CAIE Geography Pre-U

1B: The Atmospheric Environment

Case Studies

Climate classification

John E. Oliver

Genetic classification meaning he classified climates **based on their causes.** He designated particular air masses and combinations of air masses as either **dominant**, **subdominant** or **seasonal** at certain locations.

He then uses air masses to distinguish three basic climatic types:

- **Dominant**: when a single air mass was dominant all year around.
- **Seasonal**: where there were different dominant air masses depending on the season.
- **Compound**: when there was no dominant air mass.

Thornthwaite

Empirical classification meaning that he classified his climates based on the effects of the climate in that area. He used **potential evapotranspiration,** which approximates the water use of plants if there was an unlimited supply of water, and compares this with **actual evapotranspiration** as these are the determining factors for most crop growth and vegetation.

Thornthwaite's method is more useful on a **local scale** for soil scientists, agriculturalists and water resource specialists. The data is hard to obtain and will not be widely available.

Koppen

Also had an **empirical** classification system which was based on **temperature and precipitation**. He made sure that his climatic regions coincided with well-defined vegetation regions. Both precipitation and temperature are easy to measure and widely available across the world. He established **5 main climatic groups** based on temperature and the subgroups which were based on precipitation.

Koppen was able to develop precise definitions for each climatic region however, he ignored cloud cover, winds, humidity, precipitation intensity and daily extremes of temperature.

The **Koppen climate classification map** can be found here.
For more information on climate classification you can check out the Britannica and also this chapter on global climates and climate change.

The Great storm of 1987

Causes

- **Extreme heating** over the bay of Biscay created a **depression** which then travelled over the British Isles.
- **Warm tropical air and very cold polar air collided**. This forced the warm air to rise and created an area of **low pressure.**
- Pressure rose rapidly in some areas which caused massive **pressure differences**. These pressure differences created very strong winds.

- The storm was also boosted by a phenomenon known as **string jet**. This is where cold dry air descends into storms high in the atmosphere and cools the air even further, creating stronger winds.

Impacts

- **15 million trees were blown down**. This blocked roads and railways and damaged buildings.
- Several hundred people were left without any power.
- Public transport was halted.
- **18 people died.**
- Most people advised not to go to work so production decreased.
- It cost the insurance companies **£2 billion.**
- Boats were wrecked at sea.
- Average of **80km/h winds** with a **high of 150km/h.**

The 2003 European heatwave

Causes

- **High pressure** over most of western Europe.
- The air was moving around the high-pressure system in a clockwise direction and so was bringing a hot, dry, tropical continental air mass to Europe.
- There was also an anticyclone which was anchored over Northern France. This **blocked the Atlantic air mass for 20 days.**

Impacts

- Low levels of water in rivers and lakes.
- Lots of forest fires. In Portugal, **10% of their forests were destroyed** by forest fires.
- **35,000 people died.**
- The crop harvest was damaged. In the UK, the **wheat harvest was down by 12%.**
- Railway tracks buckled so public transport and the transport of resources was halted.
- Drinking water supplies affected.
- People mainly suffered from **dehydration, heat stroke and sunburn.**

Responses of the government

- Hosepipe ban.
- Advice was given to the public by the media.
- Imposed speed restrictions for trains.
- Workers altered hours.
- The French government was heavily criticised for doing too little too late, and as a result, they have now put in better warning systems.