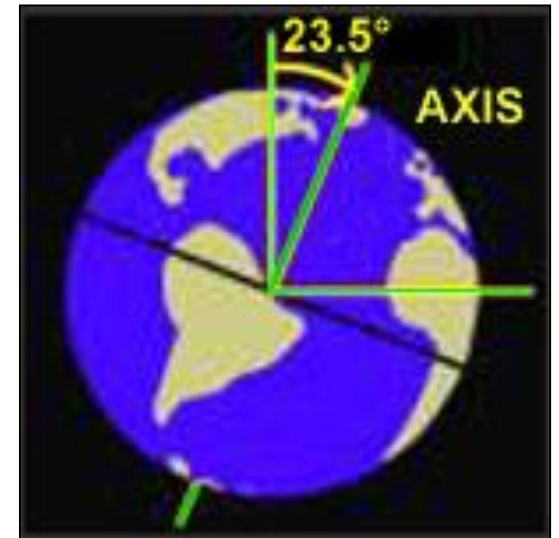
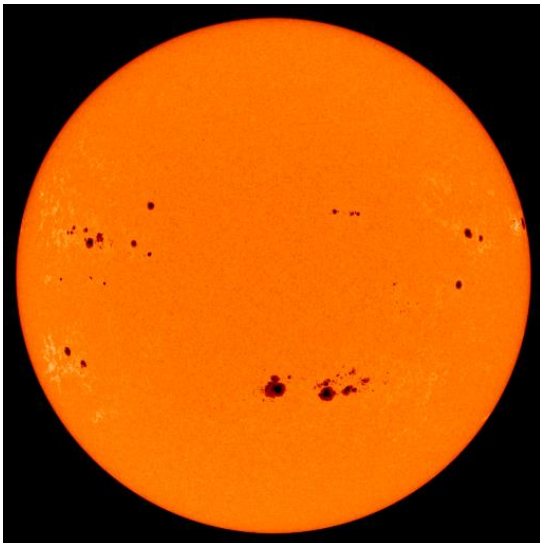


Natural Causes

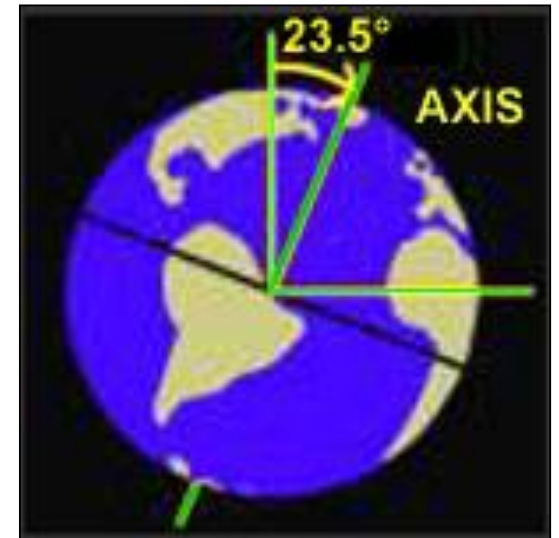
Learning Objective:

- **Analyse** the natural causes for climate change



Learning Outcomes:

- **Identify** how to measure a change in climate
- **Analyse** the natural causes of climate change
- **Apply** understanding using a resource

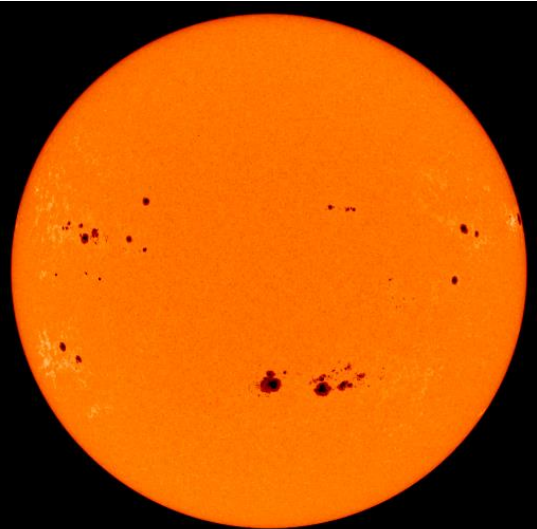


Natural

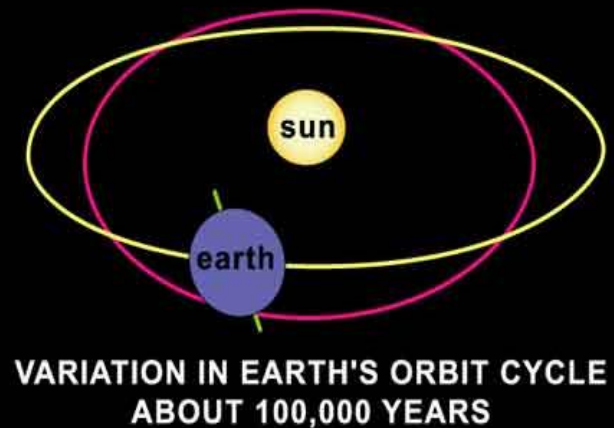
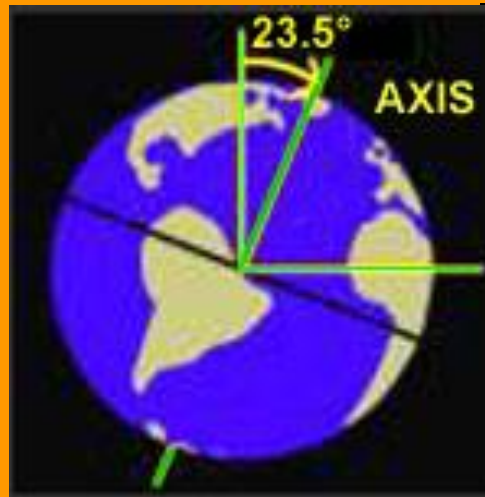
1. Volcanic Eruptions



2. Sunspots



3. Orbital Changes



Eruption Theory



- Powerful eruptions release ash and gas high into the atmosphere.
- If the ash and gas rise high enough, they can travel around the Earth.
- This forms a blanket around Earth and stops sunlight getting through, instead it reflects off the ash and gas back into the atmosphere.
- This causes the planet to get cooler.

Eruption Theory

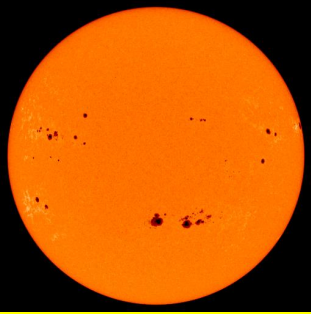


- This theory would only effect Earth's climate for a few years.

EXAMPLE

When Mount Pinatubo erupted in 1991, 17 million tonnes of sulphur dioxide was released into the atmosphere!

This cooled the planet by 0.5°c for a year.



Sunspot Theory



- Sunspots are black areas on the surface of the sun.
- Lots of spots means the sun is more active and firing out more solar energy.
- This theory would effect the Earth's climate for a few hundred years and would change temperatures by 1-2°c.



[Solar video](#)

[Live video](#)

[Wonders of universe clip](#)



Sunspot Theory



- Sunspots have been identified as the possible cause for two different climatic periods:
 - Little Ice Age (Colder)
 - Medieval Warm Period (Warmer)



Orbital Theory



- Over long periods of time the Earth's orbit can change...
 - Earth's orbit is sometimes circular, sometimes oval.
 - The tilt of the Earth's axis changes
 - The axis can wobble
- These changes affect the amount of sunlight the Earth gets and where that sunlight falls, therefore affecting our climate.



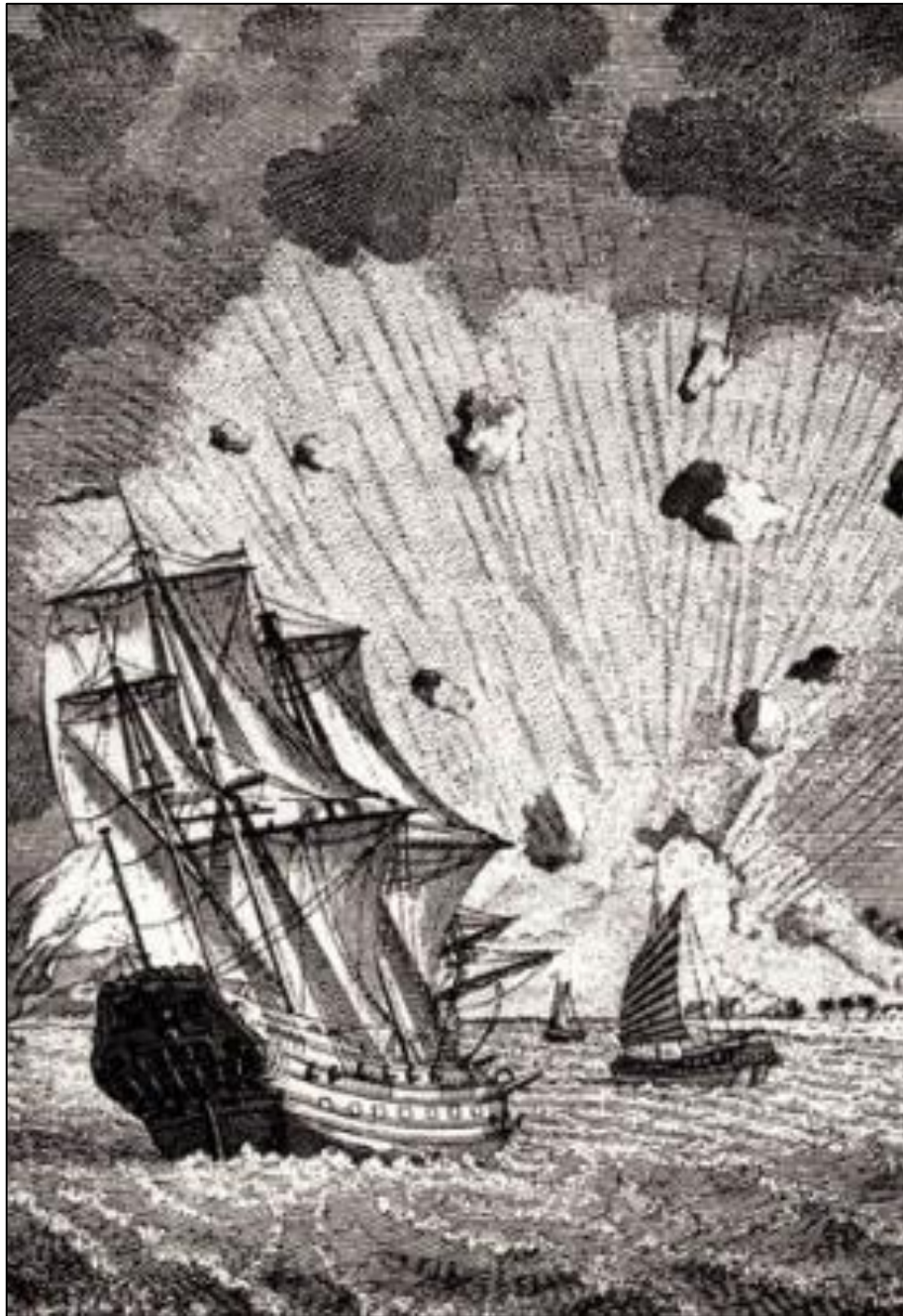
Orbital Theory



- This theory would affect Earth's climate for thousands of years and is enough to start or end an Ice Age.
- It can cause temperatures to drop by 5-6°C or temperatures to rise by 2-3°C.

Why has the earth's climate changed in the past?

<p>Eruption theory</p>	<p>It takes 41,000 years for the earth's axis to tilt, straighten up, and tilt again</p>	<p>Dark spots tell us that the sun is more active than usual and therefore warmer</p>	<p>The blanket of ash and gas can stop some sunlight reaching the earth's surface</p>	<p>These are black areas on the surface of the sun</p>	<p>The eruption of Mount Pinatubo in 1991 reduced global sunlight by 10 % and cooled the earth by 0.5°C</p>
<p>Sunspot theory</p>	<p>Volcanic eruptions produce ash and sulphur dioxide gas</p>	<p>The Little Ice Age and Medieval Warm Period may have been caused by these changes in activity</p>	<p>It takes 100,000 years for the earth's orbit to change from circular to more of an ellipse</p>	<p>Glacial and interglacial (warmer) periods may have been caused by these orbital changes</p>	<p>The changes in the earth's orbit and axis are called Milankovitch Cycles</p>
<p>Orbital theory</p>	<p>Sometimes the sun has lot's of spots and other times they disappear</p>	<p>If the ash and gas rise high enough they can spread round the earth by strong winds</p>	<p>Lot's of spots mean more solar energy being fired out from the sun towards the earth</p>	<p>Over 26,000 years the earth's axis 'wobbles' and straighten up, like a spinning top</p>	<p>Some of the sunlight is reflected off the ash and gas back into space. This cools the earth and lowers temperatures</p>



Explain how and why volcanic activity can affect global climate. (4 marks)

Eruption of Mount Tambora, 1815

In 1815 there was a massive volcanic eruption of Mount Tambora in Indonesia (image **D**). It was the most powerful eruption in the world for 1600 years! Ash and sulphuric acid caused average global temperatures to fall by 0.4°C – 0.7°C and 1816 became known as 'The year without a summer'.

Across the world harvests failed. There were major food shortages throughout North America and Western Europe, including the UK. Food prices rose sharply and there were riots and looting in European cities. It was the worst famine in Europe in the nineteenth century, resulting in an estimated 200 000 deaths.

Explain how and why volcanic activity can affect global climate. (4 marks)

- Mount Tambora in Indonesia was the most powerful eruption for 1600 years.
- Masses of ash, gases and other volcanic material was thrown up into the atmosphere.
- Radiation from the sun was reflected back into space by droplets that formed in the atmosphere, and so did not reach the Earth's surface.
- This led to a fall in global temperatures of between 0.4 and 0.7 °C.