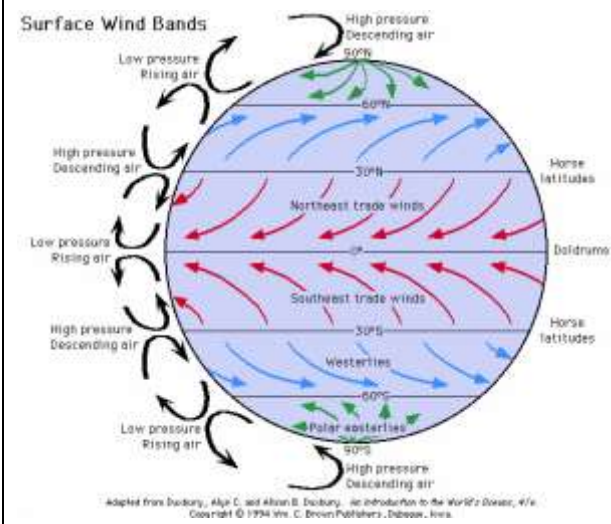


Y10 Geography Knowledge Map. (Unit 1: Living with the physical environment. Section A: The challenge of natural hazards. Part 2 of 3: Weather Hazards)

Global Atmospheric Circulation



The main controls on climate

1. Latitude - Latitude refers to the distance from the Equator. The further from the Equator you are, the colder it is.
2. Continentality - is a word to describe how far from the sea somewhere is. In general, the further from the sea somewhere is, the less rain it gets.
3. Altitude - Temperatures decrease, on average, by 1°C for every 100 metres of altitude (height above sea level). So mountainous areas are always cooler. These areas also tend to get more rain (because of relief rainfall), so they are wetter too.
4. Atmospheric currents - (pressures and winds) Surface winds blow from areas of high pressure to areas of low pressure.

Where are tropical storms formed?

A tropical storm is a localised, very intense low-pressure wind system, forming over tropical oceans and with winds of hurricane force.

1. Hurricanes, cyclones and typhoons are exactly the same thing – they are just named differently based on where they are.
2. All tropical storms form where the surface sea temperature is at least 27°C.
3. The water has to be at least 70m deep.
4. They cannot form within 5° north or south of the Equator.

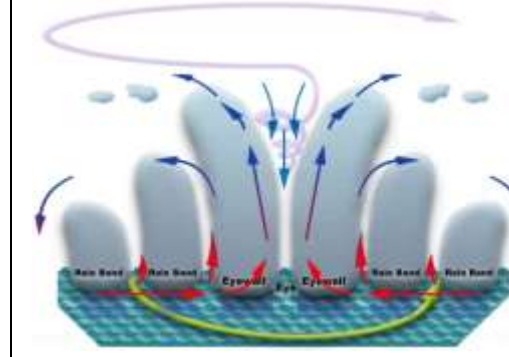


Tropical storms usually form between approximately 5° and 30° latitude and move westward due to easterly winds. The **Coriolis force** sends them spinning towards the poles.

How do tropical storms form?

- Hurricanes need a lot of heat to form, which is why they usually occur over tropical seas (at least 26°C).
- The sun is close to the equator, providing energy to heat the ocean.
- The warm ocean heats the air above it causing it to rise rapidly.
- Water **evaporates** quickly from the hot surface of the ocean, so the rising air contains great amounts of water vapour.
- The rising air starts to spin (clockwise in the northern hemisphere)
- The centre of the storm - the eye - is calm.
- As the air rises it cools, condenses and forms towering **cumulonimbus clouds**.
- The rapidly rising air creates an area of intense low pressure. The low pressure sucks in air, causing very strong winds.
- Once the storm moves over land it starts to lose energy and fades.

The structure of tropical storms



Eye – no clouds, calm, cold air sinks towards the ground and warms up.

Eye Wall – strong winds in excess of 120km per hour. Heavy rain and possible thunder

Torrential rain, very strong winds, thunder and lightning.

Reducing the effects of a tropical storm (see class notes for more)

Developments in technology have made it possible to predict and monitor tropical storms more effectively and accurately.

In the North Atlantic, there are 2 levels of warning issued by the National Hurricane Centre in Miami.

1. Hurricane Watch – advises hurricane conditions are possible
2. Hurricane Warning – advises hurricane conditions are expected.

Protection:

- Windows, doors and roofs reinforced to strengthen buildings
- Storm drains constructed to remove excess amounts of rainfall
- Sea walls built to protect properties from storm surge
- Houses constructed on stilts
- In Bangladesh 2000 cyclone shelters have been built.

Planning:

Raising individual and community awareness.

Bangladesh – a success story.

Typhoon Haiyan – Case Study – Tropical Storm (see book for all effects and responses).

In November 2013 'Super' Typhoon Haiyan – a category 5 storm on the Saffir-Simpson scale – hit the Philippines. Huge areas of coastline and several towns were devastated by winds of up to 275km/h (170mph) and waves as high as 15m. It was one of the strongest storms ever recorded.

What were the effects of Typhoon Haiyan?

The province of Leyte took the full force of the storm. The city of Tacloban was one of the worst affected places, with most of the 220,000 inhabitants left homeless. Most of the destruction in Tacloban was caused by a 5-metre high storm surge. This is a wall of water similar to a tsunami. The very low atmospheric pressure associated with the typhoon caused the level of the sea to rise. As the strong winds swept this water onshore, it formed a wall of water several metres high.

Primary Effects: Strong winds, heavy rain and storm surge. Tacloban airport terminal badly damaged. The typhoon destroyed 30,000 fishing boats. About 6,300 people killed – most drowned by the storm surge.

Secondary Effects: 14 million people affected, many left homeless and 6 million people lost their source of income. Power supplies in some areas cut off for a month. Flooding caused landslides and blocked roads, cutting off aid to remote communities.

Immediate Responses: International government and aid agencies responded quickly with food aid, water and temporary shelters. Over 1,200 evacuation centres were set up to help the homeless.

Long-term Responses: Foreign donors, including US, Australia and the EU, supported new livelihood opportunities. 'Cash for work' programmes – people paid to help clear debris and rebuild the city.

Weather Hazards and Extreme Weather in the UK

- Flooding
- Drought
- Heatwave
- Blizzard
- Gales
- Hail storm
- Thunderstorm

Since the 1960s, floods have become:

- more frequent;
- longer lasting;
- worse to deal with.

Rainfall increased by 10% from 1997 to 2007.

Temperature ranges have been more extreme (i.e. -20°C to +22°C in Highland in the same year!)

Somerset Levels Floods 2014 – Case Study (see class notes for more)

The Somerset Levels and the Somerset Moors form an extensive area of low-lying farmland and wetlands bordered by the Bristol Channel and Quantock Hills to the west and the Mendip Hills to the north.

The area is drained by several rivers, most notably the Tone and the Parrett, which flow to the Severn Estuary via Bridgewater. Flooding has occurred naturally here for centuries. As the area has been developed for farming and settlement, many people are now at risk from extreme flood events.

What caused the floods in 2014?

- There were several factors that led to extensive flooding of the Somerset Levels.
- It was the wettest January since records began in 1910. A succession of depressions (areas of low pressure) driven across the Atlantic Ocean brought a period of wet weather lasting several weeks. About 350mm of rain fell in January and February, about 100mm above average.
- High tides and storm surges swept water up the rivers from the Bristol Channel. This prevented fresh water reaching the sea and it spilled over the river banks.
- Rivers had not been dredged for at least 20 years and had become clogged with sediment.

Social Impacts: Over 600 houses flooded. 16 farms evacuated.

Economic Impacts: Local roads cut off by floods. Somerset County Council estimated the cost of flood damage to be more than £10 million.

Environmental Impacts: Stagnant water that had collected for months had to be reoxygenated before being pumped back into the rivers.

