Climate change and impacts

Business Travel Association
Planet Plan Conference
5 July 2023

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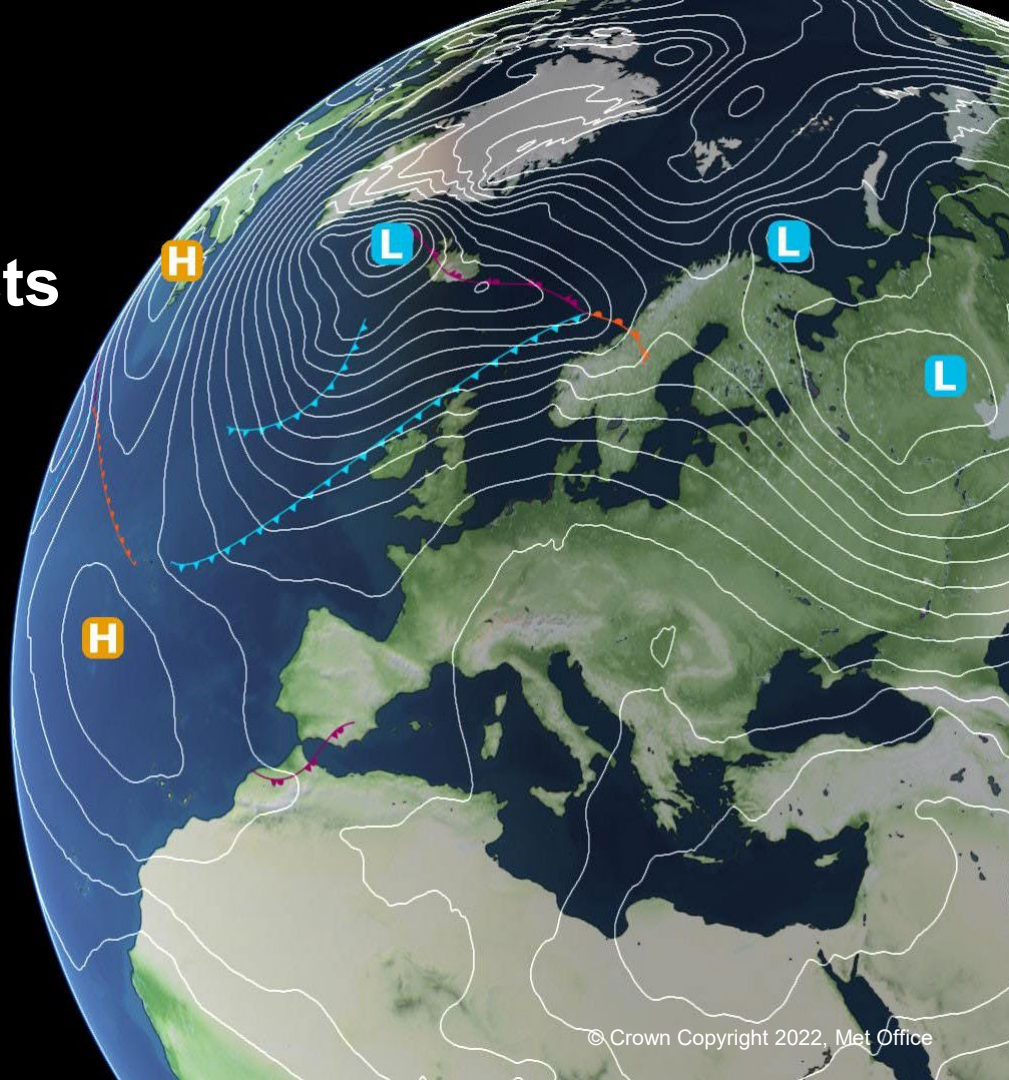


Met Office

What's the difference between weather and climate?

Daily elements, such as temperature, rain and wind.
These can change hour by hour, day by day.

Weather

Time

Climate

How the weather changes over a long period of time, typically over 30 years.
It can be thought of as the average weather over a long period.

UN CLIMATE CHANGE CONFERENCE UK 2021

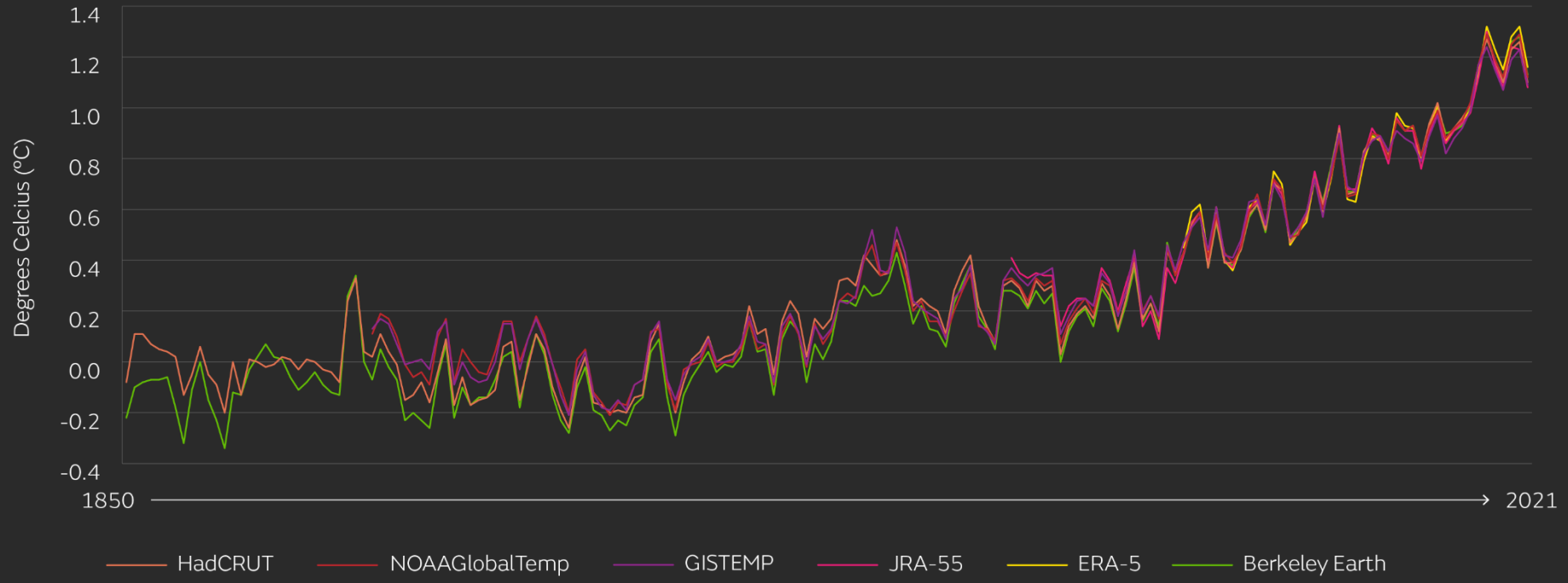
Met Office

WORLD METEOROLOGICAL ORGANIZATION

GLOBAL AVERAGE TEMPERATURE DIFFERENCE*

1.11 °C ↑

* Compared to 1850 – 1900 ‘pre-industrial’ levels



Met Office

Met Office | WORLD METEOROLOGICAL ORGANIZATION

WMO Global Annual to Decadal Climate Update

There is a 98% chance of at least one year in the next five **exceeding the current warmest year**, 2016, when there was an exceptionally strong El Niño.

The Met Office is the WMO Lead centre for Annual to Decadal Climate Prediction

In 2022, the earth's average temperature was **1.15°C above the pre industrial baseline** (1850-1900 average).

There is a 66% chance that annual global surface temperature will **temporarily exceed 1.5°C** above pre-industrial levels for at least one of the next five years.

The annual mean global near-surface temperature for each year between 2023 and 2027 is predicted to be between **1.1°C and 1.8°C higher** than the 1850-1900 average.

There is a 98% chance of the five-year mean for 2023-2027 being **higher than the last five years** (2018-2022).

Met Office

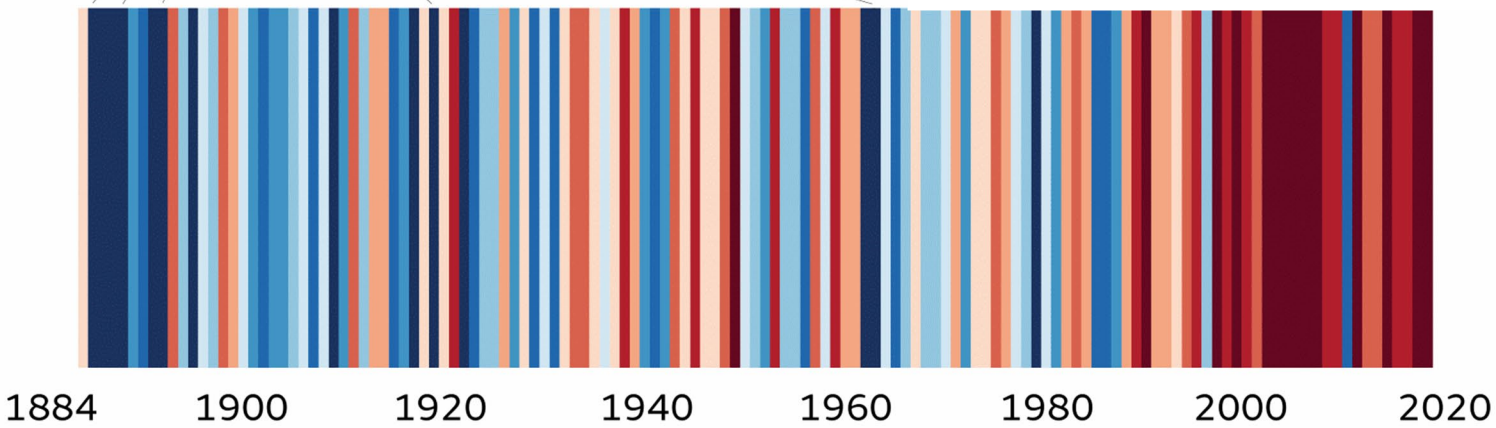
UK annual temperature

5 coolest years

1892, 1888, 1885, 1963, 1919

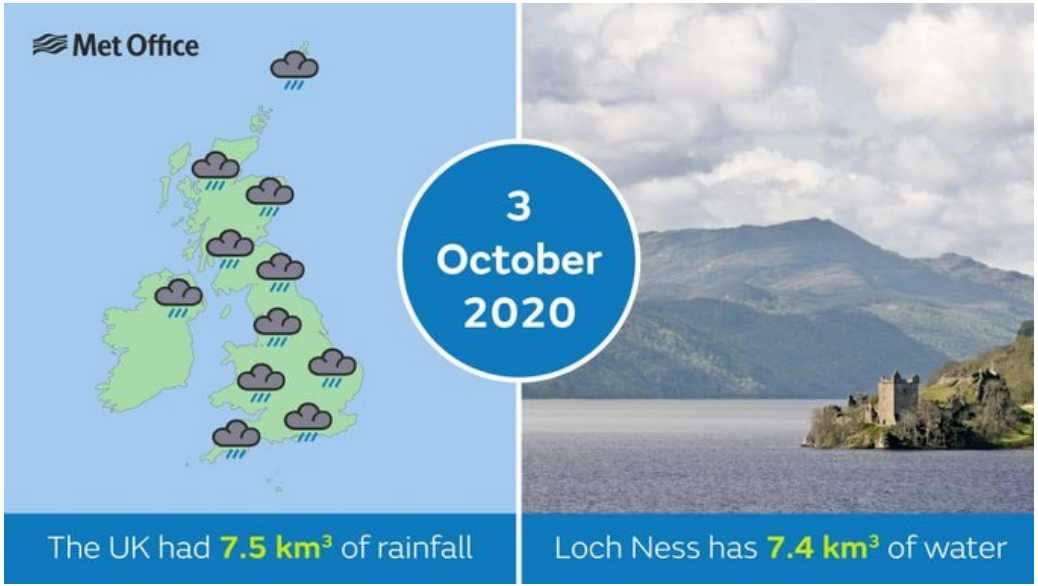
5 warmest years

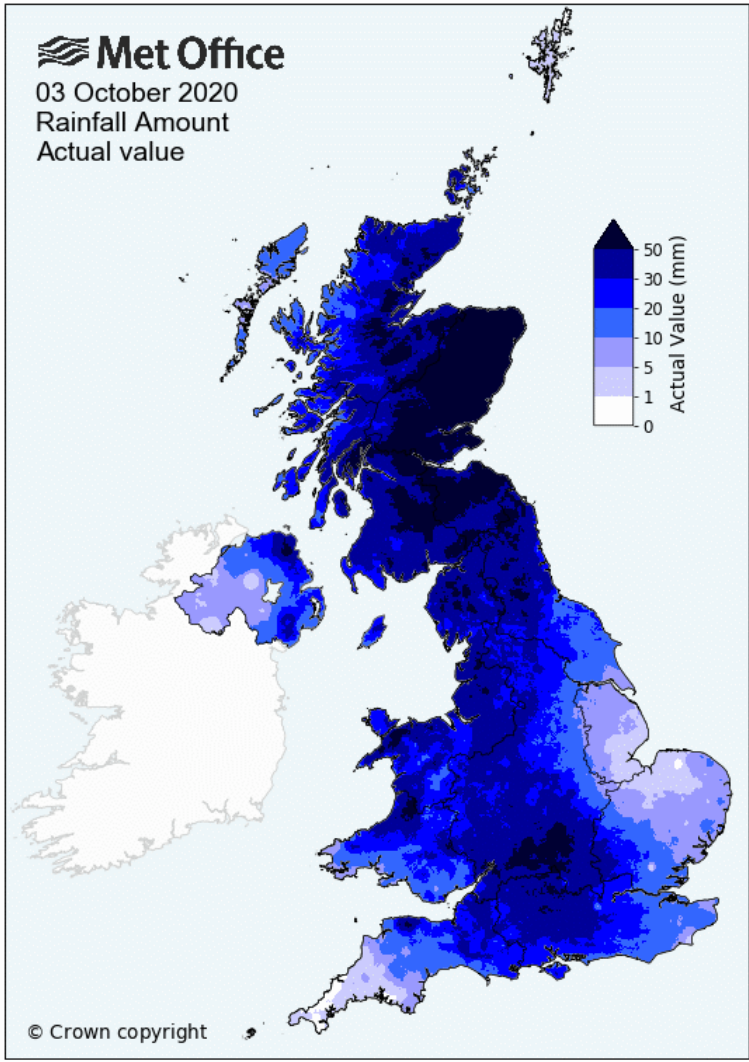
2022, 2014, 2006, 2020, 2011



UK Wettest Day on Record

Following Storm Alex, there was average rainfall across the entire UK of 31.7mm





Kendon and McCarthy, 2021 (bit.ly/3j3uBel)

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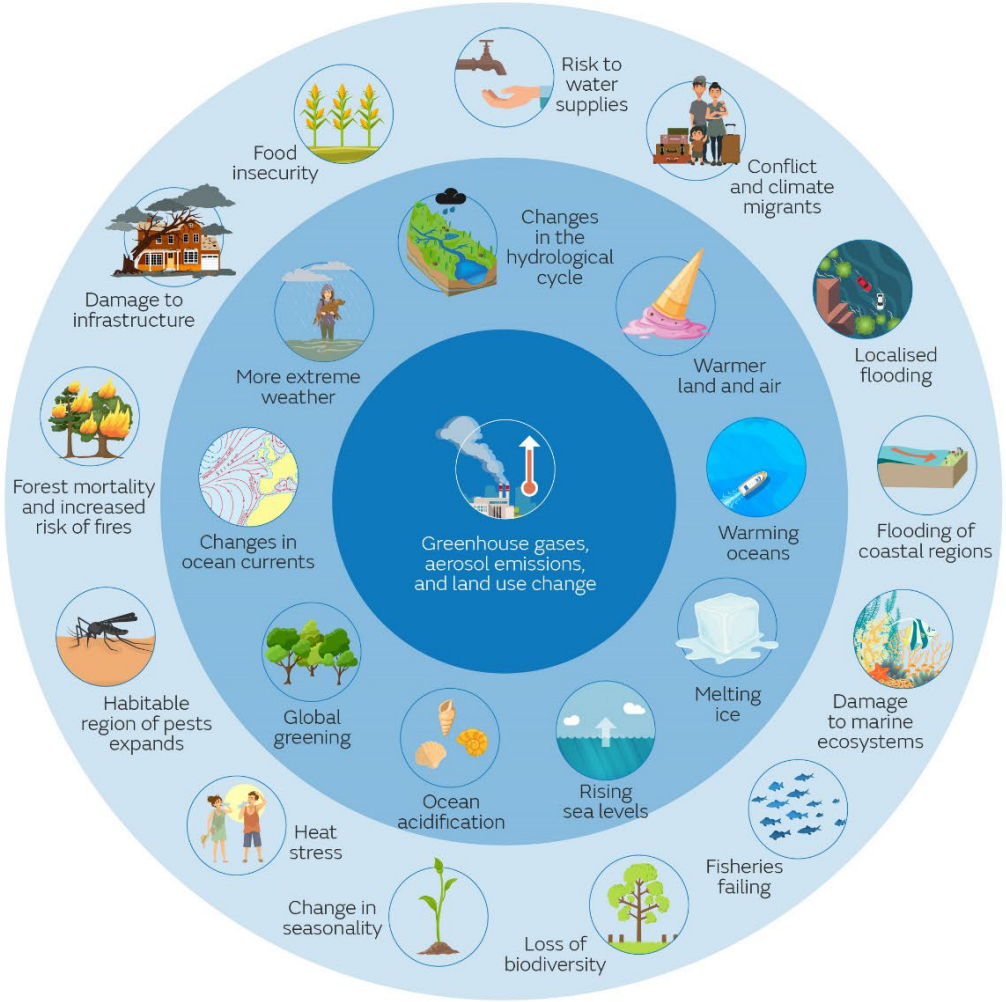
Climate change impacts



Drivers of climate change

Changes to the climate system

Impacts

Climate change is already impacting on extreme weather across the planet

Siberian heatwave

- First six months of 2020 resulting in wildfires and loss of permafrost
- Event was 600 times more likely due to climate change

European flooding

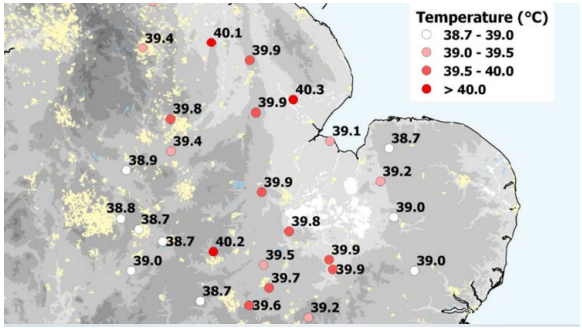
- July 2021 resulting in extreme impacts and over 200 deaths
- Event was 1.2 to 9 times more likely and rainfall intensity 3-19% higher due to climate change

India & Pakistan heatwaves

- Record-breaking temperatures in May 2022, 51°C recorded in Pakistan.
- Event over 100 times more likely because of climate change

Met Office

Extreme events are impacting the UK



Heatwaves

- July 2022 – Unprecedented heatwave, with multiple stations exceeding 40°C. First red warning.
- Exceptional spread across the UK, with Wales and Scotland also setting new national records, and linked with heatwaves across Europe
- By 2050 hot summers could happen every other year

Heavy rainfall

- February 2020 – Wettest February on record
- Storm Ciara (2020) saw a month's worth of rain fell across parts of West Yorkshire in just 18 hrs, leading to widespread flooding
- By 2080, extreme rainfall could be x4 as frequent compared to 1980s

Wildfires

- Figures suggest the number of UK wildfires has been increasing in recent years
- Wildfires could be 5 times more likely by 2100 due to increases in high temps and low summer rainfall; conditions highly conducive to wildfires

Impacts at the local level

Health

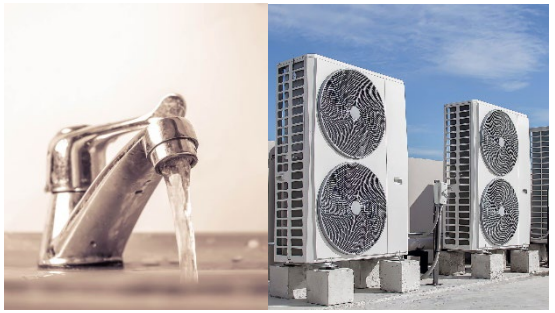
Emergency planning

Natural environment

Transport

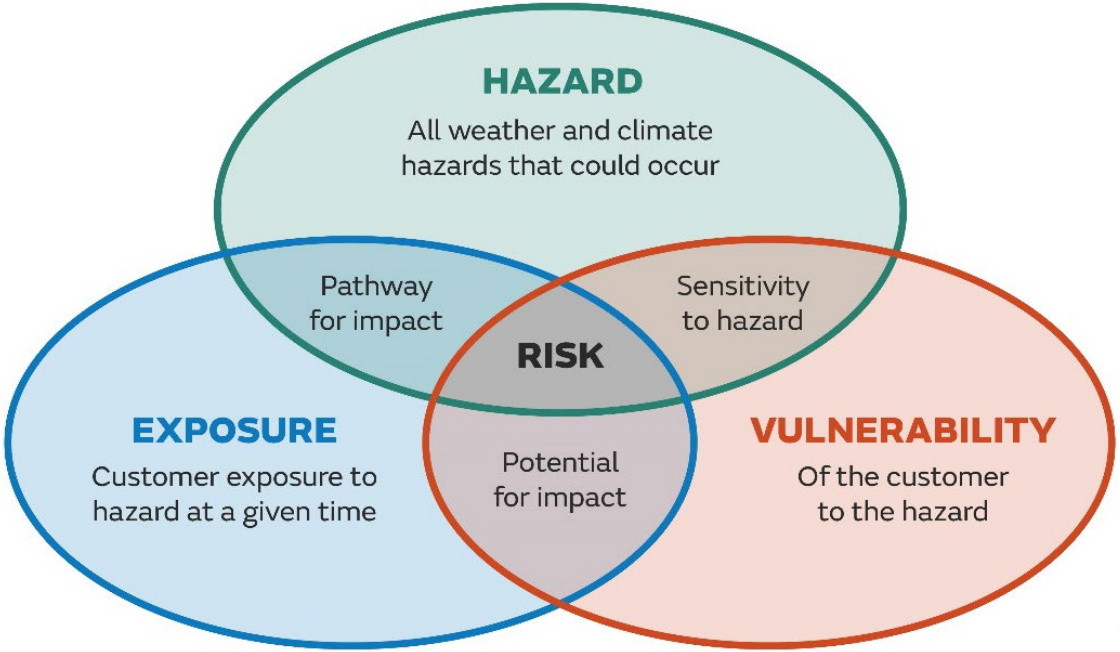
Buildings

Utilities



From hazard to risk

Developing approaches to combine hazard with exposure and vulnerability to produce projections of future climate risk



Probabilities of localised climate hazard

+

Measure of vulnerability from stakeholders interested in a climate impact

+

Exposure information

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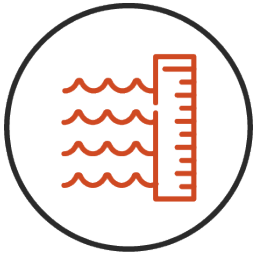
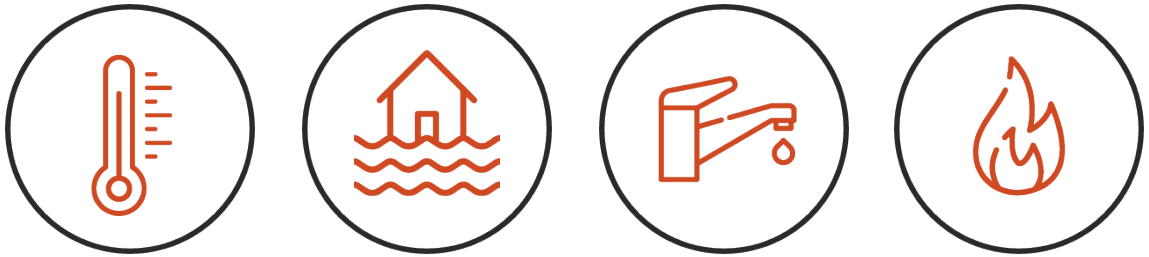
Global climate change risks


	Heat stress risk (No. of people exposed to extreme heat)	River flooding (No. of people affected)	Drought (% time cropland experiencing drought)	Wildfires (% land area exposed to 'very high' fire risk)	Biodiversity range loss
Present day	**68 million**	**54 million**	**7%**		
2°C warming	**1 billion**	**97 million**	**16%**	**36%**	**19%**
4°C warming	**3.5 billion**	**211 million**	**30%**	**50%**	**46%**
Impacts at 4°C vs 2°C	***3.5x worse***	***~1.2x worse***	***~0.9x worse***	***~0.4x worse***	***~1.4x worse***

Met Office

UK climate change risks



	Heat related deaths (per year)	Flooding (annual damages)	Water availability (low river flows)	Wildfires (% days with 'very high' fire risk)
Present day	**2,000**	**£2 billion**		**9%**
2°C warming	**7,000**	**£2.7 - £3 billion**	**20% decrease**	**26%**
4°C warming	**13,000**	**£3.5 - £3.9 billion**	**50% decrease**	**50%**
Impacts at 4°C vs 2°C	***~86% worse***	***~30% worse***	***30% worse***	***~92% worse***

Met Office | Department for Environment Food & Rural Affairs | Department for Business, Energy & Industrial Strategy | Environment Agency

UKCP18: Climate change over land

How will the seasons change?

Summers

HOTTER

DRIER

Winters

MILDER

WETTER

Year-to-year variations mean we'll still see some cold dry winters and cool wet summers, but they will become less likely.

Projections for average annual warming over the UK give a range of 1°C to 4°C for the lowest and highest emission scenarios.

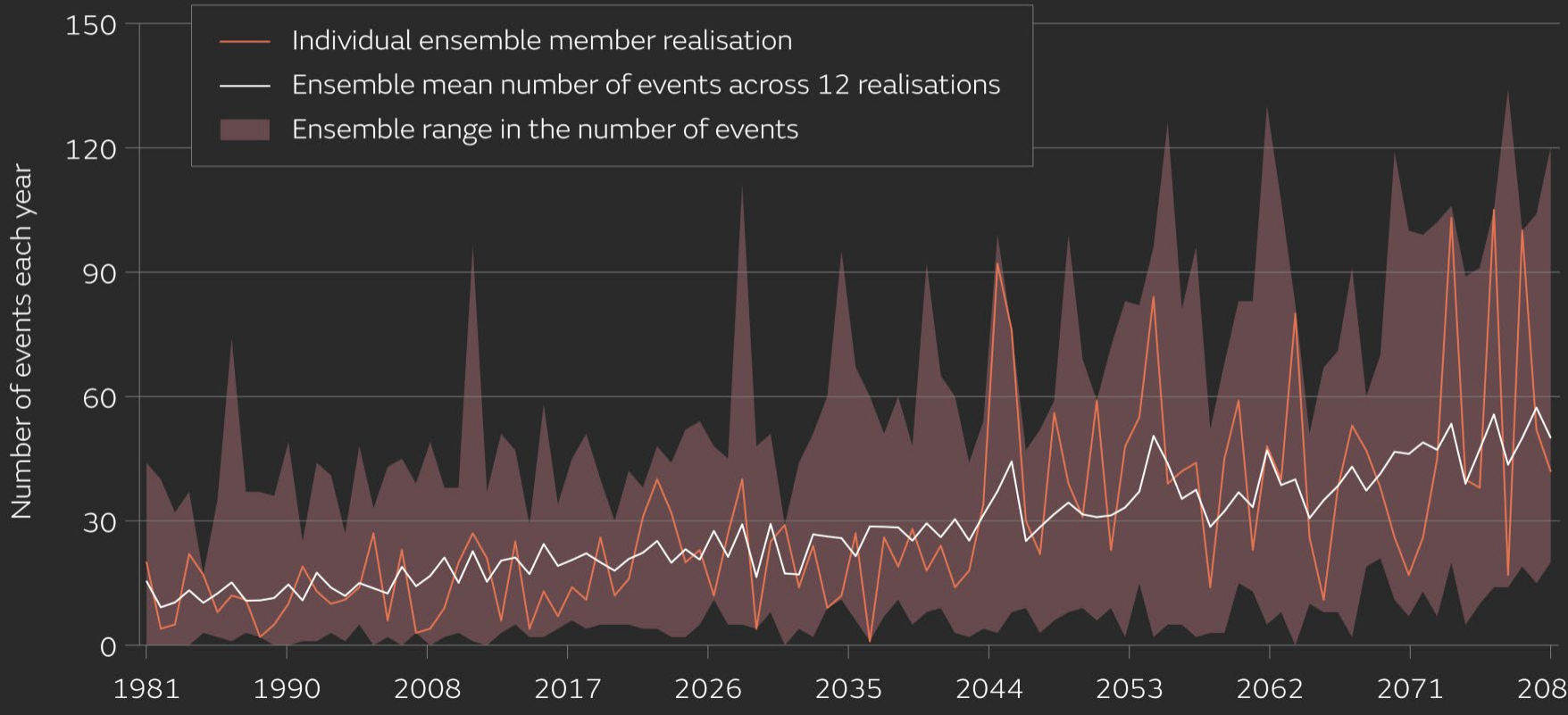
How will extremes change?

Maximum temperature of a summer's day could increase by as much as 10°C in some places

Rainfall is expected to be more intense, increasing the risk of flash flooding

Met Office

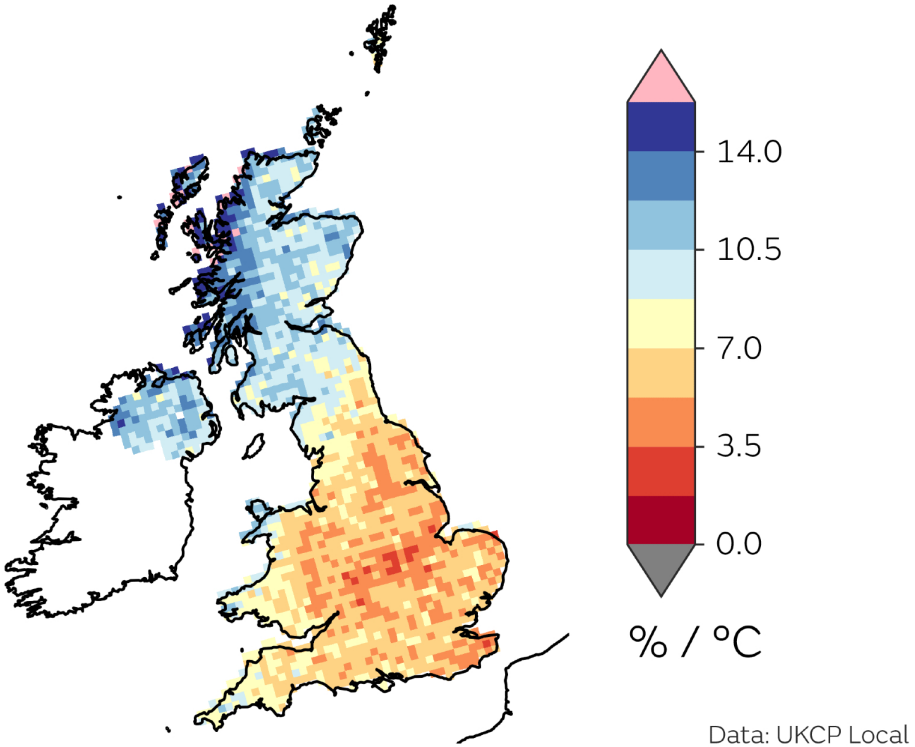
Number of events each year across the UK when 20 mm/hour or more of rain is recorded



Data: UKCP Local

Met Office

Underlying change in the intensity of extreme hourly precipitation for every degree of warming



Adaptation is essential to address the locked-in effects of climate change

Adaptation is needed to manage risks from:

On-going impacts

Those we are already experiencing

Committed impacts

Those that would occur even if emissions stopped today

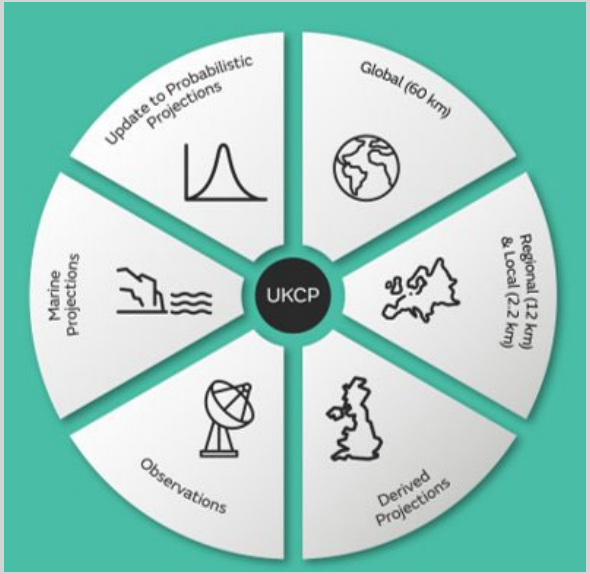
Future warming

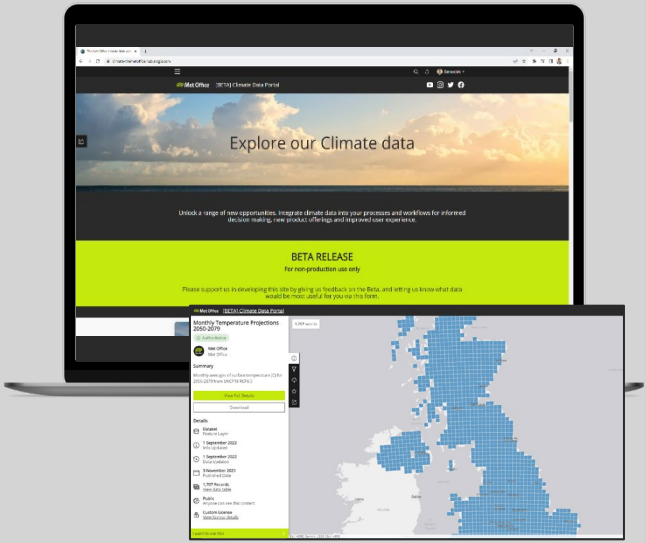
Planning for all possible outcomes including long-term, worst-case scenarios

It is not possible to eliminate all climate risks and the faster emissions are reduced, the less likely that limits to adaptation are reached.

Met Office

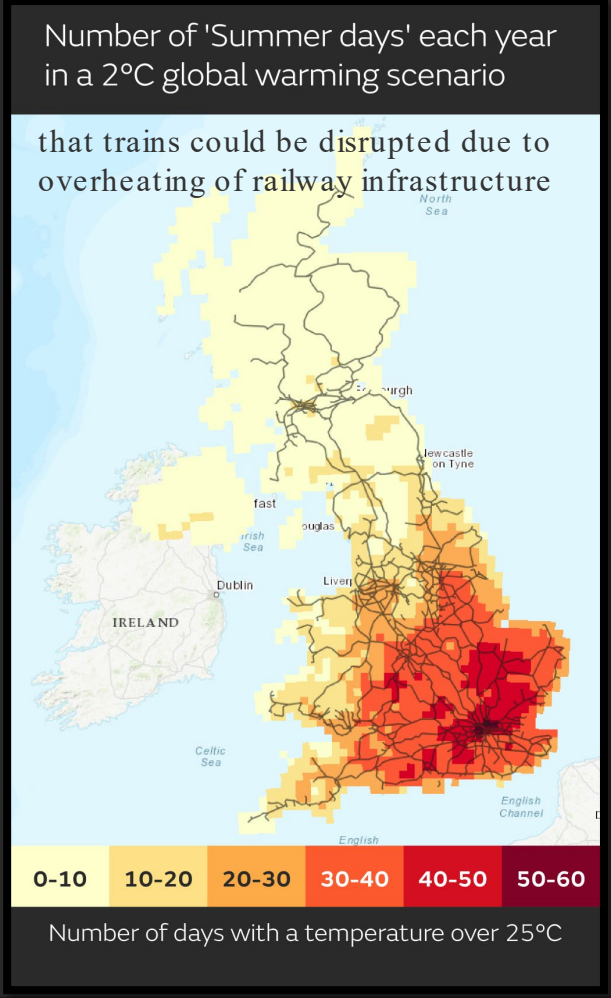
Helping you make better decisions to stay safe and thrive





Met Office Climate Data Portal

- New **data portal** live 29 June 2023
- Combines **Met Office** expertise and data with **ESRI UK** geospatial technology
- Makes it easier for you to **combine** open climate data with your own data
- Presents complex scientific climate projections in **easy-to-use** formats, ready to visualise and analyse in GIS and non-spatial applications or integrate into business processes for improved **decision making**



Link to User Guide

Examples of Transport services

Surface Transport

Monitoring and operational support for road infrastructure and gritting, including route optimisation.

Support to rail operators, especially tailored to hazards such as ice, strong winds, low adhesion, overtopping and high temperatures (track buckling).

Examples of Transport services

Marine Services

Shipping, inshore waters and storm forecasts.

Support to offshore sectors to minimize weather-related risk, reduce operational costs, and ensure safety at sea.

Advice and guidance to inform design of weather-related marine warranty standards and safe adoption of marine autonomous systems.

Examples of Transport services

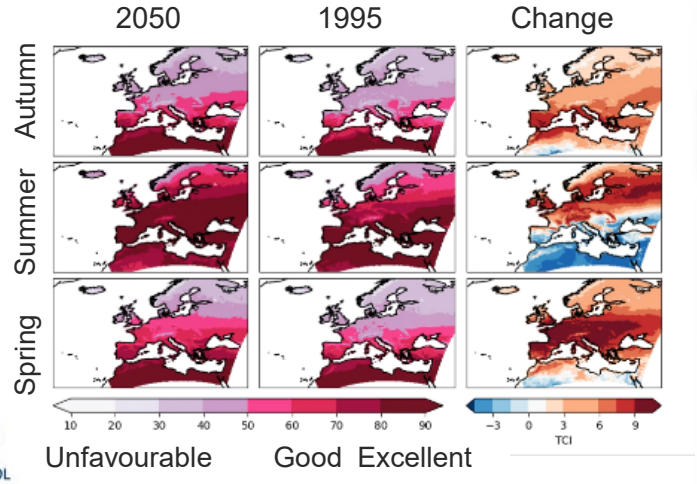
Aviation Applications

Aviation Briefing Service provides weather information to pilots to support flight safety.

Additional research on e.g., turbulence, icing and convective storms.

Route optimisation.

Tourism patterns.



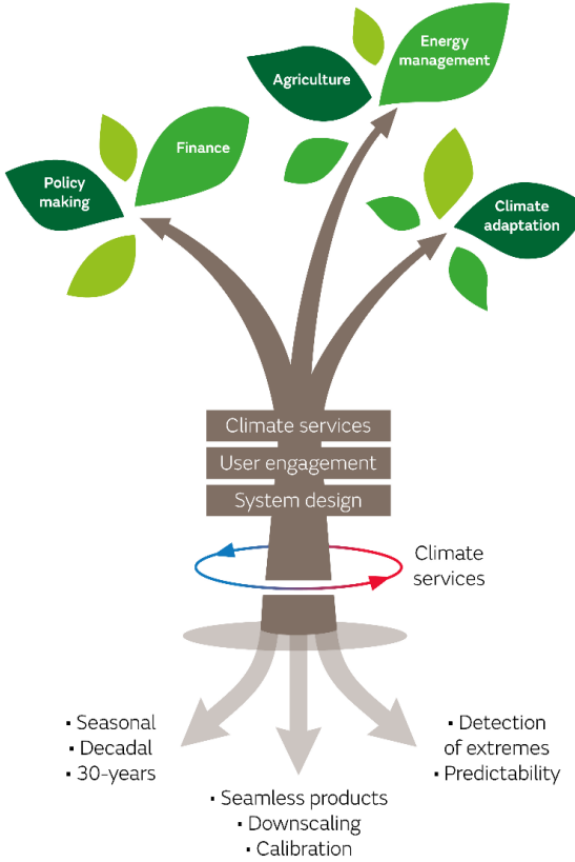
Adaptation-oriented Seamless Predictions of European ClimaTe

ASPECT

Facilitating seamless climate adaptation by improving existing climate prediction systems and merging their outputs across timescales together with climate projections

The overall objective of ASPECT is to improve and produce seamless climate predictions covering the next 30 years and to embed these predictions into societally important climate change adaptation decisions over a range of sectors, time scales, spatial scales and decision making levels.

ASPECT will provide a delivery system for climate prediction information tailored taking into account user requirements.



Led by Barcelona Supercomputing Centre
11 partners
Jan 2023 - Dec 2026

Funded by the European Union

COMPETITION

BECOME A 'SUPER USER'!

We are looking for two organisations involved in societally important sectors to join our project!

- ✓ Make better informed **decisions**
- ✓ Develop your **understanding** on extreme weather and climate risks
- ✓ Co-produce useful & usable seasonal-to-decadal **predictions**

Apply Now!

Funded by the European Union

ASPECT

BECOME A 'SUPER USER'

Apply Now!

TIMELINE

June 2023 -
Application Open

9 Oct 2023 -
Closing Date

Oct / Nov 2023 -
Interviews with shortlisted applicants

December 2023 -
New Super Users announced!

aspect-project.eu
@ASPECT_project

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ASPECT

Met Office

Thank you for listening.

Please contact freya.garry@metoffice.gov.uk **Twitter** @freyagarry