What causes climate change?

KS2 KS3 KS4 Ages 7-16 ⏰ 4 min read

Earth's climate has always changed — ice ages, warm periods, mass extinctions driven by volcanic eruptions. What's different now is the speed, the cause, and the scale.

The greenhouse effect

Earth is kept warm by the **greenhouse effect**. Sunlight passes through the atmosphere and warms the surface. The surface radiates heat back upward as infrared radiation. Greenhouse gases — mainly water vapour, carbon dioxide, and methane — absorb some of this outgoing heat and radiate it back towards Earth, keeping it warmer than it would otherwise be. Without any greenhouse effect, Earth's average temperature would be around −18°C instead of the current +15°C. The greenhouse effect is not a problem; it's essential for life.

The problem is too much of it.

Imagine Earth's atmosphere is a duvet on a bed. A thin duvet keeps you comfortably warm on a cold night. A thicker duvet keeps you warmer still. Keep adding duvets and you start to overheat. Since the Industrial Revolution, humans have been adding CO_2 to the atmosphere at an unprecedented rate — thickening the duvet. The bed is warming, and the consequences of overheating ripple through everything the bed is connected to.

Where is the extra CO_2 coming from?

Primarily from burning fossil fuels — coal, oil, and natural gas — which releases CO_2 that was locked underground for millions of years. Deforestation releases CO_2 stored in trees. Agriculture produces methane (from livestock) and nitrous oxide (from fertilisers), both powerful greenhouse gases. Since 1750, atmospheric CO_2 concentration has risen from about 280 parts per million to over 420ppm — higher than at any point in the past 800,000 years, based on ice core evidence.

Why does 1.2°C matter?

Global averages hide local extremes. A 1.2°C rise in average temperature means much more frequent heatwaves, stronger storms, faster-melting ice, rising sea levels, and disrupted rainfall patterns that affect agriculture. The concern is feedback loops: melting Arctic ice (which reflects sunlight) exposes darker ocean (which absorbs it), causing more warming; melting permafrost releases stored methane, causing more warming. Each degree of additional warming makes subsequent degrees more likely and faster-arriving.