

### What is the difference between weather and climate?

**Weather** = The day to day conditions of the atmosphere.

**Climate** = The average weather conditions over a long period of time (generally at least 30 years).

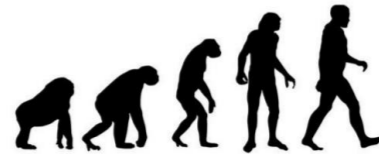
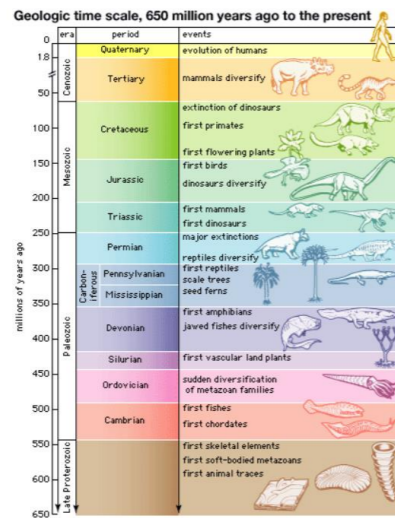
### Climate change

A large-scale, long-term shift in the planet's weather patterns or average temperatures.

### The quaternary period

The most recent geological time period, spanning from 2.6 million years ago to the present day. It includes the whole of human history.

In the period before the quaternary, the Earth's climate was warmer and stable. This changed...a LOT!



# Crazy Climates



### The evidence for climate change

**Sea ice extent** – sea ice forms around the poles in winter when ocean temperatures fall below -1.8degrees, and melts during summer. By observing the ice, scientists can tell how the ice is changing. The data is reliable, but accurate records do not go back very far.

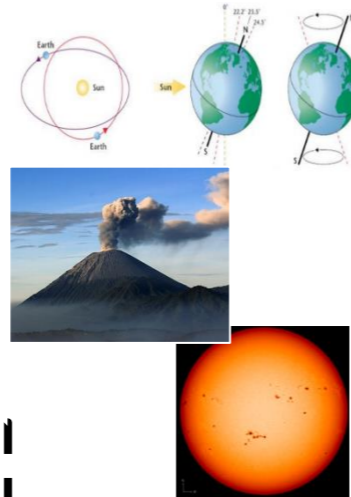
**Global temperature data** – Since the 1850s, global temperatures have been measured and plotted on graphs. They give reliable, but short-term data. However, weather stations are not evenly distributed across the world, so data can be patchy.

**Ice cores** – Ice sheets are made from layers of ice, one new layer each year. Scientists drill into the ice and pull out a round core. By analysing the gases in the ice, they can tell when the temperature was when the ice formed. The data is very reliable and detailed.

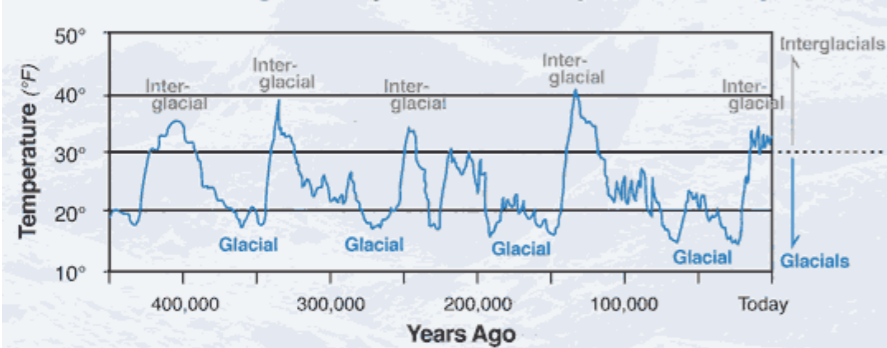
**Paintings and diaries** – Paintings of fairs and markets on frozen rivers show that Europe was regularly much colder than it is now. Historical diary entries can show what the climate was like in the past by someone writing it down. However, they are not as reliable as only give on persons viewpoint.

### Natural causes of climate change

- Orbital changes** – the Earth goes through cycles that move the earth closer to, and further away from, the sun, altering the climate. These changes include; the wobble, orbit shape and tilt of Earth.
- Volcanos** – after an eruption, volcanic ash enters the atmosphere. This prevents the suns radiation entering and cools the climate.
- Sunspots** – show cool spots on the sun where the sun's energy has been emitted towards Earth. More sunspots = warmer climate.



### Glacial-interglacial cycles over the past 450,000 years

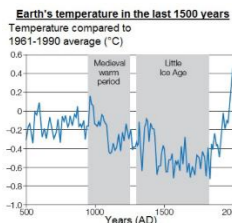


### Changes in climate – 450,000 to present

In the last 450,000 years the climate has **fluctuated** between cold glacial periods lasting 100,000 years, and warmer interglacial periods lasting 10,000-15,000 years.

### Changes in climate – 1500 years to present

The Earth has experienced a Medieval warming period, followed by a Little Ice Age. Since then Earth has warmed considerably.



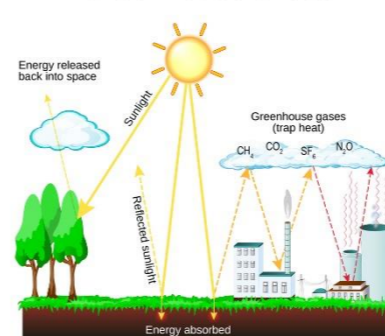
### The greenhouse effect

The gases in our atmosphere **act like a blanket** around our planet which traps in heat, making the temperature rise. This is called the Greenhouse Effect and is a **natural process** that keeps the planet warm and sustains life. Without it the Earth would be around -18degrees.

### HOWEVER

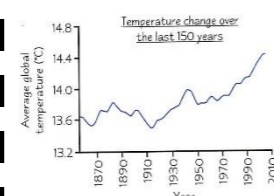
Humans are now enhancing the greenhouse effect by producing greenhouse gases through driving cars, factories and cows. This is warming the Earth much more quickly than it would naturally.

### Greenhouse effect



### Changes in climate – 150 years to present

In this time the temperature has seen an overall increase from 13.5 degrees in 1870 to 14.4 degrees in 2010.



### The global impacts of climate change

#### Social:

- Higher numbers of people suffer respiratory issues.
- Spread of disease much quicker
- Higher chance of flooding and damage to homes.

#### Economic:

- Harder farming conditions reduced number of crops.
- More storms damages infrastructure and businesses.
- Loss of tourism as places become too hot.

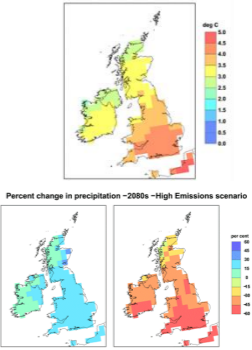
#### Environmental:

Loss of animal species that cannot adapt to warmth.

Sea level rise causes flooding

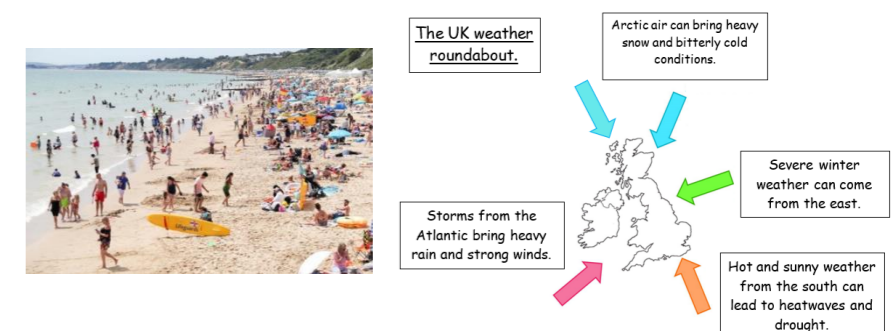
Increased air pollution

Change in annual average daily temperature – 2080s



### UK impacts of climate change

The South of the UK will see an increase in temperature, with the North (Scotland) also seeing an increase but by less. Winter rainfall will increase across the whole country. Summer rainfall in the South will be much lower, causing drought conditions.



### The UK heatwave of 2018

#### Causes:

- Warm air carried across from the East
- Previously dry weather making the ground easier to warm.

#### Impacts:

- Ground became scorched from lack of rainfall.
- Burrator reservoir in Devon was 50% lower than normal.
- Moorland fires occurred in Lancashire and Yorkshire
- 700 people died across the hottest 15-day period.

#### Challenges:

- Underground trains became extremely hot and stuffy.
- The RSPCA received a high number of calls to rescue animals.
- Fish suffocated as the water heated up.
- Surge in horse flies and ants.

#### Opportunities:

- UK tourism industry boomed
- Drought uncovered valuable historical sites.
- Sales of ice creams and cold drinks rocketed.
- Pubs and beer gardens had increased sales due to the World Cup at the same time.