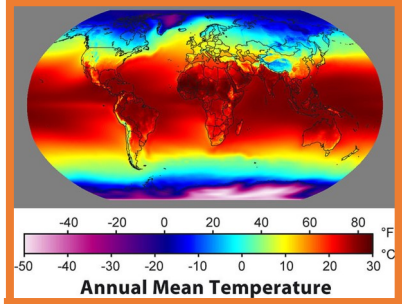
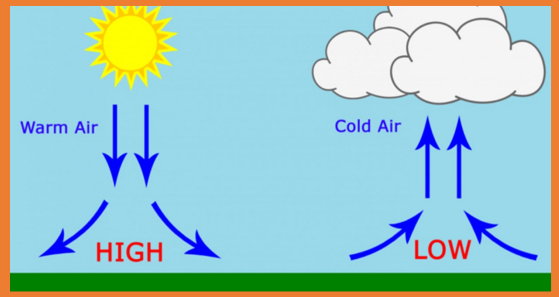
GCSE Knowledge Organiser: The Challenge of Natural Hazards — Weather Hazards (Paper 1)



Temperature varies across the globe with the thermal Equator being the hottest part and the poles being the coldest.

This is due to the **angle** of the sun, thickness of the **atmosphere** and the **albedo** effect.



Direction of air movement from the surface of the Earth causes different weather patterns across the globe.

Moist, warm air rises at the Equator, causing **low pressure** and forming large cumulonimbus clouds, bringing rain. When air sinks, like at 30°N/S of the equator, **high pressure** is created and clear skies.

Key Terms:

Albedo: Reflection and scattering of the sun's rays.

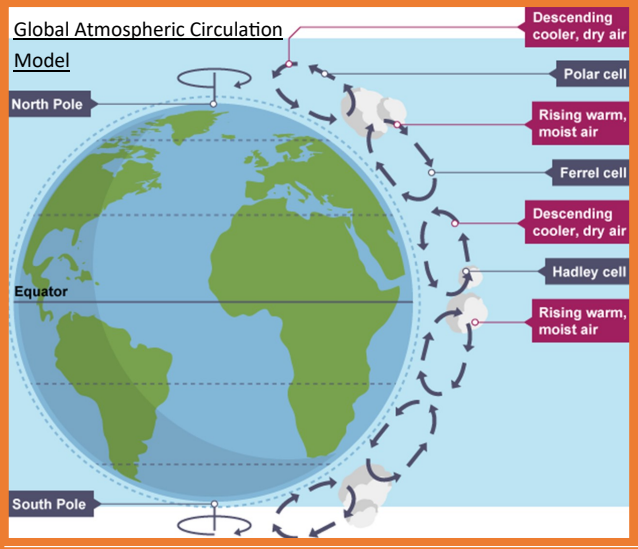
Tropopause: Lower layer of the Earth's atmosphere.

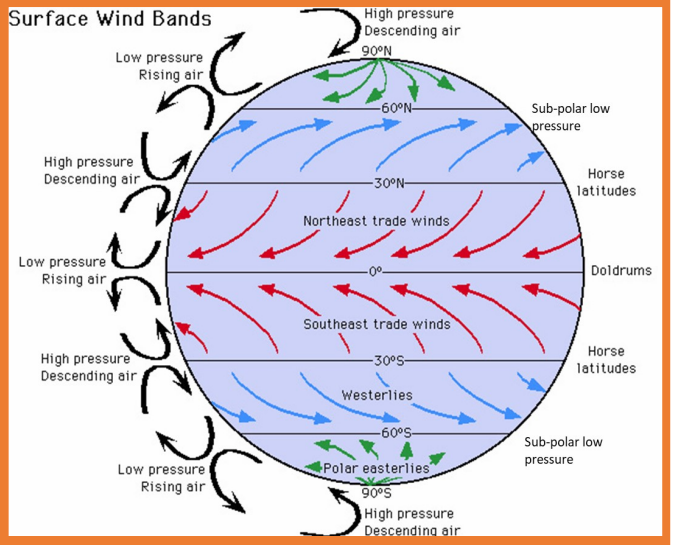
Coriolis Effect: a change in direction on moving objects e.g. winds caused by the rotation of the Earth.

Jet Stream: A narrow band of string wind high above the Earth's surface.

Surface winds: A movement of air across the surface of the Earth e.g. trade winds.

Pressure belts: A region which is dominated by either high pressure cells or low pressure cells

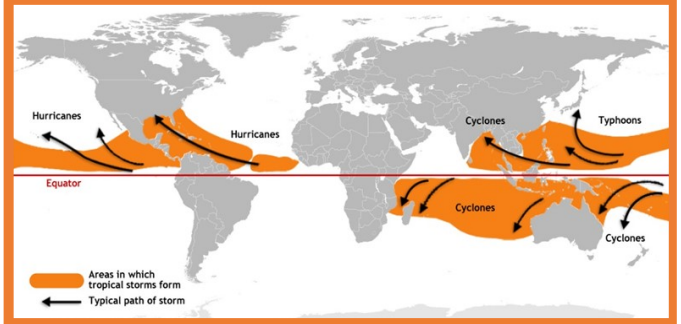




Global Atmospheric Circulation Model (three cell model)

- Air is heated at the thermal equator by the sun, causing it to rise and create an area of low pressure at the surface. It then cools and condenses to form cumulonimbus clouds which bring rain and is usually where tropical rainforests form.
- As air rises from the surface, it reaches the tropopause, spreading outwards towards the poles. As the air cools, it begins to sink at 30°N/S of the Equator. This creates high pressure at the surface and is often where hot deserts are found.
- The air then moves back over the surface of the Earth as the trade winds, completing the Hadley Cell.
- Temperatures at the Poles are cold, so air sinks, causing high pressure. Air then travels across the surface of the globe as the Polar winds. Air temperatures warm up and around 60°N/S air will begin to rise towards the tropopause where it spreads out and returns to the Poles to complete the Polar Cell.
- The Ferrel cell is thermally indirect and air moves in response to movement in the Polar and Hadley cells. Surface winds are known as the easterlies (northern hemisphere) and westerlies (southern hemisphere).
- This movement of wind is important in the redistribution of heat energy across the globe.

The Distribution of Tropical Storms



Tropical Storms An area of <u>low pressure</u> with winds moving in a <u>spiral</u> around a calm centre known as the eye of the storm. Once winds reach speeds of 74mph it becomes a **hurricane**, **typhoon** or **cyclone**.

On reaching land the storm's energy supply (evaporated water) is cut off. Friction with the land slows it down and it begins to weaken. If the storm reaches warm seas after crossing the land, it may pick up strength again.

As the storm is carried across the ocean by the prevailing winds, it continues to gather strength.

The storm now develops an eye at its centre where air descends rapidly. The outer edge of the eye is the eyewall where the most intense weather conditions (strong winds and heavy rain) are felt.

Several smaller thunderstorms join together to form a giant spinning storm. When surface winds reach an average of 120 km per hour (75 miles per hour) the storm officially becomes a tropical storm.

As the air condenses it releases heat which powers the storm and draws up more and more water from the ocean.

This evaporated air cools as it rises and condenses to form towering thunderstorm clouds.

A strong upward movement of air draws water vapour up from the warm ocean surface.

Conditions needed for tropical storm formation:

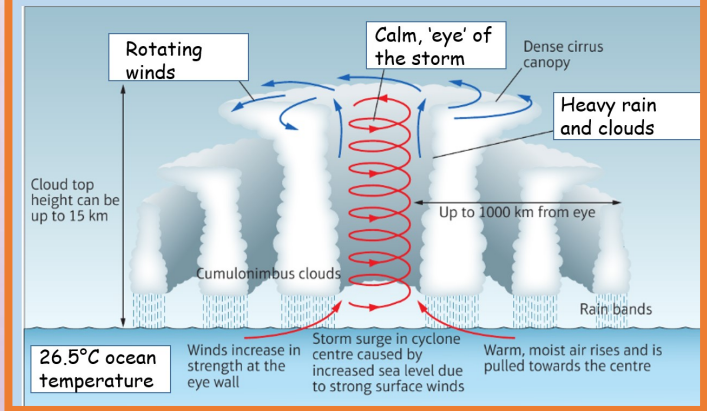
Sea temperatures above 26.5°C - only occurs in tropical waters.

Water from the ocean gives moisture/energy - without which it would die out.

Low rotation of the Earth (Coriolis) - starts the spin of the storm either side of the Equator (It is too low at the actual Equator), but not too high to separate it.

Low wind sheer - not to be too strong so it doesn't rip the storm apart.

Structure of a Tropical Storm(cyclone)



Predicted changes in tropical storms:

Computers predict that **frequency** might decrease, but **intensity** is likely to increase as a result of rising sea surface temperatures. This will also cause **distribution** to change, as areas such as the South Atlantic see sea surface temperatures rise as a result of climate change.

The Path of Hurricane

Key terms:

Primary effect: an immediate impact.

Secondary effect: a more long term effect which happens in the weeks and months following a natural hazard.

Short-term response: The immediate reaction to a natural disaster e.g. send tents

Long-term response: The reaction in the weeks and months which follow a disaster e.g. rebuilding schools.

Case Study: Hurricane Katrina 2005

Primary effects:

Levees broke, flooding 80% of New Orleans- some places up to 20ft in water.

300 000 homes destroyed.

1800 people died.

3 million people without electricity.

Secondary effects:

The National guard had to be brought in due to increased violence and looting.

50 000 people waited to be evacuated from New Orleans

230 000 jobs were lost due to damaged businesses and looting.

Short-term response:

Coastguard helicopters sent in to rescue people stranded by flood water.

People were evacuated to the Superdome.

Prisoners were evacuated from Baton Rouge.

Long-term response:

$10.5 billion dollars pledged to rebuild and support New Orleans.

Communications were rebuilt.

127,000 people were moved out of temporary housing into long-term solutions.

100 million m^3 debris removed.

Monitoring, Prediction, Protection and Planning to reduce the impact of tropical storms:

education

emergency plans