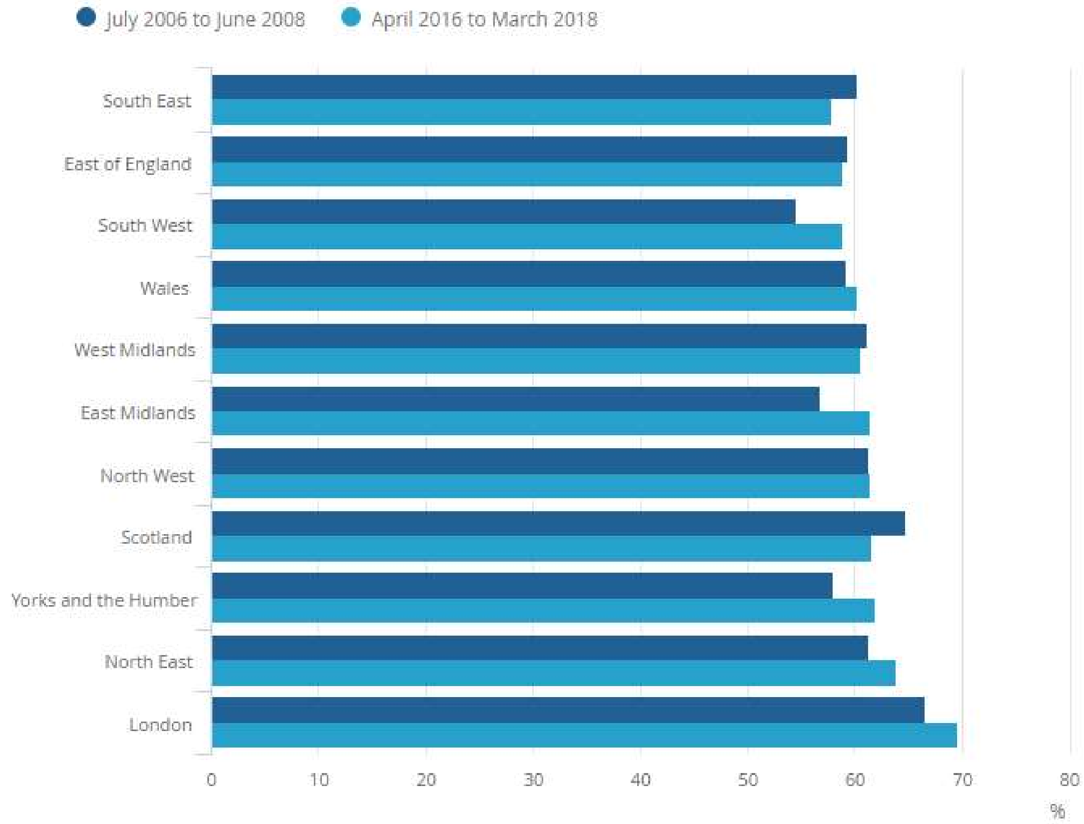
Income Inequality Maps

- https://www.ons.gov.uk/visualisations/dvc1370/
- https://www.ons.gov.uk/economy/regionalaccounts/grossdisposablehouseholdincome/bulletins/regionalgrossdisposablehouseholdincomegdhi/1997to2018#regional-gross-disposable-household-income-data
- https://www.ons.gov.uk/economy/regionalaccounts/grossdisposablehouseholdincome/datasets/regionaldifferencesinproductivityandhouseholdincome
- https://ifs.org.uk/tools_and_resources/incomes_in_uk

Figure 7: London is the most unequal region in terms of wealth inequality

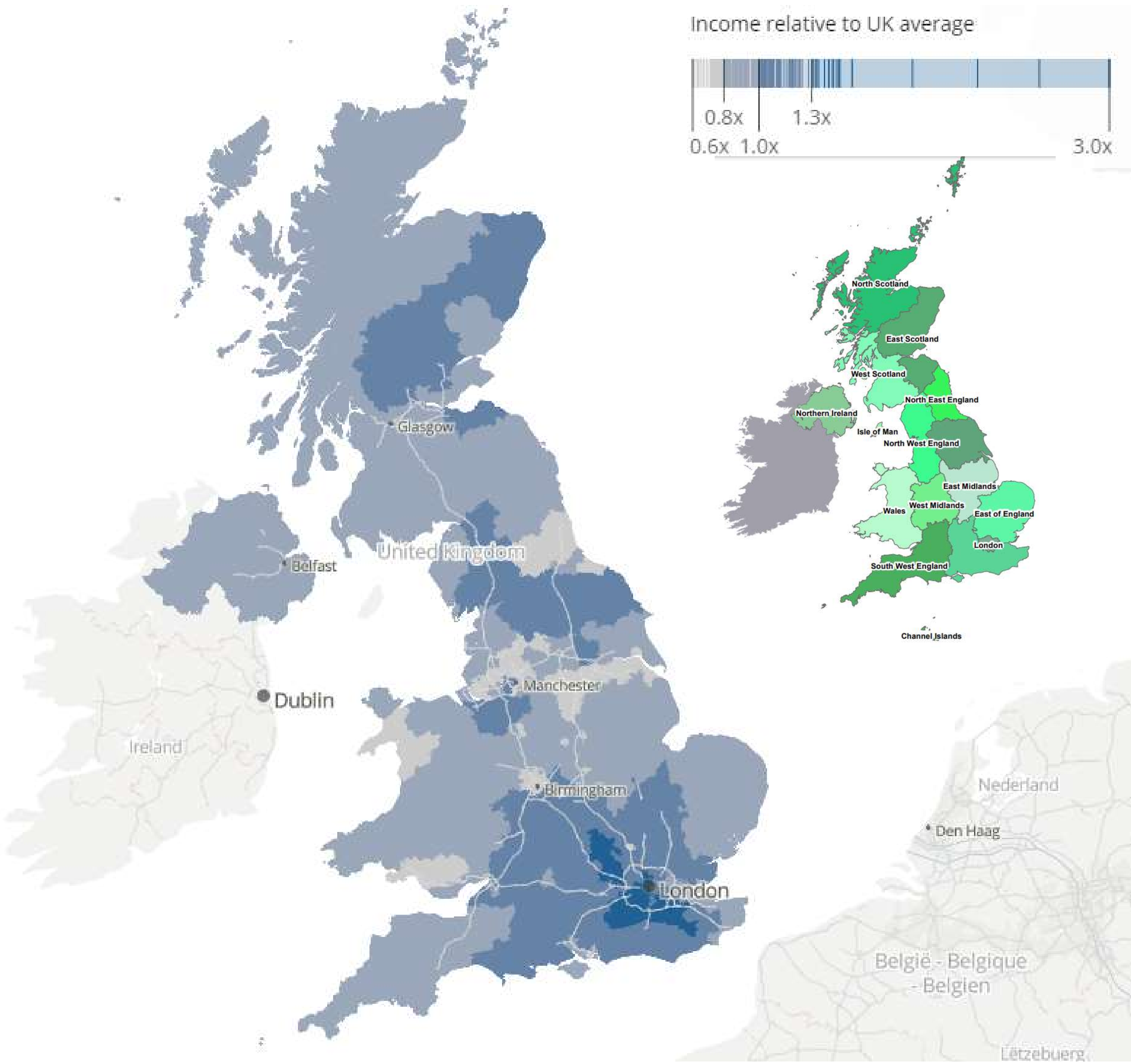
Gini coefficients for total wealth, NUTS 1 regions[1], July 2006 to June 2008, and April 2016 to March 2018



Region	April 2016 to March 2018
South East	57.815
East of England	58.942
South West	58.981
Wales	60.195
West Midlands	60.6
East Midlands	61.419
North West	61.505
Scotland	61.625
Yorks and the Humber	61.909
North East	63.919
London	69.601

Gini Index World Bank definition

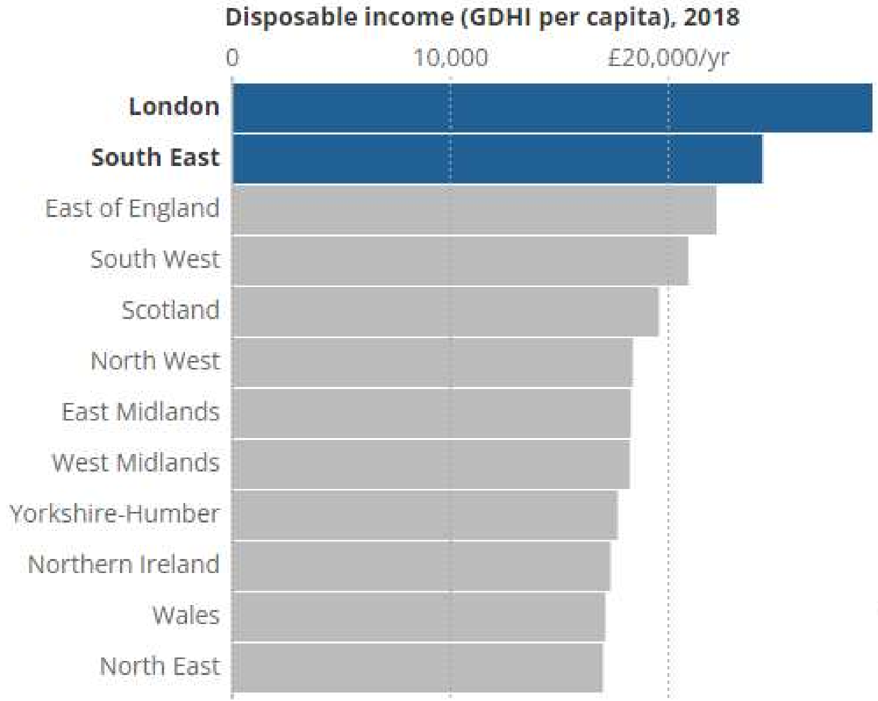
- Gini index measures the extent to which the distribution of income (or, in some cases, consumption expenditure) among individuals or households within an economy deviates from a perfectly equal distribution. A Lorenz curve plots the cumulative percentages of total income received against the cumulative number of recipients, starting with the poorest individual or household. The Gini index measures the area between the Lorenz curve and a hypothetical line of absolute equality, expressed as a percentage of the maximum area under the line. Thus a Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality.



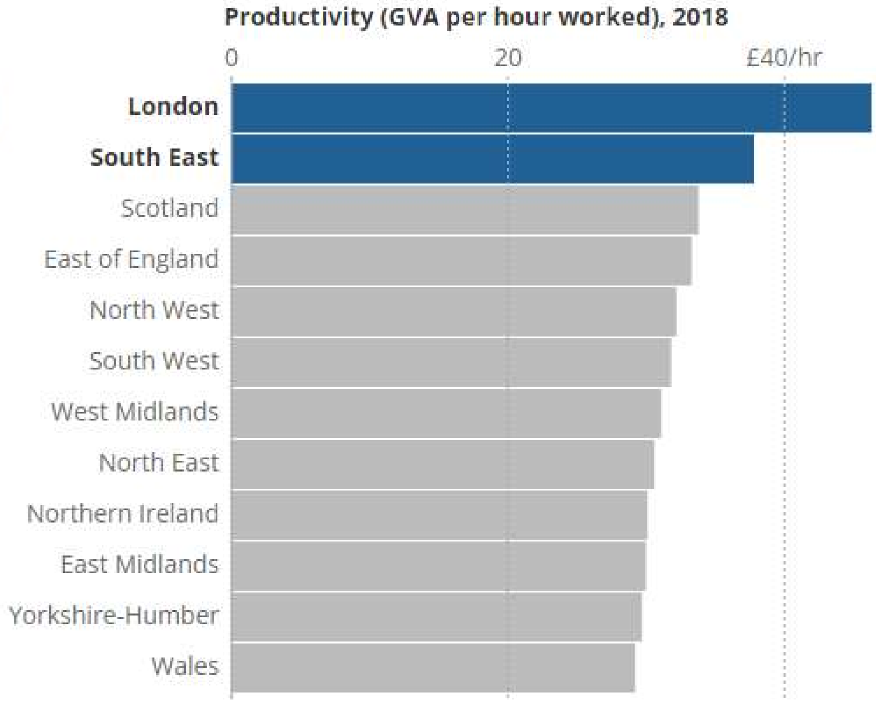
In 2018, higher income areas were in the south, Cheshire, North Yorkshire, East Cumbria, and also Edinburgh, Aberdeen and the east of Scotland.

Lowest income areas were mostly urban areas in the Midlands, North West, North East, and Yorkshire and The Humber.

Manchester, Birmingham and Nottingham are major UK cities with household income among the lowest in the country, even though their levels of productivity are closer to national average. “Commuter effect” – high income workers don’t live in cities.

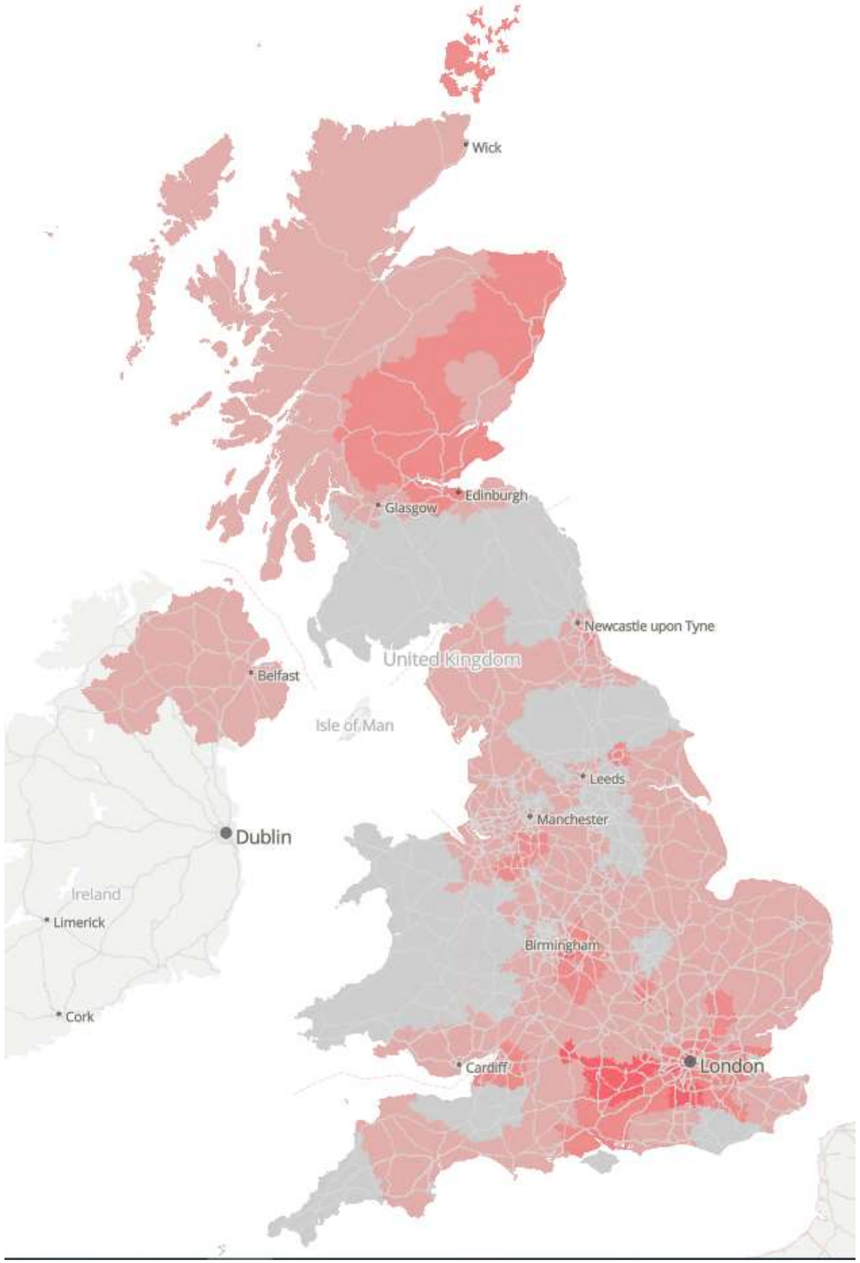


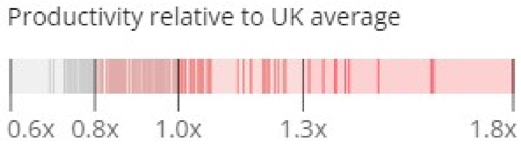
Disposable income (GDHI per capita), 2018
0
10,000
£20,000/yr
London
South East
East of England
South West
Scotland
North West
East Midlands
West Midlands
Yorkshire-Humber
Northern Ireland
Wales
North East



Productivity (GVA per hour worked), 2018
0
20
£40/hr
London
South East
Scotland
East of England
North West
South West
West Midlands
North East
Northern Ireland
East Midlands
Yorkshire-Humber
Wales

Levels of income were particularly high in central London areas such as Kensington and Chelsea, Hammersmith and Fulham, Camden and City, and Westminster.

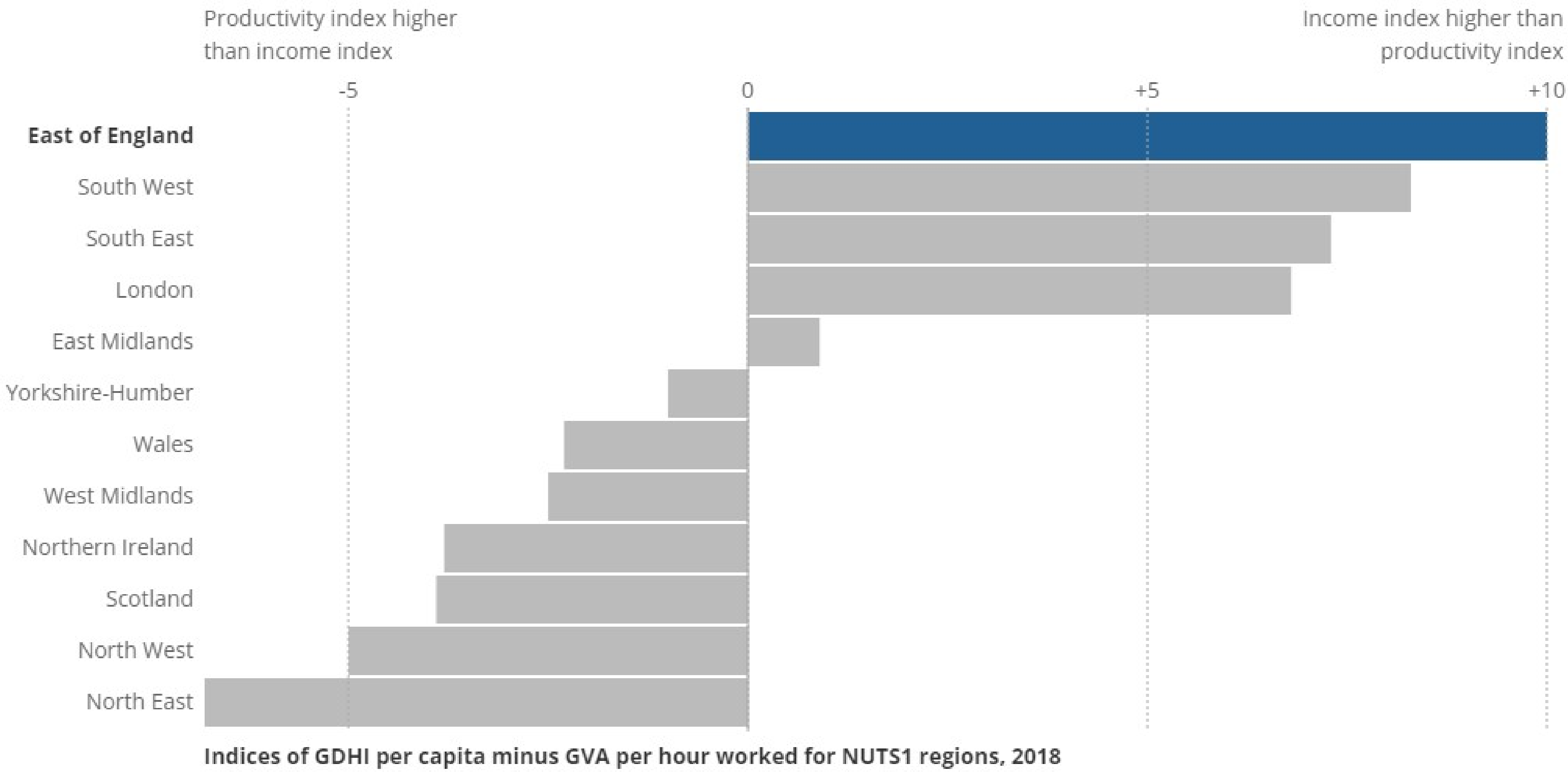




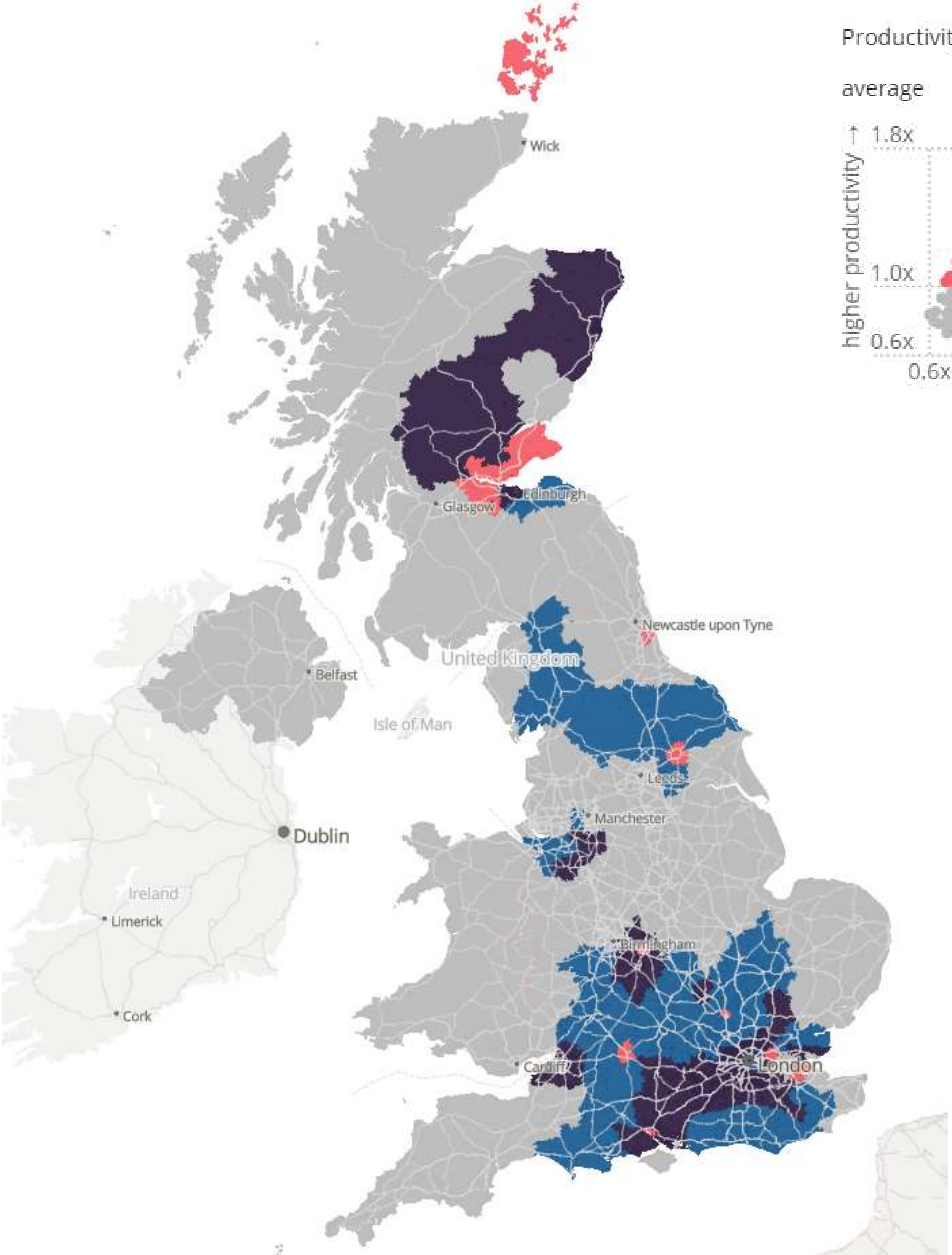
High productivity areas outside of London are often car manufacturing hubs, such as Sunderland, Swindon and Solihull.

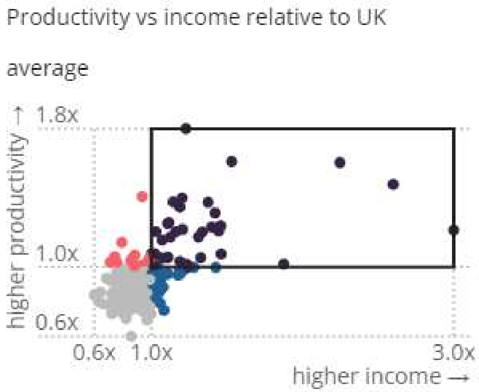
Lowest productivity areas are typically more rural, like East Sussex and Somerset.

A few low productivity areas are urban, like Wolverhampton, Stoke-on-Trent or Greater Manchester North East including Oldham and Rochdale.



Clear north-south divide at a regional level. South of England and East Midlands income tends to exceed productivity. Elsewhere they do not.





In 2018, areas with above average productivity and income were mostly in southern England and parts of Scotland (top right of scatter chart).

Areas with below average productivity but above average income were mostly rural areas within commuting distance of large cities.

Areas with above average productivity but below average income were mostly urban areas outside of London.

In England, a significant number of southern areas had higher than average income, likely due to wider influence of business and commuting around London.

Table 1: Gross disposable household incomeÂ¹, UK and constituent countries and regions, 2018Â²

Countries and regions of the UK	PopulationÂ³	GDHI per head (Â£)Â¹	GDHI per head growth on 2017 (percentage)	GDHI per head index (UK=100)	Total GDHI (Â£ million)	Total GDHI growth on 2017 (percentage)	Share of the UK population (percentage)	Share of UK total GDHI (percentage)
UK	66,435,550	21,109	4.6	100	1,402,367	5.3	100	100
England	55,977,178	21,609	4.6	102.4	1,209,637	5.3	84.3	86.3
North East	2,657,909	16,995	3.9	80.5	45,171	4.4	4	3.2
North West	7,292,093	18,362	4.4	87	133,897	4.9	11	9.5
Yorkshire and The Humber	5,479,615	17,665	4.5	83.7	96,796	5	8.2	6.9
East Midlands	4,804,149	18,277	3.6	86.6	87,804	4.3	7.2	6.3
West Midlands	5,900,757	18,222	4.7	86.3	107,526	5.4	8.9	7.7
East of England	6,201,214	22,205	4.9	105.2	137,698	5.5	9.3	9.8
London	8,908,081	29,362	5.2	139.1	261,562	6.1	13.4	18.7
South East	9,133,625	24,318	4.1	115.2	222,113	4.7	13.7	15.8
South West	5,599,735	20,907	5	99	117,071	5.8	8.4	8.3
Wales	3,138,631	17,100	4.4	81	53,669	4.8	4.7	3.8
Scotland	5,438,100	19,572	5.1	92.7	106,433	5.4	8.2	7.6
Northern Ireland	1,881,641	17,340	4.7	82.1	32,627	5.3	2.8	2.3

Source: Office for National Statistics â€“ Regional gross disposable household income (GDHI)

Notes

1 Figures may not sum to totals as a result of rounding; per head (Â£) figures are rounded to the nearest pound sterling.

2 2018 estimates are provisional.

3 Population estimates are sourced from the Population estimates for UK.

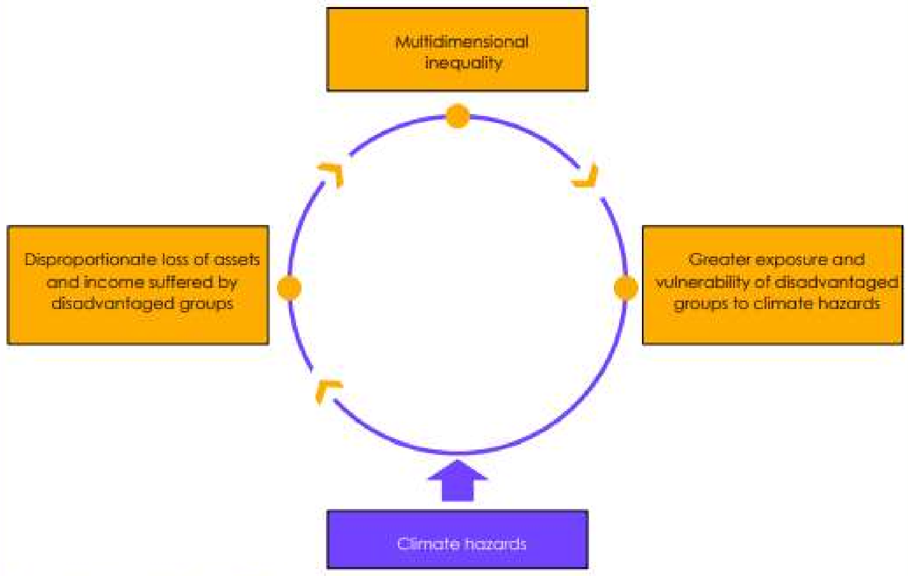
Climate Change and Inequality

- Strong adaptation planning should go beyond merely avoiding worsening inequality and endeavour to reduce inequality.
- This requires a particular focus on reducing risk for disadvantaged or exposed communities, and in keeping with the Government's commitment to levelling up across the whole of the UK to ensure that no community is left behind

CCRA3

- Existing inequalities mean that certain groups are more exposed to climate hazards (for example, coastal communities exposed to sea level rise) and/or more vulnerable to climate hazards (for example, low income households with limited financial savings).
- Climate change can exacerbate these existing inequalities, leading to a disproportionate impact on some populations over others and resulting in greater subsequent inequality in a negative cycle (Figure 3.2).

Figure 3.2 Cyclical relationship between climate hazards and inequality



Source: Islam, N. and J. Winkel, 2017.
Notes: Illustration of the negative cycle of climate hazards leading to greater inequality.

CCRA3

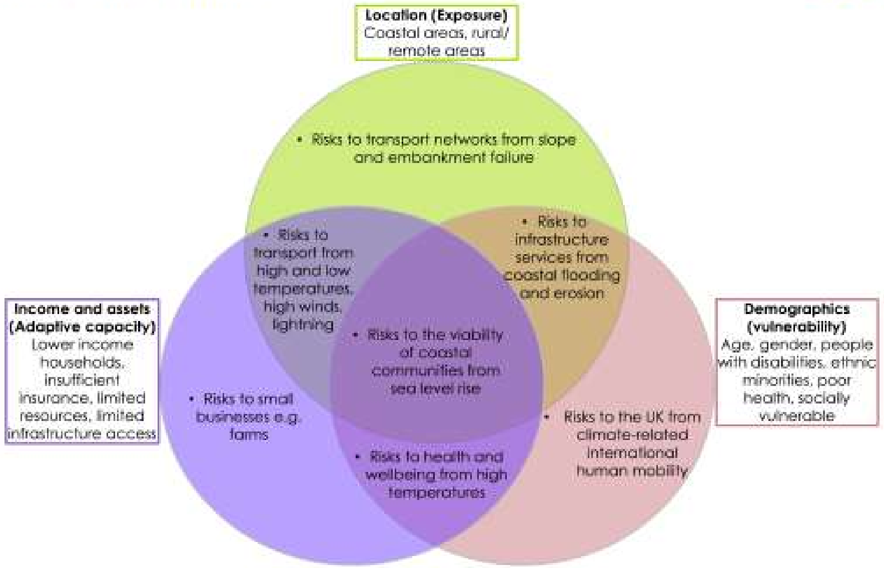
Distributional effects of climate change

- Location: high exposure across a range of risks in the Technical Report include coastal areas, rural, or remote areas
- Income and assets: key determinants of adaptive capacity and low income and assets result in households and businesses with insufficient insurance and limited resources for recovery
- Demographics: age, gender, and people with underlying poor health could increase vulnerability to individual risks (also an inter-generational effect, with future generations experiencing greater impacts and suffering compounded inequalities compared to current generations)

CCRA3 Risks

- Physical variables: temperature (highs and lows), heavy precipitation, wet/dry cycles, coastal erosion and flooding, high winds, lightning, sea level rise
- Sectors: transport, energy, agriculture, infrastructure
- Social: health and wellbeing, migration

Figure 3.3 Examples of climate risks with distributional effects



Source: CCC analysis.

Notes: Venn diagram with examples of risks which are increased by one or more distributional effects. Risks within the green circle are higher in specific locations due to higher exposure; risks within the pink circle are higher for certain demographic groups due to higher vulnerability; risks within the purple circle are higher for people or households with lower incomes and/or assets due to reduced adaptive capacity. This diagram is not a comprehensive mapping of risks against distributional effects but illustrates how these three main factors can overlap to compound some risks in particular situations.

CCRA3 Opportunities

- An opportunity for health and wellbeing from warmer summers and winters, with potential for increased use of outdoor space for physical, leisure and cultural activities.
- However, access to outdoor space has been shown to be concentrated among wealthier groups and be diminished for lower income and ethnic minority groups, presenting unequal opportunities from a changing climate.
- The decline of green spaces in urban settings is also a limiting factor on enjoying this benefit.
- Similarly, other opportunities from climate change may not be realised equitably.

Guidance on Accounting for the Effects of Climate Change – Treasury Green Book

- Following internal review, the UK Government is considering the case for extending the lower discount rate of 1.5%, applied to health impacts, to environmental impacts.
- The discount rate used for climate change risks should be lowered, as higher incomes in the future will not compensate for the welfare loss due to climate impacts, including some irreversible changes.

Homicide, Inequality, and Climate: Untangling the Relationships Kuznar and Day, 2021.

- Coccia (2018) importantly demonstrates that there is a strong correlation between hot climate and inequality that confounds the relationship between homicide, inequality, and temperature.
- The Gini coefficient measures overall patterns of inequality, the percent population below the poverty line measures the effects of absolute poverty, and a new measure of inequality based on wealth and status distributions provides an examination of these relationships for poor, middle class, and wealthy segments of society.
- The fundamental finding is that inequality is the prime driver of homicide rather than temperature, although inequality-driven risk sensitivities of poor, middle-class, and wealthy segments of society interact with temperature.
- Homicide rates are higher when poorer segments of populations are disproportionately influenced by temperature, middle class segments are influenced by inequality, and the wealthy are influenced by middle and impoverished class dynamics.
- These interactions have potential policy implications and deserve further scrutiny.

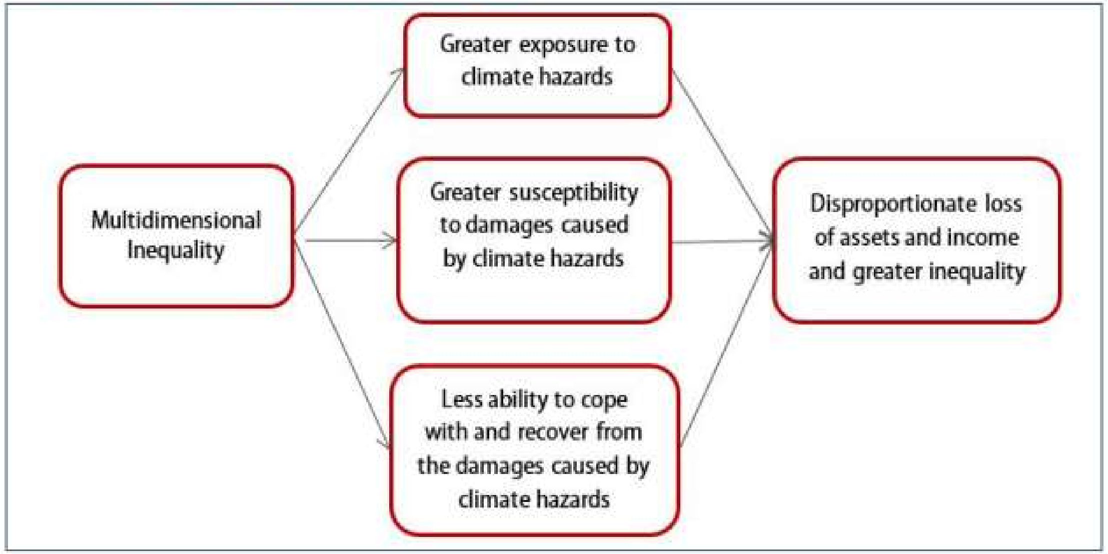
Climate Change, Temperature, and Homicide: A Tale of Two Cities, 1895–2015. Lynch et al., 2020.

- This study examined the long-term temperature–crime association for homicides in New York and London for 1895–2015. Consistent with previous studies examining seasonal weather and crime patterns, we found a positive correlation between annual homicide rates and temperature, but only at the bivariate level.
- This relationship became statistically insignificant in both New York and London when gross domestic product is controlled.
- Moreover, the bivariate relationship between temperature and homicide is statistically insignificant when correcting for nonstationarity.
- Thus, it does not appear that climate change has led to higher rates of homicide in New York and London over the long term.
- These nonfindings are important because they suggest that **studies of climate change and violence might do well to consider alternative mechanisms that mediate the relationship between climate change and violence.**

Climate Change and Social Inequality* Islam and Winkel, 2017.

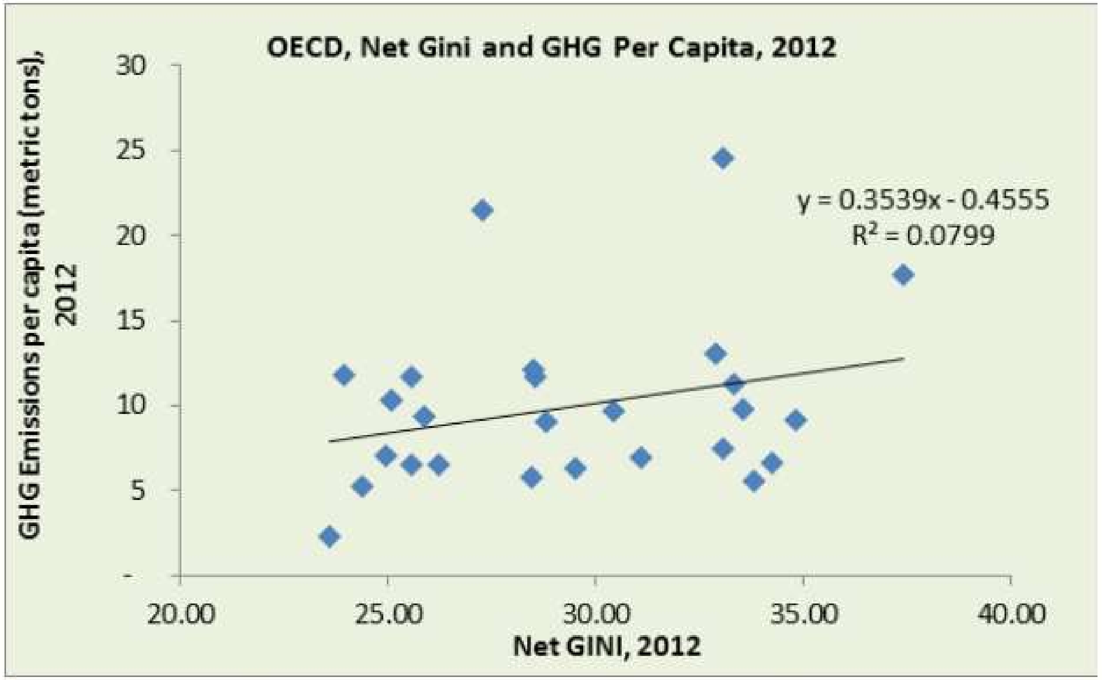
- Initial inequality causes the disadvantaged groups to suffer disproportionately from the adverse effects of climate change, resulting in greater subsequent inequality.
- Three main channels:
  - (a) increase in the exposure of the disadvantaged groups to the adverse effects of climate change;
  - (b) increase in their susceptibility to damage caused by climate change; and
  - (c) decrease in their ability to cope and recover from the damage suffered

Figure 1
Three effects of inequality on disadvantaged groups



- Among OECD countries, those with higher inequality tend to have higher per capita levels of waste generation, consumption of water, and consumption of meat and fish.

Positive relationship between inequality and per capita GHG emission among OECD countries



Inequality links

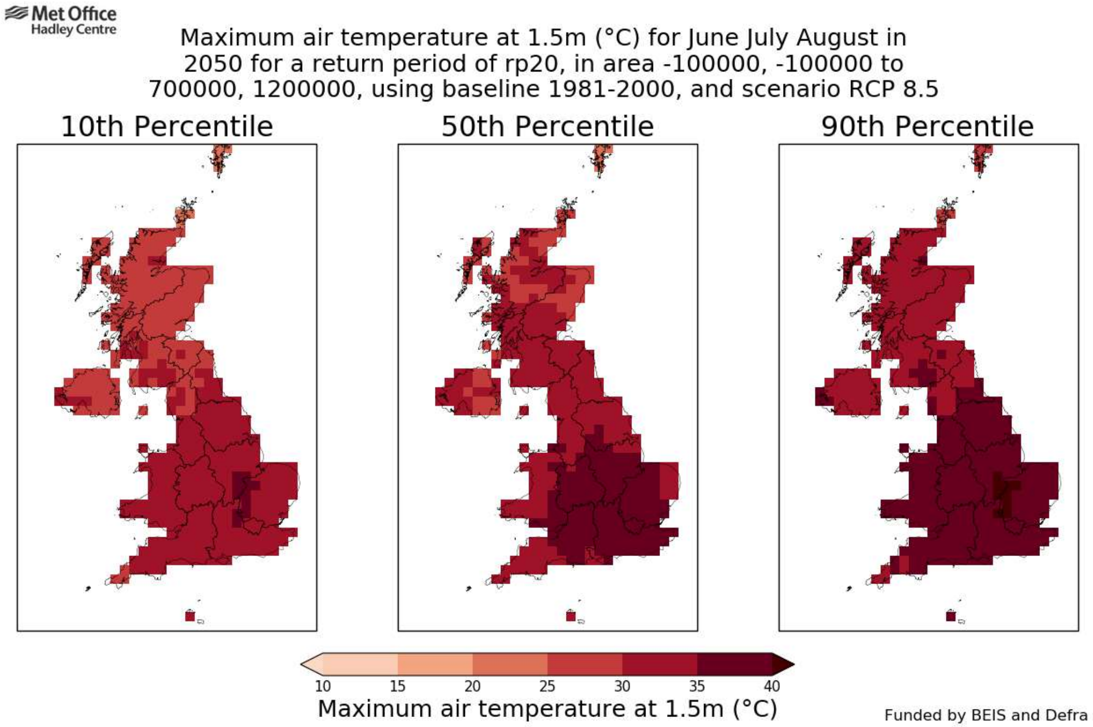
- https://equalitytrust.org.uk/blog/why-climate-change-inequality-issue
- https://www.cardiff.ac.uk/news/view/2605846-report-calls-for-urgent-action-on-climate-change-inequality
- https://www.gov.uk/government/news/environmental-inequality-must-not-be-ignored
- https://www.economicsobservatory.com/how-does-climate-change-shape-inequality-poverty-and-economic-opportunity
- https://www.un.org/esa/desa/papers/2017/wp152_2017.pdf
- https://www.cse.org.uk/projects/view/1237
- https://www.instituteofhealthequity.org/in-the-news/press-releases-and-briefings-/health-inequalities-climate-change-assessed-together-to-inform-sixth-carbon-budget

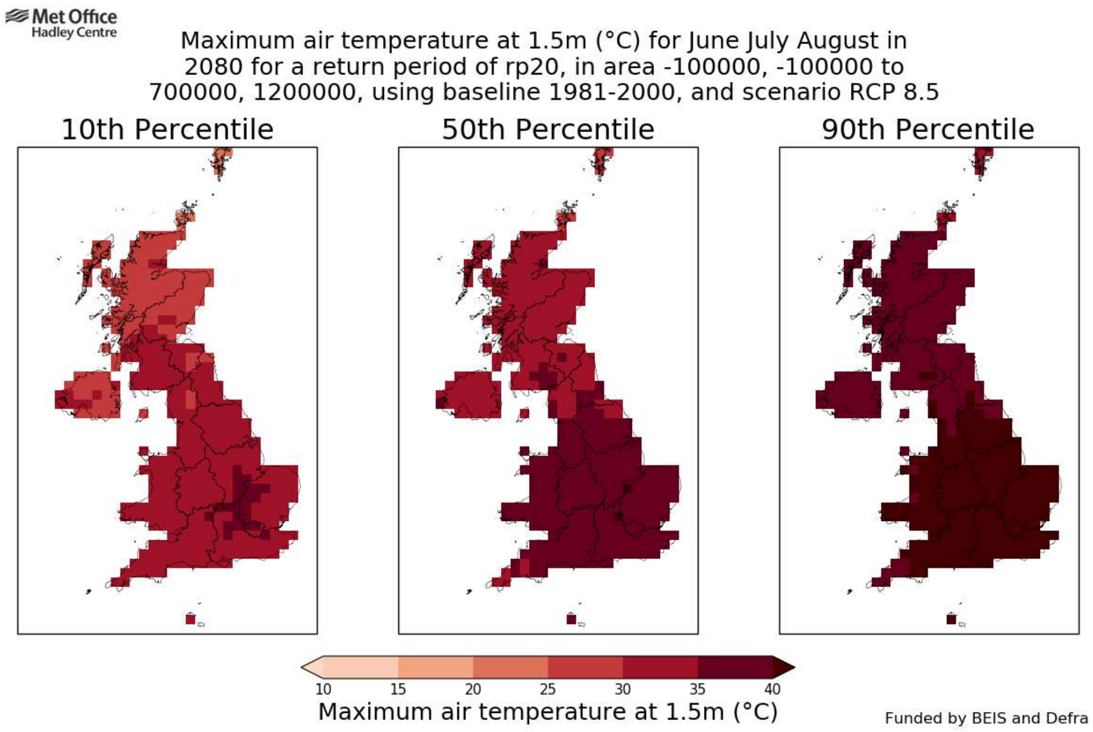
UKCP18 regions

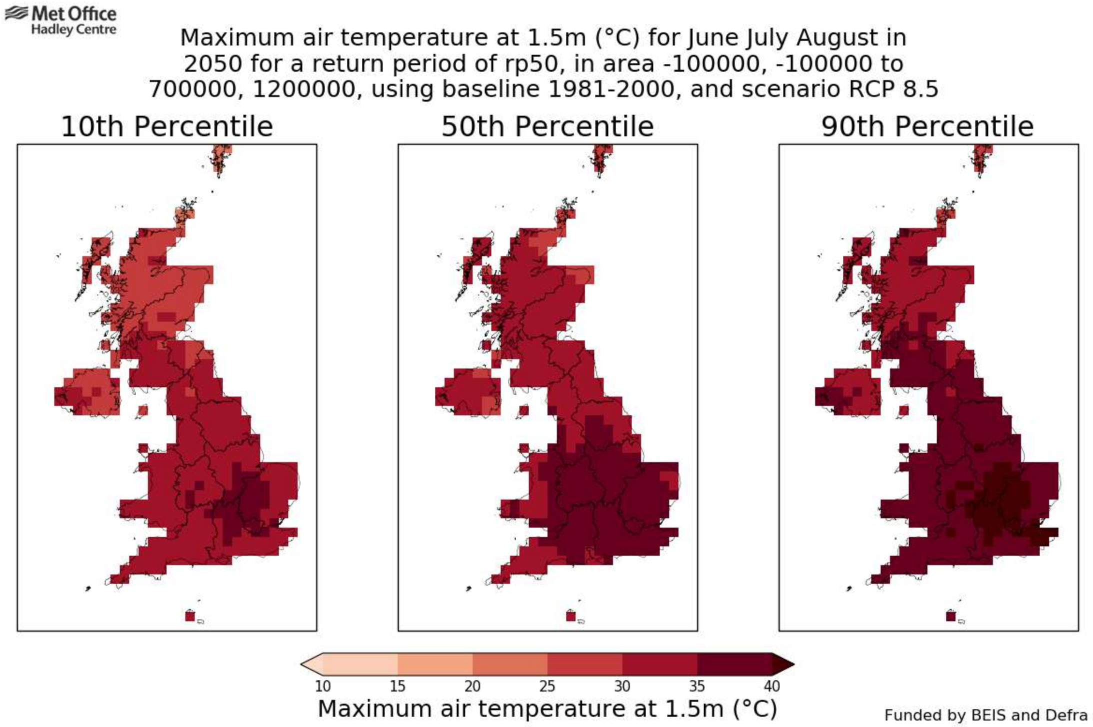
Crime data regions

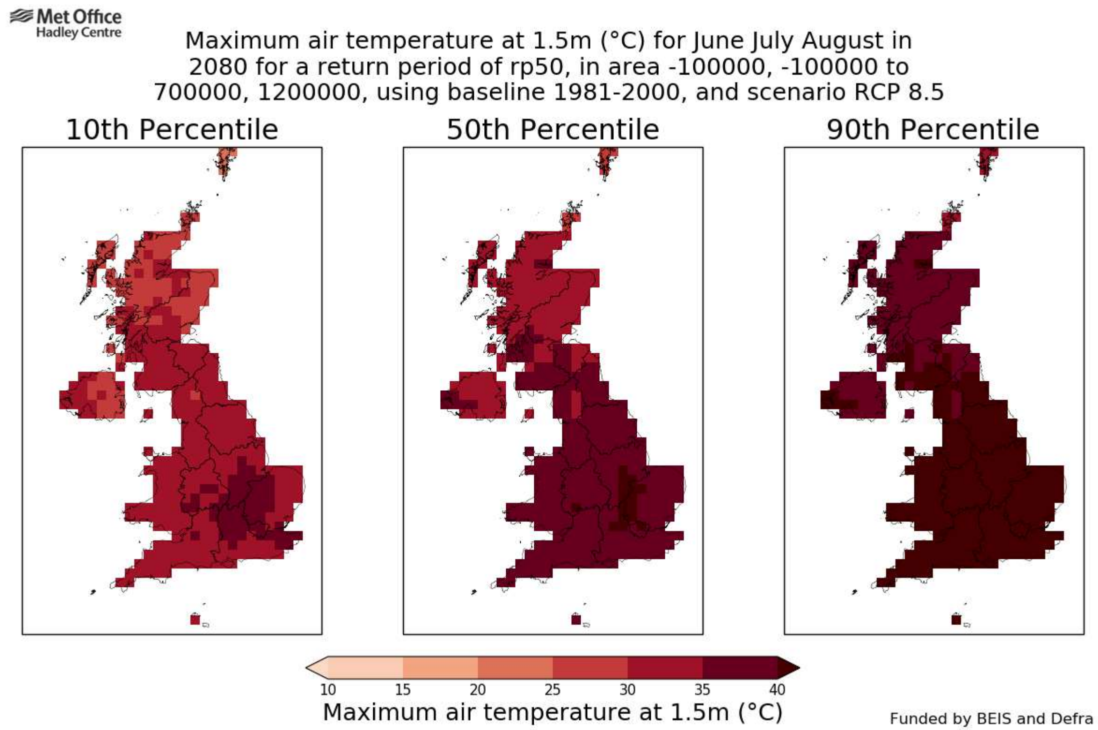
Physical Change

- Temperature (highs and lows)
- Heavy precipitation, wet/dry cycles, landslides
- Coastal erosion and flooding
- High winds
- Lightning
- Sea level rise


Met Office
Hadley Centre
Maximum air temperature at 1.5m (°C) for June July August in
2050 for a return period of rp20, in area -100000, -100000 to
700000, 1200000, using baseline 1981-2000, and scenario RCP 8.5
10th Percentile
50th Percentile
90th Percentile
10
15
20
25
30
35
40
Maximum air temperature at 1.5m (°C)
Funded by BEIS and Defra

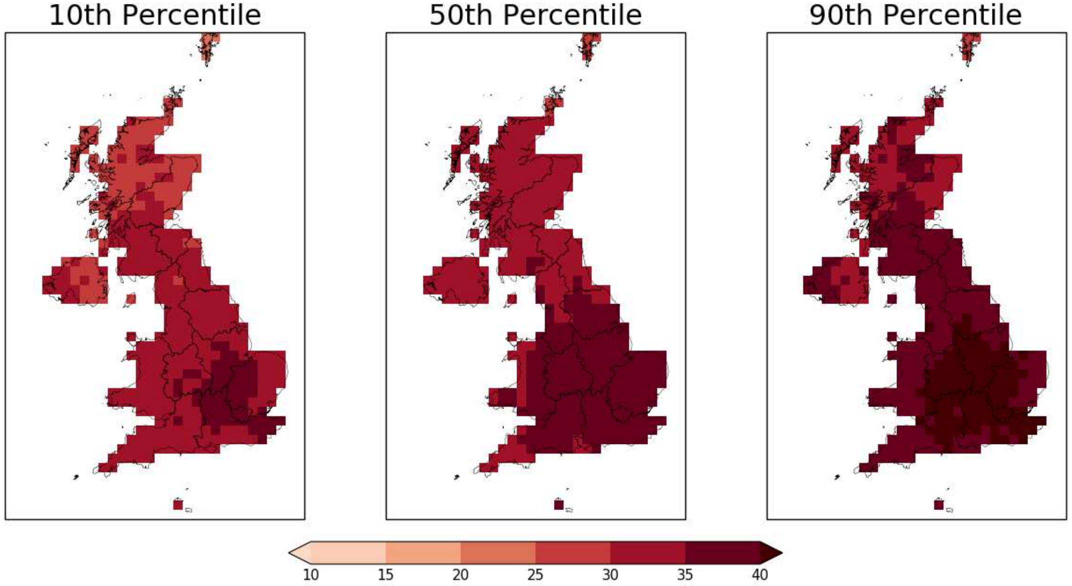

Met Office
Hadley Centre
Maximum air temperature at 1.5m (°C) for June July August in
2080 for a return period of rp20, in area -100000, -100000 to
700000, 1200000, using baseline 1981-2000, and scenario RCP 8.5
10th Percentile
50th Percentile
90th Percentile
10
15
20
25
30
35
40
Maximum air temperature at 1.5m (°C)
Funded by BEIS and Defra


Met Office
Hadley Centre
Maximum air temperature at 1.5m (°C) for June July August in
2050 for a return period of rp50, in area -100000, -100000 to
700000, 1200000, using baseline 1981-2000, and scenario RCP 8.5
10th Percentile
50th Percentile
90th Percentile
10
15
20
25
30
35
40
Maximum air temperature at 1.5m (°C)
Funded by BEIS and Defra


Met Office
Hadley Centre
Maximum air temperature at 1.5m (°C) for June July August in
2080 for a return period of rp50, in area -100000, -100000 to
700000, 1200000, using baseline 1981-2000, and scenario RCP 8.5
10th Percentile
50th Percentile
90th Percentile
10
15
20
25
30
35
40
Maximum air temperature at 1.5m (°C)
Funded by BEIS and Defra

Met Office
Hadley Centre

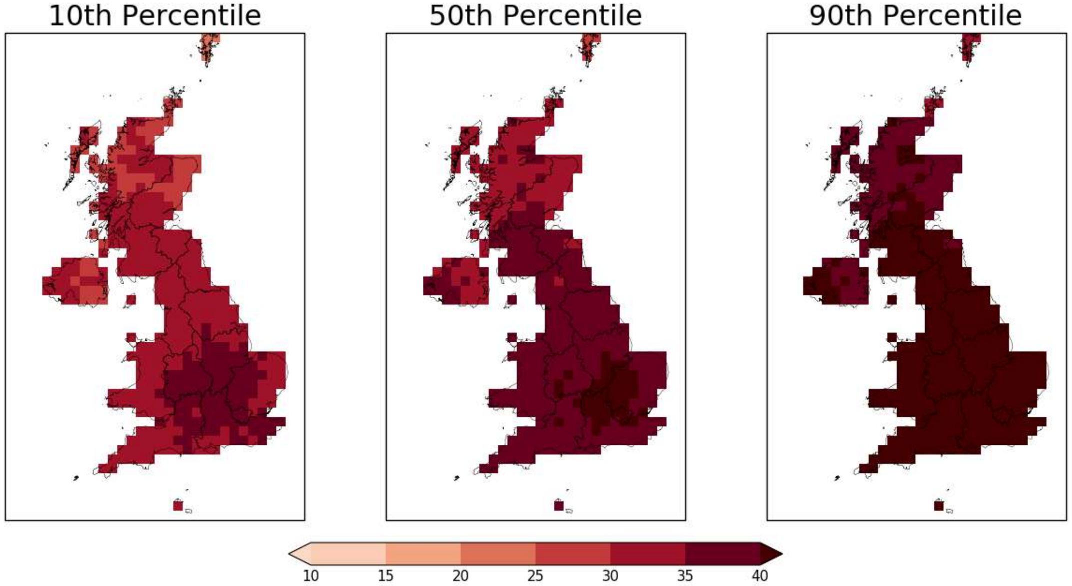
Maximum air temperature at 1.5m (°C) for June July August in 2050 for a return period of rp100, in area -100000, -100000 to 700000, 1200000, using baseline 1981-2000, and scenario RCP 8.5



Funded by BEIS and Defra

Met Office
Hadley Centre

Maximum air temperature at 1.5m (°C) for June July August in 2080 for a return period of rp100, in area -100000, -100000 to 700000, 1200000, using baseline 1981-2000, and scenario RCP 8.5



Funded by BEIS and Defra

Min temp Winter	RCP4.5						RCP8.5					
Compared to 1981-2010 baseline	2050s			2080s			2050s			2080s		
	10th	50th	90th	10th	50th	90th	10th	50th	90th	10th	50th	90th
Wales	0.147808	1.145738	2.279547	0.419914	1.75509	3.265555	0.41852388	1.612899	3.048139	1.016151	2.948949	5.303077
Northern Ireland	0.080357	0.986381	2.056519	0.330975	1.618593	3.110099	0.28881344	1.416803	2.780361	0.838803	2.712258	5.033824
Isle of Man	0.109664	1.004038	2.062628	0.314669	1.593863	3.061728	0.30550882	1.429677	2.788756	0.812569	2.672097	4.980259
Channel Islands	0.186762	1.208697	2.367535	0.464243	1.836454	3.399766	0.46271023	1.696455	3.190745	1.096257	3.105775	5.56294
Yorkshire and Humber	0.144825	1.140849	2.280773	0.42525	1.761403	3.286478	0.4145047	1.611596	3.063399	1.028659	2.970979	5.34838
West Scotland	0.111103	1.088988	2.238993	0.319764	1.695604	3.277154	0.33647472	1.552725	3.020107	0.868391	2.877567	5.356794
West Midlands	0.157746	1.156807	2.299317	0.420817	1.77079	3.297175	0.42709866	1.635771	3.09009	1.0267	2.987272	5.377785
South West England	0.168812	1.187125	2.350763	0.453028	1.820396	3.372497	0.44447482	1.673578	3.154828	1.069398	3.064804	5.489052
South East England	0.176948	1.211811	2.393343	0.458093	1.859938	3.450339	0.45739734	1.714393	3.232966	1.09686	3.151045	5.654194
North West England	0.138475	1.092903	2.21993	0.325521	1.693168	3.245445	0.35697865	1.556106	3.003809	0.870488	2.857016	5.311388
North Scotland	-0.01066	0.945285	2.016996	-0.00365	1.295041	2.754873	0.13308728	1.332926	2.725981	0.367899	2.318608	4.592042
North East England	0.129432	1.084131	2.21476	0.333614	1.704109	3.275957	0.34976628	1.549547	2.999886	0.877392	2.876826	5.350684
London	0.177459	1.207794	2.386322	0.454167	1.852189	3.435514	0.4564437	1.707615	3.221676	1.090395	3.134189	5.628966
East Scotland	0.121732	1.119954	2.291821	0.332669	1.742964	3.368467	0.3532996	1.595194	3.098135	0.891118	2.956069	5.506247
East of England	0.163197	1.18559	2.354099	0.453325	1.846203	3.42125	0.43966186	1.679136	3.183205	1.087604	3.116113	5.598741
East Midlands	0.156462	1.154063	2.296647	0.429438	1.782077	3.312542	0.42599636	1.633355	3.094406	1.041085	3.006025	5.409734

Figure 4.3.1. Future change in cold winter days. Changes for (left) 2nd lowest, (centre) central and (right) 2nd highest member locally, for CPM_new at native 2.2km resolution.

Changes (in °C) correspond to the difference between the future (2061-2080) and baseline (1981-2000) periods. Cold winter days are defined as the 1st percentile of daily mean temperature in DJF. UK-average changes are indicated in each panel.

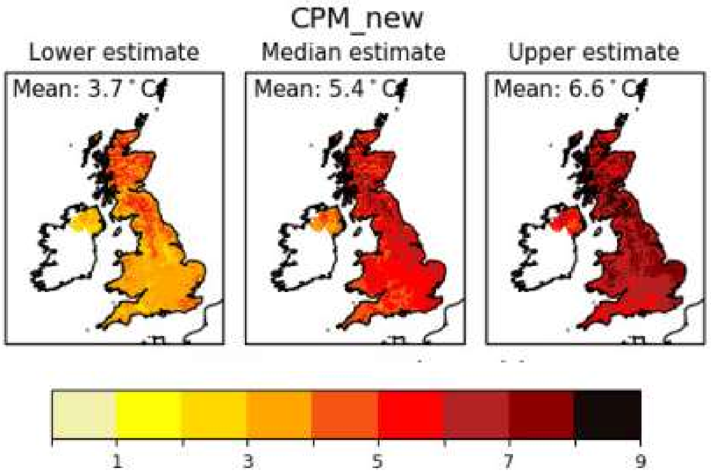


Figure 4.3.3. Future change in wet day frequency in winter. As Fig 4.3.1 but for future change in wet day frequency in winter. Wet days are defined as days with precipitation >1mm/d.

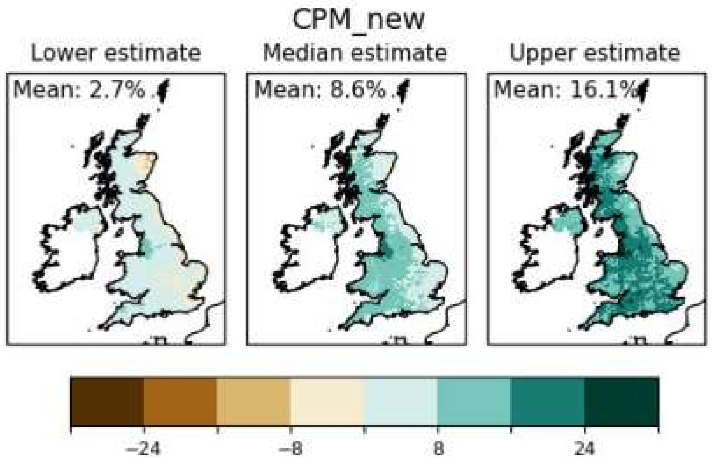
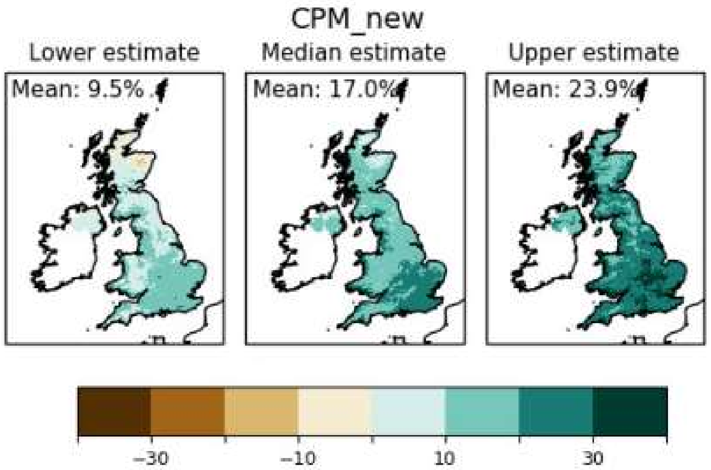


Figure 4.3.4. Future change in wet day intensity in winter. As Fig 4.3.1 but for future change in wet day intensity in winter. Wet days are defined as days with precipitation >1mm/d.



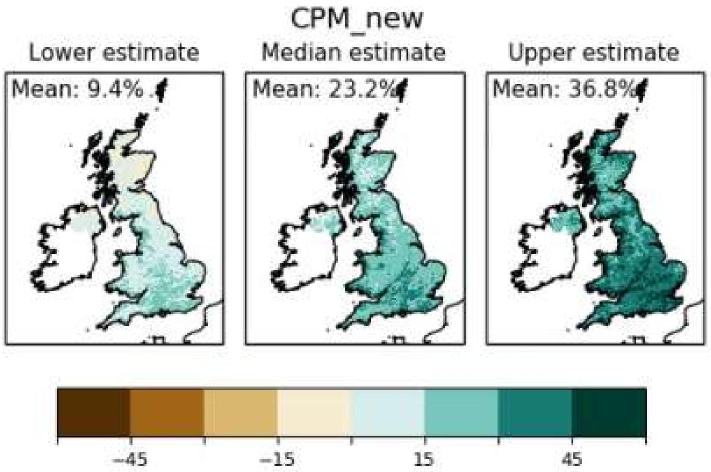


Figure 4.3.5. Future change in heavy daily events in winter. As Fig 4.3.1 but for future change in the 99th percentile of daily mean precipitation in DJF.

Figure 4.3.6. Future change in wet day frequency in summer As Fig 4.3.1 but for future change in wet day frequency in summer. Wet days are defined as days with precipitation >1mm/d.

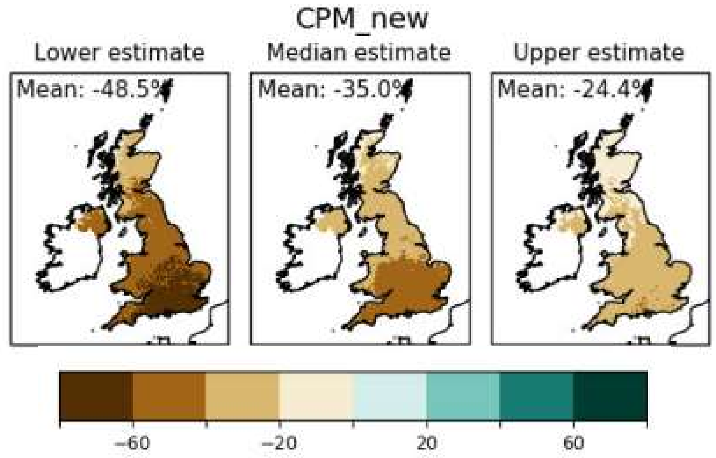
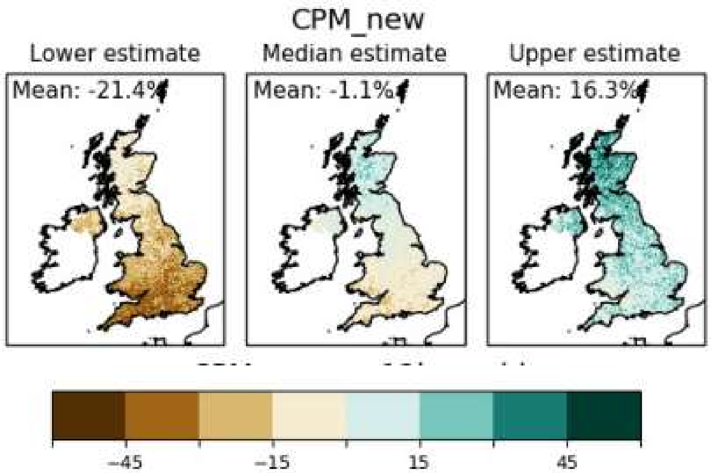


Figure 4.3.7. Future change in wet day intensity in summer. As Fig 4.3.1 but for future change in wet day intensity in summer. Wet days are defined as days with precipitation >1mm/d.



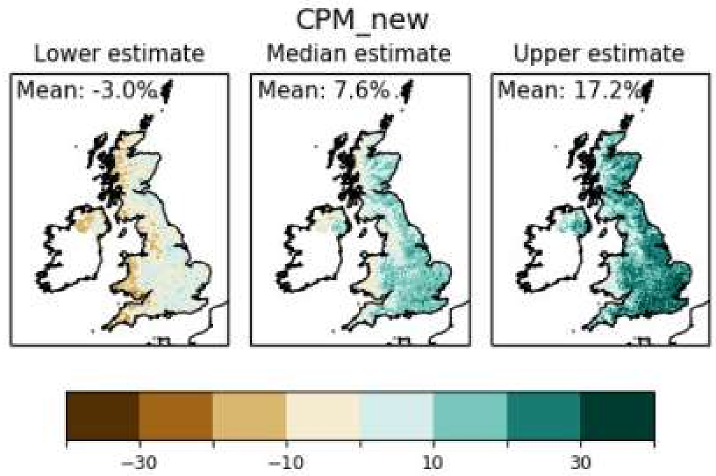


Figure 4.3.8. Future change in heavy daily events in summer. As Fig 4.3.1 but for future change in the 99th percentile of daily mean precipitation in JJA

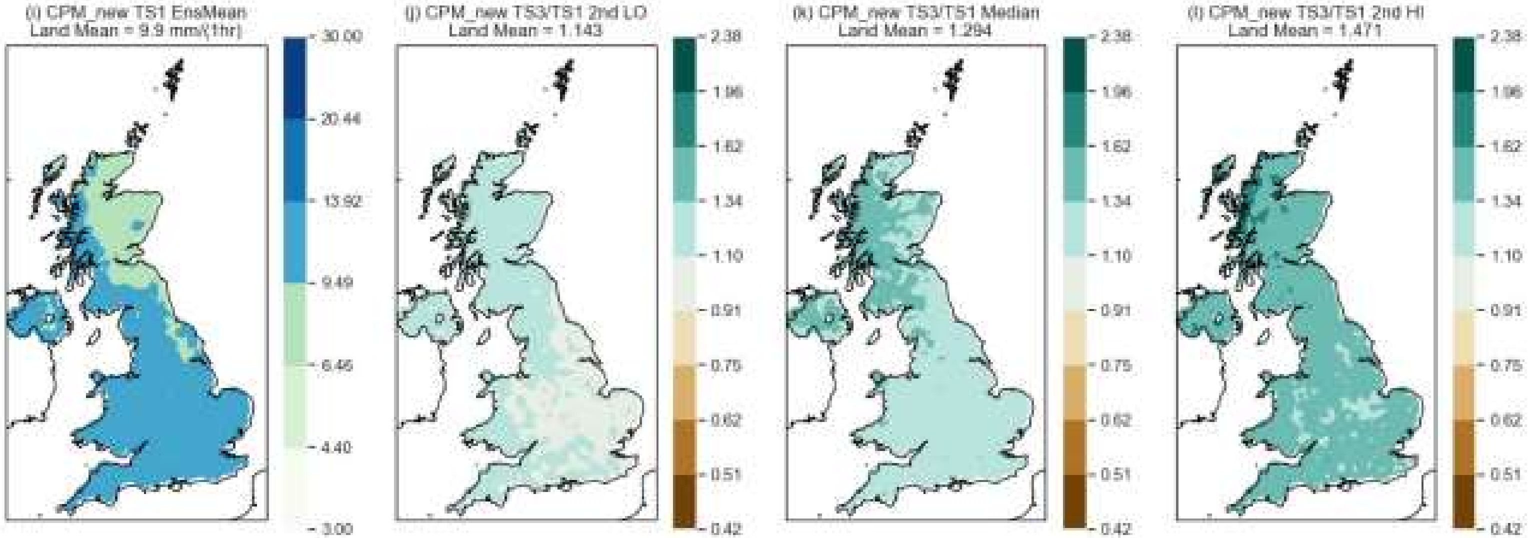
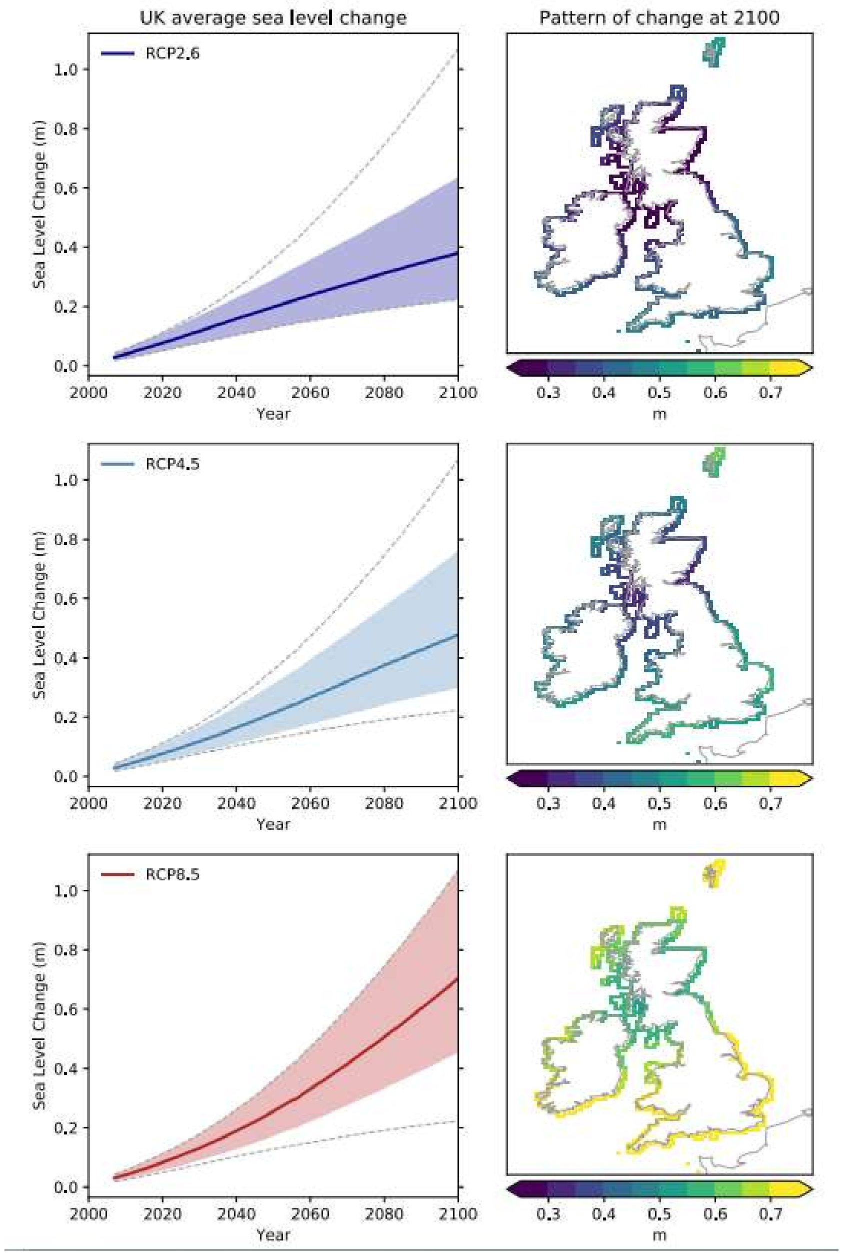


Figure 4.5.1. Future change in 2 year return level of daily maximum hourly precipitation. Shown are (a,e,i) ensemble-mean estimates of present-day return level (mm/h) for TS1 (Time slice 1, 1981-2000) and the ratio of future (TS3, 2061-80, RCP8.5) to present-day return levels for (b,f,j) 2nd lowest member locally, (c,g,k) central estimate and (d,h,l) 2nd highest member locally, for RCM, CPM_orig and CPM_new. This is for hourly precipitation data from all seasons, regridded to a common 12km grid before calculation of return levels.

Figure 1.
Left panels: time series of mean annual sea level change for the UK compared to present (1981-2000) for a high emissions scenario (RCP8.5). The bold lines are the median change and the shaded area the likely range (5th-95th percentile). The dotted line shows the range across low to high emissions scenarios (RCP2.6, RCP4.5 and RCP8.5).

Right panels: regional relative sea level change around the UK and Ireland coastline in 2100 for RCP8.5. From Figure 3.1.3 of Palmer et al, (2018)



There are no compelling trends in storminess, as determined by maximum gust speeds, from the UK wind network over the last four decades.

The global projections over the UK show:

• an increase in near surface wind speeds over the UK for the second half of the 21st century for the winter season when more significant impacts of wind are experienced (see Figure 1). This is accompanied by an increase in frequency of winter storms over the UK. However, the increase in wind speeds is modest compared to interannual variability for the PPE-15.

• no trend in the wind speed over the UK for the mean of the CMIP5-13.

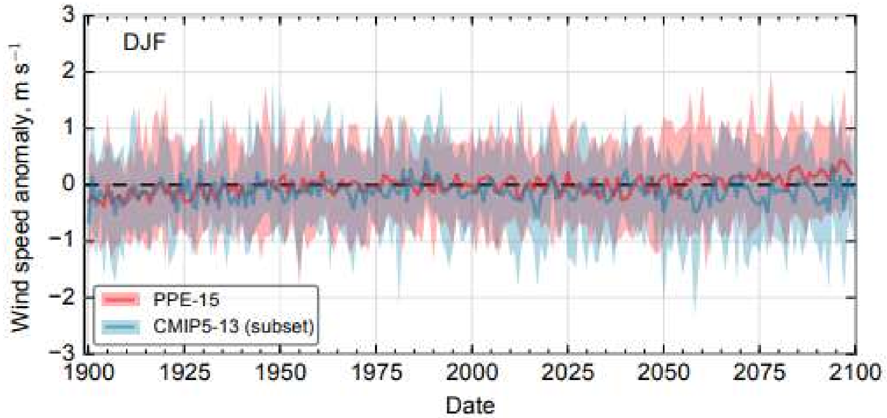


Figure 1 Global projections for changes in winter (DJF) mean near surface wind speed over the UK for 1900-2100 with respect to 1981-2000. The red line is the mean of the PPE-15 and blue line is the mean of the CMIP5-13. The red and blue shading represents the range of values from PPE-15 and CMIP5-13 respectively. Note that only 9 of the 13 models in CMIP5-13 have wind speed data for 1900-2100.

CPM_new shows a future increase in surface winds over western parts of the UK and over the ocean in winter (Fig 4.5.16). Future changes in the RCM are similar over the ocean, but CPM_new shows a greater tendency for decreasing wind speed over the south and east of the UK. Code changes in the 2.2km reruns lead to greater increases in wind speeds over the sea to the north of the UK and also over most land regions, except the Scottish mountains. Local differences in future changes in mean daily maximum wind speeds between CPM_new and CPM_orig can be up to 0.2 m/s, over the Cairngorms and over the sea to the NW of the UK, where they are significant compared to the spread across the CPM_orig ensemble (standard deviation of <0.12 m/s over land and <0.2 m/s over Scottish coastal waters, Kendon et al, 2020b).

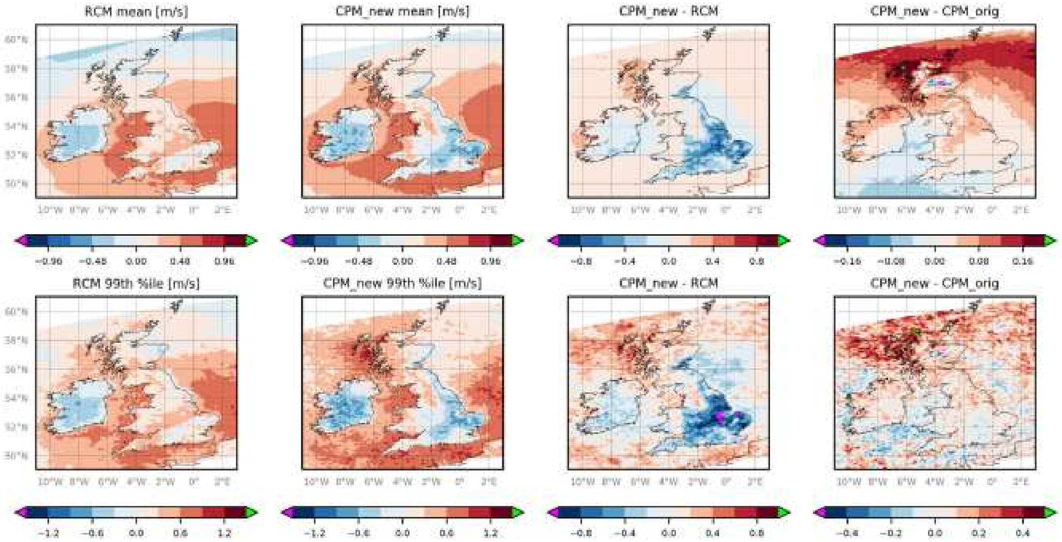


Figure 4.5.16. Future change (m/s) in surface winds in winter. Changes for (top) mean and (bottom) 99th percentile of daily maximum wind speeds for (left) RCM and (centre left) CPM_new ensemble means. Also shown are differences between changes for (centre right) CPM_new minus RCM and (right) CPM_new minus CPM_orig, for data regridded to 12km RCM grid. Future changes correspond to the difference between the future (2061-2080) and baseline (1981-2000) periods.

In summer, there is a widespread decrease in wind speeds, with future decreases over the land greater in CPM_new compared to the RCM (Fig 4.5.17). Differences between CPM_new and CPM_orig are small (<0.1m/s everywhere for mean daily max wind speeds), with no significant impact of the rerun on CPMRCM differences.

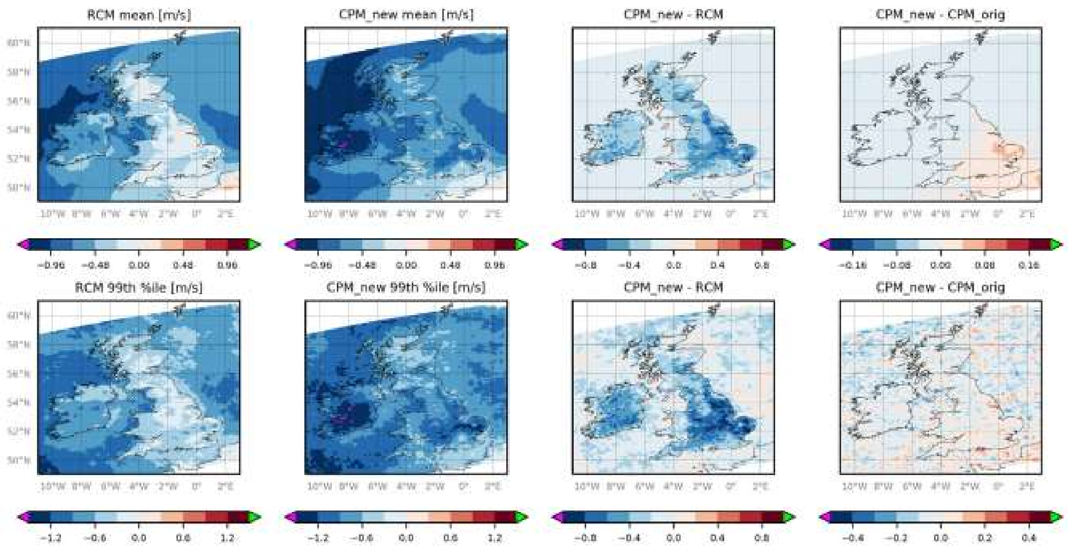


Figure 4.5.17. Future change (m/s) in surface winds in summer. As Fig 4.5.16 but for summer.

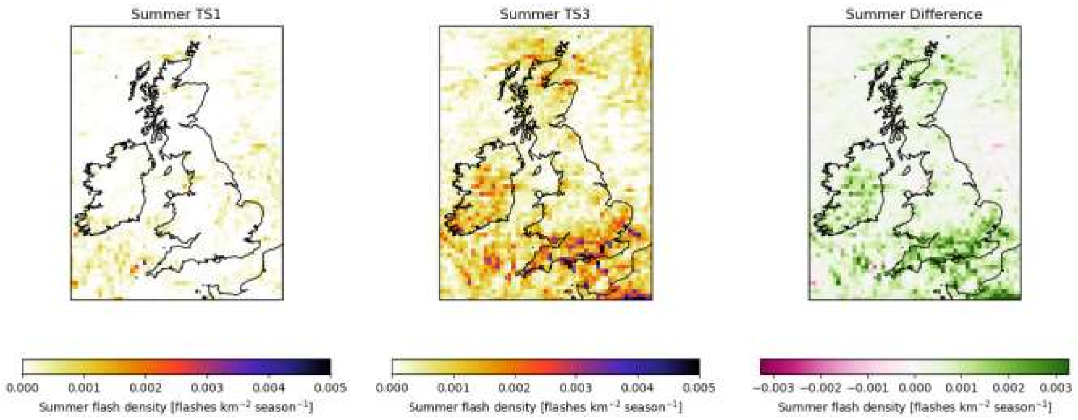


Figure 4.5.14. Lightning flashes in summer. As Fig 4.5.12 but for summer.

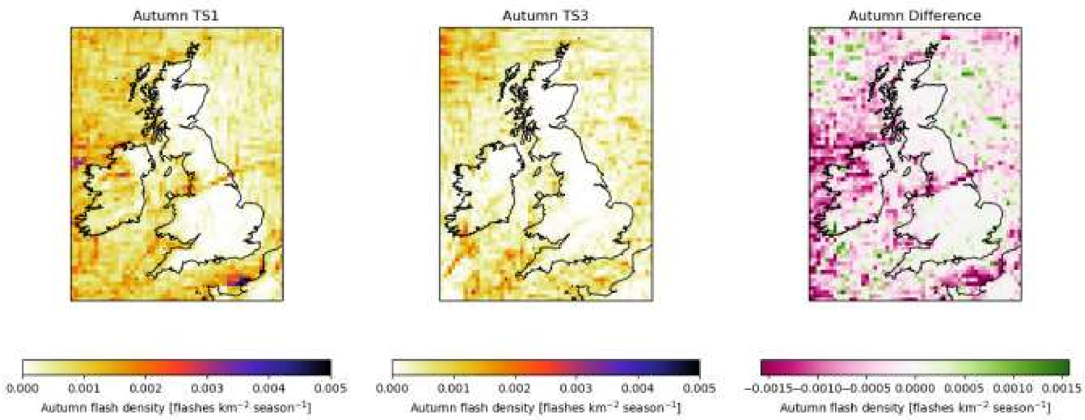


Figure 4.5.15. Lightning flashes in autumn. As Fig 4.5.12 but for autumn.

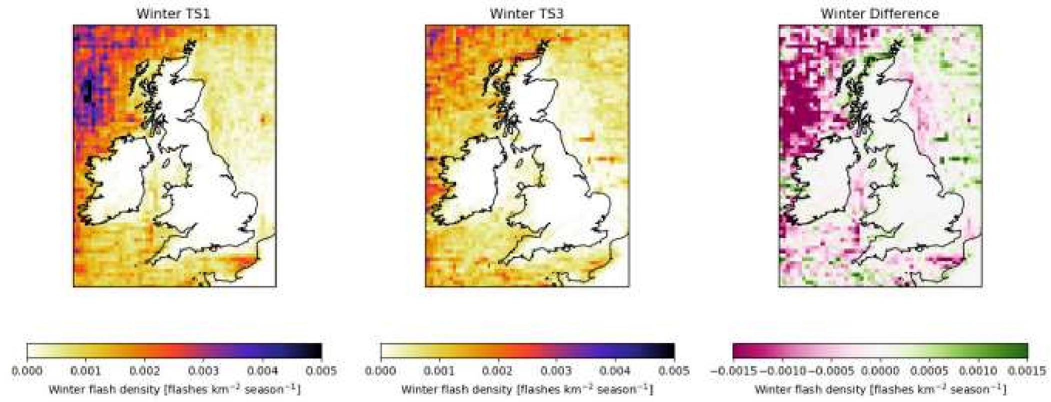


Figure 4.5.12. Lightning flashes in winter. Ensemble-average flashes per km^2 in CPM_new, for present-day (timeslice 1, TS1, left), future (timeslice 3, TS3, centre) and the difference (right) for winter. The data has been averaged over 8x8 boxes to improve the signal to noise.

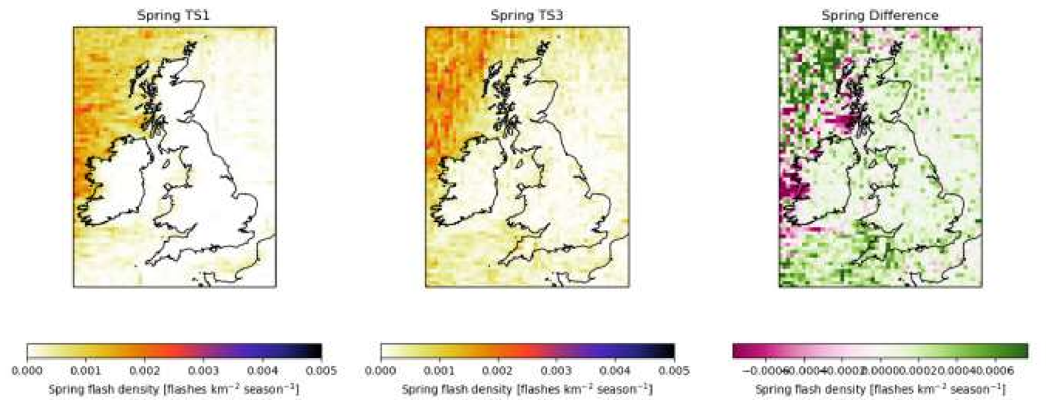


Figure 4.5.13. Lightning flashes in spring. As Fig 4.5.12 but for spring.

The Global PPE-15 and Regional RCM-12 projections show reduced soil moisture for the period 2061- 2080 under a high emissions scenario (RCP 8.5), compared to 1981-2000. The projected future changes are small in winter and spring, and larger in summer and autumn. The spatial pattern of changes is similar across PPE-15 and RCM-12, with the south-eastern UK showing greater summer drying than the northwest (Figure 1).

• Soil moisture observations suitable for comparison to climate models are few, so we use proxy observations (see ‘What do the projections show in recent climate?’ for more details). In the recent climate (1980-2000), the Global PPE-15 and Regional RCM-12 models agree well with the proxy observations in terms of duration and magnitude of the summer dry season, but show a delay in season onset and cessation (Figure 2).

• Both sets of models provide useful information regarding the direction of future changes (drier soils). However, given the differences between the models and observations in the recent climate, confidence is lower in the magnitude (by how much soils will dry) and the timing (when drying will occur).

• When analysing soil moisture and related variables in the UKCP suite of products, we advise the use of both sets of models in any analysis and full recognition of the caveats and limitations of the datasets before using the data, for example for impacts modelling

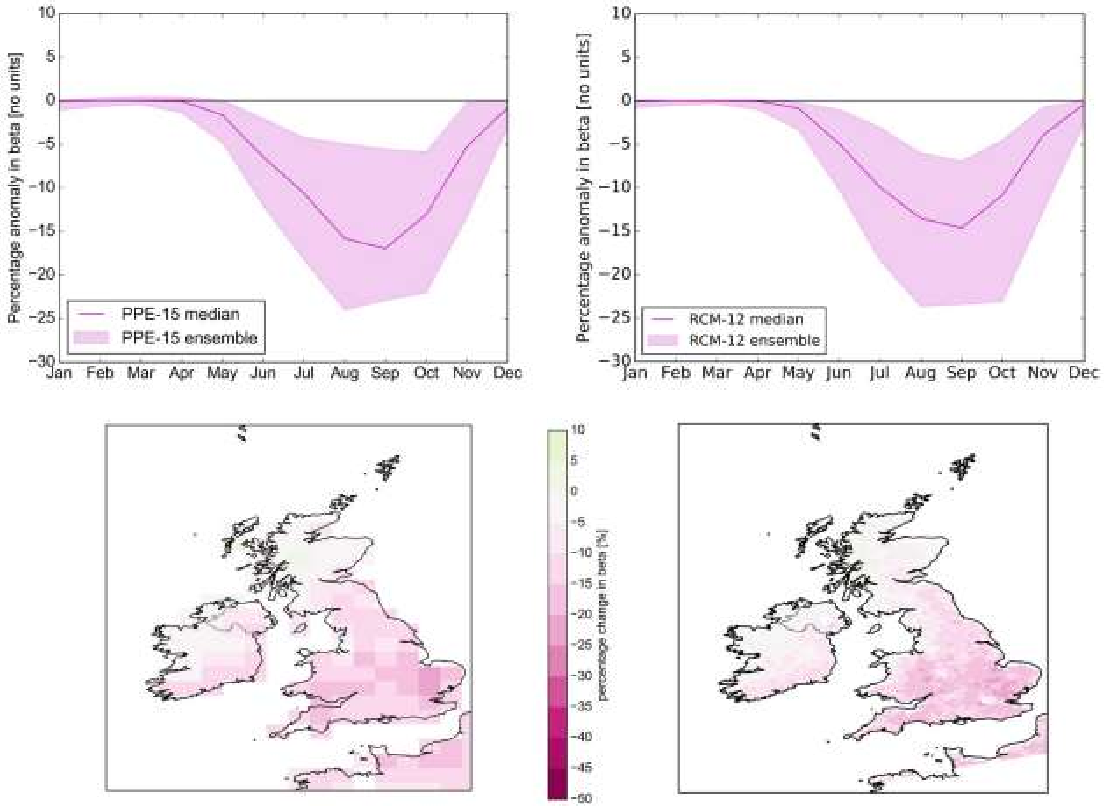


Figure 1 Top: Annual Cycles of UK percentage change in soil moisture availability factor (beta or β) with the ensemble median shown as a line and the ensemble spread shaded for [left] PPE-15 and [right] RCM-12 projections. Bottom: Maps of annual percentage change in the June-July-August median beta(β) in [left] PPE- 15 and [right] RCM-12 projections. The percentage change is the future period (2060-2080) minus the baseline (1980-2000), as a percentage of the values in the baseline.

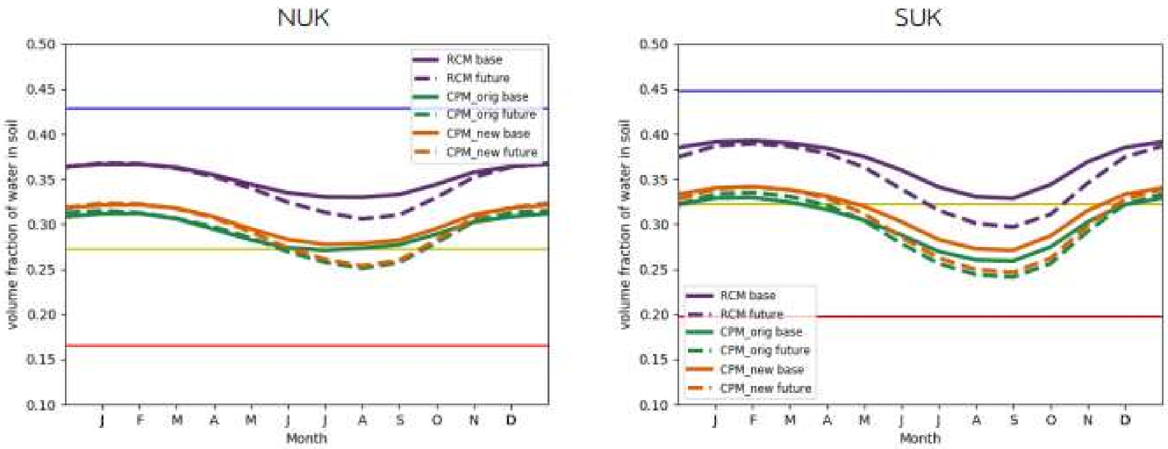


Figure 4.5.7. Future change in the annual cycle of soil moisture in the top 1m of soil. Ensemble-mean volume fraction of water in the soil (m^3/m^3) in the baseline (1981-2000) and future (2061-80) periods, in the (orange) CPM_new, (green) CPM_orig and (purple) RCM, for the (left) northern-UK and (right) southern-UK. The blue line indicates soil moisture saturation; yellow line the critical point below which evapotranspiration becomes soil-moisture limited; and red line the wilting point.

Sectors

Transport	Risks to transport networks from slope and embankment failure Risks to transport from high and low temperatures, high winds, lightning
Energy	Risks and opportunities from summer and winter household energy demand Risks to hydroelectric generation from low or high river flows Risks to energy generation from reduced water availability Risks to energy from high and low temperatures, high winds, lightning
Agriculture	Risks to and opportunities for agricultural and forestry productivity Risks to agriculture from pests, pathogens and INNS
Infrastructure	Risks to infrastructure networks from cascading failures Risks to infrastructure services from river and surface water flooding Risks to infrastructure services from coastal flooding and erosion Risks to bridges and pipelines from flooding and erosion Risks to subterranean and surface infrastructure from subsidence
Business	Risks to business sites from flooding Risks to business locations and infrastructure from coastal change Risks to business from disruption to supply chains and distribution networks Risks from climate change on international trade routes Risks to businesses from water scarcity Risks to business from reduced employee productivity – infrastructure disruption and higher temperatures Opportunities for business - changing demand for goods and services

Social

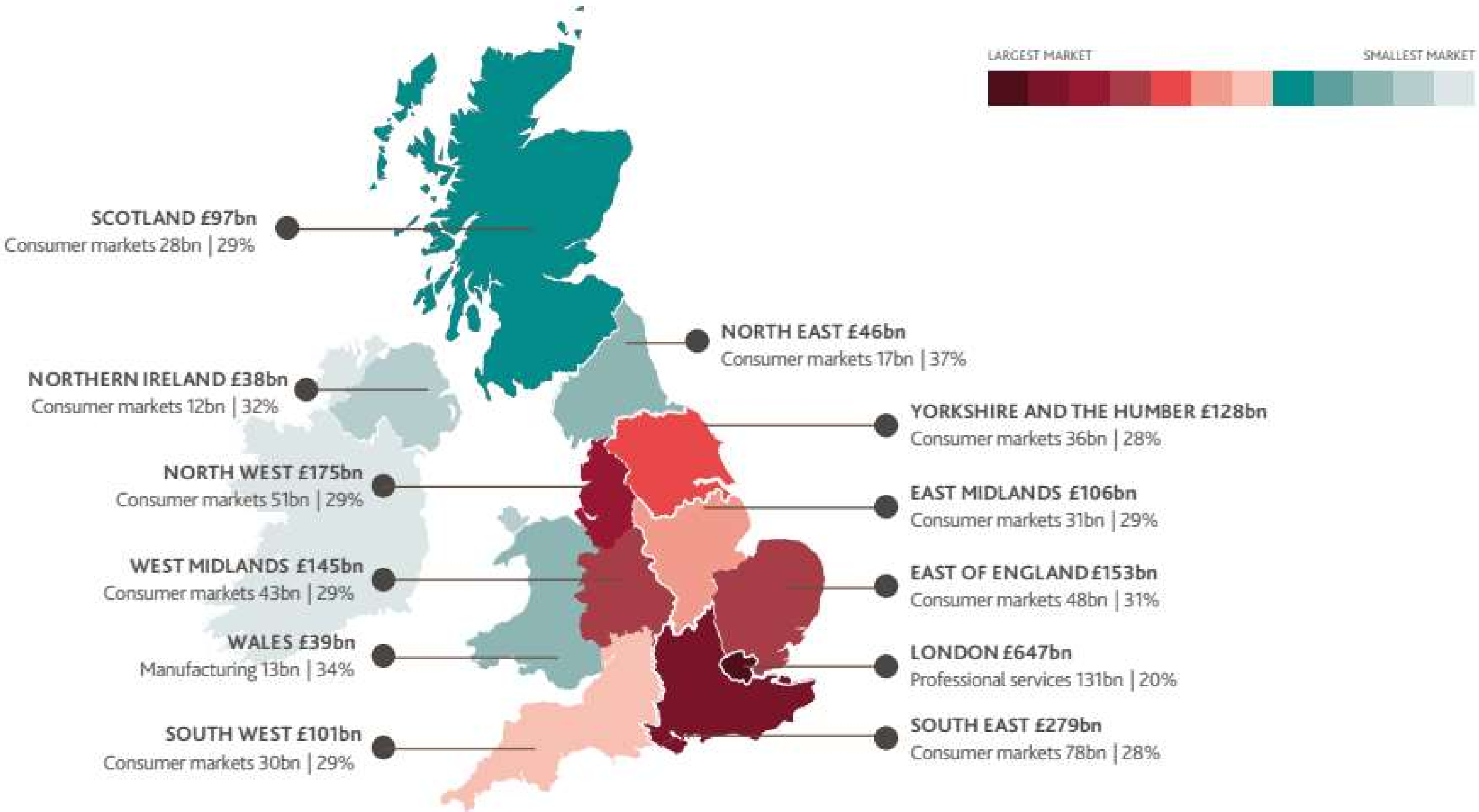
- Risks to health and wellbeing from high temperatures
- Opportunities for health and wellbeing from higher temperatures
- Risks to health and wellbeing from changes in air quality
- Risks to health from poor water quality and household water supply interruptions
- Risks to people, communities and buildings from flooding
- Risks to people, communities and buildings from sea level rise
- Risks to health from vector-borne diseases
- Risks to health and social care delivery
- Risks to education and prison services
- Risks to UK food availability, safety, and quality from climate change overseas
- Risk to UK public health from climate change overseas

Hazardous events	Main impact cascades		2020	2080
Climate driver: Increase in summer temperatures and reduction in summer mean rainfall				
Heatwaves and very hot days	Building overheating leading to building productivity loss		Medium	High
	Transport infrastructure overheating, or disruption to IT and comms services	Travel and freight delays	Low	Medium
		Transport infrastructure damage	Medium	Medium
Low summer river flows, and increase in river water temperatures	Environmental water shortages, more algal	Habitat degradation	Medium	High
	Reduction in water quality		N/A	Medium
Increase in soil desiccation	Soil condition and quality impact			Medium

Hazardous events	Main impact cascades		2020	2080
Climate driver: Extreme winter rainfall events and increase in winter mean rainfall				
River, surface and groundwater flooding	Power supply disvding		Low	Low
	Water/sewerage infrastructure flooded, reduced water quality or power supply disrupted	Water supply disrupted	Low	Medium
		Sewer flooding	Low	Medium
	Transport hubs or infrastructure flooded or damaged, or power supply disrupted	Travel and freight delayed	Medium	High
	Damaging water flows, slope or embankment failure	Transport infrastructure damaged	Medium	High
	Building flooded	Building productivity loss	Medium	High
		Building damaged	Medium	High
	Increase in run-off	Reduced water quality	Low	Low

Hazardous events	Main impact cascades		2020	2080
Climate driver: Sea level rise and storms				
Coastal flooding and erosion damage	Loss of natural flood defence		N/A	Medium
	Coastal squeeze		N/A	High
	Saline intrusion		N/A	High
	Near shore environmental impact		N/A	High
	Coastal building flooded/eroded	Coastal building productivity loss	N/A	Medium
		Coastal building damage	N/A	High

Consumer markets group = retail, wholesale, leisure and hospitality



LONDON £647BN

TOP 5 SECTORS	NUMBER OF COMPANIES	TURNOVER £'000
Professional services	3,037	131,248,816
Financial services	2,737	130,676,050
Consumer markets	2,648	146,046,947
Technology and Media	1,724	79,342,967
Not classified	1,204	55,153,645

NORTH WEST £175BN

TOP 5 SECTORS	NUMBER OF COMPANIES	TURNOVER £'000
Consumer markets	1,174	51,499,903
Manufacturing	882	35,819,325
Professional services	634	24,940,427
Financial services	416	18,654,942
Real estate and construction	394	14,480,942

EAST MIDLANDS £106BN

TOP 5 SECTORS	NUMBER OF COMPANIES	TURNOVER £'000
Consumer markets	671	31,021,232
Manufacturing	633	27,140,452
Professional services	272	11,186,420
Real estate and construction	208	7,760,408
Financial services	201	8,075,350

SOUTH EAST £279BN

TOP 5 SECTORS	NUMBER OF COMPANIES	TURNOVER £'000
Consumer markets	1,601	78,317,363
Professional services	961	42,367,071
Manufacturing	868	38,074,431
Financial services	584	28,770,744
Technology and Media	582	23,457,819

EAST OF ENGLAND £153BN

TOP 5 SECTORS	NUMBER OF COMPANIES	TURNOVER £'000
Consumer markets	1,005	48,185,127
Manufacturing	542	23,241,710
Professional services	521	25,046,436
Real estate and construction	400	17,014,796
Financial services	272	11,718,283

WEST MIDLANDS £145BN

TOP 5 SECTORS	NUMBER OF COMPANIES	TURNOVER £'000
Consumer markets	884	42,736,147
Manufacturing	813	36,223,349
Professional services	399	15,928,087
Financial services	283	12,486,759
Real estate and construction	248	9,438,192

YORKSHIRE AND THE HUMBER £128BN

TOP 5 SECTORS	NUMBER OF COMPANIES	TURNOVER £'000
Consumer markets	784	36,383,296
Manufacturing	770	32,005,676
Professional services	351	12,629,093
Financial services	287	11,688,696
Real estate and construction	256	10,233,133

NORTH EAST £46BN

TOP 5 SECTORS	NUMBER OF COMPANIES	TURNOVER £'000
Consumer markets	261	16,972,646
Manufacturing	255	9,491,211
Professional services	124	4,051,454
Financial services	99	4,504,168
Real estate and construction	96	4,095,130

SCOTLAND £97BN

TOP 5 SECTORS	NUMBER OF COMPANIES	TURNOVER £'000
Consumer markets	564	27633637
Manufacturing	418	18,567,771
Professional services	415	14,070,459
Financial services	230	6,154,507
Real estate and construction	230	9,616,218

SOUTH WEST £101BN

TOP 5 SECTORS	NUMBER OF COMPANIES	TURNOVER £'000
Consumer markets	665	29,621,663
Manufacturing	459	19,483,693
Professional services	311	12,925,964
Financial services	224	11,221,053
Real estate and construction	221	8,007,391

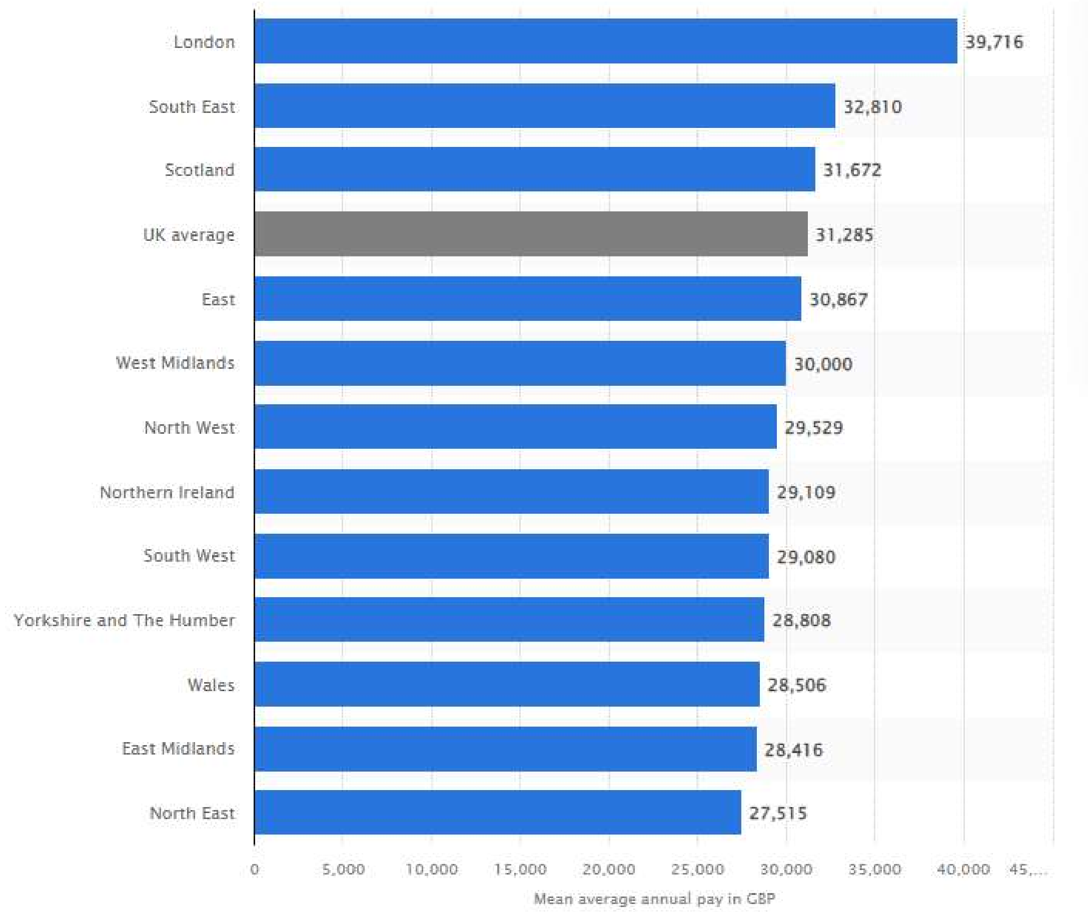
NORTHERN IRELAND £38BN

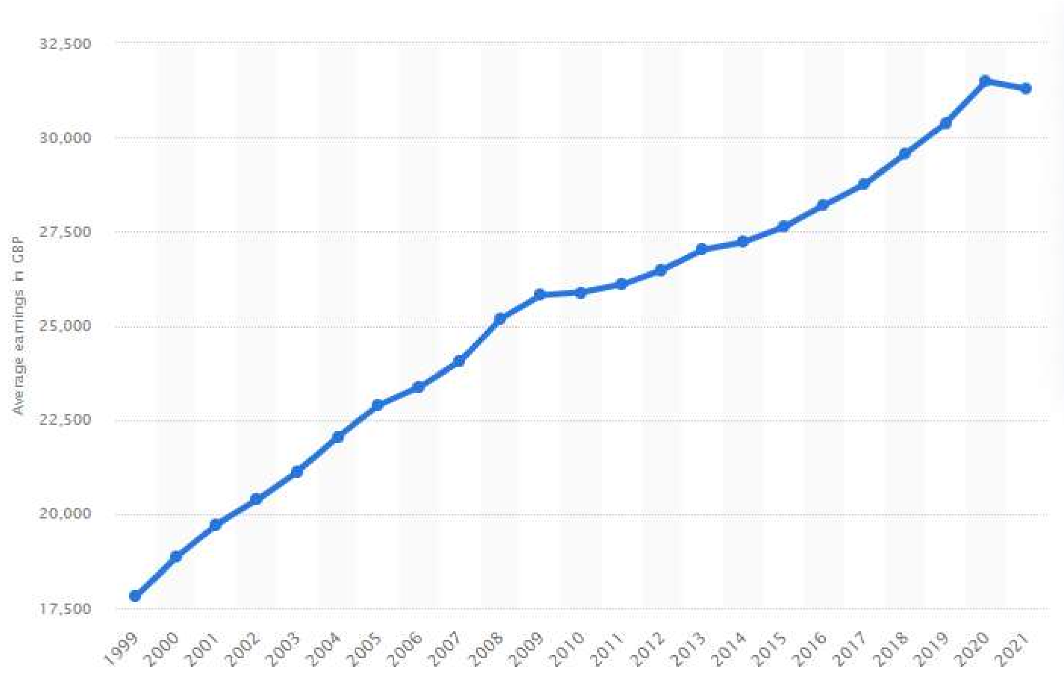
TOP 5 SECTORS	NUMBER OF COMPANIES	TURNOVER £'000
Consumer markets	309	11,920,783
Manufacturing	216	9,238,327
Real estate and construction	115	4,188,764
Professional services	75	2,483,221
Financial services	67	3,150,942

WALES £39BN

TOP 5 SECTORS	NUMBER OF COMPANIES	TURNOVER £'000
Manufacturing	289	13,402,311
Consumer markets	274	11,025,290
Professional services	108	4,237,708
Real estate and construction	100	3,930,750
Financial services	81	2,440,065


Arable
Mixed
Cattle (dairy and beef cows)
Hill sheep
Market gardening


London
South East
Scotland
UK average
East
West Midlands
North West
Northern Ireland
South West
Yorkshire and The Humber
Wales
East Midlands
North East
39,716
32,810
31,672
31,285
30,867
30,000
29,529
29,109
29,080
28,808
28,506
28,416
27,515
0
5,000
10,000
15,000
20,000
25,000
30,000
35,000
40,000
45,...
Mean average annual pay in GBP


32,500
30,000
27,500
25,000
22,500
20,000
17,500
Average earnings in GBP
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021

United Kingdom: Distribution of the workforce across economic sectors from 2009 to 2019