

## WORLD CLIMATE

### What is Climate?

We saw in Grade 5 that *climate* is the average weather over a 30 year period for a specific region. It is the average pattern of *weather* for that region. Weather and climate is not the same thing.



Weather is the short term state of the atmosphere and includes things such as temperature, precipitation (rain, hail and snow), air pressure and cloud cover.

When we study the features of the types of climate that occur in different places, we can see that large areas experience the same average conditions and so a type of *climatic region* is formed.

Through the ages, people have often been influenced by the climate when deciding where they want to settle. Large parts of the Earth are either too cold, or too dry or too hot for people to live.



**Very Cold Climate - Greenland**



**Very Hot Climate –Sahara Desert, Libya**



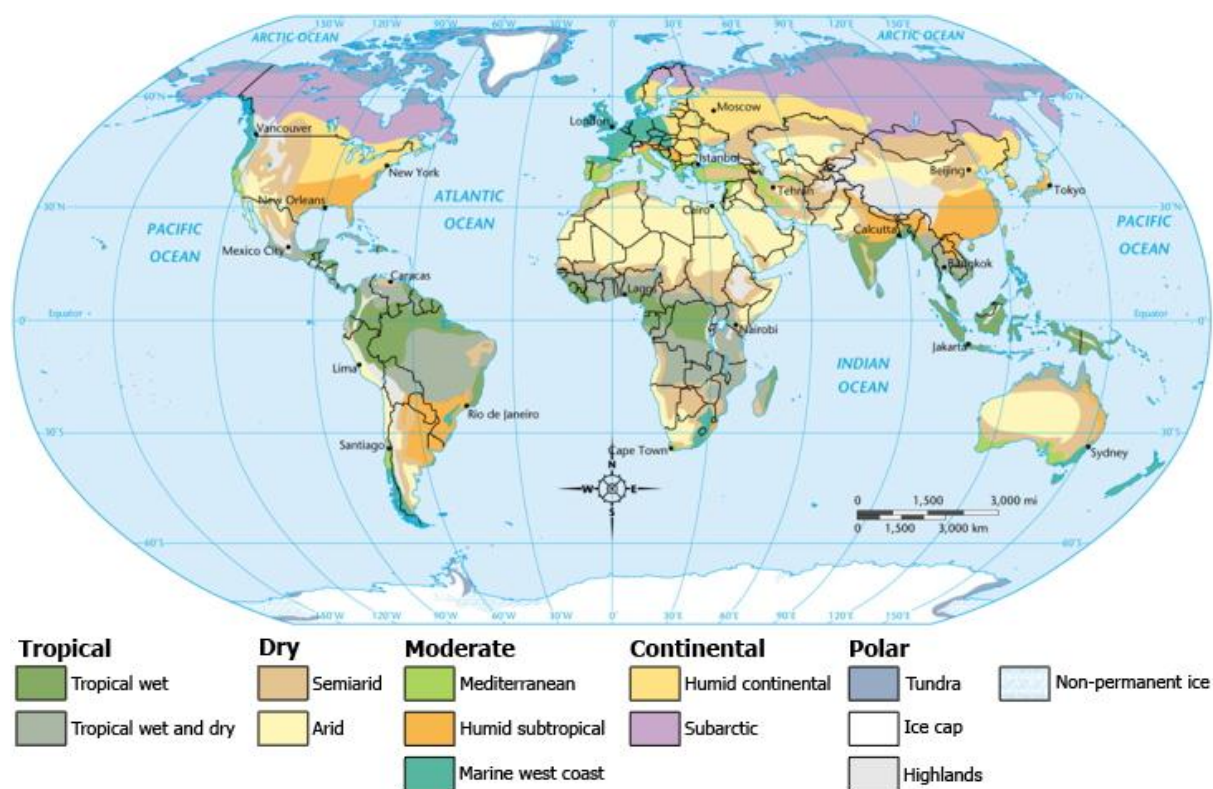
**Very Dry Climate –The Australian Outback**

The availability of resources also influences a person's choice of where to live. That is why the approximate 7 billion people on Earth occupy only 15% of its surface.

## World Climate Zones

There are differences in climate in different places in the world. These have been grouped into *climate zones*.




There are 5 main climate zones, each with a number of sub-climate zones, as shown in the map and described in the table below.









### World Climate Zones




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Climate Zone	Sub Zone	Description	Location
<p><b>Tropical</b></p>	<p><b>Tropical Wet</b></p>  <p><b>Singapore</b></p>	<p>Hot and rainy all year. No dry season.</p> <p>At least 60 mm average precipitation per month.</p>	<p>Within 5° north and south of the equator.</p> <p>Tropical rainforests.</p> <p><b>Examples:</b> Belem, Brazil Singapore Costa Rica</p>
	<p><b>Tropical Wet and Dry</b></p>  <p><b>Mumbai, India</b></p>	<p>Hot with both wet and dry seasons.</p>	<p><b>Examples:</b> Mumbai, India Rio de Janeiro, Brazil Lagos, Nigeria</p>
<p><b>Dry</b></p>	<p><b>Arid</b></p>  <p><b>Cairo, Egypt</b></p>	<p>Very little to no rain.</p> <p>Very hot days.</p> <p>Large temperature fluctuations between day and night.</p>	<p><b>Examples:</b> Dubai, UAE Cairo, Egypt Tucson, Arizona</p>

	<b>Sub Zone</b>	<b>Description</b>	<b>Location</b>
	<p><b>Semi Arid</b></p>  <p><b>The Australian Outback</b></p>	<p>Slightly more rainfall than arid climate zone</p>	<p><b>Examples:</b> The Australian Outback.</p> <p>Areas of India and Pakistan.</p> <p>West coast of North and South America.</p>
<b>Moderate</b>	<p><b>Mediterranean</b></p>  <p><b>Athens, Greece</b></p>	<p>Hot and dry summers</p> <p>Mild winters</p>	<p>Southwest coast of USA and the Mediterranean.</p> <p><b>Examples:</b> Perth, Australia</p> <p>Cape Town, South Africa</p> <p>Athens, Greece</p>
	<p><b>Humid Subtropical</b></p>  <p><b>Venice, Italy</b></p>	<p>Hot humid summers with thunderstorms.</p> <p>Mild to cool winters.</p>	<p>South east sides of continents, between latitudes 25° and 40° north and south.</p> <p><b>Examples:</b> Venice, Italy</p> <p>Durban, South Africa</p> <p>New York, USA</p>

	<b>Sub Zone</b>	<b>Description</b>	<b>Location</b>
	<p><b>Marine West Coast</b></p>  <p><b>London, England</b></p>	<p>Mild and rainy throughout the year.</p>	<p>On west coasts of mid latitude of continents. Pacific north west of USA and much of Europe.</p> <p><b>Example:</b> London, England</p>
<b>Continental</b>	<p><b>Humid Continental</b></p>  <p><b>Moscow, Russia</b></p>	<p>Warm summers.</p> <p>Cold, snowy winters.</p> <p>Large seasonal temperature variation.</p>	<p>Found in areas above 40°N latitude. Inland north eastern USA, Europe and Asia.</p> <p><b>Examples:</b> Chicago, USA Moscow, Russia</p>
	<p><b>Subarctic</b></p>  <p><b>Anchorage, Alaska</b></p>	<p>Short summers.</p> <p>Long, snowy winters.</p>	<p>Found on large landmasses, usually at 50°N to 70°N latitude. China, Russia, North America, the Alps and the Pyrenees mountain ranges in Europe.</p> <p><b>Examples:</b> Anchorage, Alaska Mohe, China Samedan, Switzerland</p>

Climate Zone	Sub Zone	Description	Location
<p><b>Polar</b></p>	<p><b>Tundra</b></p>  <p><b>Tundra</b></p>	<p>Always cold and dry.</p> <p>Short, cold summers.</p> <p>Covered by permafrost.</p>	<p><b>Examples:</b> Antarctica</p> <p>Canada</p> <p>Alaska</p>
	<p><b>Icecaps</b></p>  <p><b>Antarctica</b></p>	<p>Freezing temperatures all year.</p> <p>Little daylight in winter.</p>	<p><b>Examples:</b> Antarctica</p> <p>Greenland</p>
	<p><b>Highlands</b></p>  <p><b>Himalayas</b></p>	<p>Temperatures vary widely according to latitude and elevation.</p>	<p><b>Examples:</b> Mountain ranges such as the Rocky Mountains, Andes, Himalayas, Tibetan Plateau, East Highlands of Africa</p>

## World Temperature

The temperature of certain places can be described as shown in the table below:

Description	Monthly Average Temperatures
Excessively cold	Less than -40°C
Severely cold	-39,9°C to -25°C
Very cold	-24,9°C to -10°C
Cold	-9,9°C to 0°C
Cool	0,1°C to 9,9°C
Mild	10°C to 17,9°C
Warm	18°C to 22,9°C
Hot	23°C to 27,9°C
Very hot	28°C to 34,9°C
Severely hot	more than 35°C



The hottest climates are usually found in places closest to the equator. The further we move from the equator, the colder it becomes. At 12:00 midday, the sun is directly overhead the equator. The rays of the sun are more concentrated and the temperatures are higher.

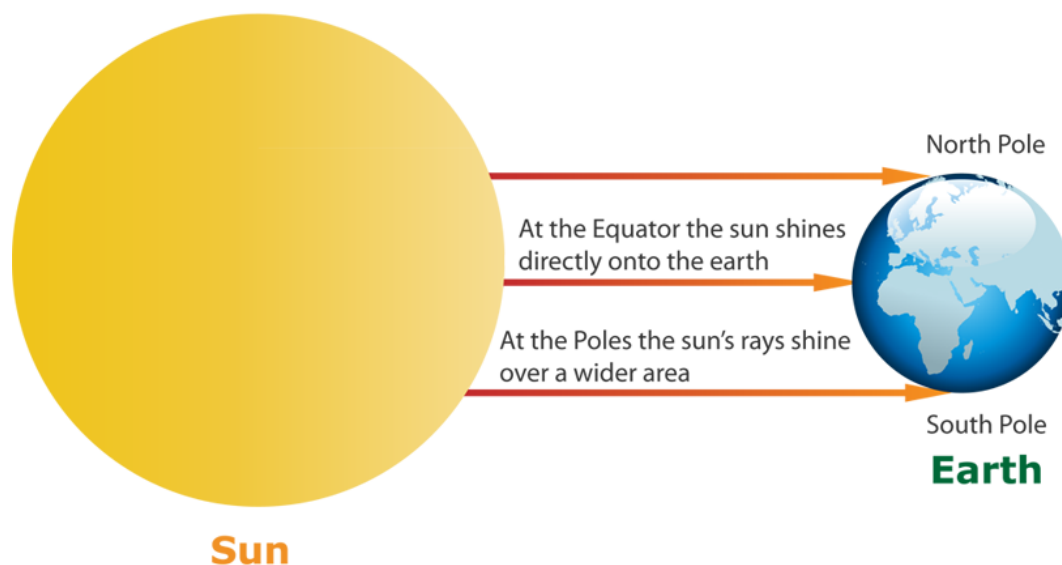
Further north and south, the rays of the sun fall at an angle and are spread over a larger area by the Earth's round shape.

At the poles, the sun is lower on the horizon, which is why the sun's rays are less concentrated and as a result the temperatures are much colder.



**At Midday, the Sun is Directly over the Equator**

## How Sun's Rays Fall on Earth



The highest temperatures are found in the tropics, i.e., the area between the Tropic of Cancer and the Tropic of Capricorn. These areas have the most direct sunlight.

Above and below the tropics, temperatures fall as you travel towards the poles. The other factor that affects temperature, apart from latitude, is elevation, or height above sea level. Generally, temperature drops by around 6,5 °C for every 1000 m above sea level.

The Earth absorbs the sun's rays, converts them to heat and radiates them again. The closer we are to the source of radiation, the hotter it is, and the further we are from the source, for example, on top of a mountain, the colder it becomes.

It is always cold on top of high mountains. The highest mountain peaks on the earth are always covered with snow.



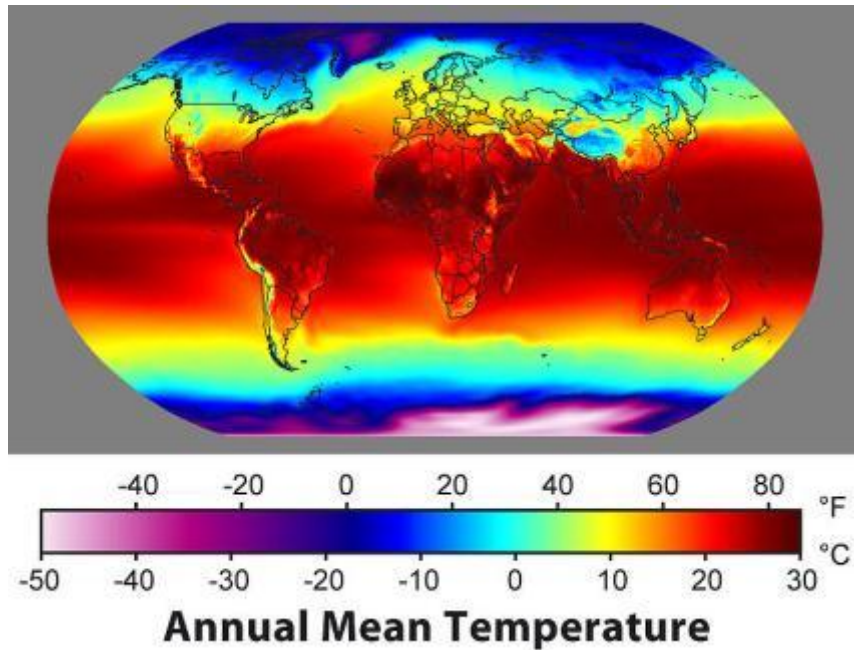
**Temperature Falls  
at Higher Altitudes**



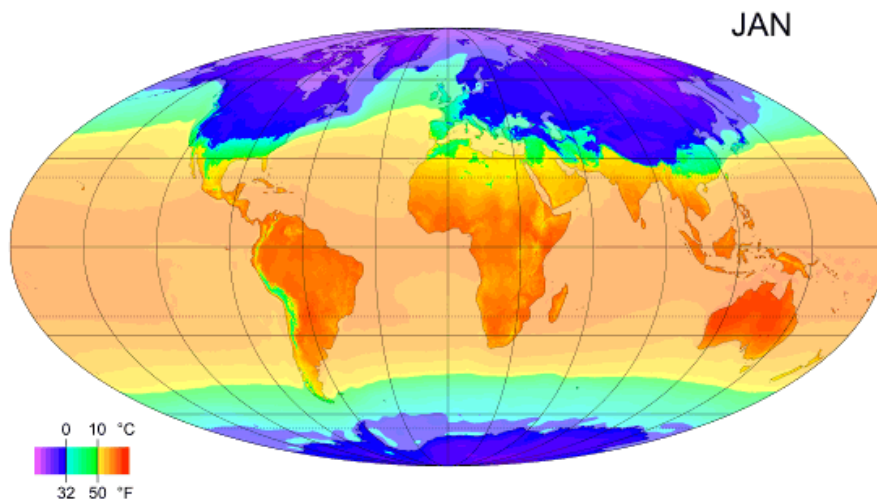
**Mount Everest –  
The Highest Mountain in the World**



The coldest areas on earth are found in Greenland and the Antarctic as they have a high latitude and a high elevation.



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To see the monthly average temperature per month, go to the module:  
<http://www.mycyberwall.co.za/get-smart/geography/grade-6/world-climate>

## The Influence of Oceans

The temperatures of the oceans influences land temperatures.

Winds blow the hot or cold air over the hot or cold oceans, towards the land, which increases or reduces the land temperatures. Winds also blow north and southwards from the Polar regions, bringing cold air onto the land.

Water has a larger heat retention capacity than the land has. Water, however, takes longer to heat during the day. Therefore land reaches higher day temperatures than water. The sea has a “cool” influence from the sea to the land. During the night the land cools down much faster than the water, which then causes a “warm” influence from the sea to the land.

The result is that places along the coast or by large water masses, experience a moderate temperature. The margin between maximum and minimum is not very large. Hot water evaporates faster than cold water. There is more evaporation above a warm sea current. This results in higher precipitation in areas that border on warm sea currents, such as Durban, which is influenced by the warm Mozambican current.

## Highest and Lowest Temperatures

The highest temperature ever recorded on earth was at Tripolitania in Libya in 1922 at 58,8 °C. The highest annual average temperature recorded was 34,4 °C at Dallol in Ethiopia.



**Dallol, Ethiopia**

The lowest temperature ever recorded on earth was at Vostok, Russia in 1983 at -88,8 °C. The lowest annual average temperature recorded was -50,55 °C at the Amundsen-Scott station in Antarctica (very close to the South Pole).

## World Precipitation

Precipitation is the release of water from the atmosphere to the earth's surface as a solid or a liquid. It includes the following:

### Rain

This is formed when warm, moist air rises up from the ground and oceans, then cools down. Droplets of water then join together in clouds and then fall back to earth as rain when the clouds become too heavy.



**Rainfall**

### Snow

Snow falls when the temperature is at or close to 0 °C. The air needs to be freezing for there to be snow. Snow is formed in the same way as rain.

### Hail

Small balls of ice are known as hailstones. They can damage crops, gardens, cars and even houses.



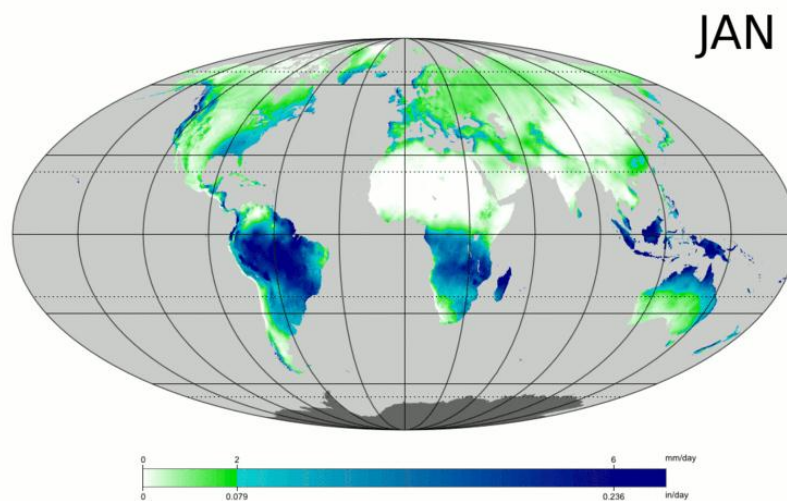
**Snowfall**



**Hailstones**

We have seen areas are classified into climate zones, depending on the amount of annual precipitation that they receive. Areas are classified as dry (arid), semi-dry or wet.

The map below shows the monthly average world rainfall.



### Monthly Average Precipitation

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To see the monthly average precipitation per month, go to the module:

<http://www.mycyberwall.co.za/get-smart/geography/grade-6/world-climate>

The lowest annual average precipitation recorded over 39 years was at WadiHalfa, Sudan at less than 2 cm per year. The highest annual average precipitation recorded was at Lloro, Colombia, South America at 1328 cm per year, recorded over a 29 year period.

## Climate Change

Climate change is the variation in global or regional climates over time. These changes can be due to internal forces in the Earth or more recently, human activities. The rise in average surface temperature is known as **global warming**.



**Polar Bear on Ice Block**



**The Result of Global Warming**

Go to the module on **Global Warming** in **Save Your Planet** for more information:

<http://www.mycyberwall.co.za/save-your-planet/climate-change/global-warming>