

# Introduction to climate

*Rangi weather and climate curriculum*

Climate, Freshwater & Ocean Science



# Weather vs. climate

Weather is what you see out your window every day, whether it's cloudy, rainy, sunny or windy. Weather is what we see and feel in the short-term. It can change quickly, over minutes, hours or a couple of days.

*Climate* describes what the weather is like over a long period of time (years or decades) in a specific area.

In short, climate is what we expect, while weather is what we get.

# WEATHER

Tells you what to wear each day



# CLIMATE

Tells you what types of clothes to have in your closet



# How do we study climate?

To study the climate of a particular place, scientists look at *averages* of rainfall, temperature, sunshine, wind and other measures of weather over a long time, often over 30 years.

These long-term averages of weather observations are known as *climate normals*. Scientists study climate to look for trends and patterns and predict how the climate may change in future.

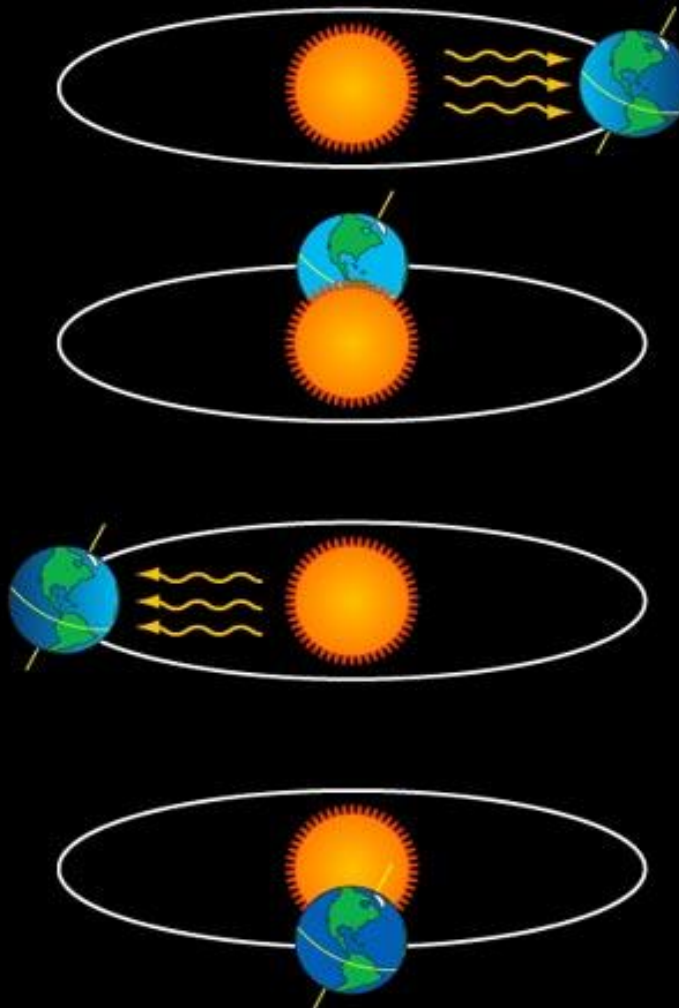
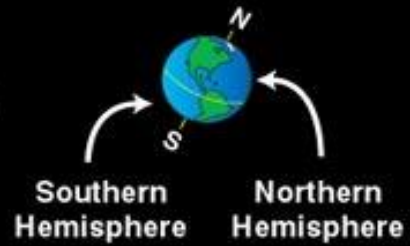


# Why do we have seasons?

Here in New Zealand it's usually warm in January (summer) and chilly in July (winter), But why? It's because the change in seasons is caused by the tilt of the Earth.

The Earth makes a full journey around the sun once per year, but because of the Earth's tilt the north and south poles sit at an angle rather than straight up and down. This tilt means that the sun's rays don't hit Earth equally. The half of the Earth tilted toward the sun receives much more light energy than the half tilted away from the sun.

Earth has seasons because its axis is tilted. Earth rotates on its axis as it orbits the Sun, but the axis always points in the same direction.



**December:**  
Summer south of the equator, winter north of the equator. The Sun shines directly on the Southern Hemisphere and indirectly on the Northern Hemisphere

**March:**  
Fall south of the equator, spring north of the equator. The Sun shines equally on the Southern and Northern Hemispheres

**June:**  
Winter south of the equator, summer north of the equator. The Sun shines directly on the Northern Hemisphere and indirectly on the Southern Hemisphere

**September:**  
Spring south of the equator, fall north of the equator. The Sun shines equally on the Southern and Northern Hemispheres

# Why do seasons change?

The half of the Earth tilted toward the sun is experiencing summer, while the half tilted away from the sun is having winter. However, since the Earth's tilt doesn't change as it orbits the sun, six months later the opposite half of the Earth is facing toward the sun and is now experiencing summer.

This is why Christmas happens in the middle of summer here in New Zealand and the rest of the Southern Hemisphere, but in the Northern Hemisphere (places like the United States and Europe), Christmas happens in winter when it's cold and snowy.

# Polar climate



*Polar climates* are found near the top and bottom of the earth – near the North and South Poles.

These areas are furthest away from the *equator*, meaning they get less direct sunlight than any other places on Earth. Less direct sunlight means colder temperatures, making the poles among the coldest places on Earth. Polar climates experience cool summers and extremely cold winters, which result in land covered in a permanent or semi-permanent layer of ice.

To be considered a polar climate, a location must have an average temperature of less than  $10^{\circ}\text{C}$  during all 12 months of the year. However, it can get much colder than that. The coldest temperature ever recorded on Earth is  $-89.2^{\circ}\text{C}$  in Antarctica. Now that is cold!



# Desert climate



*Desert climates* are very dry, hot regions where there is very little rainfall. Deserts are usually rocky or sandy because the little rainfall they receive makes it difficult for plants to grow there. Most deserts are so dry because they have almost constant high pressure (remember high pressure = dry, sunny weather) overhead stopping clouds and rain from forming.

Unlike the poles, which get extremely cold, temperatures in deserts can get extremely hot. The hottest temperature ever recorded on Earth was an incredible 56.7°C in Death Valley, California.

# Tropical climate



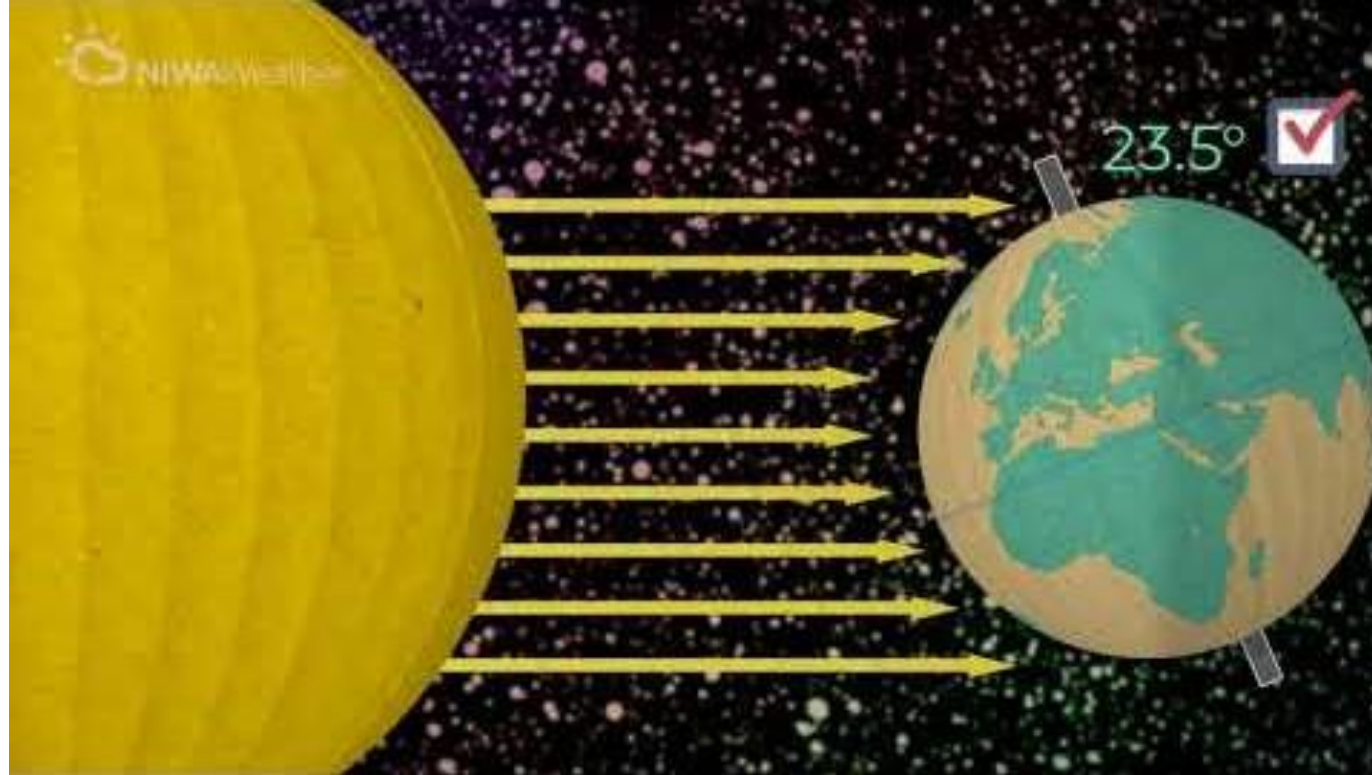
*Tropical climates* can be thought of as the opposite of polar climates. They are usually found near the equator, and are among the warmest regions on the planet. Temperatures in the tropics change very little throughout the year and it usually rains a lot. Because of all this rain, tropical regions usually have lots of lush vegetation and a large variety of animals living in them.

# Temperate climate



*Temperate climates* are considered to be those found between the polar climates and the tropical climates. In these regions, temperatures can change quite a bit during the year and there are usually four distinct seasons. This may mean that it's hot and humid during the summer, but in winter it can snow and be very cold. New Zealand has a temperate climate.

## Video: Weather Tips from Weather Nerds - Seasons



<https://www.youtube.com/watch?v=FuViGy7m6ss>



## Kahoot quiz: Introduction to climate