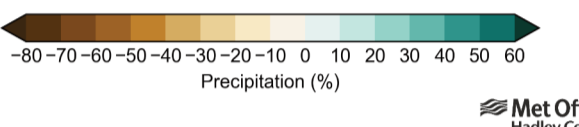
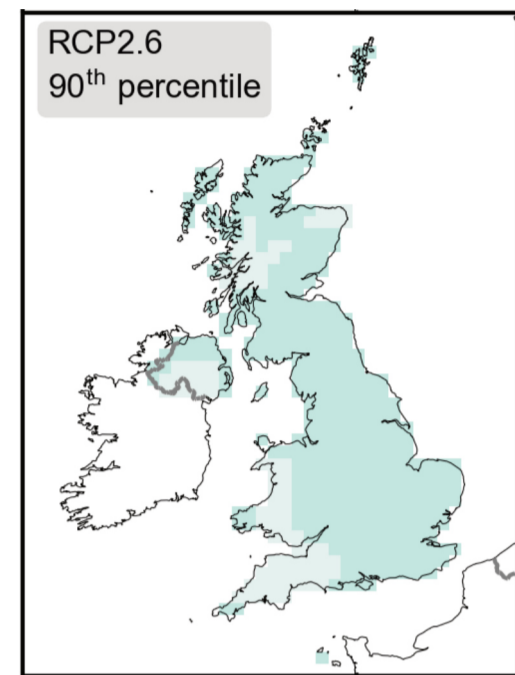


Impacts of altered precipitation on forest soil microbial structure and function

Katy J. Faulkner^[1], Sally Hilton^[1], Simon Oakley^[2], Kelly Mason^[2], Niall P. McNamara^[2], Christopher J. van der Gast^[3], Sami Ullah^[4], Gary D. Bending^[1]

Summer precipitation anomaly for 2020-2039



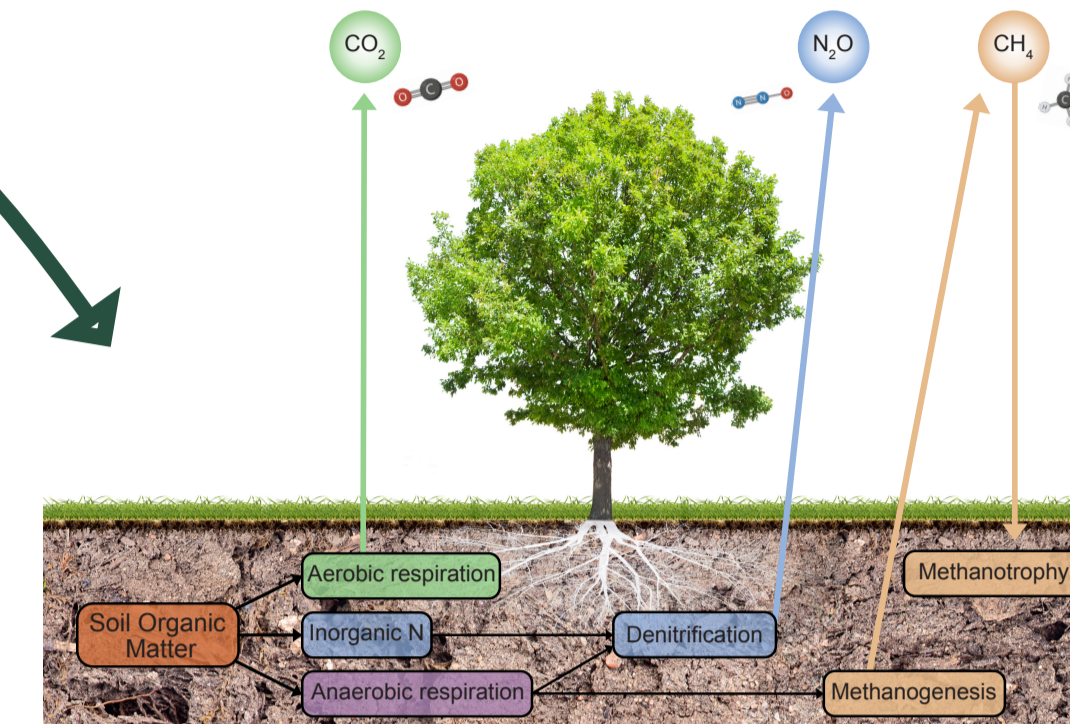
Met Office
Hockey Centre

[1] School of Life Sciences, University of Warwick, CV4 7AL [2] Centre of Ecology and Hydrology, Lancaster, LA1 4AP

[3] School of Healthcare Science, Manchester Metropolitan University, M1 5GD [4] School of Geography, Earth and Environmental Sciences, University of Birmingham, B15 2TT

Shifting precipitation patterns and increased frequency, duration and magnitude of high rainfall events

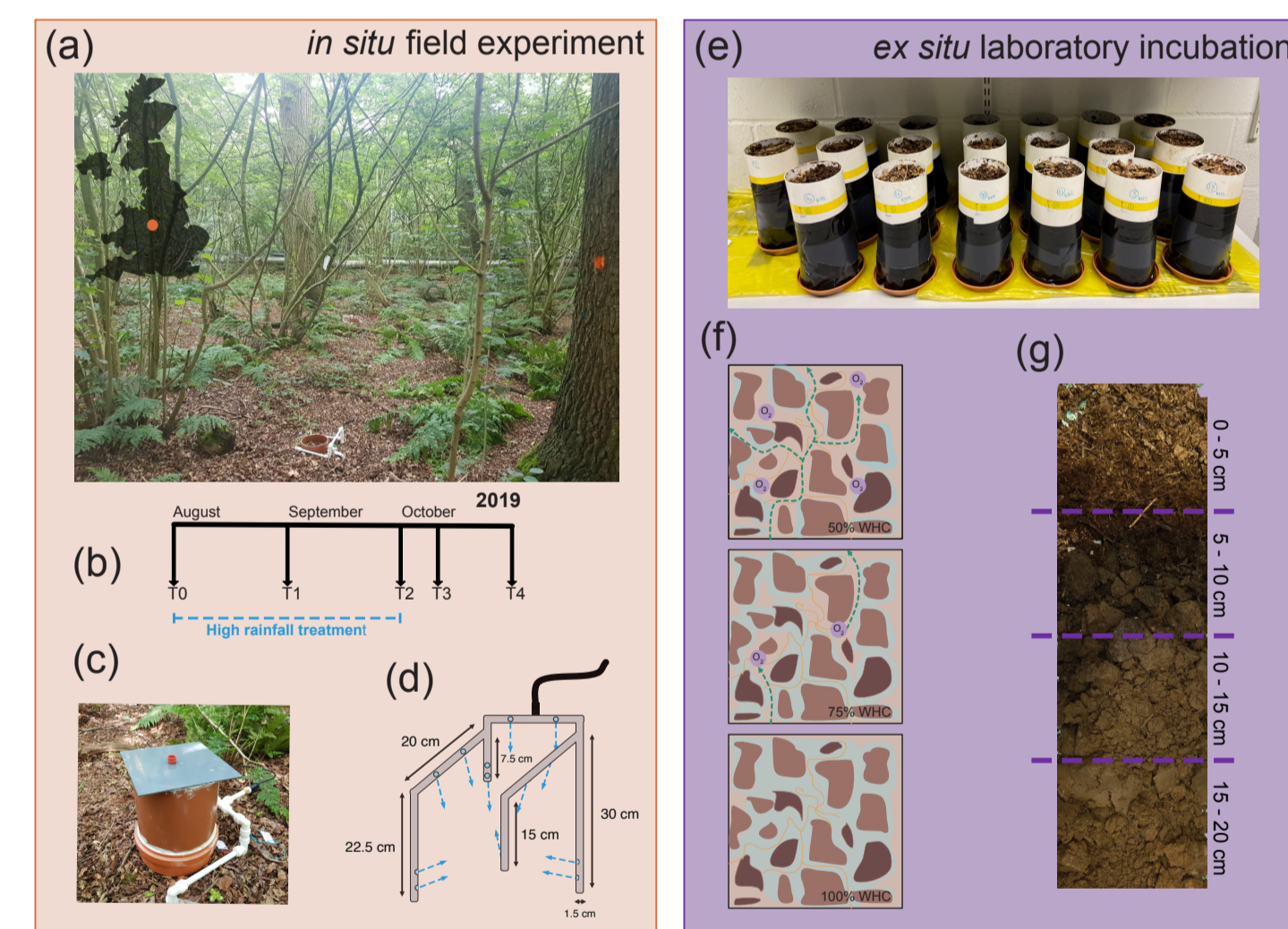
Soil moisture is a key driver of microbial processes such as decomposition, methane oxidation and denitrification



Temperate forests act as important carbon stores and sinks/sources of major greenhouse gases CO₂, CH₄ and N₂O

Aim: to investigate how forest soil-climate feedbacks, particularly those involving microbial community structure and function, could be affected by climate change

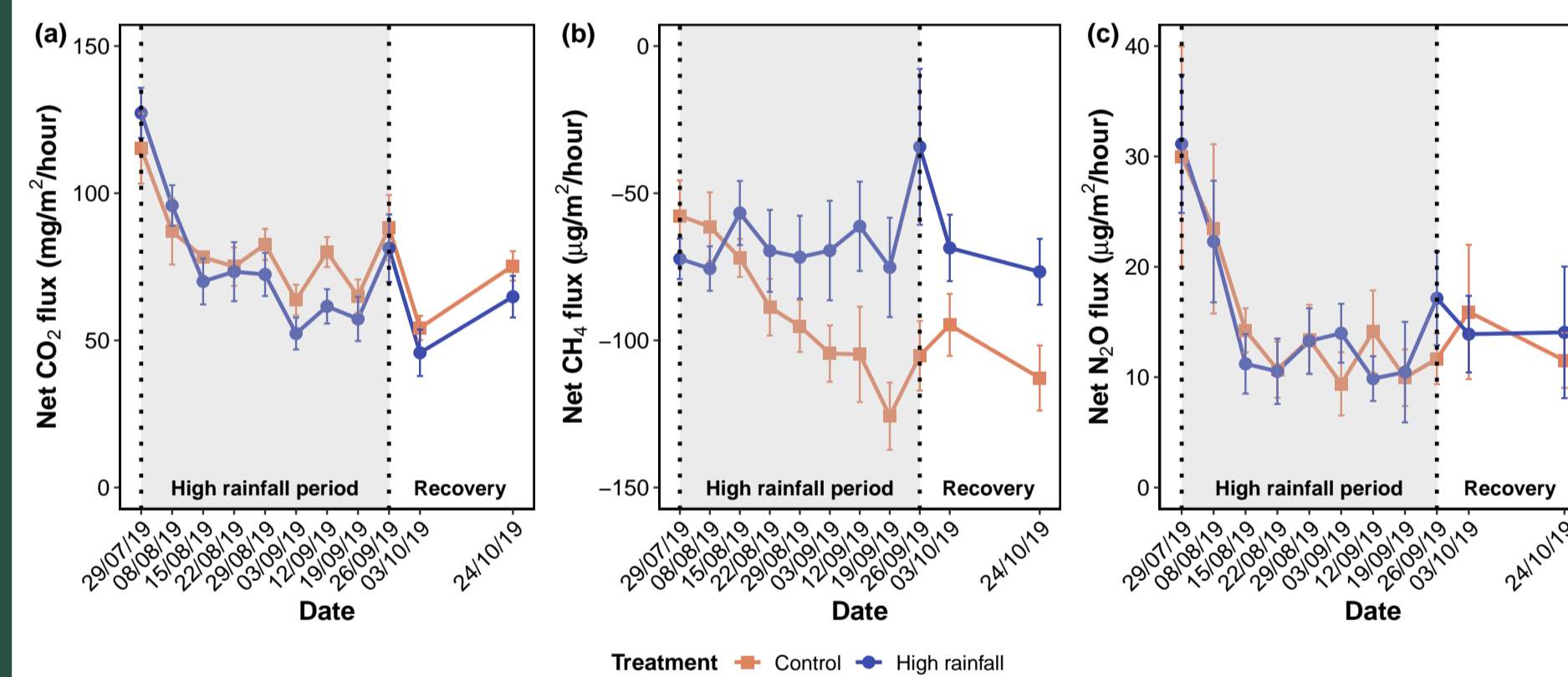
Experiment phase I: resilience of forest soil microbial structure and function to altered precipitation regimes



Temperature forest (BIFoR) *in situ* field experiment where soil moisture was increased by ~30 % compared to ambient for an 8-week period using custom-built mesocosm system (a-d).

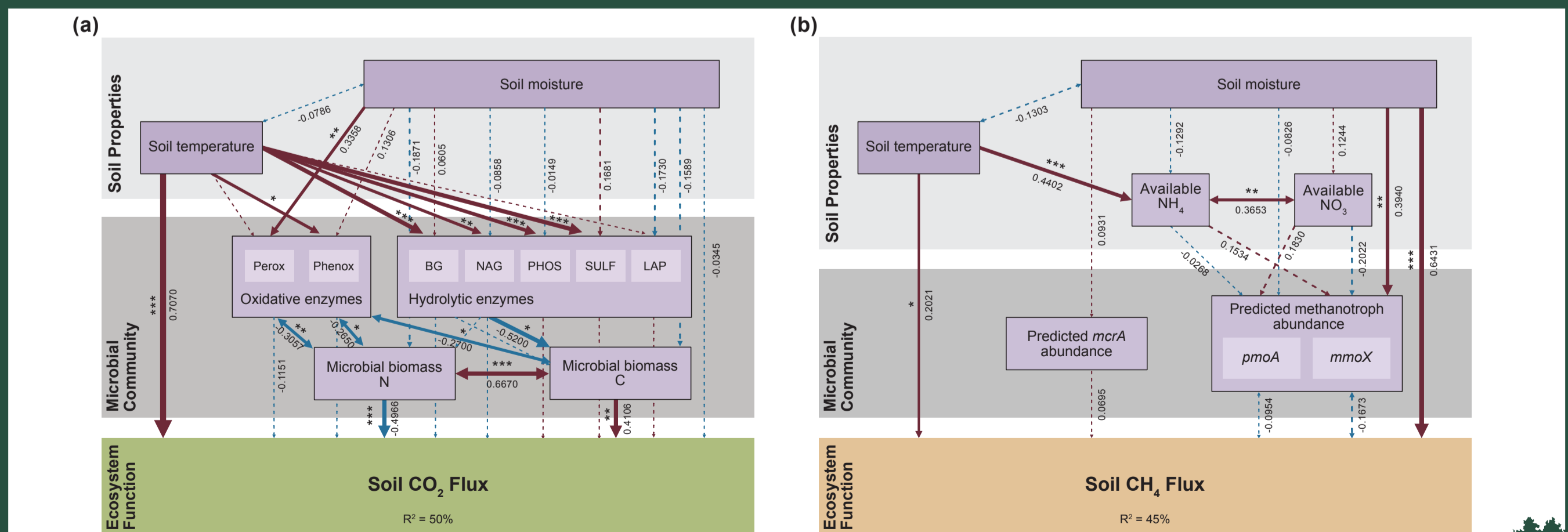
Intact soil core laboratory incubation experiment to gain mechanistic understanding of how soil moisture impacts soil function across depth (e-g).

High rainfall reduces forest soil methane sink capacity and soil carbon dioxide efflux



Soil methane sink capacity reduced by ~21-67 % during high rainfall with slow recovery
Soil CO₂ efflux reduced ~2-23 % during high rainfall
Soil N₂O flux not affected

Direct and indirect drivers of soil CO₂ and CH₄ fluxes



Experiment phase II: high rainfall under elevated CO₂

Fully factorial experiment where rainfall amount is manipulated under ambient and elevated CO₂ conditions

Impacts on microbial community structure and function within the root and soil

| Microbial community analysis | Functional analysis |
|---|--|
| Shotgun metagenomics of oak fine root and two soil horizons (organic and mineral) | Greenhouse gas fluxes Plant available nutrients |
| Microbial biomass | Extracellular enzyme activities |

