

Climate and Biomes

Adapted by T.Brunetto from:
Developed by Steven Taylor Wichmanowski based in part on
Pearson Environmental Science by Jay Withgott

What is a Biome?

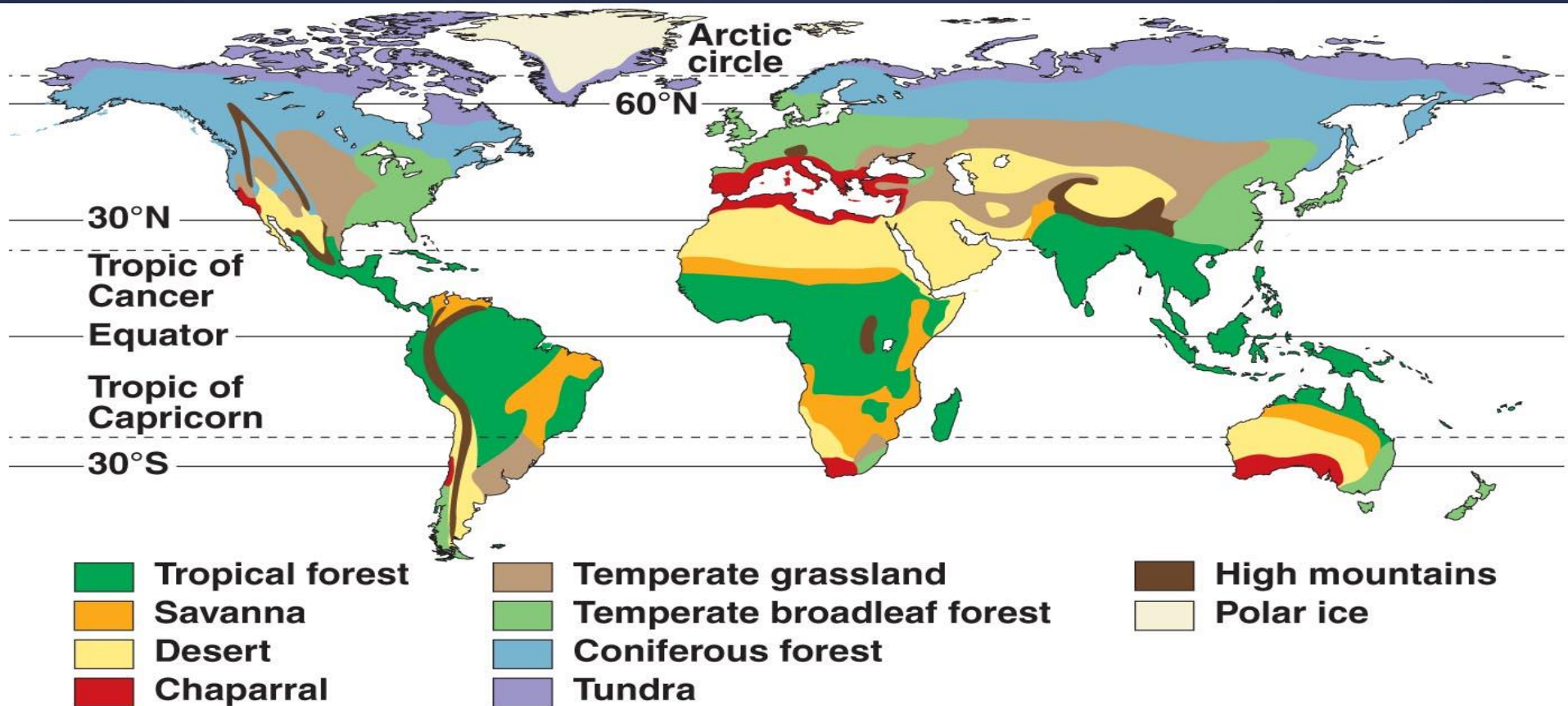
Remember that an *ecosystem* consists of all the biotic and abiotic factors interacting in a place.

Biomes are regions of the world with similar abiotic and biotic factors.



What is a Biome?

The different biomes can be spread around the globe, but similar biomes tend to be located in areas with similar climate and other abiotic characteristics.



One of the main abiotic factors that distinguish different biomes is their climate.

Climate: the prevailing weather conditions in an area over an extended period of time.

(temperature, precipitation, seasons)



Climate is different than weather.

Weather: the day to day changes in temperature, precipitation, wind, etc.

Weather is hard to predict, but *climates* are generally stable and predictable.



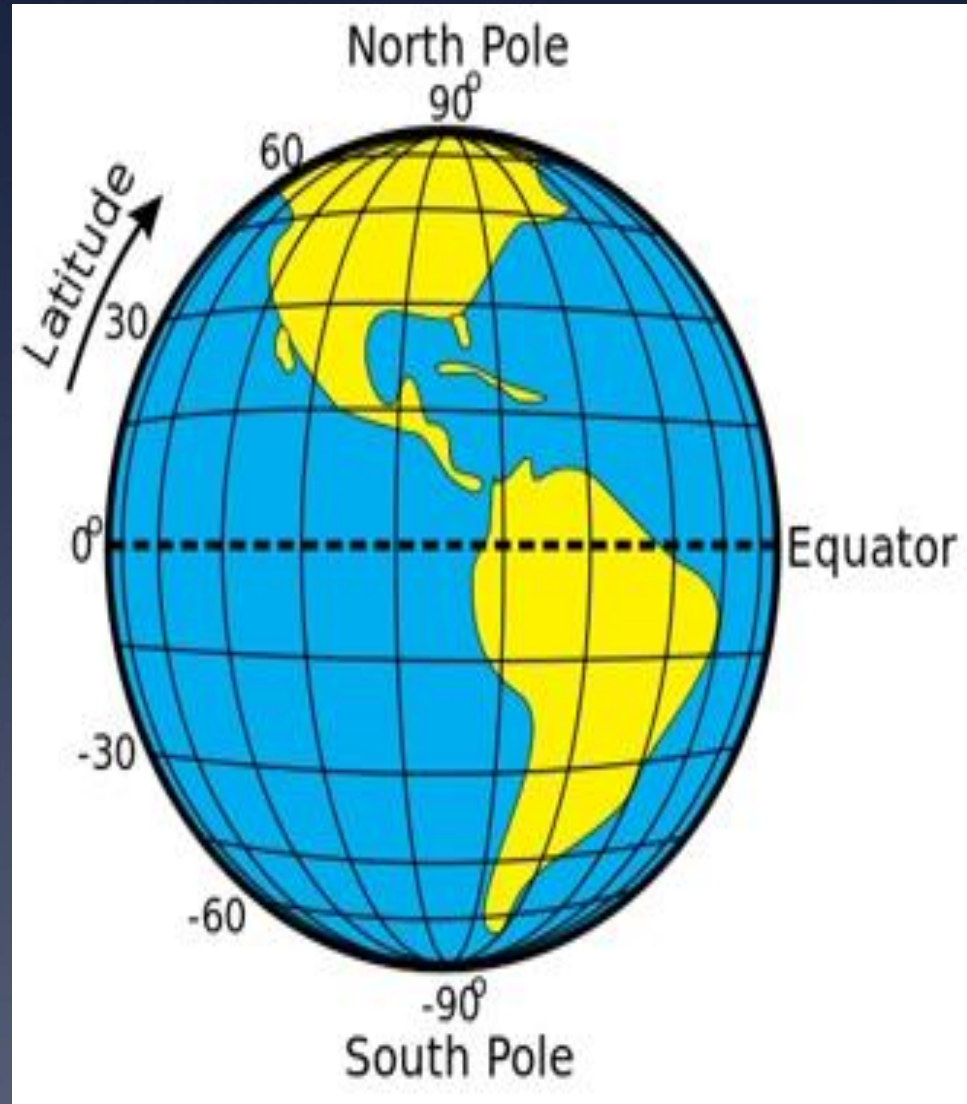
Why do we have so many different climates around the world?

A region's climate is determined by many factors including **latitude**, **altitude**, **topography**, the tilt and rotation of the Earth, **convection currents** in the atmosphere and oceans, and **seasonal changes**.



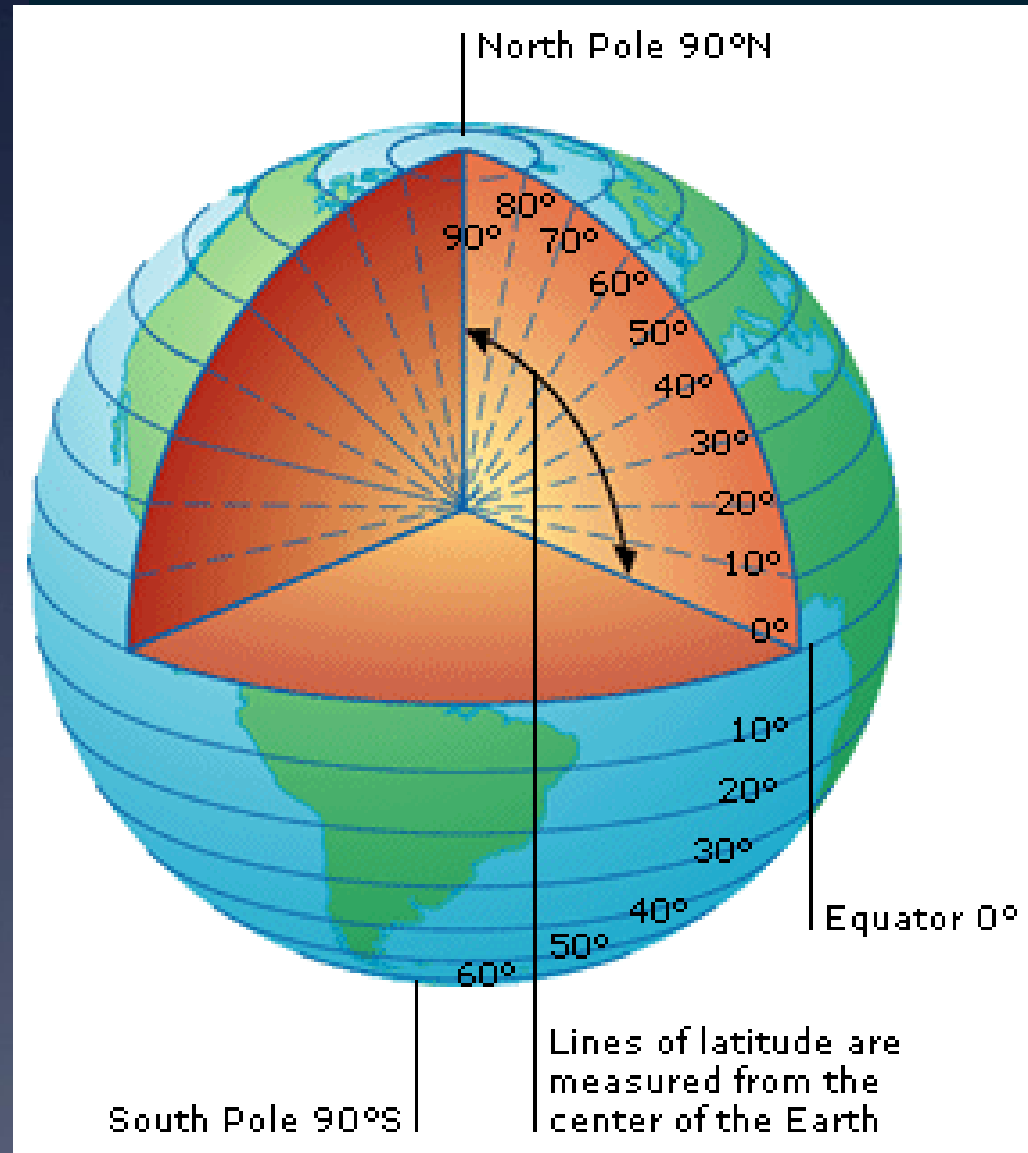
One of the main factors that determines a region's climate is its latitude.

Latitude: a measure of a place's distance North or South of the Equator.



Latitude ranges from 0° at the equator, to 90° at the poles.

Latitude is actually a measurement of the *angle* from the center of the Earth to a point on its surface, relative to the Equator.



In general, as latitude *increases* temperature *decreases*.

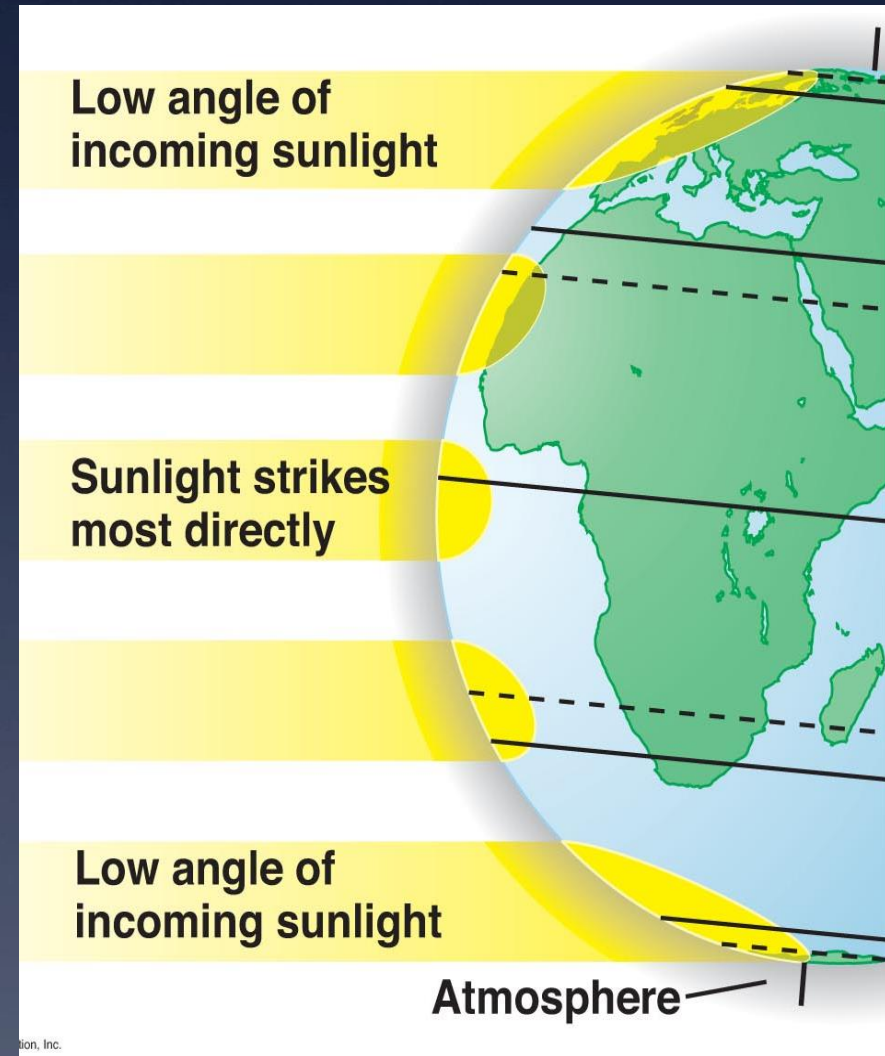
For example, Juneau, Alaska (58° N) has a much colder climate than Miami, Florida (28° N).



Temperatures differ between latitudes because the Earth is a *sphere*.

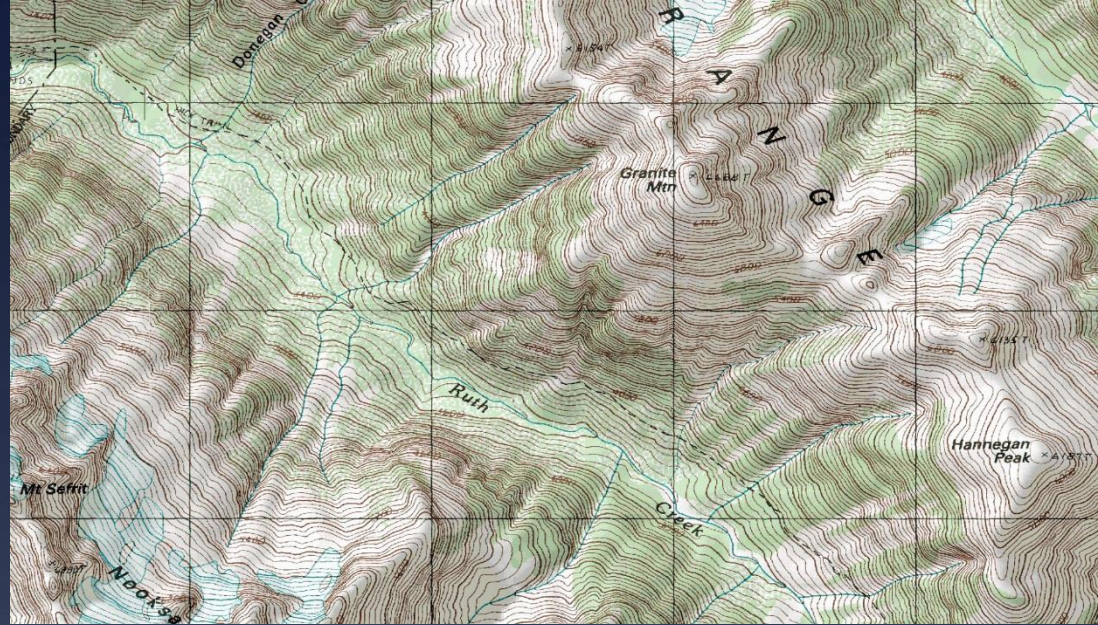
Sunlight that strikes the equator (low latitude) is very concentrated, delivering a lot of heat to a small area.

The same amount of sunlight striking near the arctic circle (high latitude) is spread out over a larger area and that area therefore receives less heat.



The climate of an area is also influenced by its topography.

Topography: the surface features of an area (elevation changes due to hills, canyons, cliffs, etc)



Altitude is one aspect of topography that influences climate.

Altitude: a measure of distance above sea level.

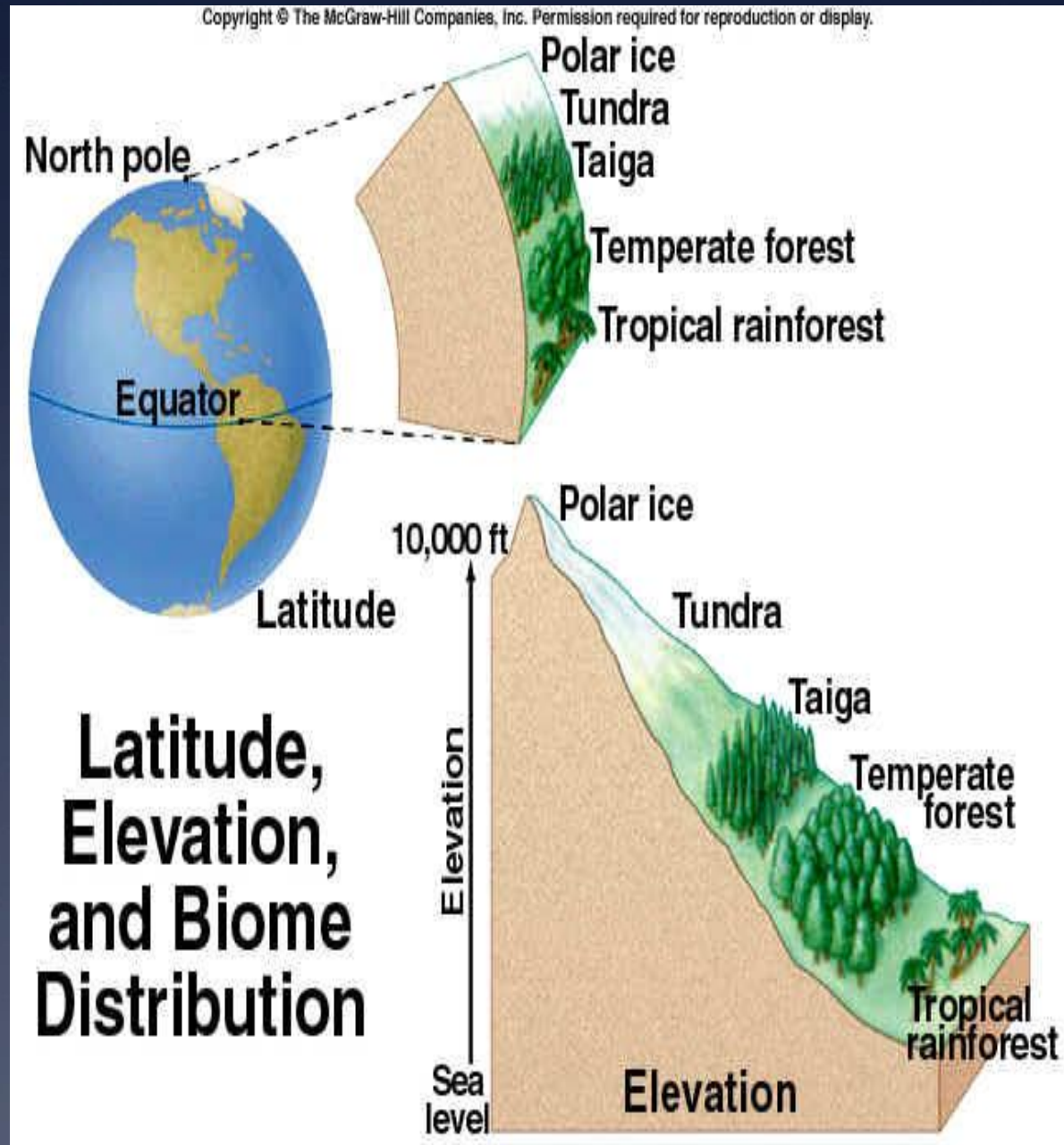
Altitude is also known as *elevation*.

As altitude/elevation increases, temperature decreases.



Increasing altitude has a similar effect on ecosystems as increasing latitude.

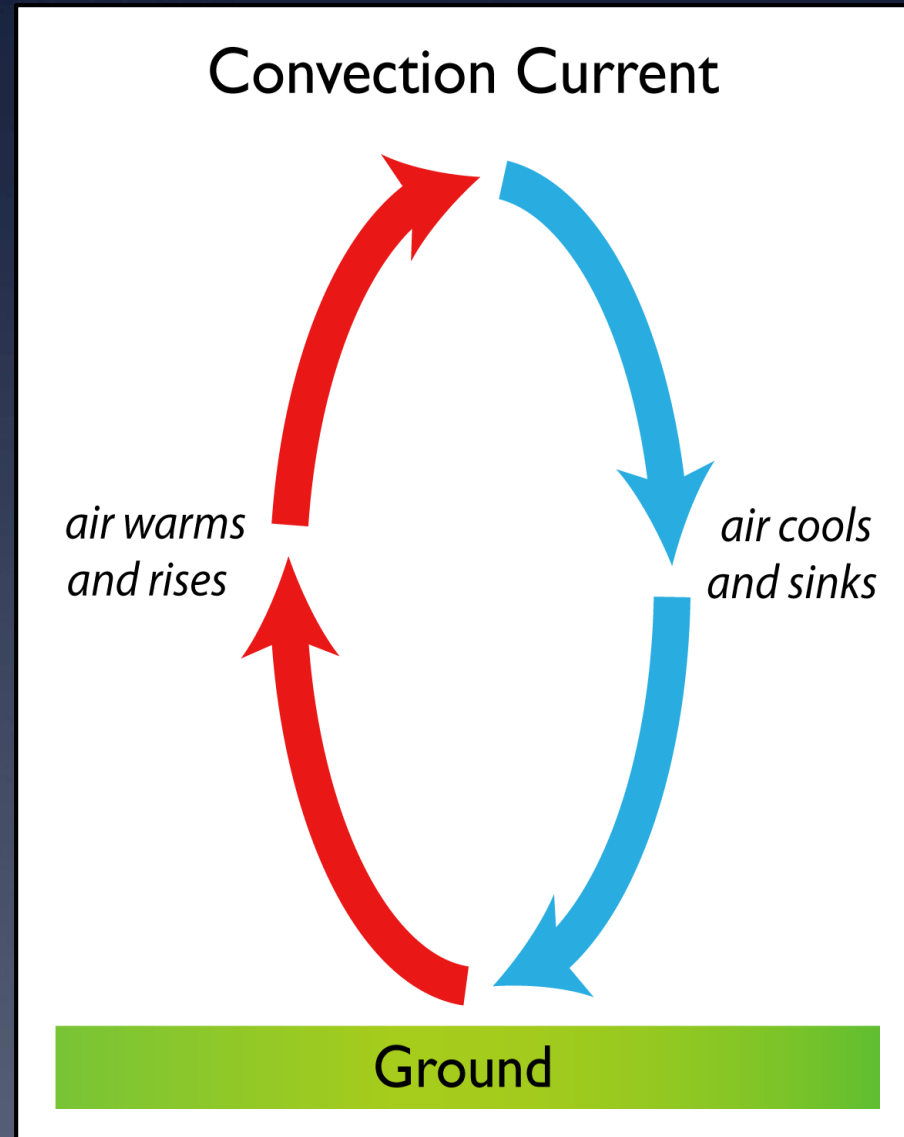
Areas at higher elevations are colder and may have different biomes than lower elevations at the same latitude.



Convection currents are important to understanding climate.

Convection: the phenomenon where warmer, less dense fluids (both liquids and gases) rise and colder, more dense fluids sink.

Convection causes *convection currents* that transfer heat energy through water and air.



Warmer air also spreads out from the equator towards the poles as cooler air from the poles moves towards the equator.

This explains why precipitation occurs in predictable bands of latitude.

90° latitude (poles)

Very cold air sinks to the surface. The air is also very dry, so little precipitation falls. No plants can grow.



60° latitude

Warm air from lower latitudes meets frigid air from the poles. This produces precipitation. Forests can grow.



30° latitude

Dry air sinks to the surface. The dry air produces little rain. Deserts occur near this latitude.



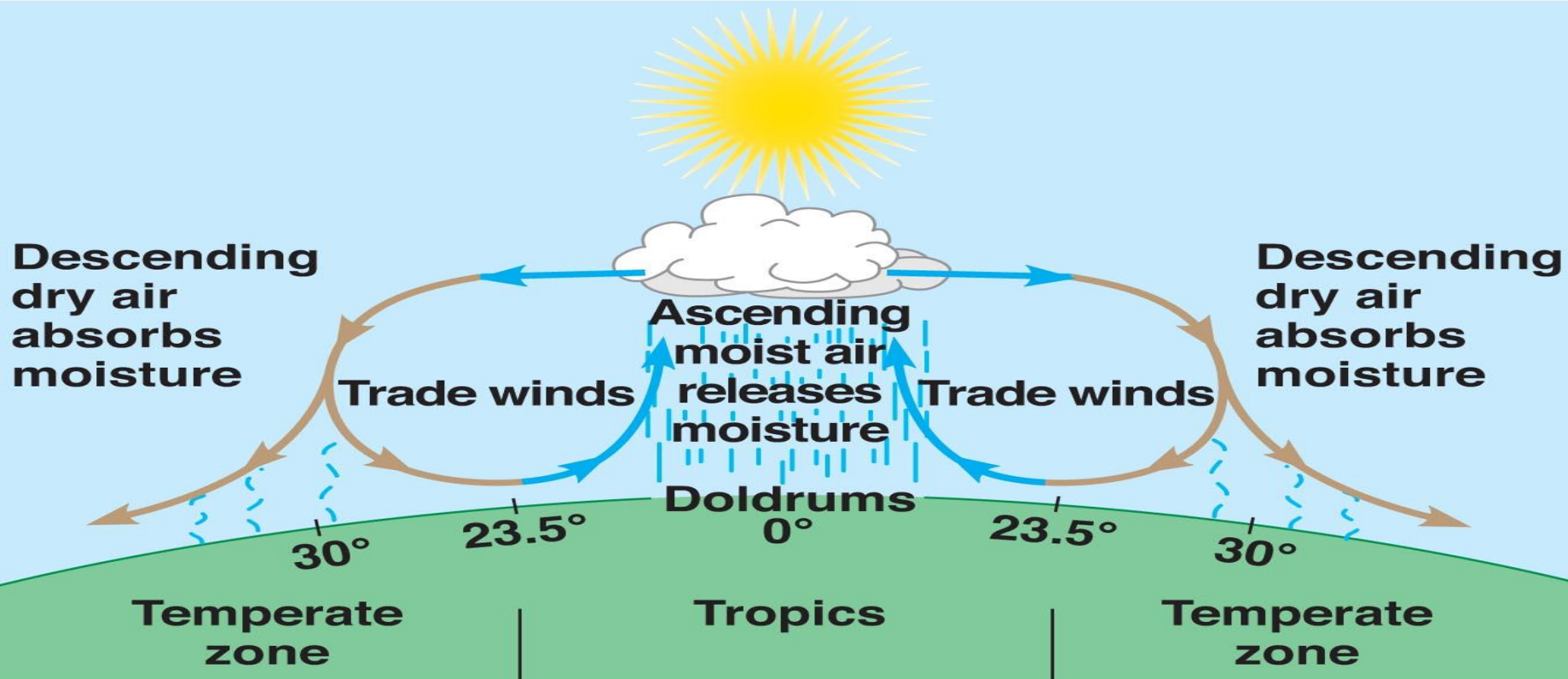
0° latitude (equator)

Warm humid air rises. It cools and produces a lot of rain. Rainforests grow here.



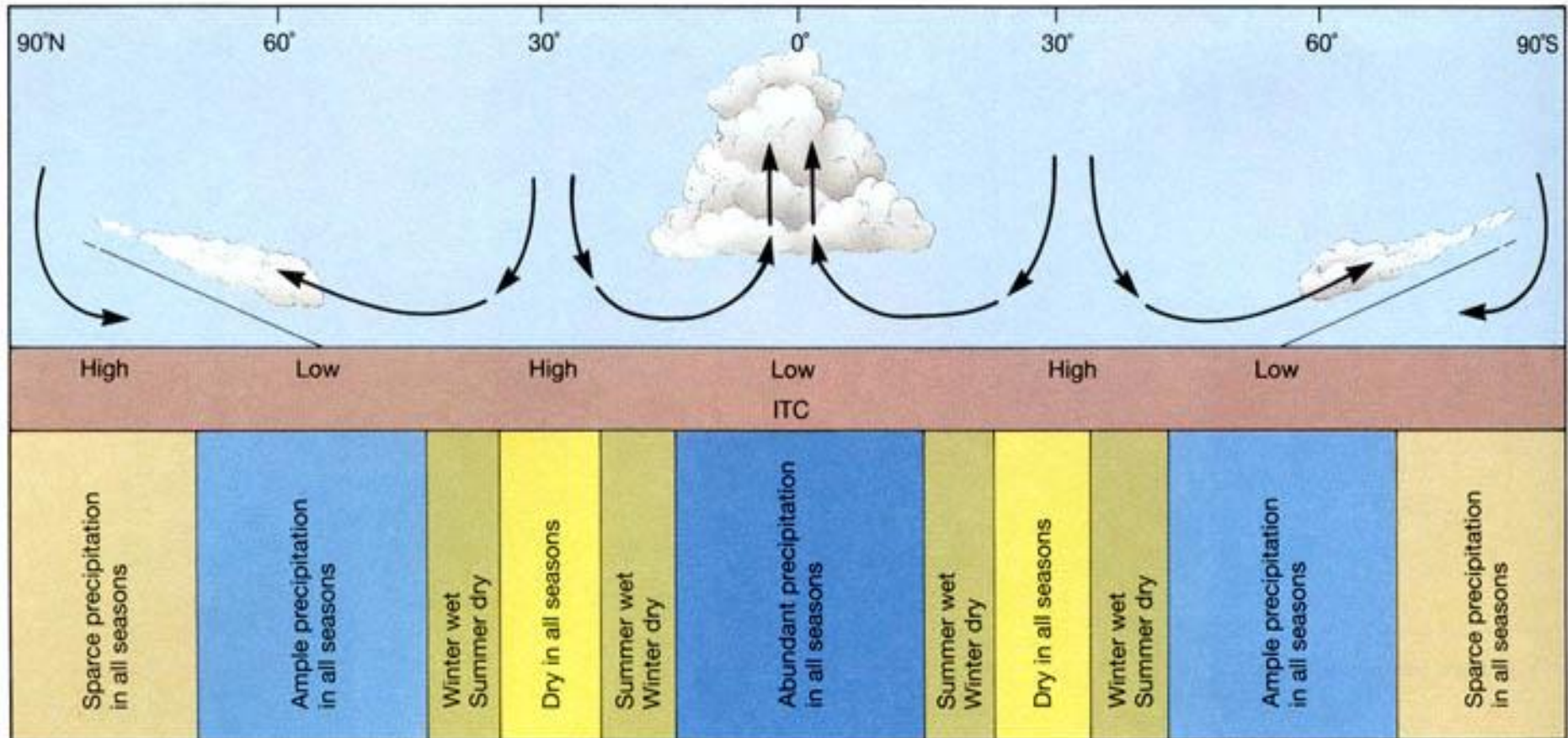
Near the **Equator**, masses of warm, moist air continually rise and form *abundant precipitation*.

Around **30° latitude** (the “horse latitudes”), dry air descends, absorbing moisture and resulting in dry conditions and *little precipitation*. Many of the world’s **deserts** occur at these latitudes.



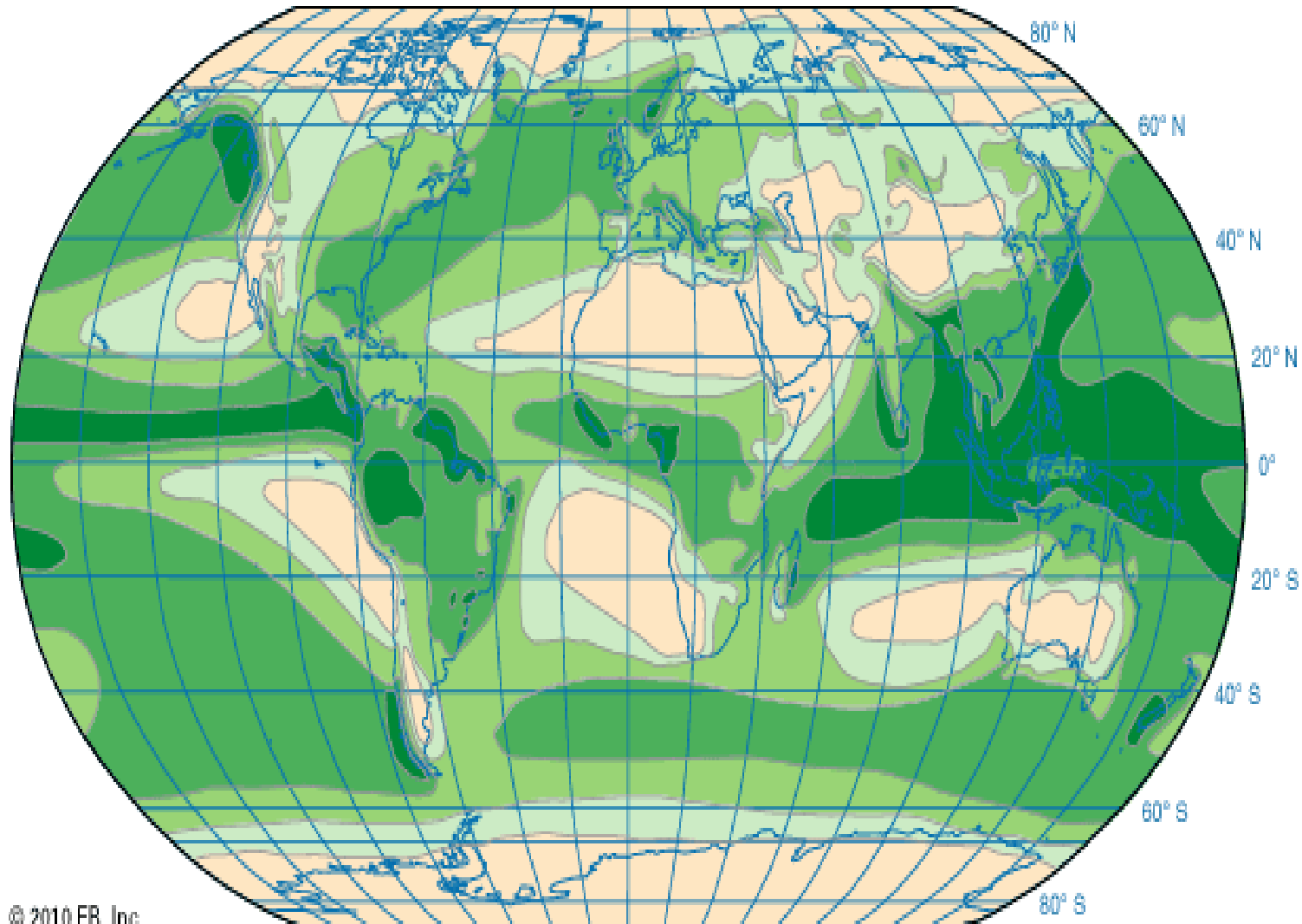
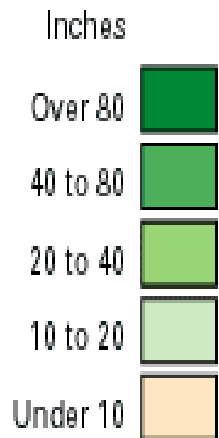
On either side of 30° latitude in the **subtropics**, distinct wet and dry seasons occur.

In the **temperate zones**, warmer air from the subtropical regions meets cooler air from the polar regions and there is precipitation in all seasons.



Finally, cool air descends at the **polar regions** and they receive *little precipitation*.

AVERAGE ANNUAL PRECIPITATION



Convection causes *ocean currents* to form in water as cooler water near the poles sinks and is replaced by warm water flowing from the Equator.

Ocean Currents: are continuous, directed movements of ocean water that can regionally affect climate.

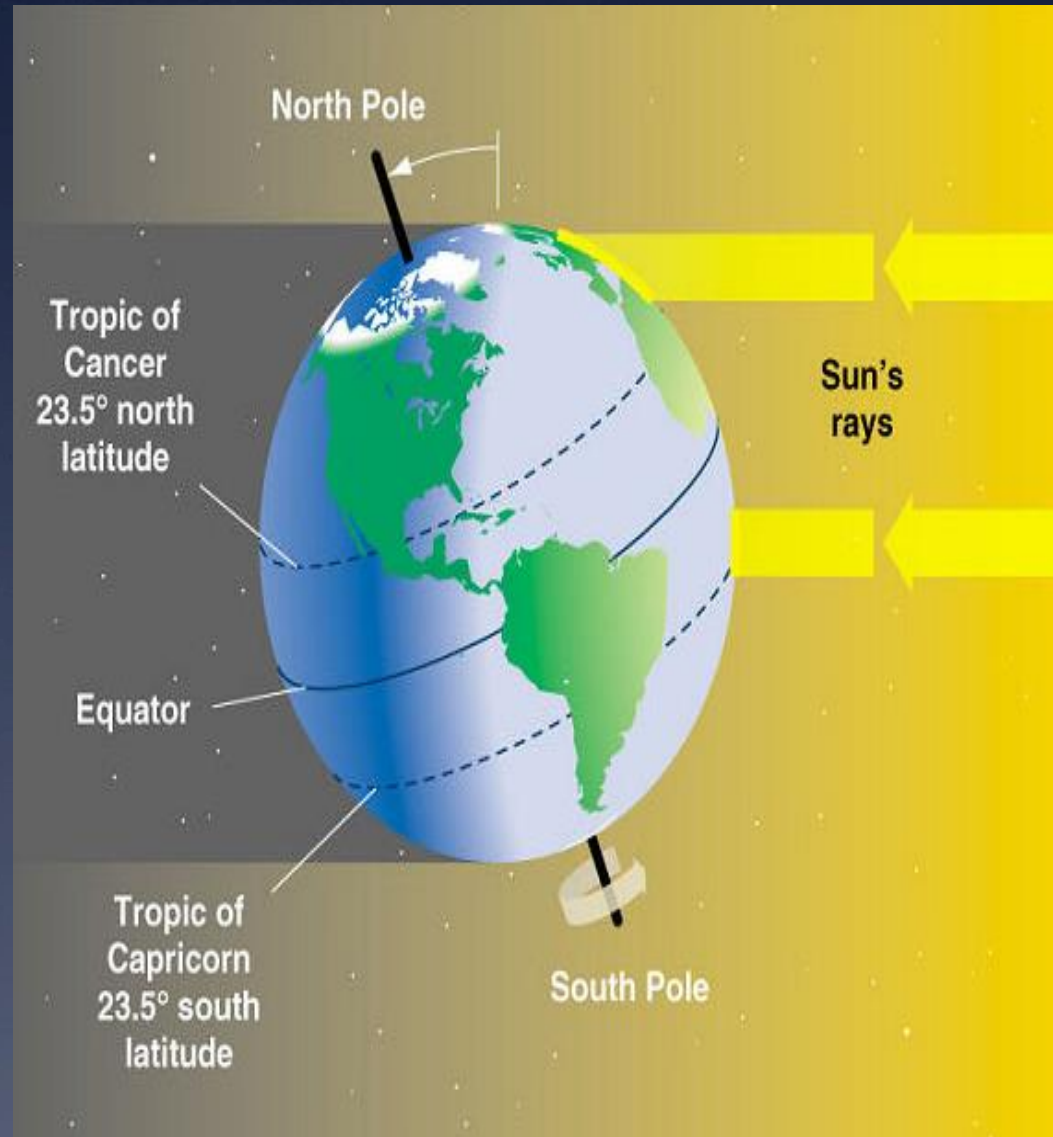


Seasons:

The Earth is not only spherical, it is also tilted on its axis which causes seasons.

Axis: an imaginary line running through the North and South Poles.

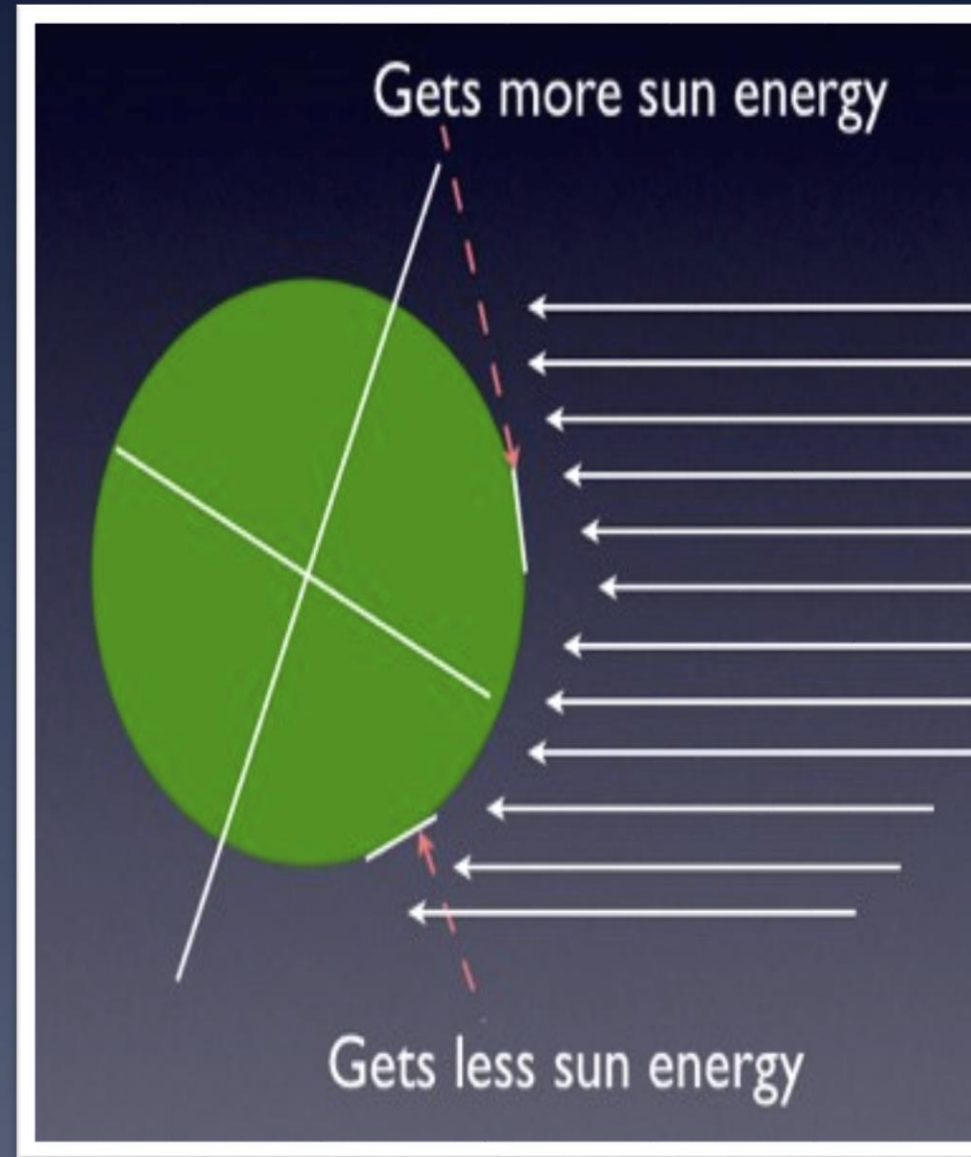
The Earth rotates on its axis from West to East.



Seasons change as the Earth orbits the sun because of this *axial tilt*.

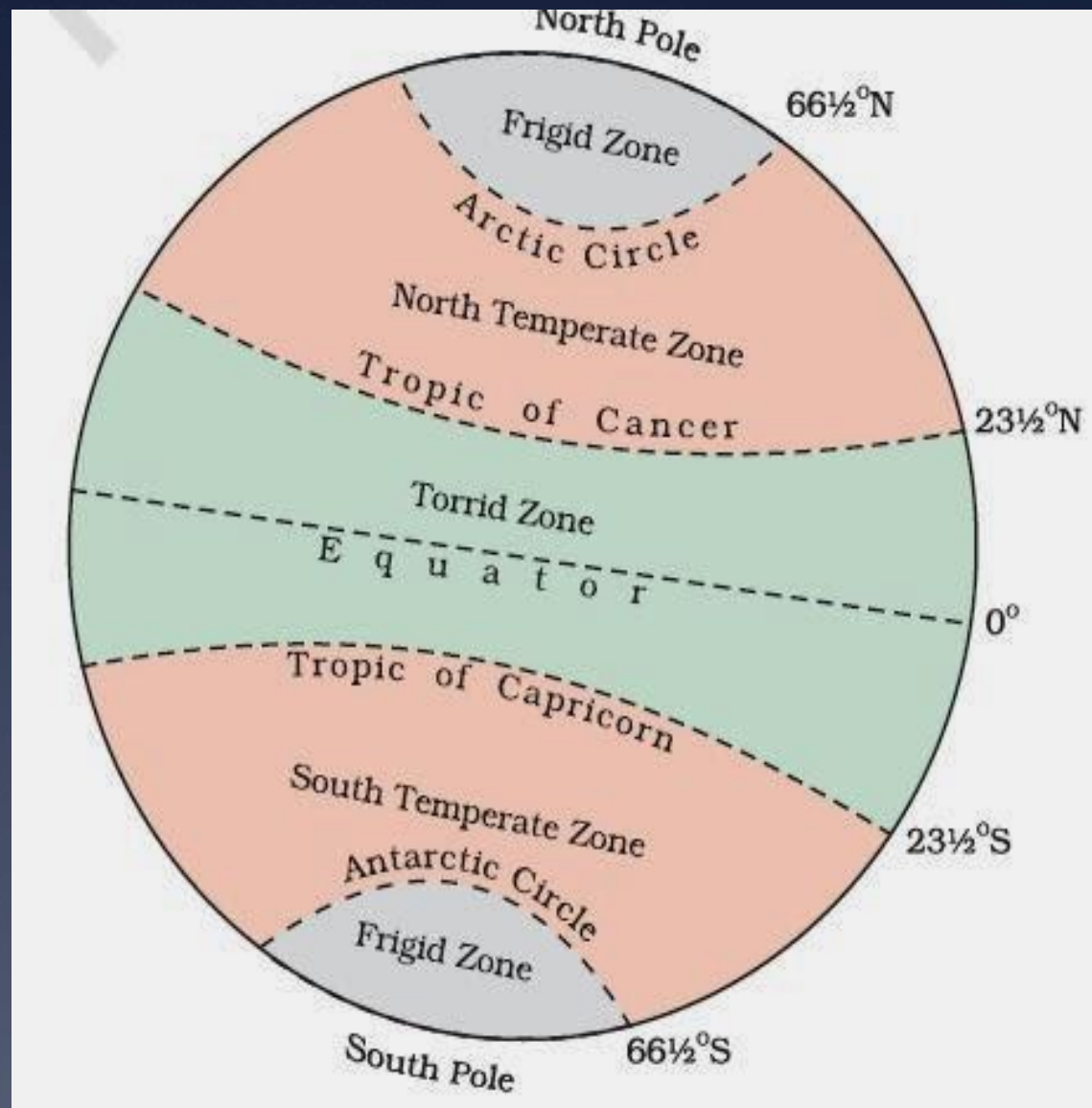
Depending on the time of year, either the Northern or Southern Hemisphere will be tilted in the direction of the sun and receive more light.

More sunlight means *longer days* and *warmer weather*.



Earth can be divided into 5 climatic zones:

- The North Polar Zone (The Arctic)
- The North Temperate Zone
- The Tropics
- The South Temperate Zone
- The South Polar Zone (Antarctic)



The **Polar zones** range from 66.5° - 90° latitude (both North and South).

The Polar zones are the coldest areas on Earth.



The Temperate zones range from 23.5° - 66.5° latitude (both North and South)

The Temperate zones have a high degree of seasonal variation and diverse climates, from relatively warm conditions in the lower latitudes, to sub-arctic conditions in the higher latitudes.



The **Subtropics** lie within the temperate zones at latitudes below 38° (both North and South)

In general, climate in the subtropics is much **warmer** and has **less seasonal variation** than the rest of the temperate zones.

Many of the world's deserts are located at subtropical latitudes.



The **Tropics** range from 23.5° N latitude (the *Tropic of Cancer*) to 23.5° S latitude (the *Tropic of Capricorn*)

The tropics are the warmest areas of Earth and have little to no seasonal variation in temperature (although some areas have wet and dry seasons).



Tropical regions near the Equator have abundant precipitation year round, making it possible for *tropical rainforests* to thrive.



Climate also includes precipitation.

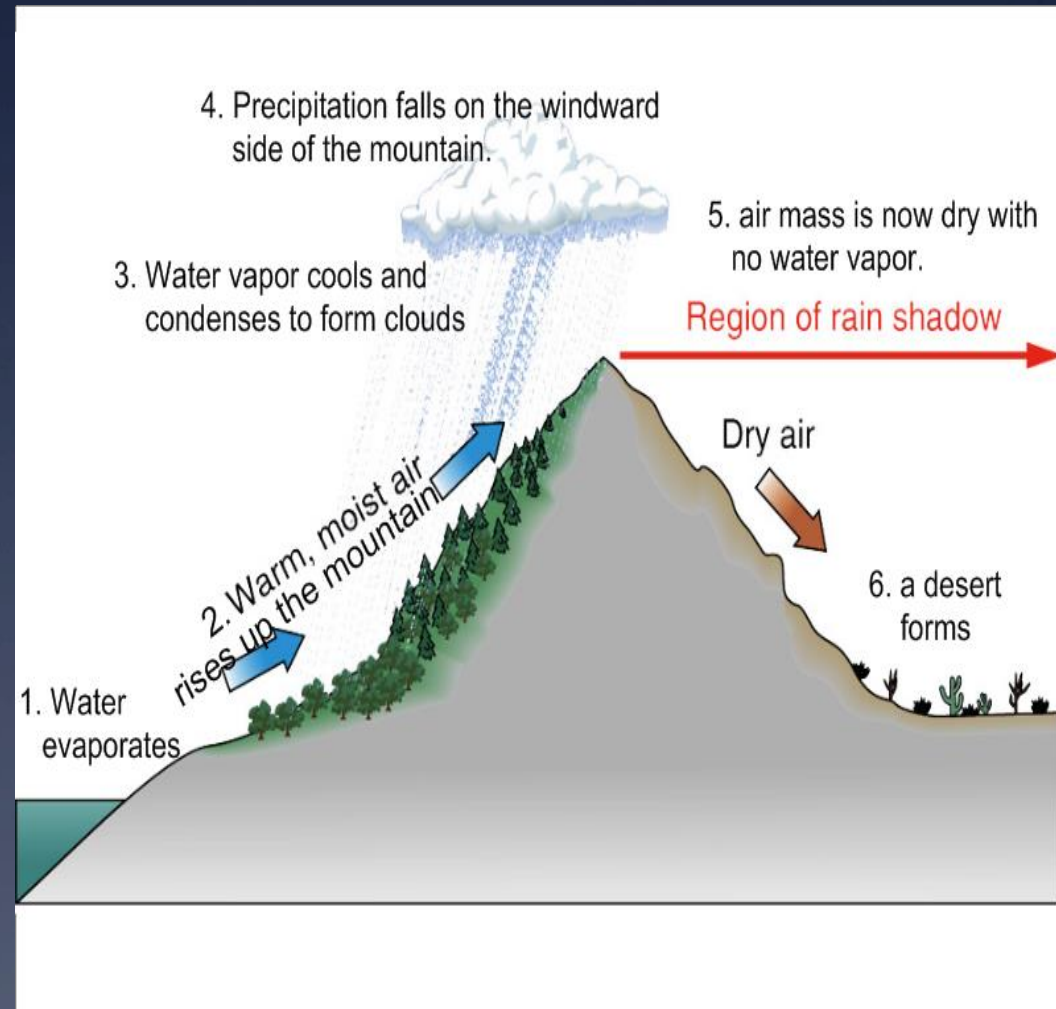
Precipitation:
condensed water that falls from clouds (usually as rain or snow).

Precipitation usually occurs where warm, moist air meets cooler air.



Topography can also affect precipitation.

When winds blow moist air up the side of a mountain, the air cools as it rises and releases precipitation. This creates a *rain shadow* on the other side of the mountain.



This effect is most dramatic in the Andes Mountains of South America near the equator.

Here there are *tropical rainforests* at the lowest elevations and snow capped peaks similar to *polar ice* at the highest elevations over 6,000 meters.



My Biome Diary

Your Task:

Create a product that identifies the biomes: Tundra, Temperate Rainforest, Temperate Grassland, Taiga, Deciduous Forest, Tropical Rainforest, Desert, and Savanna. Your 'product' will provide the climate: average temperature range, average rainfall, one dominant plants and one dominate animal. Your 'diary' needs to contain pictures/illustrations for each biome.

If you do not want to make a 'Travel Diary', you can create a calendar, a scrapbook, flip book, or any other teacher approved product. Student projects can be paper or digital with teacher approval.

Terrestrial Biomes

Tundra and Alpine Tundra

Taiga (Boreal Forest)

Temperate Rainforest

Deciduous Forest

Temperate Grassland

Tropical Rainforest

Savanna

Desert

Biome Locations

