

YEAR 10 UNIT 3: Weather Hazards and Climate Change

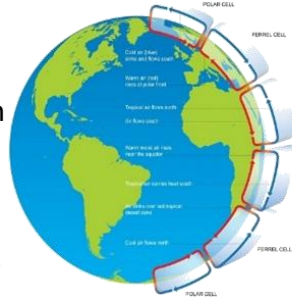
Global Pattern of Air Circulation

Atmospheric circulation is the large-scale movement of air by which heat is distributed on the surface of the Earth.

Hadley Cell – Largest cell which extends from the Equator to between 30° to 40° north & south.

Ferrel Cell - Middle cell where air flows poleward between 60° & 70° latitude.

Polar cell - Smallest & weakness cell that occurs from the poles to the Ferrel cell.



Tropical Storms

Tropical Storms are intense low pressure weather systems with heavy rain and strong winds that spiral around the centre. They have a few names (hurricanes, typhoons, and cyclones) but they're all the same thing.

Formation of Tropical Storms

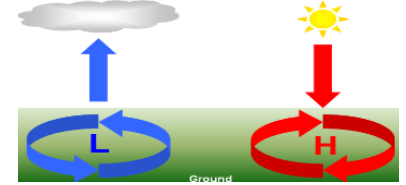
1. The sun's rays heats large areas of ocean in the summer and autumn. This causes **warm, moist air to rise over** the particular spots
2. Once the **temperature is 27°**, the rising warm moist air leads to a **low pressure**. This eventually turns into a thunderstorm. This causes air to be sucked in from the **trade winds**.
3. With trade winds blowing in the opposite direction and the rotation of earth involved (Coriolis effect), the thunderstorm will eventually start to **spin**.
4. When the storm begins to **spin faster than 74mph**, a tropical storm (such as a hurricane) is officially born.
5. With the tropical storm growing in power, **more cool air sinks** in the centre of the storm, creating calm, clear condition called the **eye of the storm**.
6. When the tropical storm hits land, it **loses its energy source** (the warm ocean) and it begins to lose strength. Eventually it will 'blow itself out'.



High and low Pressure

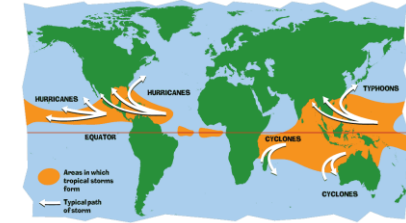
low Pressure - Caused by hot air rising. Causes stormy, cloudy weather.

High Pressure - Caused by cold air sinking. Causes clear and calm weather.



Distribution of Tropical Storms

They are known by many names, including hurricanes (North America), cyclones (India) and typhoons (Japan and East Asia). They all occur in a band that lies roughly 5-15° either side of the Equator.



Primary Effects of Tropical Storms

- The intense winds of tropical storms can destroy whole **communities, buildings** and **communication networks**.
- As well as their own destructive energy, the winds can generate abnormally high waves called **storm surges**.
- Sometimes the most destructive elements of a storm are these subsequent **high seas and flooding** they cause to coastal areas.



Secondary Effects of Tropical Storms

- People are **left homeless**, which can cause distress, poverty and ill health due to lack of shelter.
- **Shortage of clean water** and **lack of proper sanitation** makes it easier for diseases to spread.
- **Businesses are damaged** or destroyed causing employment.
- Shortage of food as **crops are damaged**

Changing Pattern of Tropical Storms

Scientists believe that global warming is having an impact on the frequency and strength of tropical storms. This may be due to an increase in ocean temperatures.



Management of Tropical Storms



Protection Preparing for a tropical storm may involve construction projects that will improve protection.	Aid Aid involves assisting after the storm, commonly in LIDs.
Development The scale of the impacts depends on the whether the country has the resources cope with the storm.	Planning Involves getting people and the emergency services ready to deal with the impacts.
Prediction Constant monitoring can help to give advanced warning of a tropical storm	Education Teaching people about what to do in a tropical storm.

Typhoon Haiyan - 2013

Causes - Started as a tropical depression on 2nd November 2013 and gained strength. Became a Category 5 “super typhoon” and made landfall on the Pacific islands of the Philippines.

Effects

- Almost 6,500 deaths.
- 130,000 homes destroyed.
- Water and sewage systems destroyed had caused diseases.
- Emotional grief for dead.

Management

- The UN raised £190m in aid.
- USA & UK sent helicopter carrier ships deliver aid remote areas.
- Education on typhoon preparedness.



What is Climate Change?

Climate change is a large-scale, long-term shift in the planet's weather patterns or average temperatures. Earth has had tropical climates and ice ages many times in its 4.5 billion years.



Enhanced Greenhouse Effect - Recently there has been an increase in humans burning fossil fuels for energy which emit greenhouse gases. This is making the Earth's atmosphere thicker; trapping more solar radiation and causing less to be reflected. As a result, the Earth is becoming warmer.



UK Weather Hazards

Prolonged rainfall – over a long period of leads to river floods, such as the very wet winter of 2013/14 causing flooding across much of southern England.

Strong winds, such as in February 2014 cause disruption to power supplies, damage from fallen trees and coastal battering from large waves.

Heavy snow and extreme cold are less common nowadays, but can cause great hardship to people in the north of the UK. December 2010 was the coldest in a century!

Thunderstorms follow hot weather bringing lightening and torrential rainfall linked to Flash Flooding.

Drought and extreme heat cause rivers to dry up and reservoirs run dangerously low. The heatwave of 2013 over much of Europe killed over 20000 people.

Somerset levels 2014

Causes – A sequence of south westerly depressions brought record rainfall in January and February. Rivers clogged with sediment, had not been dredged for 20 years.

Effects – Over 600 houses flooded and 16 farms evacuated. Villages cut off – disrupting work, schools and shopping. Power supply, roads and railway cut off. Floodwaters contaminated with sewage.

Response - Cut-off villages used boats for transport. Community groups and volunteers gave invaluable support. £20 million Flood Action Plan launched by Somerset County Council and Environment Agency to reduce future risk. 8km of Rivers Tone and Parrett dredged. Road levels raised in lowest dips.

Recent Evidence for Climate Change

Global Temperature - Average global temperatures have increased by more than 0.6°C since 1950.

Ice Sheets and Glaciers - Many of the world's glaciers and ice sheets are melting. E.g. the Arctic sea ice has declined by 10% in 30 years.

Sea level Change - Average global sea level has risen by 10-20cms in the past 100 years. This is due to the additional water from ice and thermal expansion.

Evidence of Natural Change

Orbital Change - Some argue that climate change is linked to how the Earth orbits the Sun, and the way it wobbles and tilts as it does it.

Sun Spots - Dark spots on the Sun are called Sun spots. They increase the amount of energy Earth receives from the Sun.

Volcanic activity - Volcanoes release large amounts of dust containing gases. These can block sunlight and results in cooler temperatures.

Managing Climate Change

Carbon Capture - This involves new technology designed to reduce climate change.

Planting Trees - Planting trees increase the amount of carbon is absorbed from atmosphere.

International Agreements - Countries aim to cut emissions by signing international deals and by setting targets.

Renewable Energy - Replacing fossil fuels based energy with clean/natural sources of energy.

