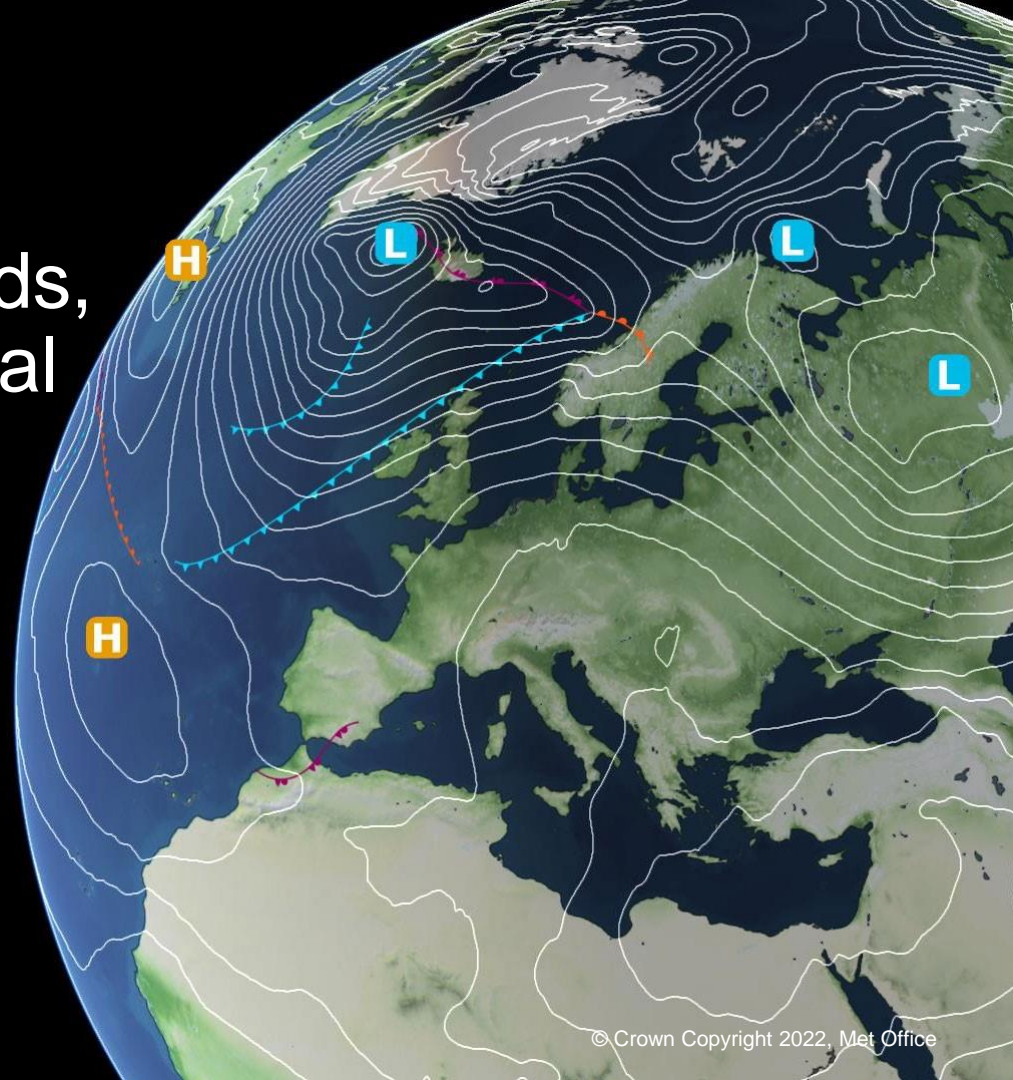


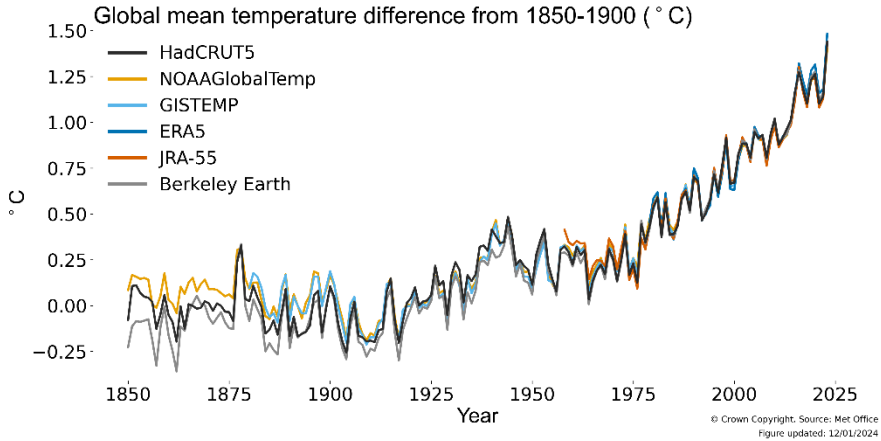
Climate Risks: global trends, scenarios, and the potential impacts

Professor Jason A. Lowe OBE
Met Office and University of Leeds
8th May 2024



Global temperatures have risen by $\sim 1.25^{\circ}\text{C}$

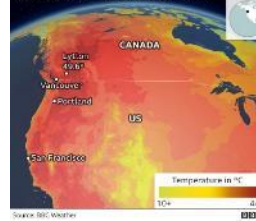
 Met Office



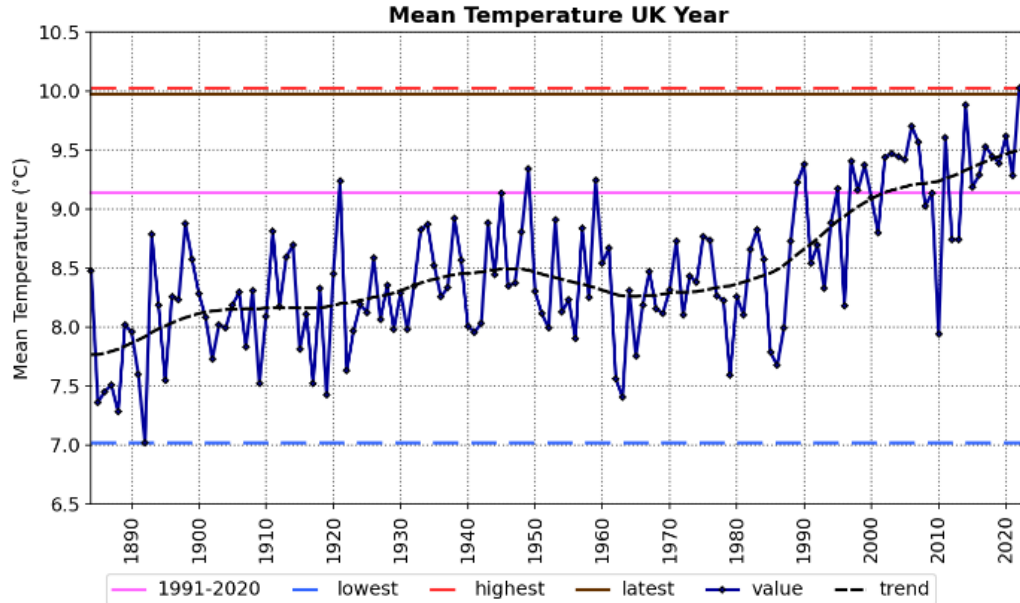
2023 was warmest year on record and 10th year in succession that has equalled or exceeded 1.0°C above the pre-industrial period.



Temperatures in Canada and north-west US reached record highs on 29 June

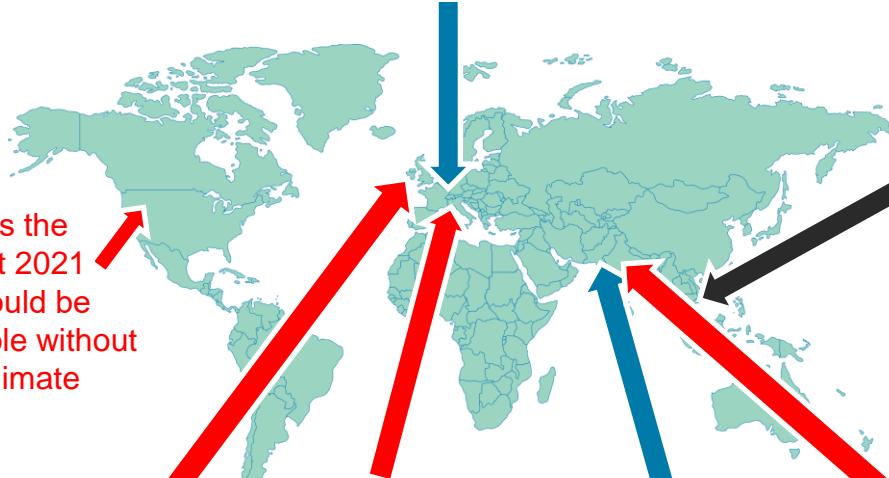


UK Climate in 2023



- 2023 is the **second warmest year for the UK** according to mean temperature.
- It was the **hottest June on record** for the UK, and the joint-hottest September.
- UK saw 11% more rain than average.
- **England had its sixth wettest year on record** (series from 1836), with 1045.4mm, or 20% more than average.

“Climate change increased the intensity of the maximum 1-day rainfall event in the 2021 summer season... by about 3 – 19% compared to a global climate 1.2 °C cooler than today”. WWA



“An event such as the Pacific Northwest 2021 heatwave would be virtually impossible without human-caused climate change”. WWA

“Both the Met Office and WWA studies found that human-caused climate change has made the chance of 40°C in the UK about ten times more likely when compared with the pre-industrial climate.”

“Without human induced climate change... maximum heat like in July 2023 would have been virtually impossible to occur in Southern Europe.” WWA

“Climate change likely increased extreme monsoon rainfall, flooding highly vulnerable communities in Pakistan in 2022”. WWA

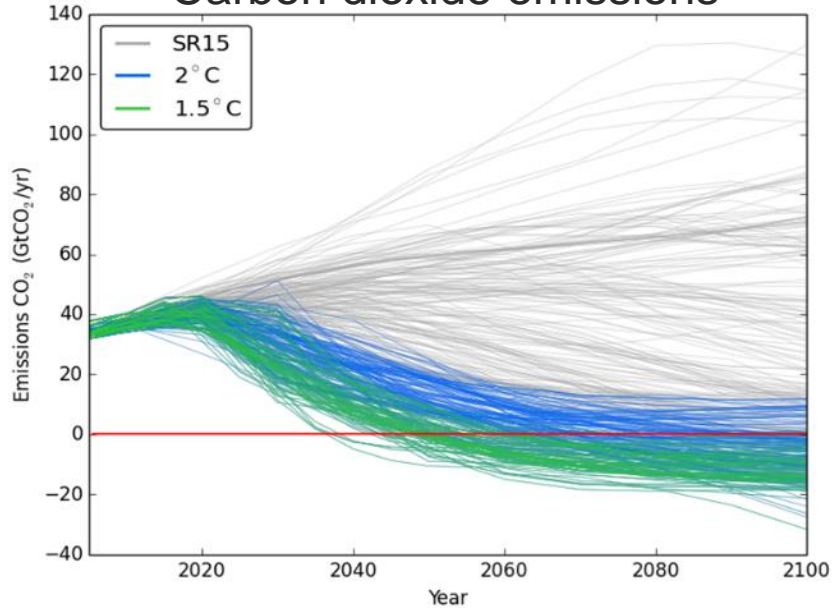
“The chances of a record-breaking heatwave, like that in 2022, in north-west India and Pakistan has been made over 100 times more likely because of climate change says a Met Office study”

“In October 2020, Vietnam was greatly affected by several heavy rainfall events occurring sequentially during the month. Combining results from models and observations, we find no significant evidence that human-caused climate change has changed the probability or intensity of the 2020 event”. WWA

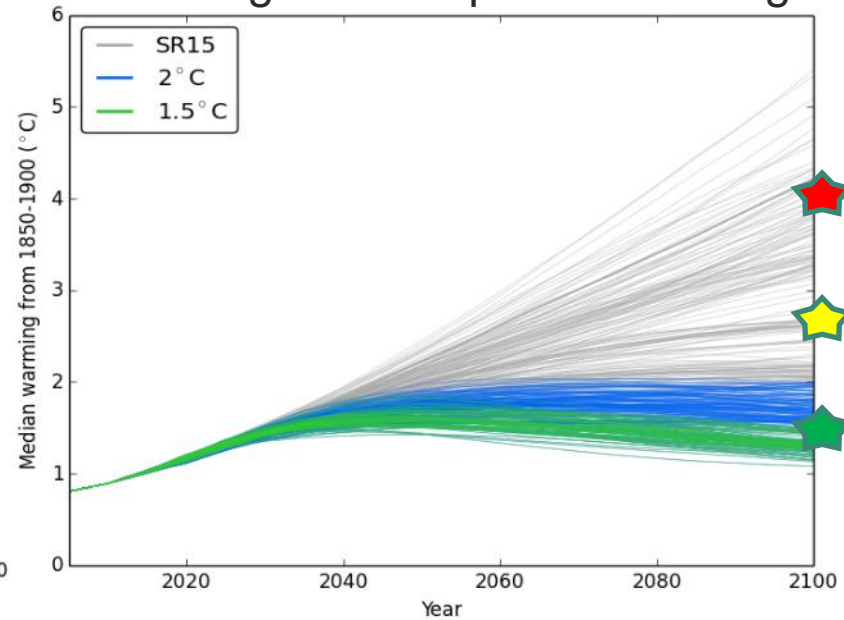
The amount of future climate change depends on future emissions.....



Carbon dioxide emissions

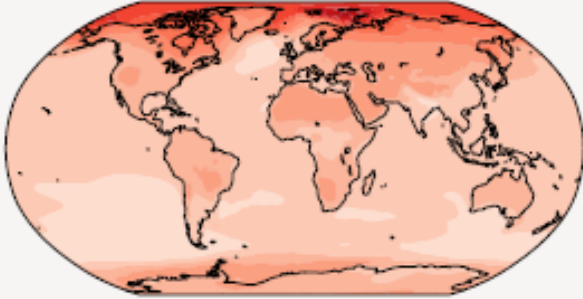


Median global temperature change

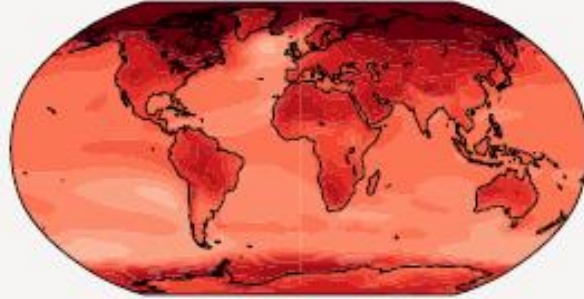


Warming and rainfall change will not be the same everywhere

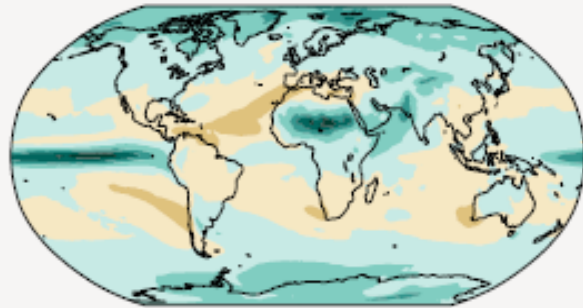
Simulated change at 1.5 °C global warming



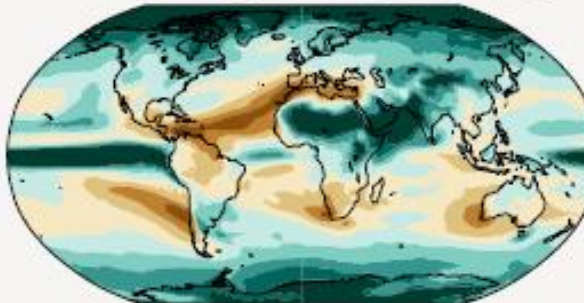
Simulated change at 4 °C global warming



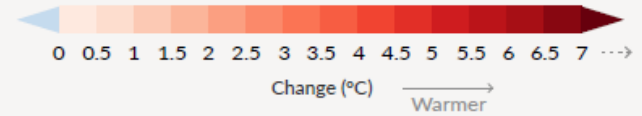
Simulated change at 1.5 °C global warming



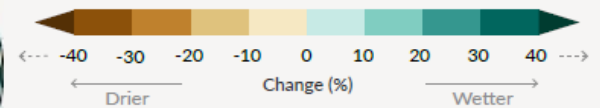
Simulated change at 4 °C global warming



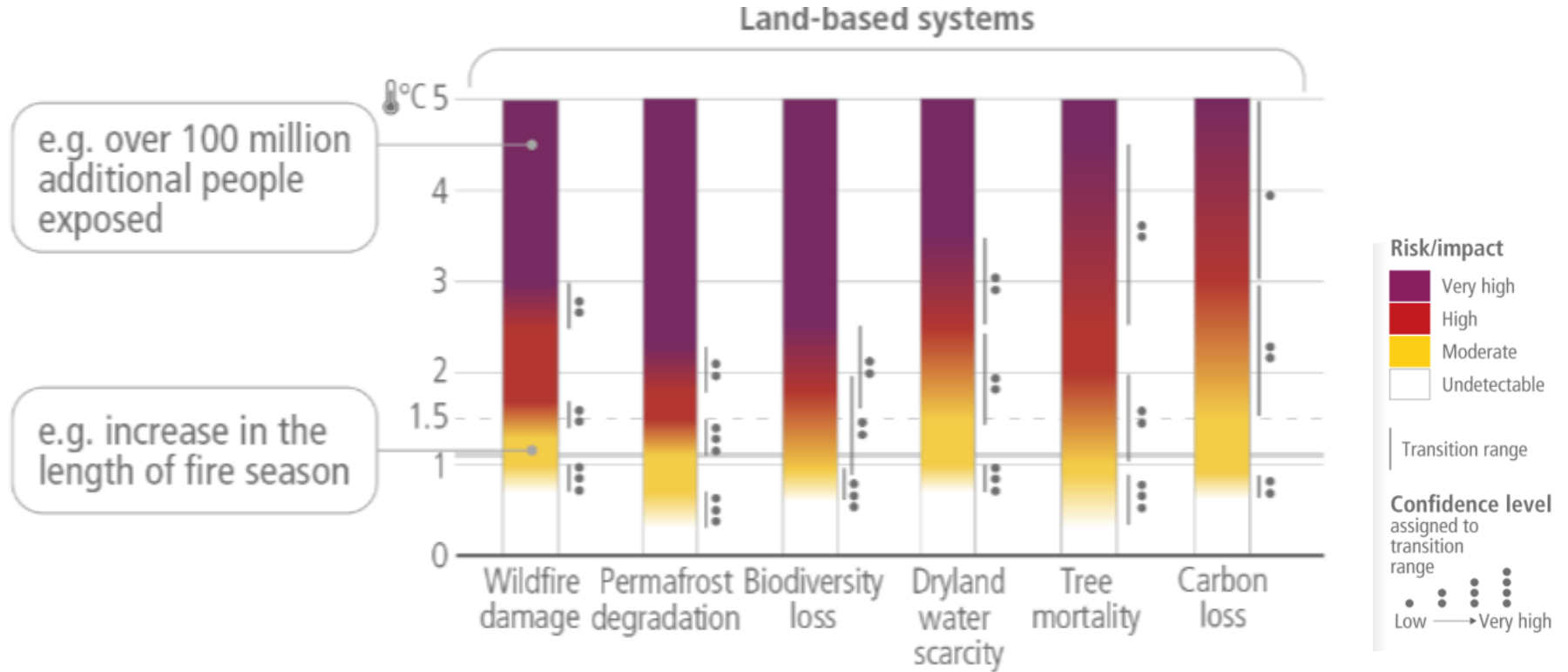
b) Annual mean temperature change (°C) relative to 1850-1900



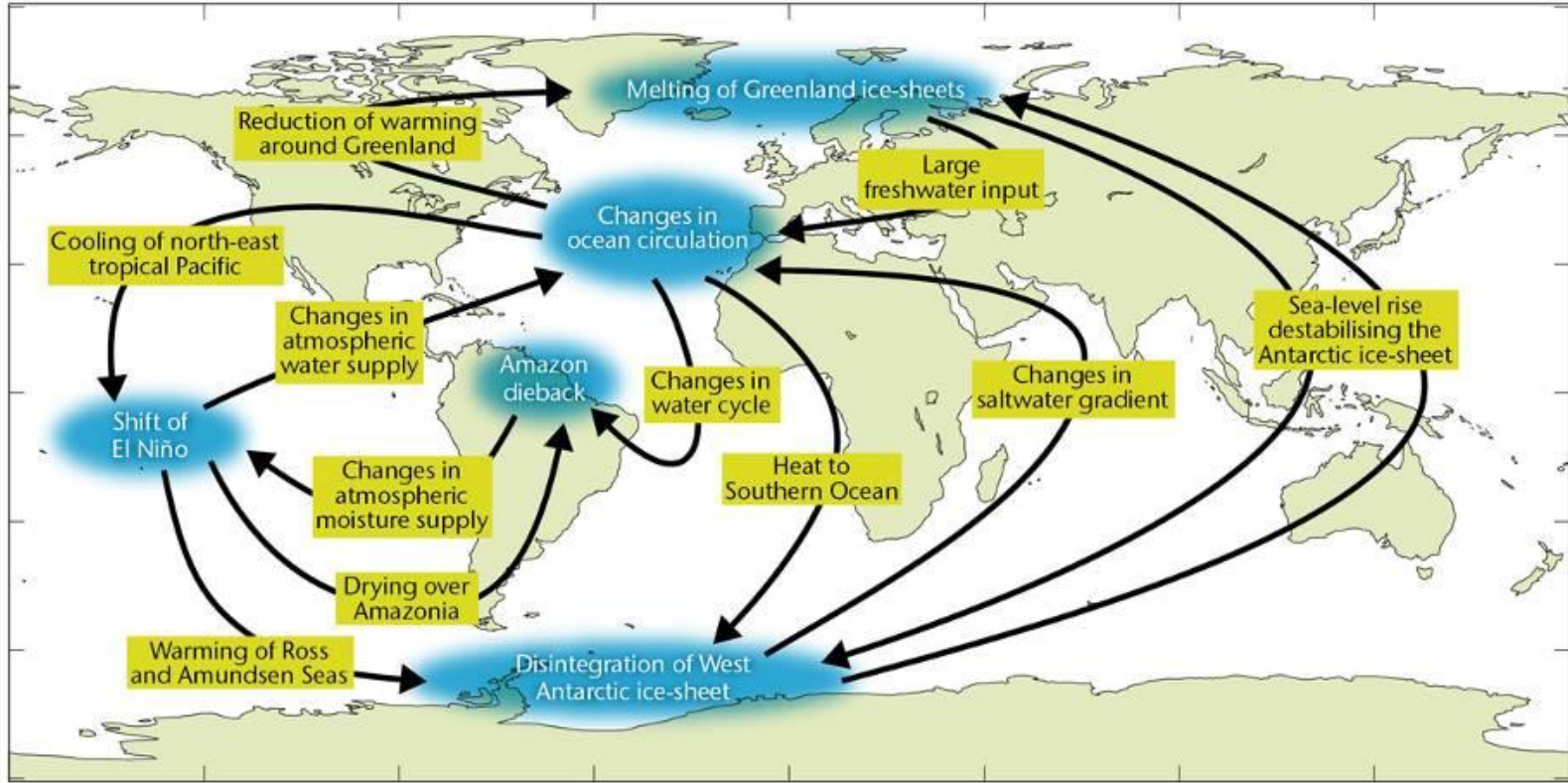
c) Annual mean precipitation change (%) relative to 1850-1900



Quantifying dangerous climate change



Tipping points and interactions between large-scale system changes

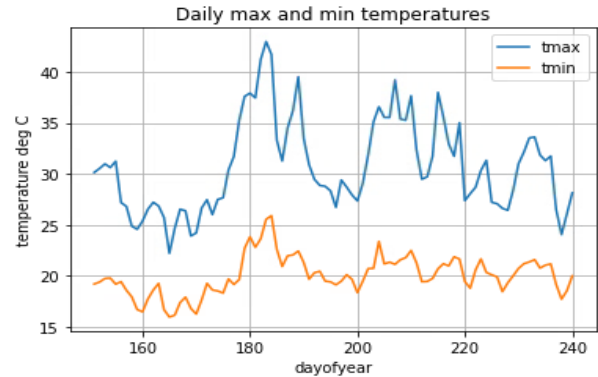
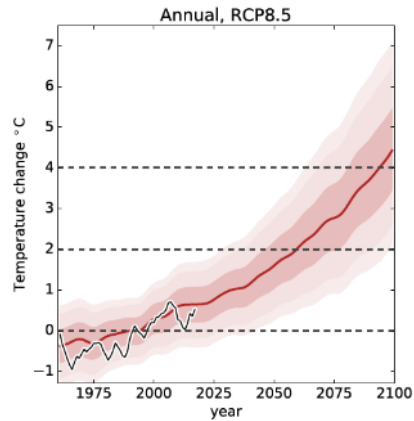
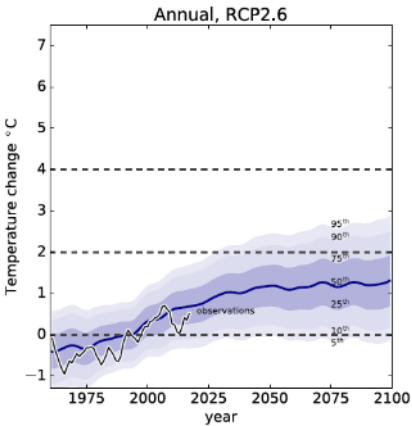


Focusing in on the UK:

“a greater chance of warmer, wetter winters and hotter, drier summers”

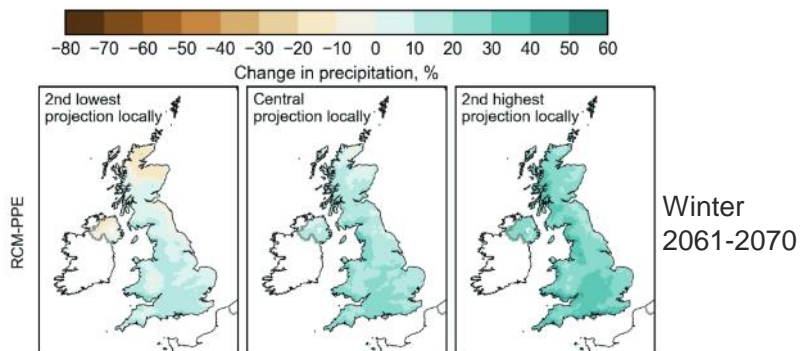
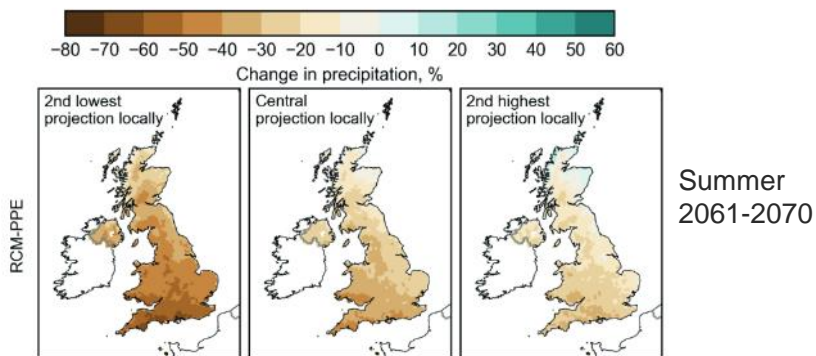


Future UK temperature change

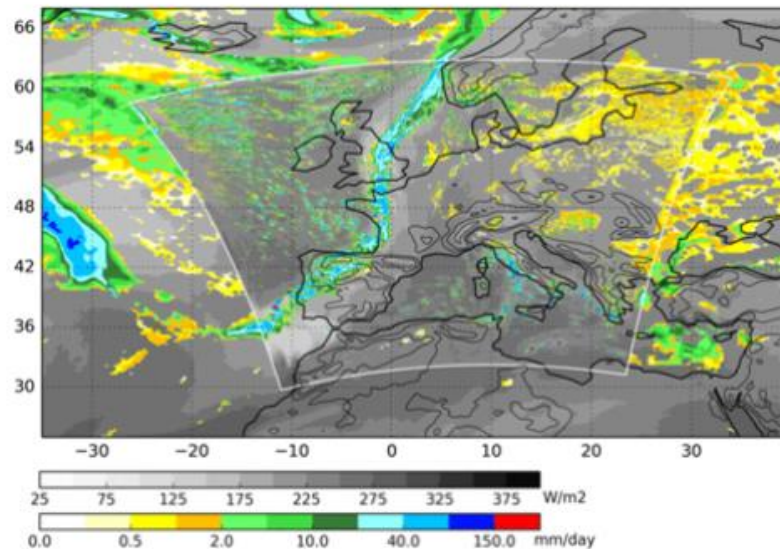


During the next 2 decades, we expect to see more very hot days the UK.

Future UK precipitation change

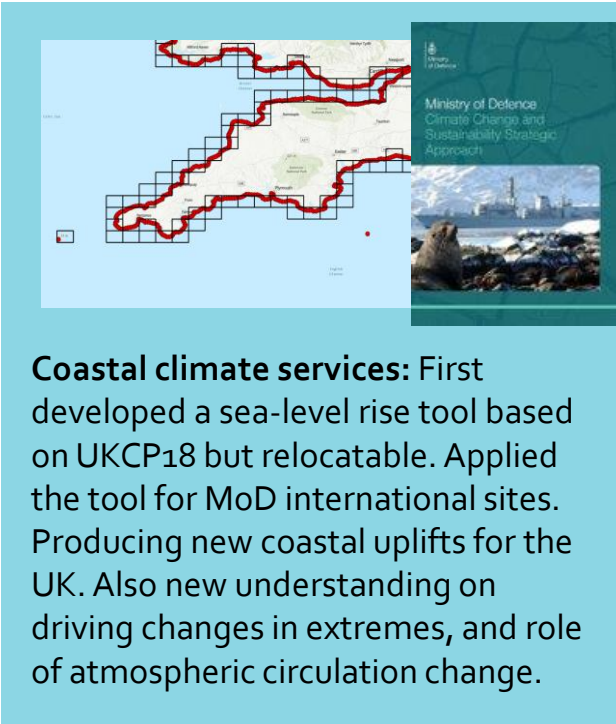
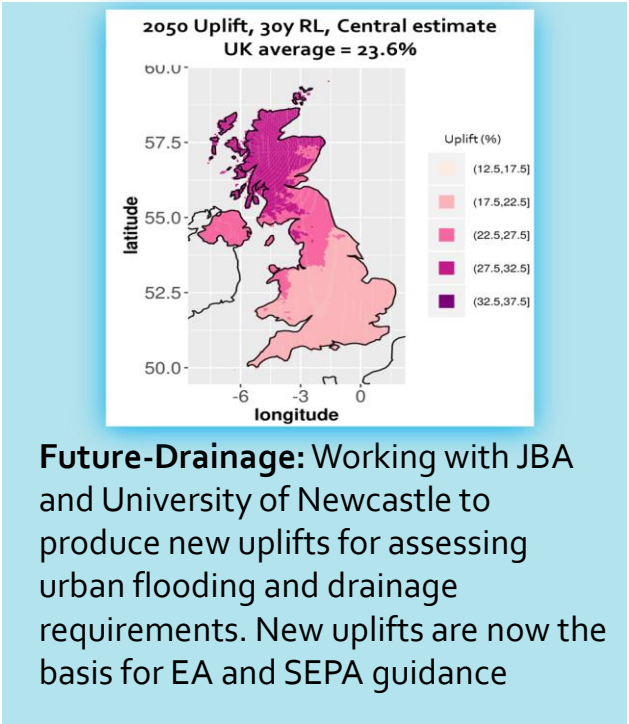
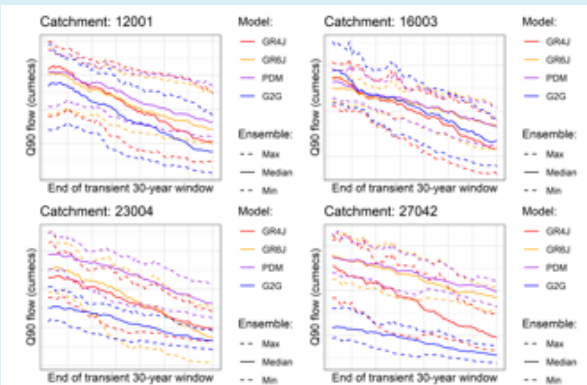


UKCP Local (2.2km) projections



The rainfall associated with a 2-year return period increases by 29% by 2070s

Local scale impacts of climate variability and change

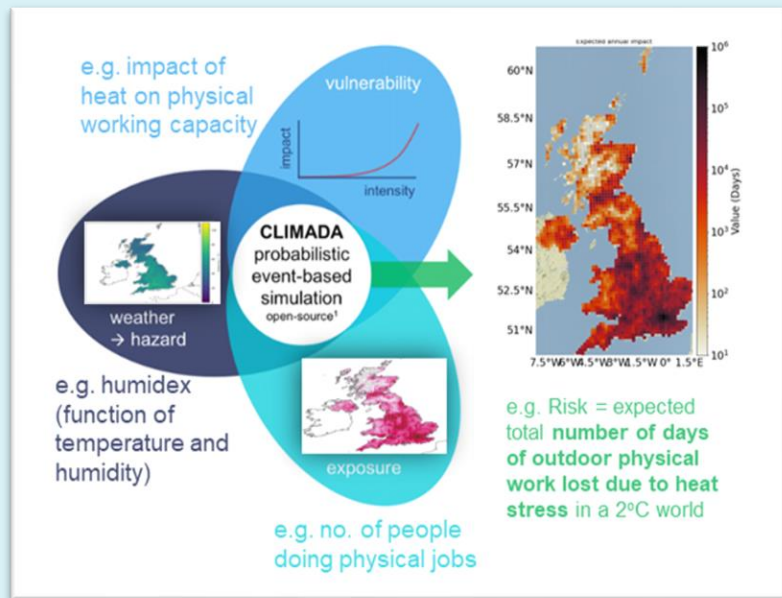


EFLAG: A UKCEH led project combining climate modelling with river and ground water modelling. For 1983-2079 period the transient low flows are projected to decrease in most catchments during the 21st century

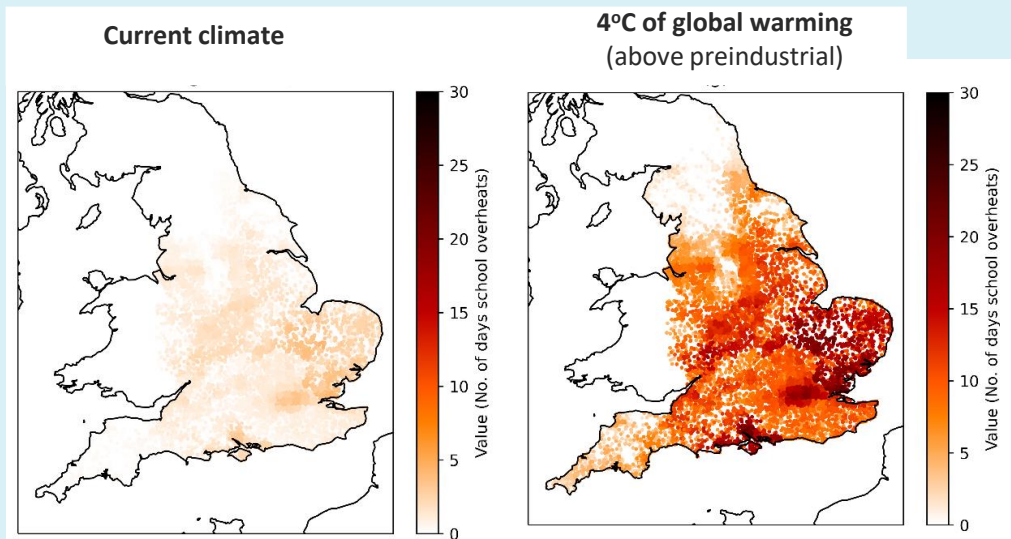
Future-Drainage: Working with JBA and University of Newcastle to produce new uplifts for assessing urban flooding and drainage requirements. New uplifts are now the basis for EA and SEPA guidance

Coastal climate services: First developed a sea-level rise tool based on UKCP18 but relocatable. Applied the tool for MoD international sites. Producing new coastal uplifts for the UK. Also new understanding on driving changes in extremes, and role of atmospheric circulation change.

Local scale impacts of climate variability and change



Risk assessment of overheating in schools



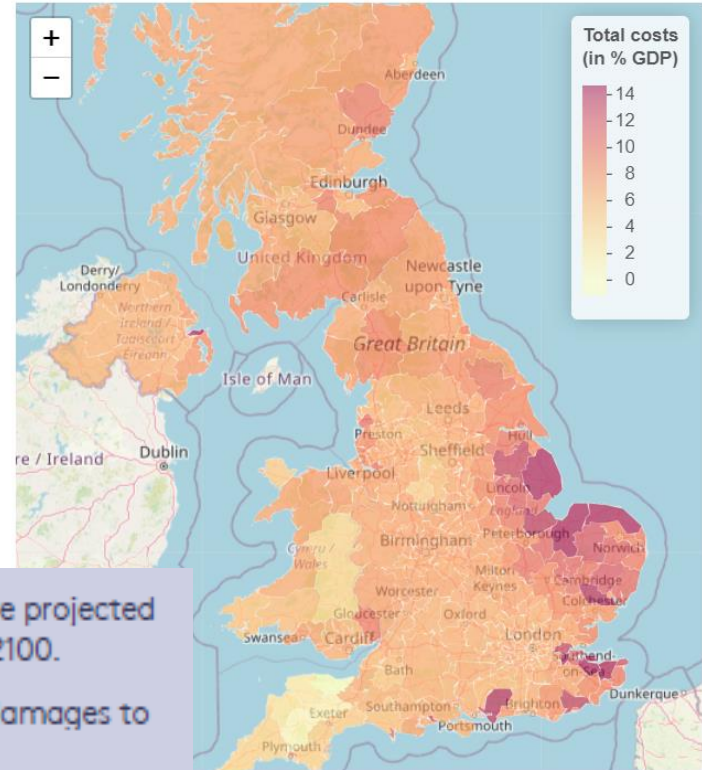
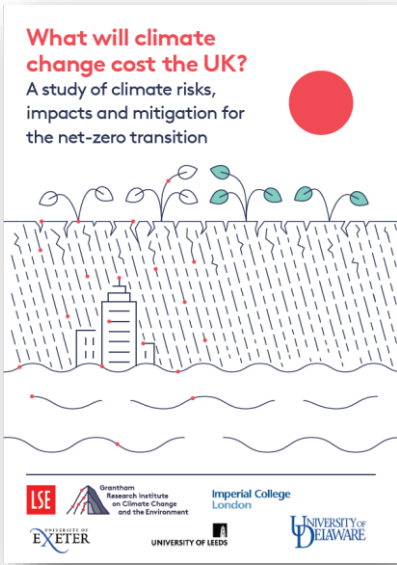
Use of open-source risk tools adapted for use with climate model data and event set sampling

Dawkins et al., 2024

Economic damage

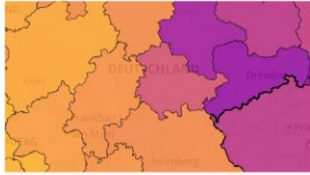
Rising et al., 2022

UK Climate Change Risk Maps



- Under current policies, the total cost of climate change damages to the UK are projected to increase from 1.1% of GDP at present to 3.3% by 2050 and at least 7.4% by 2100.
- Strong global mitigation action could reduce the impacts of climate change damages to the UK from 7.4% to 2.4% of GDP by 2100.

Climate science can provide information to help plan.....



Wind/Flood Risk Correlation Explorer

The Explorer displays correlations for variables including wind gust, precipitation and river flow, as well as Flood Severity and Storm Severity indices.



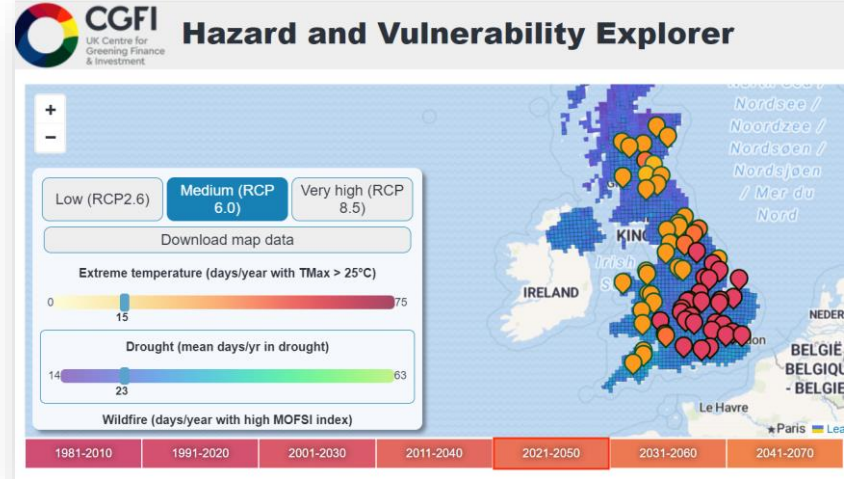
GRI Risk Viewer

The Resilient Planet Data Hub (RPDH)'s GRI Risk Viewer displays risk from climate hazards at a global scale, and includes data on hazards, vulnerability and exposure under different future climate scenarios.

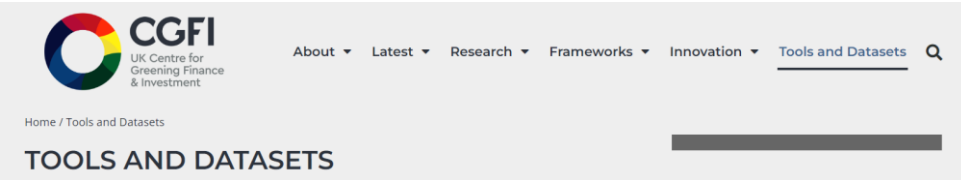


GeoAsset Databases

The Spatial Finance Initiative's GeoAsset project is a public goods endeavour that creates and disseminates global, open asset databases for high impact industries.



The aim is to make it easier to identify better **hazard** data and bring it together with **exposure** and **vulnerability** to inform on **climate physical risk**



Discussion