High-impact low-likelihood climate scenarios for the UK

Summary

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Part A: Transient high-impact low-likelihood scenarios

Summary

	Scenario	Summary
HILL-1	Enhanced global warming	Global temperature increases well above 4°C due to very high emissions, stronger carbon cycle feedbacks and/or high climate sensitivity.
HILL-2	Rapid aerosol reductions	Lower aerosol emissions increase warming. This scenario can be applied with any emissions scenario.
HILL-3	Volcanic eruption	Cooling follows major volcanic eruption (VEI7). This scenario can be applied with any emissions scenario.
HILL-4	Stronger Arctic Amplification	A strong increase in Arctic warming leads to circulation changes which increase the frequency of occurrence of cold periods. This scenario can be applied with any emissions scenario.
HILL-5	Ocean circulation change	Changes in the North Atlantic Ocean lead to cooling across the UK. Two variants (HILL-5a collapse of the Atlantic Meridional Overturning Circulation and HILL-5b collapse of the sub-Polar Gyre) describe different levels of cooling. This scenario can be applied with any emissions scenario.
HILL-6	Enhanced sea level rise	Rapid deglaciation in Greenland and Antarctica leads to an increase in sea level around the UK of up to 2.2m relative to current levels by 2100. Two standalone scenarios are presented representing enhanced sea level rise with high and low emissions.

HILL-1
Enhanced global warming

Storyline narrative
The rate and magnitude of climate change is greater than assumed, resulting in global warming in excess of 4ºC above pre-industrial levels by 2100.

Description
Future global warming is considerably greater than 4ºC by 2100. This is because future emissions increase more rapidly than anticipated, because the climate system is more sensitive to emissions than conventionally assumed and/or because positive feedbacks which release stored carbon and methane are stronger than conventionally assumed.

Storyline type
The storyline describes a **forcing of climate change** outside the conventional range and/or a **climate system response** outside the conventional range.

Variants
There are no variants to this storyline, although there are several options for its application.

Links to other scenarios
This scenario affects the plausibility of HILL-4, HILL-5 and HILL-6, and affects the consequences of HILL-2 and HILL-3.

Implications for UK climate and sea level
An increase in winter and summer average temperature of up to 4.2 and 5.6ºC above the 1981-2000 average respectively by the 2050s, an increase in winter precipitation of up to 60%, a decrease in summer precipitation of up to 65%. Mean windspeed up to 9% stronger in winter by 2050, and up to 10% weaker in summer. Increase in mean sea level by up to 40cm by the 2050s.

Confidence in UK effects
Increase in temperature:	High
Increase in winter precipitation:	Med
Increase in summer precipitation:	Low
Decrease in winter precipitation:	Low
Decrease in summer precipitation:	Med
Increase in winter windspeed:	Med
Increase in summer windspeed:	Low
Increase in sea level:	High

Sources of evidence
The specific scenario is based on the UKCP18 RCP8.5 projections. Plausibility and confidence are based on a combination of historical experience, theory and climate model simulations.

HILL-2
Rapid aerosol reductions

Storyline narrative
Air quality concerns result in large, rapid reduction to anthropogenic aerosol emissions, which accelerate greenhouse gas driven warming for a few decades.

Description
Anthropogenic aerosols act to cool the climate, primarily by scattering incoming solar radiation back to space, and by altering the properties of clouds to make them more reflective. Aerosols have offset some of the warming due to increases in greenhouse gases, and rapid reductions in their emissions will unmask this warming.

Storyline type
This storyline describes a **forcing of climate change** at the limit of conventional ranges.

Variants
There are no variants to this storyline

Links to other scenarios
The scenario is independent of the other scenarios.

Implications for UK and sea level
An increase in UK average temperature, of up to 0.75°C degree, relative to scenarios with present-day aerosol emissions. The maximum temperature effect is likely to be felt in the 2040s, when differences between aerosol pathways are largest. No clear effects on precipitation or storminess in the UK.

Confidence

Increase in temperature	Med
Change in rainfall	Low
Change in windspeed	Low

Sources of evidence
The scenario is based on climate model simulations with very different aerosol pathways to 2050 in three climate models. The models span a range of sensitivities to aerosol changes (indicated by their historical aerosol radiative forcing) in the more sensitive half of the CMIP5/6 distribution. The large responses seen in some figure panels likely represent an upper bound. Plausibility is based on technological ability, observed changes in emissions in recent decades, and past climate responses to aerosol changes. Confidence in UK effects is based on a comparison of model responses.

HILL-3
Volcanic cooling

Storyline narrative
A major volcanic eruption ejects large quantities of aerosol into the stratosphere, cooling the earth for several years.

Description
Some volcanic eruptions emit large quantities of aerosol directly into the stratosphere, where they remain for several years. These aerosols reflect incoming solar radiation, leading to cooling at the surface of the earth, changes to the hydrological cycle and potentially changes to atmospheric circulation patterns.

Storyline type
The storyline describes a **forcing of climate change** outside the conventional range.

Variants
There are no variants to this storyline.

Links to other scenarios
There is a potential link to HILL-5.

Implications for UK and sea level
A reduction in average temperature for five years across the UK, with the greatest reduction of 2.5ºC, relative to the long-term average, in the first year. Reduction in precipitation up to 20% in the first year. No direct effects on storminess or sea level in the UK.

Confidence
Decrease in temperature:	High
Decrease in precipitation:	Low
Change in windspeed:	Low

Sources of evidence
The specific scenario is based on climate model simulations with hypothetical volcanic eruptions. Plausibility and confidence are based on a combination of historical experience, theory and climate model simulations.

HILL-4
Stronger Arctic Amplification

Storyline narrative
More extreme Arctic Amplification and/or a more extreme response to it, leading to changes in the position of the jet stream and therefore UK weather and climate.

Description
It is well established that high latitudes warm more rapidly than lower latitudes, partly due to amplified feedbacks due to loss of snow and sea ice cover ("Arctic Amplification"). This alters temperature and pressure gradients and leads to a shift in the winter jet stream to the south. This reduces the frequency of westerly weather patterns and increases the exposure of the UK to cold weather events in winter.

Storyline type
The storyline describes a **climate system response** outside the conventional range.

Variants
There are no variants to this storyline.

Links to other scenarios
The plausibility of this scenario is influenced by HILL-1.

Implications for UK climate and sea level
Fewer westerly weather patterns, leading to average temperatures in winter up to 1.5°C cooler by the end of the century than in conventional projections, and lower rainfall and lower windspeeds than in conventional projections. More frequent cold extremes in winter.

Confidence
Decrease in winter temperature: Low
Decrease in winter rainfall: Low
Decrease winter windspeed: Low

Sources of evidence
The specific scenario is based on the UKCP18 RCP8.5 projections. Plausibility and confidence are based on a combination of historical experience, theory and climate model simulations.

HILL-5
Change in ocean circulation

Storyline narrative
A step change in ocean circulation in the North Atlantic leads to cooling across western Europe.

Description
The temperature of the Atlantic Ocean influences temperatures in the UK and the position of storm tracks. Changes in ocean circulation in the North Atlantic lead to lower sea surface temperatures, and therefore lower temperatures, lower rainfall and stronger storms. Ocean circulation change can be triggered by collapse of the Atlantic Meridional Overturning Current (AMOC) or a collapse of the sub-Polar Gyre (SPG).

Storyline type
The storyline describes a **climate system response** outside the conventional range.

Variants
There are two variants to this storyline:
HILL5a: AMOC collapse
HILL5b: SPG collapse

Links to other scenarios
The plausibility of this scenario is influenced by HILL-1.

Implications for UK climate and sea level
AMOC collapse leads to a reduction in temperature of 5ºC below what would otherwise have occurred, a reduction in summer rainfall of up to 40%, an increase in frequency of winter storms, and a higher sea level.
Weakening of the sub-Polar Gyre leads to a reduction in temperature of around 1ºC below what would have otherwise occurred, a reduction in summer rainfall of up to 20%, and a small increase in the frequency of winter storms.

Confidence in UK effects
Reduction in temperature:	High
Reduction in winter precipitation:	Low
Increase in winter precipitation:	Med
Reduction in summer precipitation:	Med
Increase in summer precipitation:	Low
Increase in winter windspeed:	Med
Increase in sea level:	Low

Sources of evidence
The specific scenarios are based on the climate model projections. Plausibility and confidence are based on a combination of historical experience, theory and climate model simulations.

HILL-6
Enhanced sea-level rise

Storyline narrative
Accelerated ice loss from Antarctica and Greenland will substantially enhance sea-level rise.

Description
Enhanced sea-level rise is driven by changes in the surface mass balance in Greenland, which changes outlet glaciers and dynamics of the main ice sheet, and disintegration of marine ice shelves in Antarctica and the onset of marine ice sheet instability and marine ice cliff instability.

Storyline type
The storyline describes a **climate system response** outside the conventional range.

Variants
There are no variants to this scenario

Links to other scenarios
Enhanced sea-level rise will be influenced by HILL-1.

Implications for UK sea level
Average sea level increases around the UK coastline by between 1.8 and 2.2m by 2100, relative to the 1981-2000 average, with very high emissions. The increase is greatest in southern and eastern England. In a 2°C world the increase is between 0.8 and 1.1m by 2100. Under both emissions scenarios sea level continues to increase after 2100.

Confidence
Plausibility of driver: Low
Confidence in UK effects: High

Sources of evidence
The specific scenario is based on climate and ice-sheet model simulations and structured expert evaluation of multiple lines of physical evidence and is taken directly from the IPCC AR6 report. Plausibility and confidence are based on a combination of historical experience, theory and climate and ice-sheet model simulations.

Part B: HILL Extreme Anomalies

Summary

Extreme anomaly scenarios

Scenario	Description	Compound	Summary storyline
Hot	Average monthly temperatures between 4 and 6°C above the mean	Wet and windy in winter, dry and calm in summer	Winter: strong jet stream and cyclonic conditions, positive North Atlantic Oscillation Summer: weak, meandering Jetstream, blocking and anticyclonic conditions
Cold	Average monthly temperatures between 4 and 7°C below the mean	Dry and calm in winter, wet and windy in summer	Winter: persistent anticyclonic conditions over Scandinavia with a weak jet stream. Frequent sudden stratospheric warmings and cold air outbreaks. Negative NAO Summer: strong jet stream to the south with frequent windstorms. Strongly cyclonic
Wet	Average monthly rainfall between 2.5 and 3 times the mean	Mild and windy in winter, cool and windy in summer	Strongly cyclonic conditions with a strong jet stream to the south of its average position. Positive NAO
Dry	Average rainfall 10% of the mean (at the regional scale)	Cold and calm in winter, hot and calm in summer	Strongly anticyclonic conditions, with the jet stream to the north and weak with persistent meanders. Negative NAO in winter and positive NAO in summer.
Windy	Average windspeeds 60 to 80% higher than the average	Mild and wet in winter, cool and wet in summer	Strong jet stream with strongly cyclonic conditions. Positive NAO

Persistent extreme anomaly scenarios

Scenario	Characteristics	Storyline
Persistently cyclonic	Wet and windy: rainfall 3 times the mean, windspeed 1.6 times the mean, and temperatures 3°C above the mean November to March and 3°C below the mean May to September	Persistent cyclonic conditions bring mild wet air from the west, with high windspeeds and frequent and clustered storms. Strong jet stream. At some point in spring and autumn temperatures will be close to the average
Persistently anticyclonic	Dry and calm: Rainfall 10% of the mean, windspeed 50% of the mean, temperatures 3°C below the mean November to March and 3°C above the mean May to September	Persistently anticyclonic conditions bring dry air from the east and south. Weak meandering jet stream, and persistent blocking. Cold in winter with frequent cold spells; hot in summer with chance of intense convective storms
Cyclonic in winter and anticyclonic in summer	Temperatures consistently 3°C above the mean, wet and windy in winter and dry and calm in summer	Cyclonic conditions bring mild air and wet and windy weather from the west during winter. In spring this flips rapidly to persistent anticyclonic conditions, bringing hot, dry and calm conditions from the east. In autumn conditions flip back to cyclonic
Anticyclonic in winter and cyclonic in summer	Temperatures consistently 3°C below the mean, dry and calm in winter and warm and windy in summer.	Anticyclonic conditions bring cold and dry air from the east during winter. In spring this flips rapidly to persistent cyclonic conditions bringing cool, wet and windy weather in summer. In autumn conditions flip back to anticyclonic.

HILL Extreme Anomaly: Hot

Characteristics

Regional average monthly temperatures **4ºC** above the long-term mean between February and October, and **5ºC** above the mean in November and January. December average temperatures **6ºC** above the long-term mean in England from the Midlands southwards, and **5ºC** above the long-term mean elsewhere.

Average seasonal temperatures **3ºC** above the long-term mean across the UK.

Compound months and seasons

November to April

Wet (rainfall **2.5** times the long-term mean) and **windy** (mean windspeed **1.6** times the long-term mean)
Winter season **wet** (rainfall **2** times the long-term mean) and **windy** (mean windspeed **1.4** times the long-term mean)

May to October

Dry (rainfall **10%** of mean) and **calm** (mean windspeed **60%** of mean)
Summer season **dry** (rainfall **25%** of mean) and **calm** (mean windspeed **80%** of mean)

Spring season

Wet (**2** times the mean) and **windy** (**1.4** times the mean) or **dry** (**25%** of mean) and **calm** (**80%** of mean).

Autumn season

Wet (**2** times the mean) and **windy** (**1.4** times the mean) or **dry** (**25%** of mean) and **calm** (**80%** of mean).

Note: extreme anomalies at finer spatial scales are larger

Narrative storyline

November to April

Mild months and winter seasons are generated by a strong jet stream bringing frequent weather systems across the Atlantic. Airflows are predominantly from the west or south west, and cyclonic conditions dominate. The NAO index is positive. Weather patterns 4, 15 and 21 are common.

May to October

Hot months and summer seasons occur when a weak, highly meandering jet stream enables the development of persistent atmospheric blocks associated with quasi-stationary planetary waves and anticyclones affecting UK weather patterns. Airflows are predominantly from the south, south east or south west. The (summer) NAO index is positive, and pressure is high over Scandinavia. Sea surface temperatures around the UK are higher than average. Dry soils across Europe amplify the high temperatures due to enhanced positive feedbacks. Increased chance of intense convection and heavy localised rainfall. Weather patterns 17 and 27 are common.

Spring

Hot springs can be generated either by a strong jet stream (extended mild winter) or by blocking anticyclones (early hot summer)

Autumn

Hot autumns can be generated either by blocking anticyclones (extended hot summer) or a strong jet stream (early mild winter)

HILL Extreme Anomaly:
Cold

Characteristics

Regional average monthly temperatures **7ºC** below the long-term mean between December and February, **5ºC** below the mean in March, April, October and November, and **4ºC** below the mean between May and September.

Average winter seasonal temperatures **5ºC** below the long-term mean across the UK, and **3ºC** below the long-term mean in spring, summer and autumn.

Compound months and seasons

November to April

Dry (rainfall down to **20%** of the long-term mean) and **calm** (mean windspeed down to **50%** of the long-term mean) and can be foggy

Winter season **dry** (rainfall down to **40%** of the long-term mean) and **calm** (mean windspeed down to **75%** of the long-term mean)

May to October

Wet (rainfall **2.5** times the mean) and **windy** (mean windspeed **1.6** times the long-term mean)

Summer season **wet** (rainfall **2** times the mean) and **windy** (mean windspeed **1.2** times the long-term mean)

Spring season

Wet (**2** times the mean) and **windy** (up to **1.4** times the mean) or **dry** (**25%** of mean) and **calm** (**80%** of mean).

Autumn season

Wet (**2** times the mean) and **windy** (**1.4** times the mean) or **dry** (**25%** of mean) and **calm** (**80%** of mean).

Narrative storyline

October to April

Cold months and winter seasons are generated by persistent anticyclonic conditions centred over Eurasia and Scandinavia, occurring when a weak, meandering jet stream leads to blocking. Airflows are predominantly from the north east, east and south east. The NAO and Arctic Oscillation are negative, and the stratospheric polar vortex is weak. Sudden Stratospheric Warmings lead to cold spells. Persistent snow cover amplifies cold extremes. Weather patterns 27 and 28 are common.

May to September

Cool months and summer seasons occur when a strong jet stream to the south of its average position brings a succession of weather systems across the UK from the west. Airflows are predominantly from the north and north west. Weather patterns 19, 26 and 30 are common.

Spring

Cold springs can be generated either by prolonged anticyclonic conditions (extended cold winter) or by a strong southerly jet stream (early cool summer).

Autumn

Cold autumns can be generated either by early anticyclonic conditions (early cold winter) or by a continuation of a strong southerly jet stream (late cool summer).

Note: extreme anomalies at finer spatial scales are larger

HILL Extreme Anomaly: Wet

Characteristics

Regional average monthly rainfall **3** times the long-term mean in England, Wales and Northern Ireland, and **2.5 times** the long-term mean in Scotland

Average seasonal rainfall **2** times the long-term mean in England, Wales, Scotland and Northern Ireland

Compound months and seasons

November to April

Mild (temperature **3ºC** above the long-term mean) and **windy** (mean windspeed **1.6** times the long-term mean)

Winter season **mild** (temperature **2ºC** above the long-term mean) and **windy** (mean windspeed **1.25** times the long-term mean)

May to October

Cool (temperature **3ºC** below the mean) and **windy** (mean windspeed **1.6** times the long-term mean)

Summer season **cool** (temperature **2ºC** below the mean) and **windy** (mean windspeed 1.2 times the long-term mean)

Spring season

Warm (**2ºC** above the long-term mean) and **windy** (**1.3** times the mean) or **cool** (**2ºC** below the long-term mean) and **windy** (**1.3** times the mean).

Autumn season

Warm (**2ºC** above the long-term mean) and **windy** (1.3 times the mean) or **cool** (**2ºC** below the long-term mean) and **windy** (1.3 times the mean).

Narrative storyline

Wet months and seasons in England and Wales are generated by a strong jet stream to the south of its average position bringing frequent weather systems and storms across the Atlantic. Airflows are predominantly from the south or south west, and cyclonic conditions dominate. The NAO and East Atlantic pattern indices are both positive.

Wet months and seasons in Scotland and Northern Ireland are generated by a strong jet stream, with airflows predominantly from the west and south west. Westerly conditions dominate.

Weather patterns 29 and 30 are common throughout the year. In summer, weather patterns 11 and 24 are common in England and Wales, and 29 is common further north.

Note: extreme anomalies at finer spatial scales are larger

HILL Extreme Anomaly:
Dry

Characteristics

Regional average monthly rainfall **10% (x0.1)** of the long-term mean

Average seasonal rainfall **30% (x0.3)** of the long-term mean

Compound months and seasons

November to April

Cool (temperature **4ºC** below the long-term mean, and **6ºC** below in December-January) and **still** (mean windspeed **50% less** than the long-term mean)
Winter season **cool** (temperature **3ºC** below the long-term mean) and **calm** (mean windspeed **20% less** than the long-term mean in England and Wales and **40% less** in Scotland and Northern Ireland)

May to October

Hot (temperature **3ºC** above the mean) and **calm** (mean windspeed **20% less than** the long-term mean)
Dry summers can be **hot** (temperature **2ºC** above the mean) and **calm** (mean windspeed 10% less than the long-term mean)

Spring season

Cool (**2ºC** below the long-term mean) and **calm** (**20% less** than the mean) or **hot** (**2ºC** above the long-term mean) and **calm** (**20% less** than the long-term mean)

Autumn season

Warm (**2ºC** above the long-term mean) and **calm** (**20% less** than the mean) or **cool** (**2ºC** below the long-term mean) and **calm** (**20% less** than the mean)

Narrative storyline

Dry months and seasons in England and Wales are generated by a jet stream to the north of its average position, resulting in weather systems passing further north than usual. Anticyclonic conditions dominate with high pressure over Scandinavia, and airflows typically come from the east and south east. In summer the NAO is strongly positive and in winter strongly negative. Persistent dry conditions across Europe lead to further reductions in rainfall due to reductions in precipitation recycling, exaggerating the dynamic effect.

Dry months and seasons in Scotland and Northern Ireland are typically generated by a weak jet stream. Anticyclonic conditions dominate with frequent airflows from the east, south east and south.

Weather patterns 17, 25, 27 and 18 are common.

Note: extreme anomalies at finer spatial scales are larger

HILL Extreme Anomaly: Windy

Characteristics

Regional average monthly windspeed **1.6 times** the long-term mean in England and Northern Ireland, and **1.8 times** the long-term mean in Scotland and Wales

Average seasonal windspeed **1.5 times** the long-term mean

Compound months and seasons

November to April

Mild (temperature **3ºC** above the long-term mean) and **wet** (**2.5 times** the long-term mean)

Winter season **mild** (temperature **2ºC** above the long-term mean) and **wet** (**2** times the long-term mean)

May to October

Cool (temperature **3ºC** below the mean) and **wet** (**2.5** times the long-term mean)

Windy summers can be **cool** (temperature **2ºC** below the mean) and **wet** (**2** times the long-term mean)

Spring season

Hot (**2ºC** above the long-term mean) and **wet** (**2** times the mean) or **cool** (**2ºC** below the long-term mean) and **wet** (**2** times the mean).

Autumn season

Hot (**2ºC** above the long-term mean) and **wet** (**2** times the mean) or **cool** (**2ºC** below the long-term mean) and **wet** (**2** times the mean).

Narrative storyline

Windy months and seasons are generated by a strong jet stream bringing frequent weather systems and clusters of storms across the Atlantic. Airflows are predominantly from the west and south west, and cyclonic conditions dominate.

Weather patterns 20, 26 and 30 are common throughout the year.

Note: extreme anomalies at finer spatial scales are larger

HILL Extreme Anomaly:
Persistently cyclonic

Characteristics

Rainfall **3** times the mean and windspeeds **1.6** times the mean, with temperatures **3ºC above** the mean between November and March and **3ºC below** the mean between May and September: April and October temperatures are close to the mean.

Storyline

This storyline describes persistently wet and windy conditions. Temperatures are below the long-term average in summer and above the average in winter.

Persistent cyclonic conditions bring mild, wet air from the west with high windspeeds and frequent and clustered storms. Strong cyclonic conditions are associated with a strong jet stream and in winter are characteristic of a strong North Atlantic Oscillation, positive East Atlantic Pattern and positive Arctic Oscillation. In summer, the jet stream is to the south of its average position. The summer NAO and the Arctic Oscillation are negative.

Weather patterns in cyclonic conditions come from across the Atlantic Ocean. In winter, temperatures are therefore milder than average, and in summer they are cooler than average. This effect is exaggerated during winter because sea surface temperatures around the UK are higher than average during persistent cyclonic conditions.

At some point in spring and autumn temperatures will be close to average. Met Office Weather Patterns 20, 23 and 26 are examples of strongly cyclonic conditions.

Similar conditions can persist across the whole of the UK.

Note: extreme anomalies at finer spatial scales are larger

HILL Extreme Anomaly:
Persistently anticyclonic

Characteristics

Rainfall **10%** of the mean and windspeeds **50%** of the mean, with temperatures **3ºC below** the mean between November and March and **3ºC above** the mean between May and September: April and October temperatures are close to the mean.

Storyline

This storyline describes persistently dry and calm conditions. Temperatures are above the long-term average in summer and below the average in winter.

Persistent anticyclonic conditions bring dry air from the east and south. In winter this air is colder than average, and in summer is warmer than average. Persistent anticyclonic conditions are associated with a weak jet stream that has generated large meanders and persistent blocking, and a strong Scandinavian High Pressure anomaly. During winter cold spells are preceded by Sudden Stratospheric Warming and southerly extension of the Polar Vortex. During summer, persistent hot anticyclonic conditions increase the chance of intense convective storms and heavy localised rainfall.

At some point in spring anticyclonic conditions shift from bringing cold air to the UK to bringing warm air: this transition can be sudden. Similarly, in autumn the shift from warm to cold conditions can be abrupt.

'Persistent' anticyclonic conditions do not imply that a single anticyclone persists for many months, but rather that anticyclonic conditions lasting many days occur frequently with short interludes. Met Office Weather Patterns 17 and 27 are examples of strongly anticyclonic conditions.

Persistently anticyclonic conditions are associated with stronger feedbacks between the surface and the atmosphere, leading to higher hot extremes in summer, colder cold extremes in winter, and drier dry extremes.

Similar conditions can persist across the whole of the UK.

Note: extreme anomalies at finer spatial scales are larger

HILL Extreme Anomaly:
Cyclonic in winter and anticyclonic in summer

Characteristics

Temperatures **3ºC** above the mean, with high rainfall (**3 times** the mean) and windspeeds (**1.6 times** the mean) between October and March and low rainfall (**10%** of the mean) and windspeeds (**50%** of the mean) between May and August: April and September rainfall and windspeed are close to the mean.

Storyline

This storyline is hot all year round but wet in winter and dry in summer.

Persistent cyclonic conditions bring mild, wet air from the west in winter with high windspeeds and frequent and clustered storms. Strong cyclonic conditions are associated with a strong jet stream and are characteristic of a strong North Atlantic Oscillation and Arctic Oscillation. Sea surface temperatures around the UK are above average. Weather patterns in cyclonic conditions come from across the Atlantic Ocean and are therefore milder than average. Met Office Weather Patterns 20, 23 and 26 are examples of strongly cyclonic conditions.

Persistent anticyclonic conditions in summer bring dry air from the east and south, which is warmer than average. They are associated with a weak jet stream that has generated large meanders and persistent blocking, and a strong Scandinavian High Pressure anomaly. ‘Persistent’ anticyclonic conditions do not imply that a single anticyclone persists for many months, but rather that anticyclonic conditions lasting many days occur frequently with short interludes. Met Office Weather Patterns 17 and 27 are examples of strongly anticyclonic conditions. Persistently anticyclonic conditions are associated with stronger feedbacks between the surface and the atmosphere, leading to higher hot extremes and drier dry extremes. Persistent hot anticyclonic conditions increase the chance of intense convective storms and heavy localised rainfall

A shift from persistently cyclonic conditions to persistently anticyclonic conditions (and vice versa) can be very abrupt and occur over a few days.

Similar conditions can persist across the whole of the UK.

Note: extreme anomalies at finer spatial scales are larger

HILL Extreme Anomaly:
Anticyclonic in winter and cyclonic in summer

Characteristics

Temperatures **3ºC** below the mean, with low rainfall (**10% of** the mean) and windspeeds (**50% of** the mean) between October and March and high rainfall (**3 times** the mean) and windspeeds (**1.6 times** the mean) between May and August: April and September rainfall and windspeed are close to the mean.

Storyline

This storyline is cool all year round but dry in winter and wet in summer.

Persistent anticyclonic conditions in winter bring dry air from the east and south, which is warmer than average. Persistent anticyclonic conditions are associated with a weak jet stream that has generated large meanders and persistent blocking, and a strong Scandinavian High Pressure anomaly. Cold spells are preceded by Sudden Stratospheric Warmings and extension of the Polar Vortex to the south.

'Persistent' anticyclonic conditions do not imply that a single anticyclone persists for many months, but rather that anticyclonic conditions lasting many days occur frequently with short interludes. Met Office Weather Patterns 17 and 27 are examples of strongly anticyclonic conditions. Persistently anticyclonic conditions are associated with stronger feedbacks between the surface and the atmosphere, leading to colder cold extremes. Cold and still conditions produce a greater frequency of fog.

Persistent cyclonic conditions in summer bring mild, wet air from the west with high windspeeds and frequent storms. Strong cyclonic conditions are associated with a strong jet stream and are characteristic of a strong North Atlantic Oscillation. Weather patterns in cyclonic conditions come from across the Atlantic Ocean and are therefore milder than average. Met Office Weather Patterns 20, 23 and 26 are examples of strongly cyclonic conditions.

A shift from persistently cyclonic conditions to persistently anticyclonic conditions (and vice versa) can be very abrupt and occur over a few days.

Similar conditions can persist across the whole of the UK.

Note: extreme anomalies at finer spatial scales are larger