in the INFERNO fire model. (João Teixeira et al. ESD. Jun 2026)

Influence of simulated vs. satellite-based burned areas on modelled **terrestrial carbon fluxes** (Ermitão et al., Carbon Balance and Management Jan 2026)

Estimating **future wildfire burnt area over Greece** using the JULES-INFERNO model. (Anastasios Rovithakis et al. NHESS. Sept 2025)

Understanding drivers and biases of simulated **CO emissions** from the INFERNO fire model over South America (Maria P. Velásquez-García et al., Biogeosciences, Feb 2026)

Recognition of **Loss & Damage from wildfires is key for climate justice.** (Renata da Veiga et al, Communications Earth & Environment

State of Wildfires 2023-2026

JULES-INFERNO developments

Diagnostic burned area: Tim Stripp (Exeter) see preprint

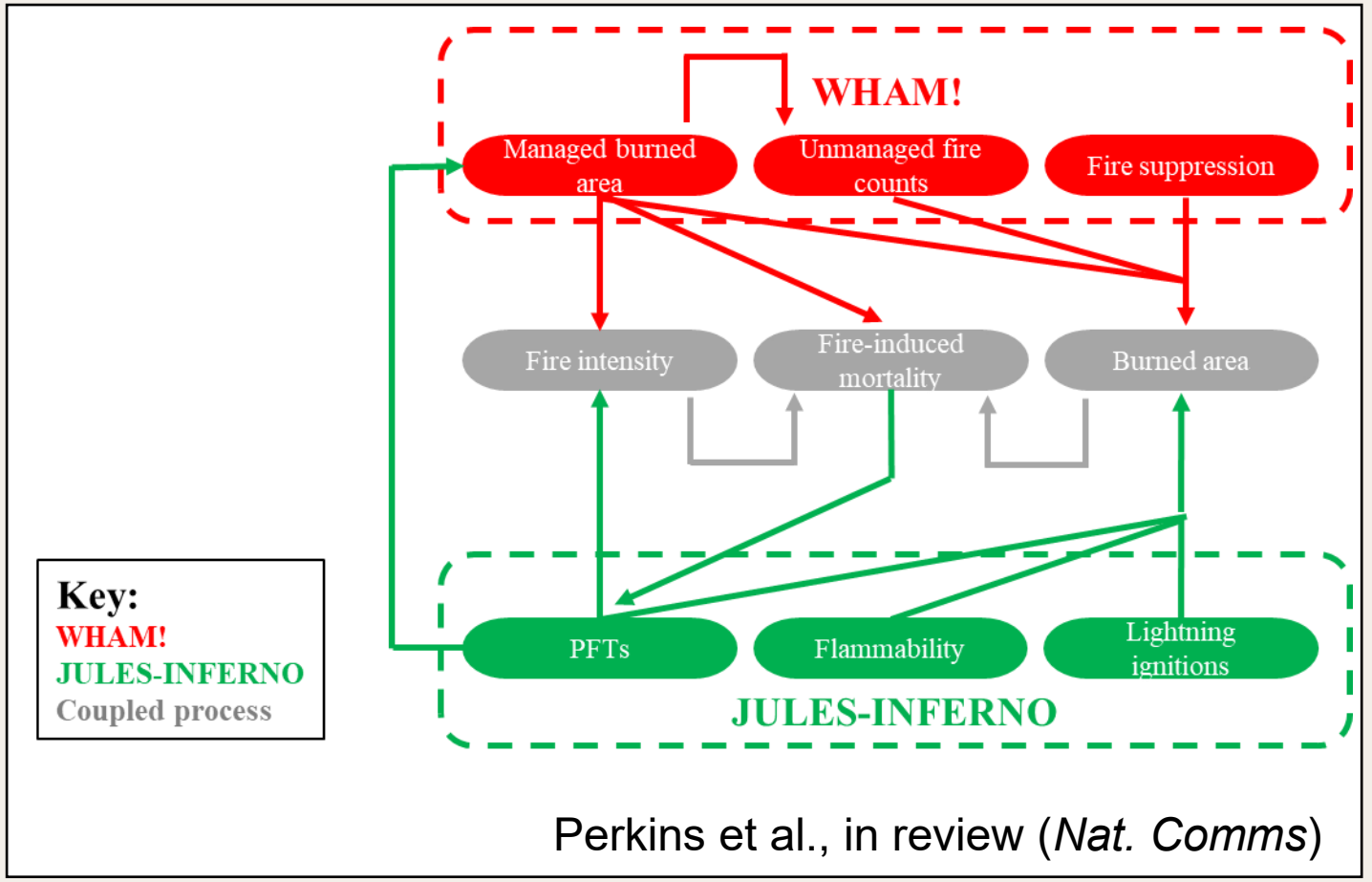
Pyrogenic carbon in the Amazon: Oscar Kennedy-Blundell (Exeter)

Peat fires: Remi Gaillard (Exeter) & Prerita Agarwal (Imperial) adding INFERNO-PEAT (developed by Katie Blackford) into JULES: **l_peat_fire** (outputs avg_ba_peat)

WHAM! agent-based model integration

University of East Anglia Norwich

- Representation of controlled human fire use & suppression
- Representation of fire intensity modulates mortality
- Coupling captures feedbacks between management, vegetation and fire
- Changes available via Github; pull request outstanding!



Perkins et al., in review (*Nat. Comms*)

Modelling adaptation potential

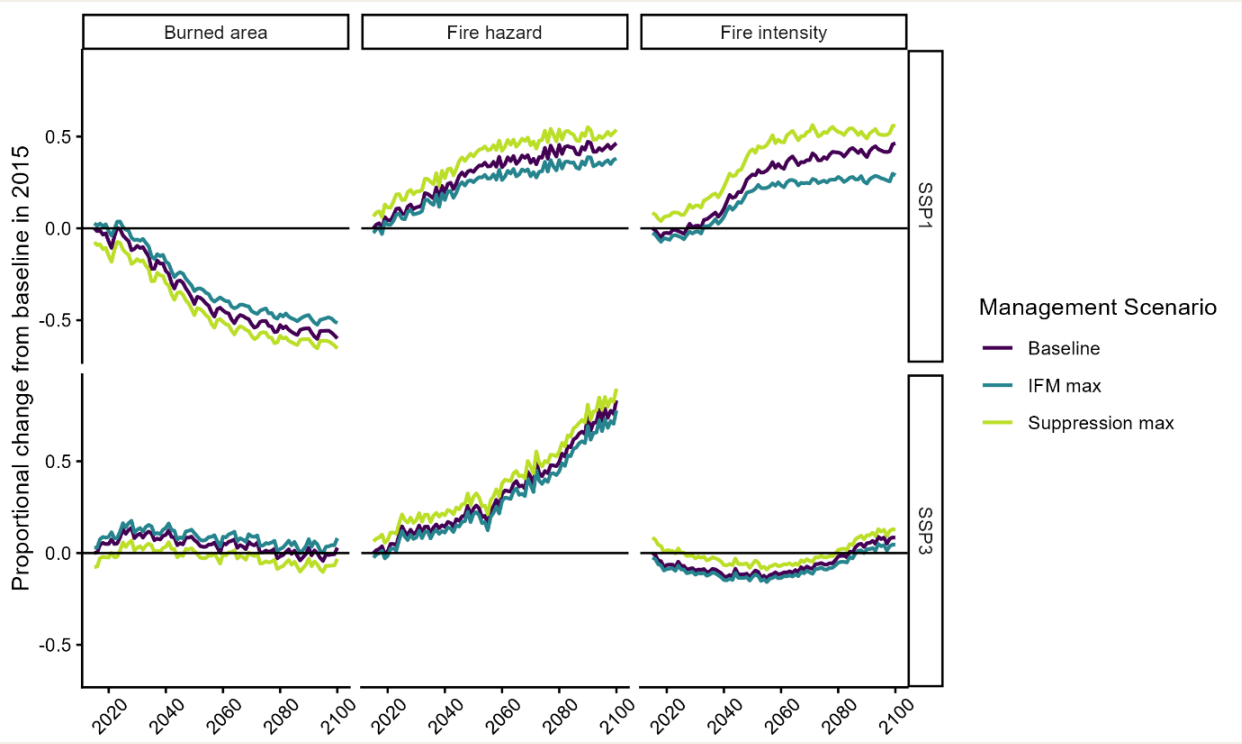
University of East Anglia Norwich

- Three different scenarios of management responses to climate change
- Changes in management lead to large intensity increases under rapid socio-economic change
- Highlights potential barriers to implementing effective controlled burning

Below: Mgmt scenarios defined with WHAM! ABM

Management scenario	Social attitude to human fire use	State-led controlled burning	Fire suppression
Baseline	Default	Default	Default
Suppression-max	Opposed	Low	High
IFM-max	Supportive	High	Default

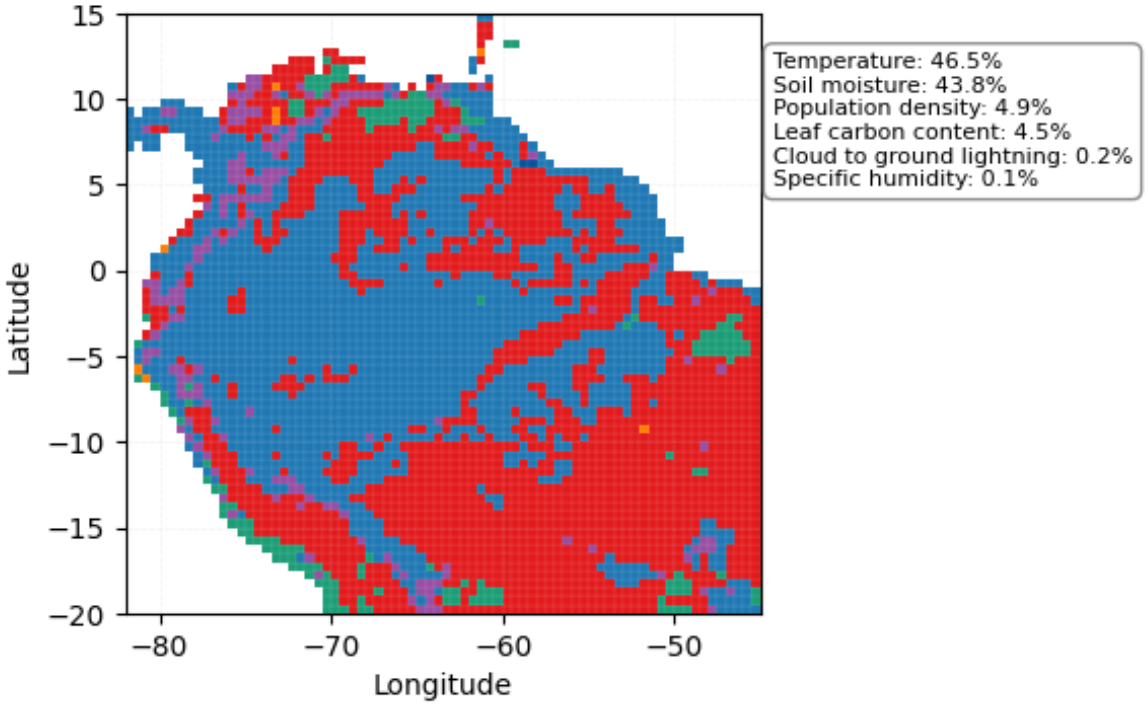
Below: Impact of alternative management on burned area, fire hazard and intensity. Hazard = intensity x flammability. IFM = integrated fire management



Perkins et al., in review (*Nat. Comms*)

Emulators and Perturbed Parameter Ensembles

- WIEMIP (Eleanor Burke) – fire & permafrost, PPE, & pulling out hard-wired parameters for further tuning
- PPE work with ISIMIP driving data (Laura Gibbs)
- JULES INFERNO Emulator (Simone Zheng)



Spatial distribution of the first dominant wildfire drivers

- This figure shows the spatial distribution of the top 1 climatic drivers for the amazon area.
- **Temperature** and **soil moisture** are two dominant climatic drivers overall which ranks first in **46.5%** and **43.8%** of the study area, respectively.

See poster tomorrow

Coupled model updates

Fire now in UKESM2 prototype

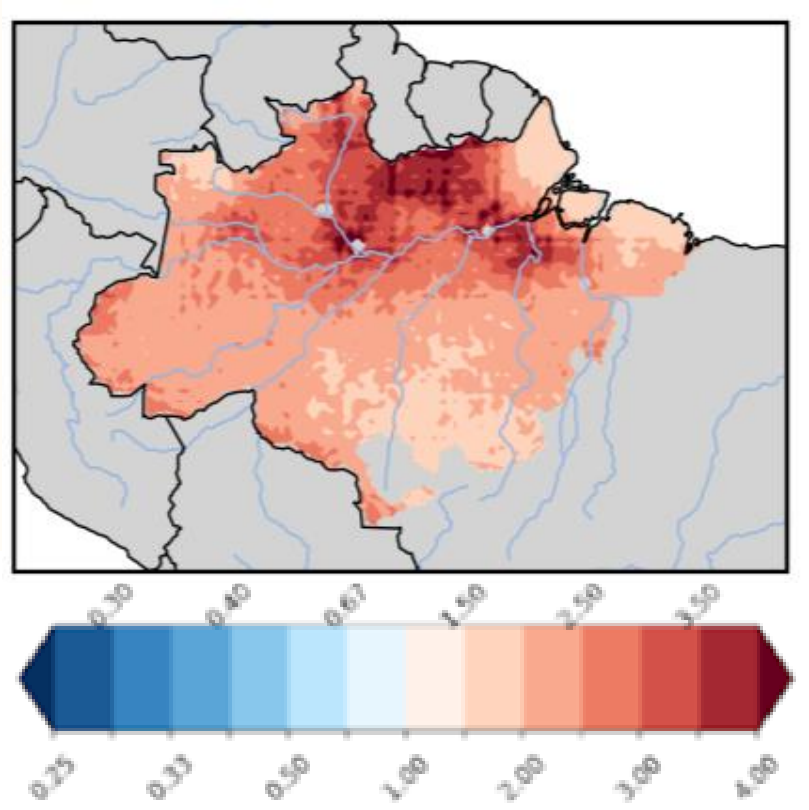
TWISTA pyrocumulus plume modelling (Ben Johnson and Jim Haywood)

BASE Wildfire Loss & Damage

Maria LF Barbosa (marbar@creh.ac.uk)

Attribution science = ConFLAME-HadGEM/-ISIMIP

Communities knowledge = observations of the season + validation of model approach



UKCEH

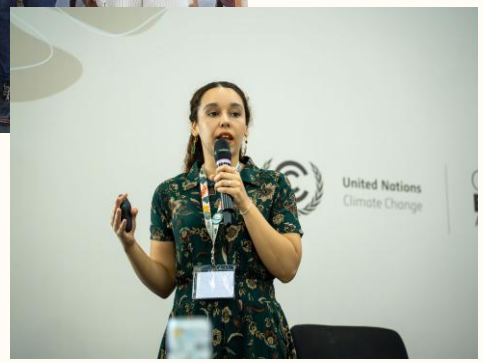
BASE
Building Approaches to fund local Solutions with climate Evidence

UK pavilion event

Wildfires: Science, Stories, and Strategies for Resilience in Amazonia

UNFCCC official side event

Building Resilience through Integrated Fire Management: Policies, Early Warning & Safeguards



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