read

Climatic Hazards

quiz

Key Terms

Convection cell – Differences in air temp create high and low pressure areas.

Differential heating – Difference in how land and water surfaces absorb heat.

High pressure – Occurs when air is descending in the atmosphere.

Insolation – The amount of solar radiation (sunlight) an area receives.

Low pressure – Occurs when air is rising in the atmosphere.

Westerlies – Winds that move air from high to low pressure areas.

Climate Change – A long-term change in the earth's climate

Coriolis effect – Spinning movement of the Earth.

Eye – mostly calm weather found at the centre of a tropical storm.

Tropical storm – An intense low-pressure system, forming over tropical oceans and with winds of hurricane force.

Extreme Weather – Weather that is severe or different from the usual weather pattern.

Enhanced Greenhouse effect – The warming of the Earth's atmosphere due to human activity increasing the layer of greenhouse gases.

Greenhouse gases – gases in the Earth's atmosphere that trap heat.

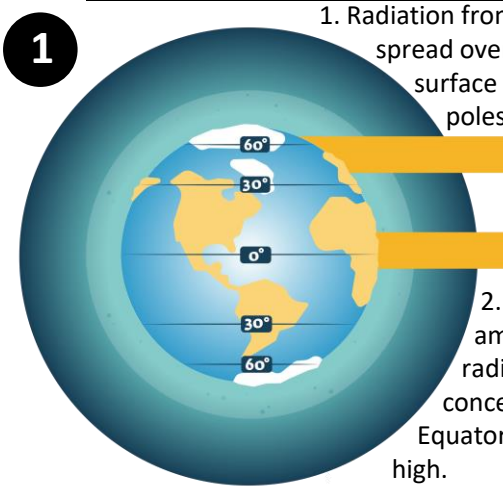
Mitigation – Action taken to reduce or prevent the cause or effect

Adaptation – Actions taken to adjust to natural events such as climate change.

Global Atmospheric Circulation Model

1

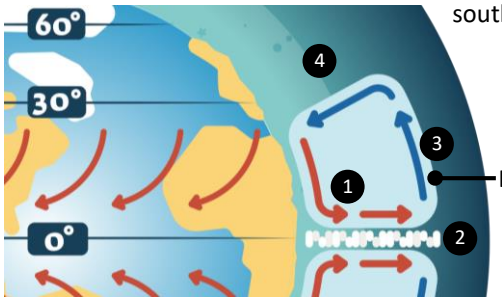
1. Radiation from the sun is spread over a larger surface area at the poles. Insolation is low.



2. The same amount of radiation is more concentrated at the Equator. Insolation is high.

2

1. Warm air rises at the equator
2. This creates an area of low pressure. As the air rises it cools, condenses and forms clouds.
3. The air travels north and south high above the surface.
4. The air sinks at 30° N&S creating high pressure. The air begins to warm and travels north and south at 30°.



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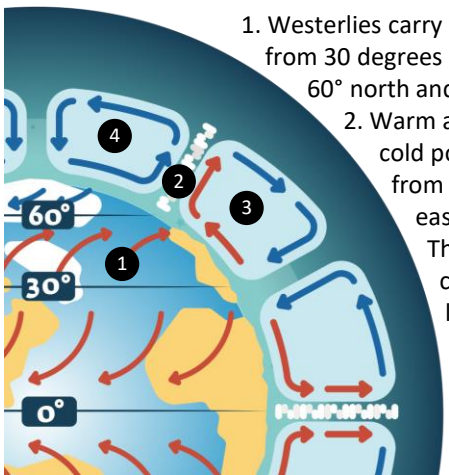
1. Westerlies carry warm air from 30 degrees up to 60° north and south.
2. Warm air meets cold polar air, from polar easterlies. The air rises creating low pressure and forms the Ferrel (3) and Polar cells (4).



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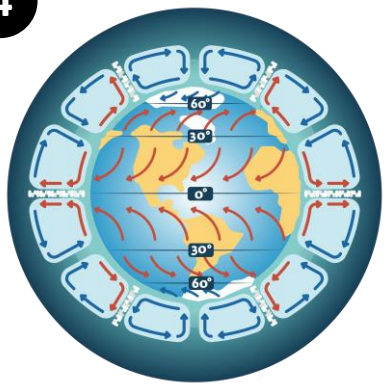
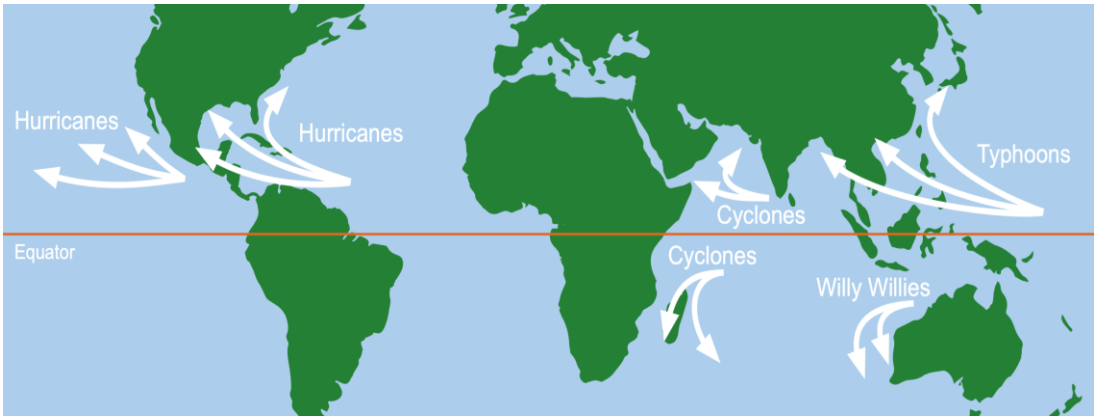


A simplified version of how air moves across the planet, based around atmospheric cells. These cells are regions where the air moves from low pressure to high pressure.

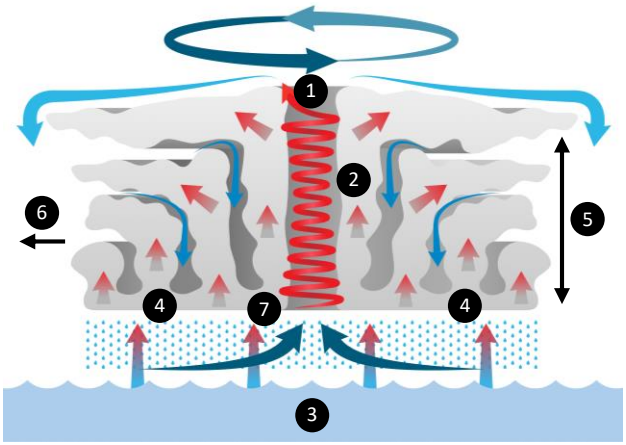
Tropical Storms

Location

Tropical storms occur between 5 and 30 degrees north and south of the Equator. They **do not** form along the equator as the Coriolis effect is not strong enough.



Structure and features



1. Eye
2. Eye wall
3. Water => 27°C
4. Rain bands
5. Height can be more than 13 km
6. Direction of movement
7. Torrential rain, very strong winds and thunder and lightening.

Formation

1. Tropical Storms start between 5° and 30° north and south of the equator where surface sea temps reach at least 27°C.
2. Warm air rises rapidly under low-pressure conditions as it is heated.
3. The rising air draws up more airing large volumes of moisture from the ocean, causing strong winds.
4. The Coriolis effect causes the air to spin upwards around a calm central eye of the storm.
5. Rising air cools and condenses to form large, cumulonimbus clouds which generate torrential rainfall.
6. Cool air sinks into the eye, therefore, there is no cloud so it is drier, clear and much calmer.
7. The tropical storm moves in the direction of the prevailing wind.

Reducing the impacts of tropical storms

Monitoring

- Satellites track the development of a tropical storm.
- Satellites monitor high-altitude rainclouds every three hours to identify changes.
- Aircraft & drones monitor weather patterns to identify potential storms (eg NASA in Atlantic)

Prediction

- Supercomputers give five days' warning and predict the location within 400 kilometres.
- Predicted path is plotted - typically, 70 per cent occur within predicted area/path.
- Early warnings are issued by national hurricane centres around the world.

Protection

- Buildings reinforced to protect from strong winds.
- Coastal flood defences to protect from storm surges.
- No build zones created in in low-lying areas.

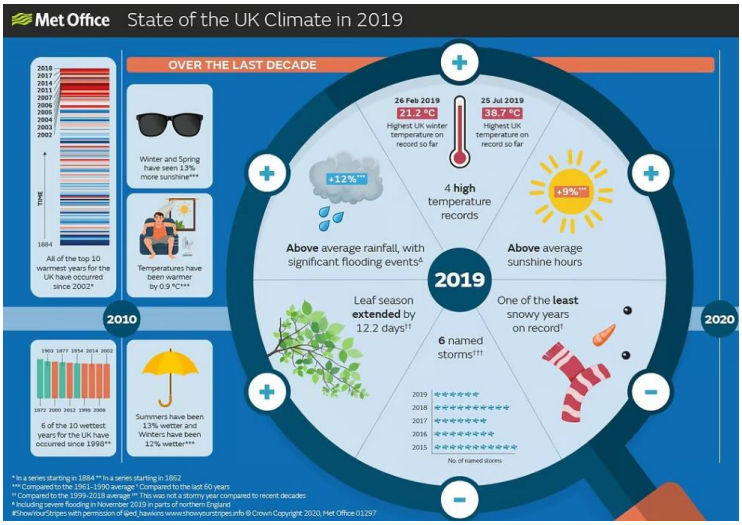
Planning

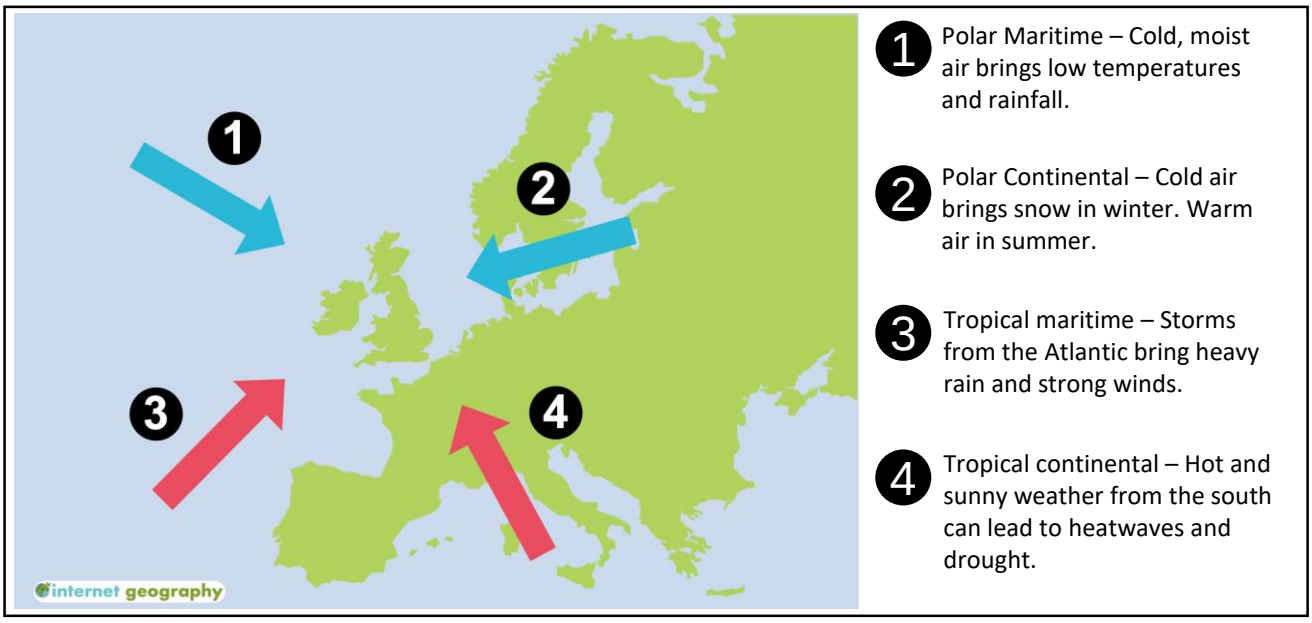
- Disaster supply kits
- Fully fuelled vehicles for
- Clear evacuation routes and centres set up.

Weather Hazards in the UK

Extreme Weather

Extreme weather is when the weather is especially severe or out of season. It is different from the usual weather pattern. Most parts of the UK are at risk from several types of extreme weather. Different air masses that affect the UK bring a variety of weather.





1. Polar Maritime – Cold, moist air brings low temperatures and rainfall.
2. Polar Continental – Cold air brings snow in winter. Warm air in summer.
3. Tropical maritime – Storms from the Atlantic bring heavy rain and strong winds.
4. Tropical continental – Hot and sunny weather from the south can lead to heatwaves and drought.

Storm Events

The UK regularly experiences depressions, areas of low pressure, which bring strong winds and heavy rain, particularly to the west and north of the country. Impacts can include:

- Flood and wind damage to property
- Trees being uprooted
- Power supplies disrupted
- Deaths and injuries

Flooding

Floods are typically caused by heavy rainfall or storm waves. Torrential rainfall can cause flash flooding. Prolonged rainfall also leads to flooding. Impacts can include

- Damage to property, businesses and possessions
- Landslides
- Deaths and injuries

Droughts and Heatwaves

Droughts and heatwaves are long periods with little or no rainfall. In the UK a drought is when there are 15 or more days with less than 0.2mm of rain on any one day. Impacts include:

- Crop failure
- Water supplies are restricted due to low reservoirs
- Elderly people become vulnerable to heat exhaustion
- Roads can melt and railway lines buckle

Extremes of Cold Weather

Cold conditions occur if depressions, associated with tropical maritime air masses, are not passing over the UK in winter. Possible impacts include:

- Crop failure and livestock deaths
- Transport infrastructure closed e.g. roads, rail and airports
- Injuries caused by people falling
- Businesses and schools close

Typhoon Haiyan

Overview

November 8th 2013
04.40 am
Philippines
NEE
190 MPH
Category 5

The tropical storm originated in the NW Pacific. Wind speeds of 314 kilometres per hour (195 miles per hour) were recorded.

Primary Effects

- 6190 people died
- 4.1 million people were made homeless
- Cost of damage was around $12 billion
- 1.1 million tonnes of crops destroyed
- 1.1 million houses damaged.

Secondary Effects

- Shortages of food, water and shelter
- Outbreaks of disease.
- Looting over supplies, 8 people died.
- Seawater, chemicals and sewerage contaminated water supplies.
- 800,000-litre oil leak from tanker that contaminated fishing waters.

Immediate Responses

- 800,000 evacuated.
- The government provided essential equipment and medical supplies.
- A curfew was introduced to reduce looting.
- 1200 centres set up to help the homeless.
- International governments and aid agencies provided food aid, water and shelters.
- Over $1.5 billion of foreign aid was pledged.

Long-term Responses

- Build Back Better launched in 2014, to upgrade damaged buildings to protect them from future disasters.
- Aid agencies EG Oxfam provided replacement fishing boats.
- New homes built away from flood risk

The Beast from the East

Background

A prolonged cold snap, with heavy snow during the last week of February, 2018.
Caused by a polar vortex, from Siberia.
It lasted for 10 days, and was compounded by the arrival of Storm Emma. Temperatures dropped to -10°C with a wind chill of -22°C.

Social Impacts

- 10 people died
- Thousands of homes were left without power
- Thousands of schools were closed
- Hundreds of motorists on the M80 near Glasgow were stuck for up to 13 hours
- The NHS cancelled non-urgent operations and clinics, affecting people's access to healthcare.

Economic Impacts

- The Beast from the East cost the UK economy £1 billion/day
- Road closures cut supplies to supermarkets, reducing stock levels and profits
- Transport closures impacted tourism and trade
- £10 million of insurance claims from car accidents.

Environmental Impacts

- Extensive snowfall led to snow drifts, in South Wales 50cm caused 7m drifts
- The cold reduced the insect population, causing food shortages for birds & wildlife.
- Crop yields and growing seasons were reduced e.g. asparagus and potatoes.
- High Force (waterfall) froze for the first time since 1929.

Management

- Red weather warning issued by the Met Office
- 4000 snow ploughs and gritters cleared roads
- Armed forces rescued drivers and drove NHS workers to work. In Edinburgh 200 critical care hospital workers were transported to their shifts at two hospitals in Edinburgh.
- High on the Pennines on the M62, the military provided support rescuing vehicles.