

JULES Vegetation Module Update 2025

Becky Oliver (UKCEH), Lina Mercado (Exeter University / UKCEH), Karina Williams (Met. Office)

JULES-CNP (Lina Mercado, Alex Kurganskiy ... et. al..) Exeter University, UKCEH

Progress running JULES-CNP for the Amazon and initial evaluation with site level data.

Progress running JULES-CNP at the BiFOR FACE site – see Alex's talk – with wider regional runs planned.

JULES-sugar (Simon Jones) Exeter University

JULES-sugar improves seasonal growth dynamics at the BiFOR FACE site. Evaluation using tree ring data

JULES Vegetation Module Update 2025

OptFor-EU (Karina Williams) Met. Office
(<https://optforeu.eu>): OPTimising FORest management decisions for a low-carbon, climate resilient future in Europe

The project aims to support decisions for EU forestry that increase the capacity of forests to mitigate and adapt to climate change.

JULES-crop (Lirong You)

Developing a better response to high temperatures for wheat with JULES-crop.

SMART DECISIONS FOR SUSTAINABLE FOREST MANAGEMENT

The 4-year project 'OPTimising FORest management decisions for a low-carbon, climate resilient future in Europe' (OptFor-EU) will support EU forests in their capacity to mitigate and adapt to climate change. How? From science to practice, with a user-centred Decision Support System (DSS) assisting decision-making. OptFor-EU will work on management practices, ecosystem service provision and CO₂ sink provided by forests, enhancing forest resilience and its capacities to mitigate climate change.

PARTNERS

OptFor-EU builds on state-of-the-art datasets, modelling outputs and integrated solutions to **co-develop with forest stakeholders the first DSS providing suitable climate adaptation and mitigation options** for science-based optimising forest ecosystem services across Europe.

The DSS will enable European forest stakeholders to **get an enhanced understanding of potential changes in forest processes, ecosystem services, vulnerabilities, costs, and adaptive capacities** for a range of forest management practices, and socioeconomic and climate scenarios, and to select management practices most appropriate to achieve their goals, including:

- mitigating and adapting to climate change
- maintaining and increasing biodiversity
- boosting circular forest economy
- adopting Nature Based Solutions
- integrating socio-economic considerations and
- forest protection and restoration, through afforestation and reforestation.

OVER 400 forest practice stakeholders to be engaged

16 partners from **9** countries

24 workshops

1 summer school

STAY IN TOUCH!

www.optforeu.eu
contact@optforeu.eu
[@OptForEU](https://www.instagram.com/OptForEU)

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JULES Vegetation Module Update 2025

CARMINE (Debbie Hemming, Steffi Urhausen) Met. Office

(<https://carmine-project.eu/>) : **Climate-Resilient Development Pathways in Metropolitan Regions of Europe**

1. Understand if tree cover can improve the resilience to climate hazards (e.g. surface water flooding and high surface temperature).
2. UK case study on Birmingham.
3. Developing a digital twin.



CARMINE

Climate-Resilient Development Pathways in Metropolitan Regions of Europe



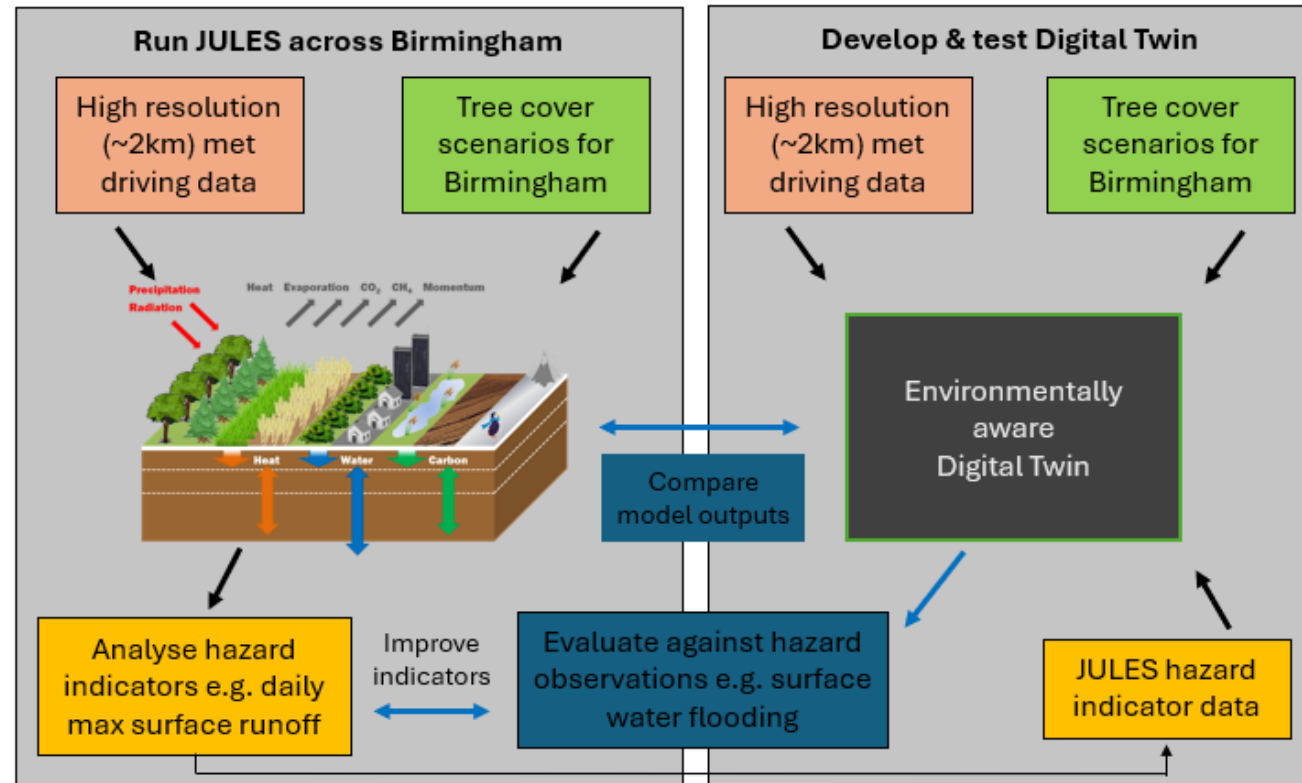
UK Case Study: Birmingham urban area

Birmingham University & Met Office

Question:

Can tree cover improve the resilience of Birmingham to climate hazards?

- Priority hazards:
 - surface water flooding
 - high surface temperature
- Process modelling using JULES & development of Digital Twin models



JULES Vegetation Module Update 2025

Urban trees (Sophia Cunningham) Sheffield University

Measuring traits in urban tree species to parameterise urban tree PFTs in JULES. Regional runs under future climate scenarios to explore trade-off between water-use and carbon sequestration.

Light acclimation (Xuan Gui) National University of Singapore / UKCEH

Assessing the impact of light acclimation of photosynthesis on the global carbon cycle using the JULES-ES-ISIMP suite.

Variation of photosynthetic capacity and respiration

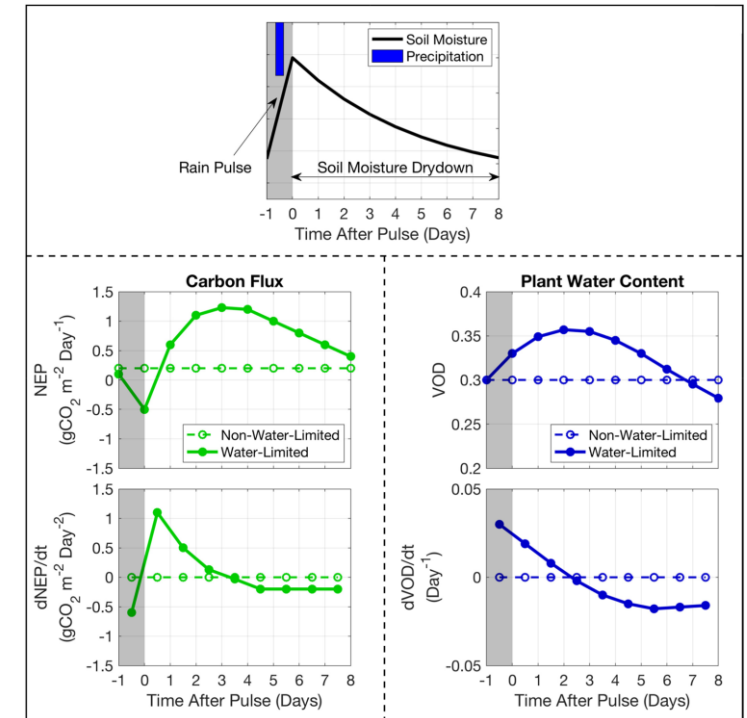
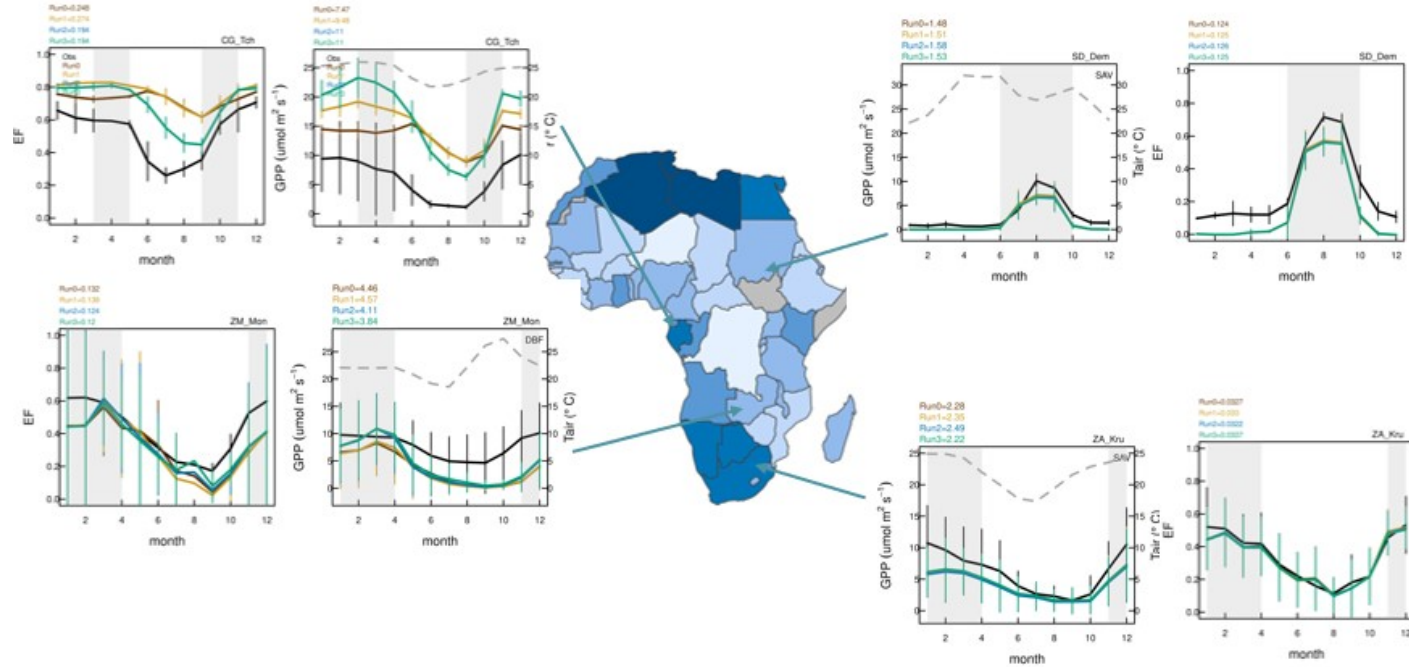
(Phil Harris, Becky Oliver, Lina Mercado...) UKCEH, Exeter University

Photosynthetic capacity parameters V_{cmax} and J_{max} vary with time of day, not just temperature. Bruhn et al., (2022) also show that nocturnal respiration also varies through the night independent of temperature. We are doing work to implement these processes into JULES to assess the impact of these circadian rhythms on modelled carbon stores using the ISIMIP suite.

JULES Vegetation Module Update 2025

JULES at African Savanna ecosystems(Becky Oliver, Eleanor Blyth...) UKCEH

Using JULES to simulate African savanna ecosystems at flux tower sites. We'll evaluate the model by looking at the behaviour of GPP in response to dry-drown events.



Water Resources Research

Research Article [Open Access](#) [CC BY](#)

Landscape-Scale Plant Water Content and Carbon Flux Behavior Following Moisture Pulses: From Dryland to Mesic Environments

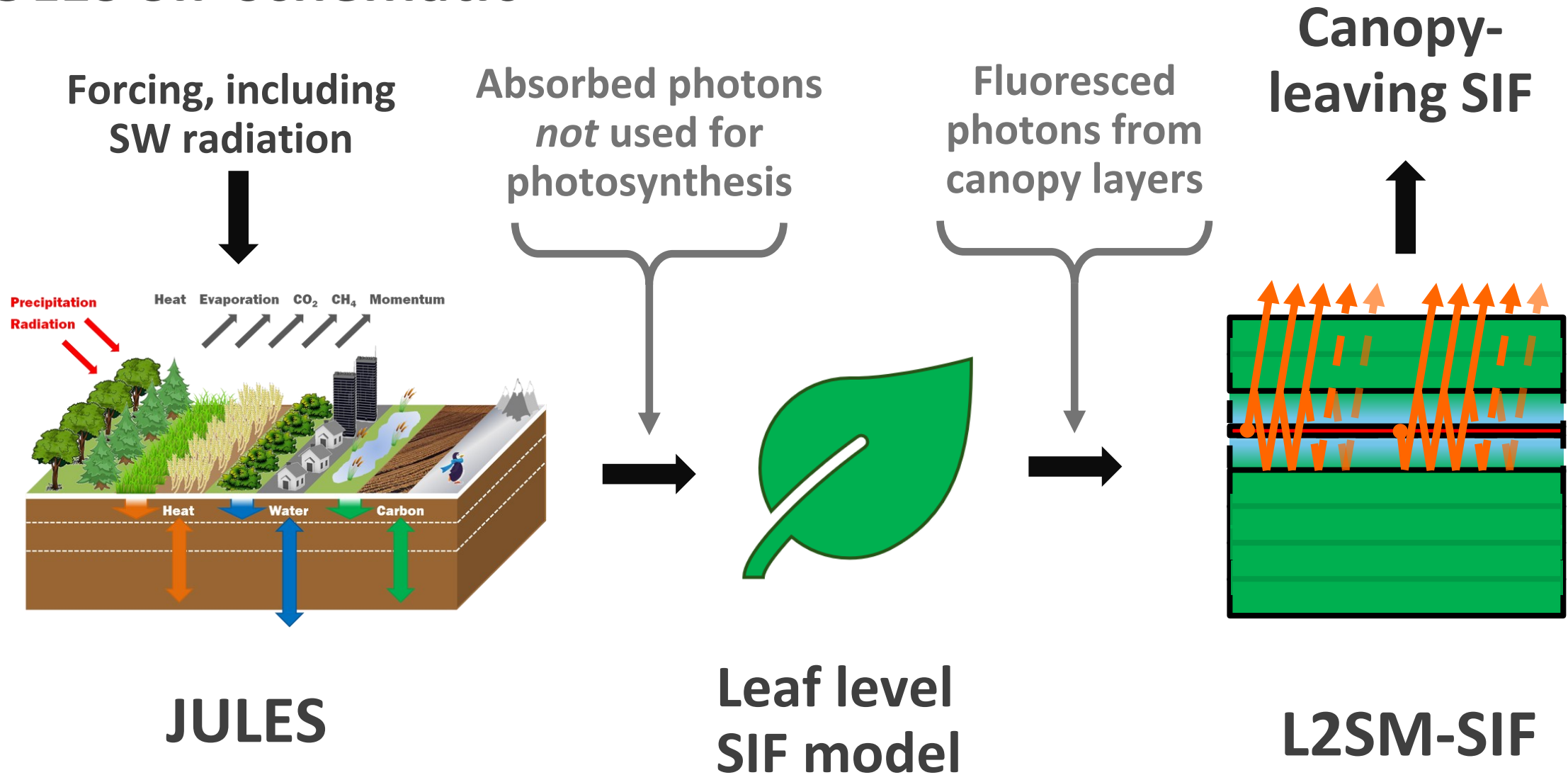
Andrew F. Feldman Apisada Chulakadabba, Daniel J. Short Gianotti, Dara Entekhabi

JULES Vegetation Module Update 2025

JULES-SIF (Tristan Quaife, Natalie Douglas, Patrick McGuire) University of Reading NCEO/NCAS

1. JULES-SIF predicts canopy-leaving chlorophyll fluorescence from plants – closely related to GPP.
2. Can make predictions at arbitrary wavelengths to simulate different satellite missions
3. Results submitted to SIFMIP
4. Uses a modified version of JULES that has new diagnostics *per canopy layer*
 1. SIF calculations then done off-line
 2. Have started process of getting the new diagnostics into the trunk
5. We have also been involved in implementing the same approach in BETHY (published) and QUINCY (in-prep)

JULES SIF schematic



JULES-SIF Global outputs (June 2016)

