

# Module 11: Meteorology

## Topic 7 Content: Natural Climate Change

### Introduction

#### Natural Climate Change

##### Introduction



Climate is always changing. While some climate change is caused by human activities, other processes cause climate change naturally. In this activity, click each of the steps to learn about the natural processes that change the dynamic climate.

- 1
- 2
- 3
- 4
- 5

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### Plate Tectonics

#### Natural Climate Change

##### Plate Tectonics

The movement of giant tectonic plates shapes the world you live on. As these plates move over long periods of time, oceans can grow and shrink. This movement disrupts the natural ocean currents and how the oceans distribute heat. Plate tectonics can move land into different formations. During the time of Pangaea, all of the land was together. This placed all land around the equator. Areas near the equator have now moved to their current locations.

Plate tectonics creates tall mountains. The mountain building process cools global temperatures. Once silicate rocks are exposed to the surface of Earth, they are weathered and eroded. Once these silicate rocks are deposited in the ocean, they will absorb carbon dioxide becoming carbonate rocks. This removes a large quantity of carbon dioxide from the atmosphere.



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### Earth's Revolution and Tilt

#### Natural Climate Change

#### Earth's Revolution and Tilt



Earth's orbit around the Sun is not a perfect ellipse. Over 100,000 to 400,000 years the distance from Earth to the Sun changes. The distance of Earth from the Sun directly impacts the climate on the planet.

Earth is tilted at  $23.5^\circ$  on its axis. Every 20,000 to 40,000 years, the Earth's tilt can change as much as  $3^\circ$ . The tilt of Earth determines what areas receive the most solar radiation. Even a small change in Earth's tilt will have a dramatic effect on climate.

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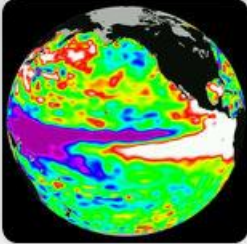
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### Ocean Currents

#### Natural Climate Change

##### Ocean Currents



El Niño proved to scientists that the currents of the ocean can have a direct impact on climate. El Niño occurs when changes in ocean circulation cause the Eastern Pacific Ocean to become warmer than usual. El Niño causes short-term climate change. The biggest climate change during El Niño deals with changes in precipitation. Some areas receive more abundant rainfall when they are normally dry. The image shows a satellite image of Pacific Ocean sea surface temperatures during El Niño. The area off of the west coast of South America is significantly warmer.

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#### Solar Activity

#### Natural Climate Change

##### Solar Activity



Over time the Sun will become larger and give off more solar radiation. Any fluctuation in the amount of solar radiation will cause great changes in the climate. Scientists have determined that cooling climatic events are associated with the number of visible sunspots. A large number of sunspots indicate a cooling period on Earth. The image shows the sunspots that are visible on the surface of the Sun.

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### Volcanic Eruptions

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Volcanic eruptions send large quantities of ash and dust into the atmosphere. These particles can block solar radiation causing a short-term cooling. Volcanic eruptions can add gases like carbon dioxide to the atmosphere. Adding greenhouse gases like carbon dioxide creates a long-term warming effect. The image shows an erupting composite volcano, taken from the International Space Station.

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