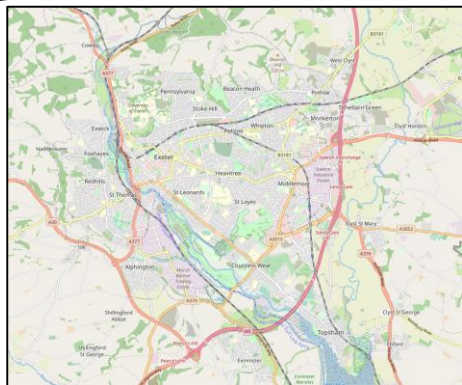


EXETER CLIMATE CHANGE

The Science

What affects Exeter's weather?



© OpenStreetMap contributors



Temperature –The maritime influence of the coast results in Exeter experiencing low annual temperature variation. Although rare, extreme summertime high temperatures can occur with south easterly winds from mainland Europe. Winters are typically mild.



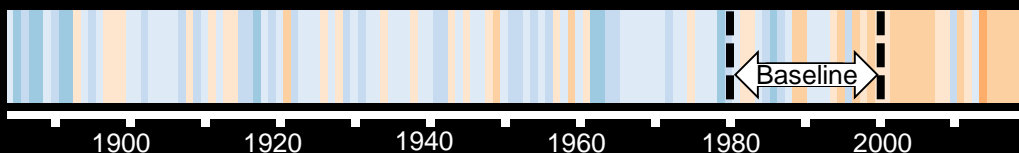
Rainfall - As Exeter is in the lee of the Dartmoor uplands, the annual rainfall is typically lower than the average for the south-west. Rainfall in the winter and autumn is associated with Atlantic depressions. Summer rainfall is typically associated with convective heating and results in showers and possible thunderstorms. The south west is prone to rare, but very heavy rainfall events.



Wind – Exeter experiences stronger winds than the English average. Strong winds may be associated with the passage of deep depressions close to, or across the British Isles, occurring most frequently in the Winter months. Prevailing winds in Exeter are from the south-west.

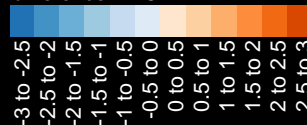
How has Exeter's climate changed?

The Exeter* climate stripes show how annual average temperature has changed since 1884, compared with a baseline average between 1981 and 2000.



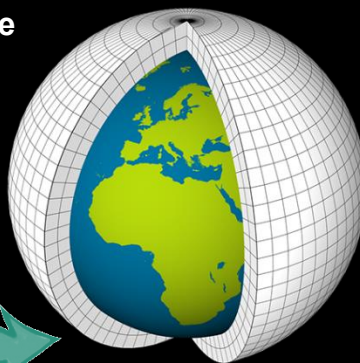
*Based on HadUK-Grid data for Devon

Scale: Temperature difference in °C



Calculating Exeter's future climate

The Met Office uses computer models to simulate decades into the future. These models tell us that increasing greenhouse gas concentrations in the atmosphere leads to an increase in global temperature – the basis for climate change.

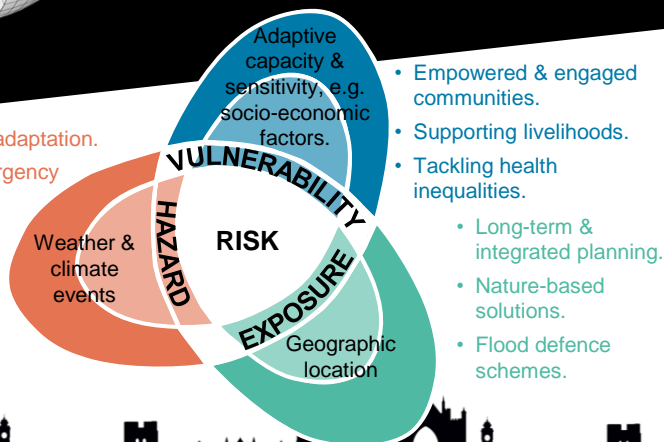


However, the climate is complex and small changes in global temperature can cause large changes to the weather patterns that we experience at a local level. To provide the best available information, multiple variations of the Met Office's latest global climate model are used to simulate the plausible future climate outcomes - this is known as a climate model ensemble.

Turning data into a decision:

The impact of a changing climate depends on three key factors - the hazard itself, exposure levels and vulnerability. Actions to reduce these could, for example, include...

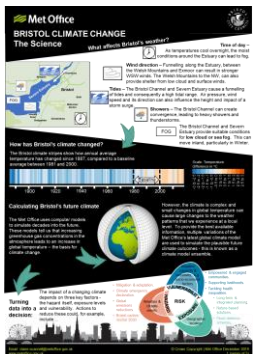
- Mitigation & adaptation.
- Climate emergency declaration.
- Global emissions reductions.
- UK carbon neutral 2050.



This factsheet is part of a set of prototype products, aimed at building a foundation of shared understanding and promoting robust use of the available UKCP climate change information.

The Climate Change series includes: (sample city shown)

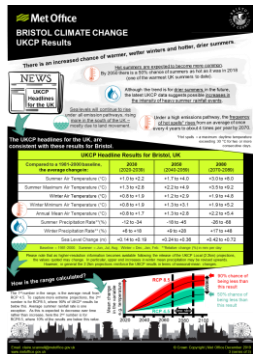
1 The Science



2 The Results Explained



3 UKCP Results



Find out more about ...

UK Climate Projections (UKCP)

- <https://www.metoffice.gov.uk/research/approach/collaboration/ukcp>

Factsheets headline findings for the wider UK

- <https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-infographic-headline-findings-land.pdf>
- <https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/factsheets>

How to download and use the UKCP data using the Climate Projections User Interface (UI)

- <https://ukclimateprojections-ui.metoffice.gov.uk/ui/home>
- <https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-guidance---how-to-use-the-land-projections.pdf>

The historical data used to produce the climate stripes

- <https://www.metoffice.gov.uk/research/climate/maps-and-data/data/haduk-grid/haduk-grid>

Representative Concentration Pathways (RCPs)

- <https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-guidance---representative-concentration-pathways.pdf>
- https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_Chapter12_FINAL.pdf

OpenStreetMap

- City maps provided by OpenStreetMap under Open Database Licence, see www.openstreetmap.org/copyright or www.opendatacommons.org/licenses/odbl for further details.

This work was supported by the UK Research & Innovation (UKRI) Strategic Priorities Fund UK Climate Resilience programme. The programme is co-delivered by Met Office and NERC on behalf UKRI partners AHRC, EPSRC, ESRC.




EXETER CLIMATE CHANGE

The Results Explained


Representing Exeter's UKCP results for a range of global average temperature increases over the 21st century.

The UK Climate Projections (UKCP) is a tool that provides information about future climate for the UK. It delivers cutting-edge climate science with the most up-to-date assessment of how the climate may change in the future.


Main advances in UKCP:




State-of-the-art global climate models




Innovative regional climate models



Up-to-date observational data



Significant user engagement



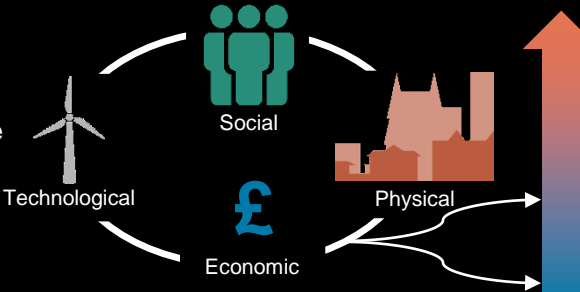
Locally relevant climate information to enhance resilience

Why are there a range of UKCP results?

Our future climate is determined by ongoing and future greenhouse gas emissions. To capture this uncertainty about the future, the results for Exeter are from the UKCP probabilistic projections, which provide the most comprehensive assessment of uncertainty in UKCP.

What are RCPs?

Representative Concentration Pathways (RCPs) are used to describe possible futures based on assumptions about human activity and greenhouse gas emissions.



- RCP8.5**
Global greenhouse gas emissions grow unmitigated.
- RCP4.5 and RCP6.0**
Are two medium emission pathways, with varying levels of mitigation.
- RCP2.6**
Global emissions are strongly reduced.

How do these relate to changes in global temperature?

*The RCP pathways represent a broad range of climate outcomes and are neither forecasts nor policy recommendations, however they offer approximate parallels for initial comparison.

*RCP	**Change in Global Average Temperature (°C) by 2081-2100
RCP8.5	4.6 (3.5 – 5.8)
RCP6.0	3.3 (2.5 – 4.3)
RCP4.5	2.9 (2.1 – 3.7)
RCP2.6	1.9 (1.2 – 2.6)

**Global warming estimates relative to pre-industrial period are from UKCP probabilistic outputs. Bold number represents the median estimate. The range presented is the 10th and 90th percentiles.

We are already witnessing the impacts of a global average temperature rise of 1°C compared to pre-industrial levels.

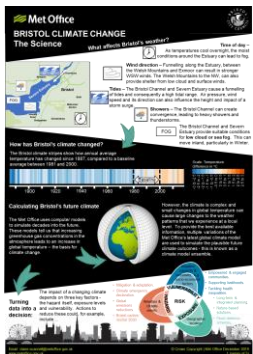
The Paris Agreement aims to curtail greenhouse gas emissions so that the future global average temperature increase is capped at below 2°C, ideally at the lower limit of 1.5°C. Recent research by the UN suggests that rapid reductions in emissions, beyond those currently pledged as part of the Paris agreement, may be required to limit warming to well below 2°C. The Committee on Climate Change (CCC) has advised that the UK should plan for a 2°C rise as a minimum, whilst preparing for a 4°C rise.”



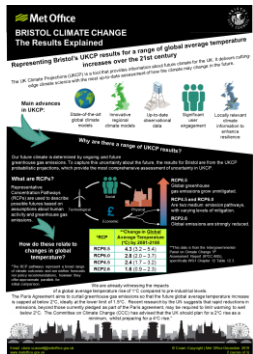
This factsheet is part of a set of prototype products, aimed at building a foundation of shared understanding and promoting robust use of the available UKCP climate change information.

The Climate Change series includes: (sample city shown)

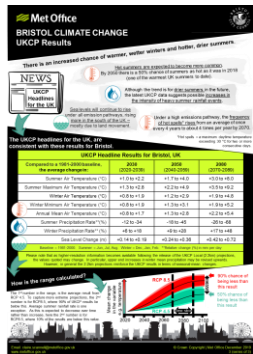
1 The Science



2 The Results Explained



3 UKCP Results



Variable	2021-2050	2051-2080	2081-2100
Summer Air Temperature (°C)	+1.0 to +2.2	+1.7 to +4.0	+0.5 to +6.0
Winter Air Temperature (°C)	+0.5 to +1.0	+1.2 to +3.5	+0.0 to +4.5
Annual Mean Air Temperature (°C)	+0.8 to +1.6	+1.3 to +3.8	+0.3 to +5.3
Annual Rainfall (mm)	-10 to -20	-20 to -40	-40 to -60
Annual Snowfall (mm)	-10 to -20	-20 to -40	-40 to -60
Annual Sunshine (hours)	+10 to +20	+20 to +40	+40 to +60
Annual Evaporation (mm)	+10 to +20	+20 to +40	+40 to +60
Annual Potential Evaporation (mm)	+10 to +20	+20 to +40	+40 to +60
Annual Potential Evaporation Ratio (%)	+10 to +20	+20 to +40	+40 to +60
Annual Potential Evaporation Ratio (%)	+10 to +20	+20 to +40	+40 to +60

Find out more about ...

UK Climate Projections (UKCP)

- <https://www.metoffice.gov.uk/research/approach/collaboration/ukcp>

Factsheets headline findings for the wider UK

- <https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-infographic-headline-findings-land.pdf>
- <https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/factsheets>

How to download and use the UKCP data using the Climate Projections User Interface (UI)

- <https://ukclimateprojections-ui.metoffice.gov.uk/ui/home>
- <https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-guidance---how-to-use-the-land-projections.pdf>

The historical data used to produce the climate stripes

- <https://www.metoffice.gov.uk/research/climate/maps-and-data/data/haduk-grid/haduk-grid>

Representative Concentration Pathways (RCPs)

- <https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-guidance---representative-concentration-pathways.pdf>
- https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_Chapter12_FINAL.pdf

This work was supported by the UK Research & Innovation (UKRI) Strategic Priorities Fund UK Climate Resilience programme. The programme is co-delivered by Met Office and NERC on behalf UKRI partners AHRC, EPSRC, ESRC.



EXETER CLIMATE CHANGE UKCP Results

There is an increased chance of warmer, wetter winters and hotter, drier summers.



Hot summers are expected to become more common.
By 2050 there is a 50% chance of summers as hot as it was in 2018 (one of the warmest UK summers to date).



Although the trend is for drier summers in the future, the latest UKCP data suggests possible increases in the intensity of heavy summer rainfall events.



Sea levels will continue to rise under all emission pathways.





Under a high emissions pathway, the frequency of hot spells* rises from an average of once every 4 years to about 4 times per year by 2070.

*Hot spells = a maximum daytime temperature exceeding 30 °C for two or more consecutive days.

The UKCP headlines for the UK, are consistent with these results for Exeter.

UKCP Headline Results for Exeter, UK

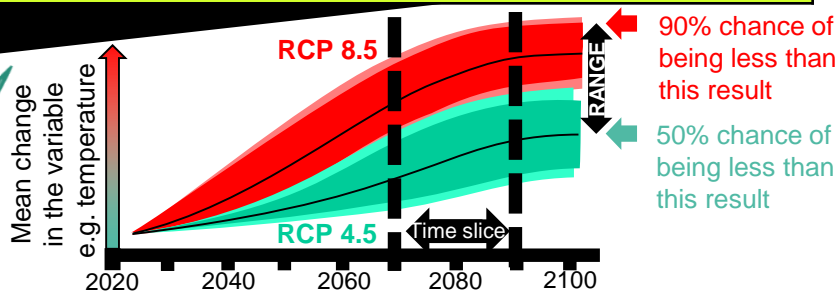
Compared to a 1981-2000 baseline, the average change in:	2030 (2020-2039)	2050 (2040-2059)	2080 (2070-2089)
Summer Air Temperature (°C)	+1.0 to +2.2	+1.7 to +3.9	+3.0 to +7.8
Summer Maximum Air Temperature (°C)	+1.3 to +2.7	+2.1 to +4.7	+3.4 to +8.8
 Winter Air Temperature (°C)	+0.8 to +1.8	+1.2 to +2.8	+1.8 to +4.8
Winter Minimum Air Temperature (°C)	+0.8 to +1.9	+1.3 to +3.1	+1.9 to +5.2
Annual Mean Air Temperature (°C)	+0.8 to +1.6	+1.3 to +2.7	+2.2 to +5.3
 Summer Precipitation Rate**(%)	-14 to -37	-22 to -53	-27 to -71
Winter Precipitation Rate** (%)	+5 to +19	+9 to +26	+15 to +42
Sea Level Change (m)	+0.14 to +0.19	+0.25 to +0.37	+0.44 to +0.75

Baseline = 1981-2000. Summer = Jun, Jul, Aug. Winter = Dec, Jan, Feb. **Relative change (%) in mm per day

Please note that as higher-resolution information becomes available following the release of the UKCP Local (2.2km) projections, the values quoted may change. In particular, upper end increases in winter mean precipitation may be revised upwards. However, in general the 2.2km projections reinforce the UKCP results in terms of seasonal-mean changes.

How is the range calculated?

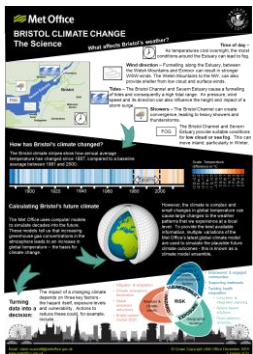
The 1st number in the range, is the average result from RCP 4.5. To capture more extreme projections, the 2nd number is for RCP8.5, where 90% of UKCP results lie below this. Average summer rainfall rate is one exception. As this is expected to decrease over time rather than increase, here the 2nd number is for RCP8.5, where 10% of the results are below this value.



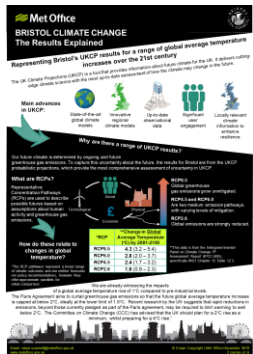
This factsheet is part of a set of prototype products, aimed at building a foundation of shared understanding and promoting robust use of the available UKCP climate change information.

The Climate Change series includes: (sample city shown)

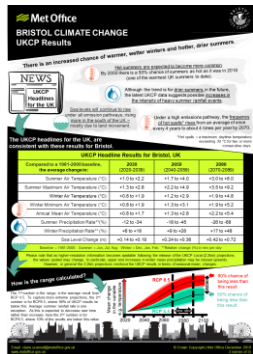
1 The Science



2 The Results Explained



3 UKCP Results



Variable	2021-2050	2051-2080	2081-2100
Summer Air Temperature (°C)	+1.0 to +2.2	+1.7 to +3.0	+2.0 to +3.5
Winter Air Temperature (°C)	+0.5 to +1.5	+1.0 to +2.0	+1.5 to +2.5
Annual Mean Air Temperature (°C)	+0.8 to +1.8	+1.3 to +2.3	+1.8 to +2.8
Annual Mean Precipitation (mm)	-10 to -20	-20 to -30	-30 to -40
Annual Mean Rainfall (mm)	-10 to -20	-20 to -30	-30 to -40
Annual Mean Snowfall (mm)	-10 to -20	-20 to -30	-30 to -40

Find out more about ...

UK Climate Projections (UKCP)

- <https://www.metoffice.gov.uk/research/approach/collaboration/ukcp>

Factsheets headline findings for the wider UK

- <https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-infographic-headline-findings-land.pdf>
- <https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/factsheets>

How to download and use the UKCP data using the Climate Projections User Interface (UI)

- <https://ukclimateprojections-ui.metoffice.gov.uk/ui/home>
- <https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-guidance---how-to-use-the-land-projections.pdf>

The historical data used to produce the climate stripes

- <https://www.metoffice.gov.uk/research/climate/maps-and-data/data/haduk-grid/haduk-grid>

Representative Concentration Pathways (RCPs)

- <https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-guidance---representative-concentration-pathways.pdf>
- https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_Chapter12_FINAL.pdf

This work was supported by the UK Research & Innovation (UKRI) Strategic Priorities Fund UK Climate Resilience programme. The programme is co-delivered by Met Office and NERC on behalf UKRI partners AHRC, EPSRC, ESRC.

