

Year 7: Wild weather and climate change

Maths in Geography

Climate graph

The bars represent rainfall. This is because rainfall is discrete data. This means that it can be counted over a period of time.

The line graph represents temperature. This is because temperature is continuous data. This means that it can be measured over a period of time.

- How do you work out the average (mean)?

$$\text{mean} = \frac{\sum x}{n}$$

$\sum x$ is sum of all data values
 n is number of data items in sample

- Using your climate graph sheet work out the average:
 - Temperature for each month
 - Average rainfall across the year

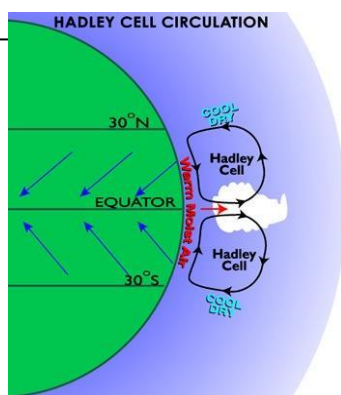
Factors that change our weather and climate.

Latitude: Locations that are further North/South receive less heat energy from the Sun.

Distance from the sea: Coastal areas are most affected by the sea. The sea takes longer to heat up and cool down than land. So in the winter the sea keeps coastal areas warm and in summer, it cools them down.

Prevailing winds: The temperature of the wind and the amount of rainfall partly depend on where the air has come from. Looking at where the air has come from helps to explain the characteristics of the weather.

Altitude: Temperatures decrease with altitude. There is a 1°C drop in temperature for every increase of 100 m in height. This is because the air is less dense in higher altitudes.



Key term	Definition
Weather	The day-to-day condition of the atmosphere
Precipitation	Moisture that falls from the air to the ground. Includes rain, snow, hail, sleet, drizzle, fog and mist.
Evaporation	When water turns from a liquid into a gas.
Climate	Average weather conditions over longer periods and over large areas.
Condensation	When water turns from a gas into a liquid
Climate graph	Show average rainfall and temperatures typically experienced in a particular location.
Anticyclone	High-pressure systems, giving clear skies and gentle wind.
Latitude	Distance from the Equator, imaginary lines around the globe
Prevailing wind	The dominant (main) wind direction in an area.
Altitude	Height above sea level (metres)
Polar Vortex	An area of low pressure and extremely cold air that swirls around the Arctic.
Weather hazard	An extreme weather event that threatens people or property. Weather hazards include: tropical storms. tornadoes. droughts
Climate Change	A change in global or regional climate patterns, due to rising temperatures in the earth's atmosphere
Tornado	A violently rotating column of air that is in contact with the surface of the earth and a thunderstorm in the atmosphere.
Tropical storm	A hazard that brings heavy rainfall, strong winds also called hurricane, typhoon or cyclone.
Coriolis effect	Apparent force, due to the spinning of the Earth, which deflects movement of particles and wind.
Primary impacts	A direct result of a weather hazard.
Secondary impacts	A 'knock-on' effect of a weather hazard.
Global warming	An increase in the overall temperature of the earth's atmosphere
The greenhouse effect	The process that causes the Earth to be warmer than it would be in the absence of an atmosphere.
Carbon footprint	the amount of carbon dioxide released into the atmosphere as a result of the activities of a particular individual, organization, or community.
Stakeholders	A person with an interest or concern in something
Mitigation	To make something (bad) less serious ie. reduce the causes of climate change
Adaptation	To adjust or change to cope with different conditions or a new environment ie. deal with impacts of climate change

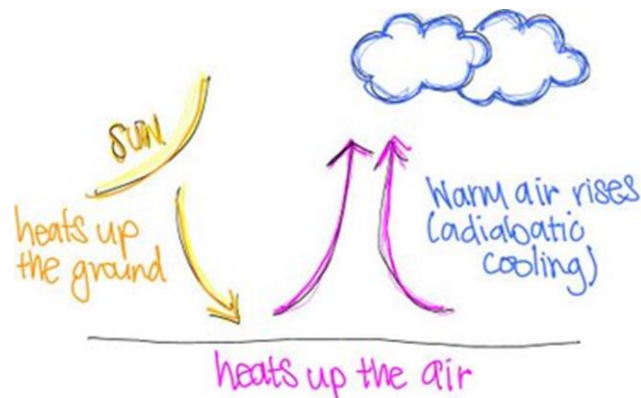
Introduction to weather, climate and air pressure

Difference between weather and climate

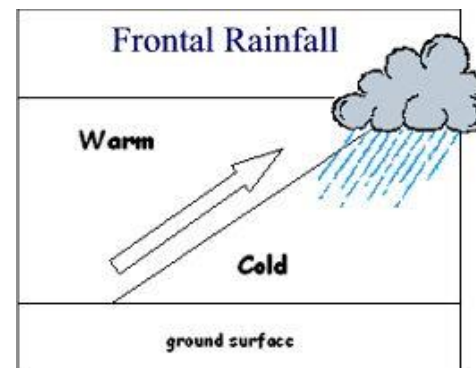
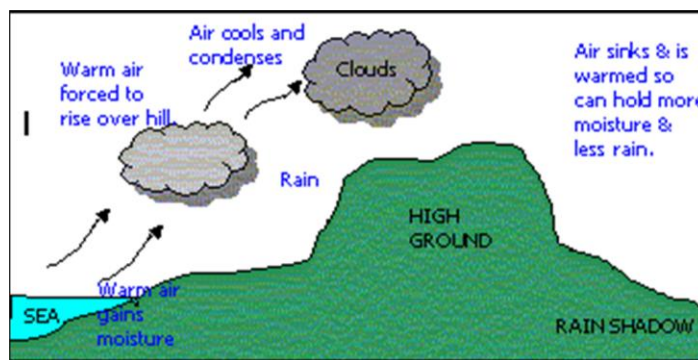
	Summer	Winter
High pressure is where the air is sinking.	High pressure in the summer often brings fine, warm weather. It can lead to long warm sunny days and prolonged dry periods. Could lead to heatwaves and droughts.	High pressure in the winter often leads to cold, dry days, with light winds. Severe nighttime frosts can develop if skies are clear.
Low pressure is where the air is rising.	Leads to periods of prolonged rainfall, which in extreme situations leads to flooding.	Low pressure in the winter often signals stormy or wintry conditions.

Types of rainfall

Convictional rainfall



Relief rainfall



Shivering Chicago: Blizzard 2019

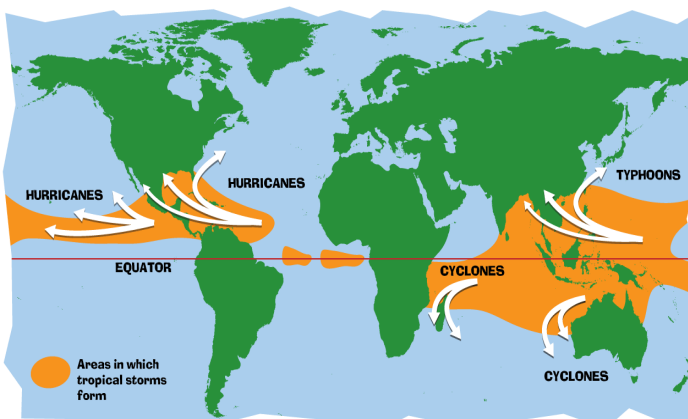
Causes	Impacts	Management
<p>The polar vortex is a mass of cold Arctic air which normally spins around the North Pole. January 2019, the vortex became more irregular in shape, sending freezing cold air further southwards than normal. When this cold, dry air comes into contact with the warmer, wetter air further south=cold low-pressure system.</p>	<p>Temperatures as low as -46C Over 90 million experience below freezing 600 cancellations at the city's airports. Car accidents Lake Erie ice over 80% Hypothermia/frostbite +2,900 flights cancelled Schools/businesses etc. closed</p>	<p>Declared a state of emergency Road closures Snow ploughs Temporary 'warming' shelters Emergency services specialist training in extreme cold weather problems Flights cancelled Setting the train tracks alight to help travelers</p>

Tornadoes: Tornado alley: An area of the USA prone (75% in the Great Plains) to tornadoes every spring.

Causes	Impacts	Preparing/Protecting
<p>Hot sun rays heat the ground this causes the air above the ground to get warmer and rise. When the warm air rises it meets cold air, causing a thunder cloud with thunder and lightening. During the storm there is very rapid movement of air upwards and other circular winds from different directions start to make it rotate. Storms and winds create a swirling funnel that drops to the ground.</p>	<p>Speeds of up to 480km per hour - strong enough to peel the roofs off houses, uproot trees and hurl heavy objects, such as cars, hundreds of metres! 2013 Oklahoma: 24 people killed, 1,150 homes destroyed, \$2billion damages, 37 injured Burst water and gas pipes</p>	<p>Disaster supplies kit Enter basement or interior room Stay under a table If outside in a ditch or low lying area</p>

Features of a tropical storm

- They contain strong winds in excess of 74 miles per hour (119 km per hour)
- Heavy rainfall
- A calm centre called the eye, that is often distinctive in satellite images. It contains calm winds, warm temperatures and clear skies.
- A spiralling cloud formation



Where do tropical storms form?

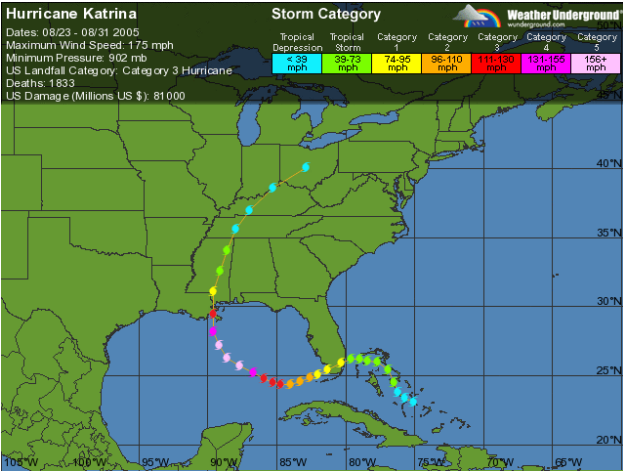
- They form between the equator and tropic of Cancer/Capricorn
- They form to the north and south of the equator
- They mention a specific ocean for e.g. Atlantic
- They mention the proximity to a specific continent e.g. to the east of Asia/North of Australia for

	Hurricanes	Tornadoes
Where do they form	Over water	Over land
How big are they	Can be several hundred miles wide	No more than 1 1/2 miles wide
How long do they last	Up to 3 weeks	Usually no more than an hour
How strong are the winds	Up to 180mph	Severe ones can be up to 300 mph
How many per year	Average of 10 per year in the Atlantic	In the US 800-1000 a year
Advance warning	Several days	Approx 15-30 minutes

Global warming & Tropical storms- as the CO2 levels increase so do the global average temperatures. Tropical storms have become more frequent and intense because oceans are warming and must be above 27C to form tropical storms.

Hurricane Sandy impacted New York, an unlikely location because it is outside the tropics and ocean temps less likely to reach 27c. Global warming made New York vulnerable / at risk of tropical storms because rising temperatures had led to thermal expansion of oceans, rising temperatures to above 27c (key ingredient in tropical storms). Sea levels are also rising mean storm surges are higher and more likely to breach.

Hurricane Katrina



Social

1,836 dead
 10,000 left homeless
 3 million no electricity
 Bridge collapsed
 Crime = reduction in rescue efforts

Economic

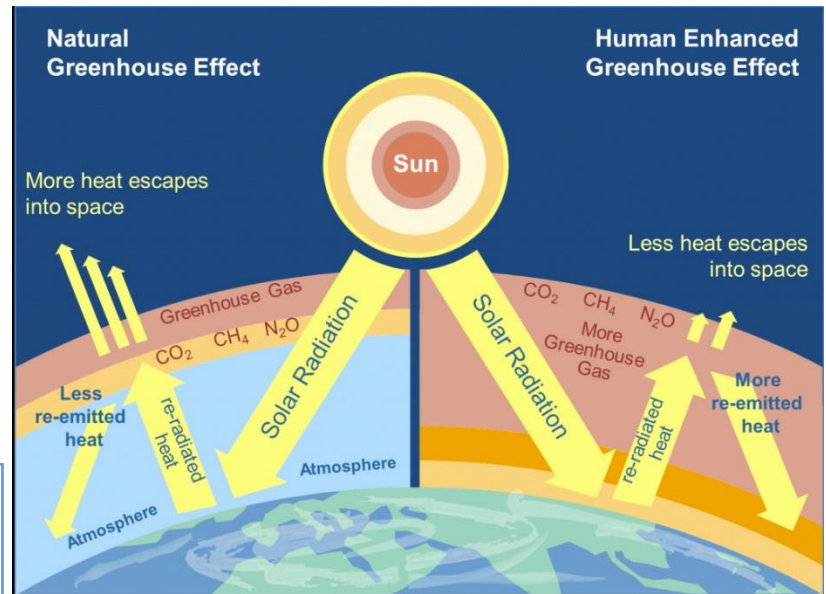
230,000 jobs lost
 Looting of businesses and homes
 The poor hit the worst

Environmental

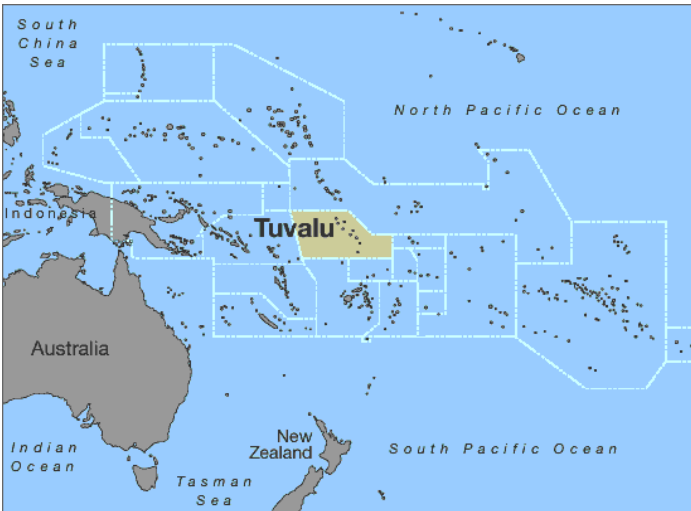
Levees broken in 53 places
 80% of New Orleans underwater
 Water supplies contaminated with sewage, chemicals and dead bodies

Global Warming and Climate Change

Natural causes of climate change	Human causes of climate change
Volcanic eruptions Changes in the earth's orbit Changes in the sun's energy	Enhanced greenhouse effect- use of non renewable energy, deforestation, growing rice, dumping waste on landfill & rearing lots livestock (cow farts)



Tuvalu: Going under- sea level rise



Location: a microstate in Polynesia, located in the Pacific Ocean, situated in Oceania and about midway between Hawaii and Australia.

1. Who is responsible for Tuvalu?
2. How will the people of Tuvalu be affected socially, economically and environmentally?

Tackling climate change

Adapting – managing water supply, reducing risk from rising sea levels, changing housing design (on stilts, grass on roof insulation)
 Mitigating- alternative energy (solar panels on houses, E.G. Bedzed, London), organic farming, replanting trees, international agreements

Case study: Maldives- completely submerged within 50-100years

Population	About 30,000 people
Number of Islands	1190- 199 of which are inhabited
Average island height	1.5 above sea level 80% of the land is below 1m

Stakeholders:

- Hotel manager**- for-relies on tourist for his livelihood
- Conservationist**- for- coral reefs 'rainforests' of the sea- home to thousands of species of plant and animals
- Factory owner in China**- against- Maldives not worth saving at cost of his business producing greenhouse gases
- Dive instructor**- for- loss of income from diving in coral reefs/education of species
- Hotel owner Seychelles**- against- Maldives are competition for tourists(most important sector).