Introduction to Climate

What is climate?

Weather - The condition of Earth’s atmosphere at a particular time and place

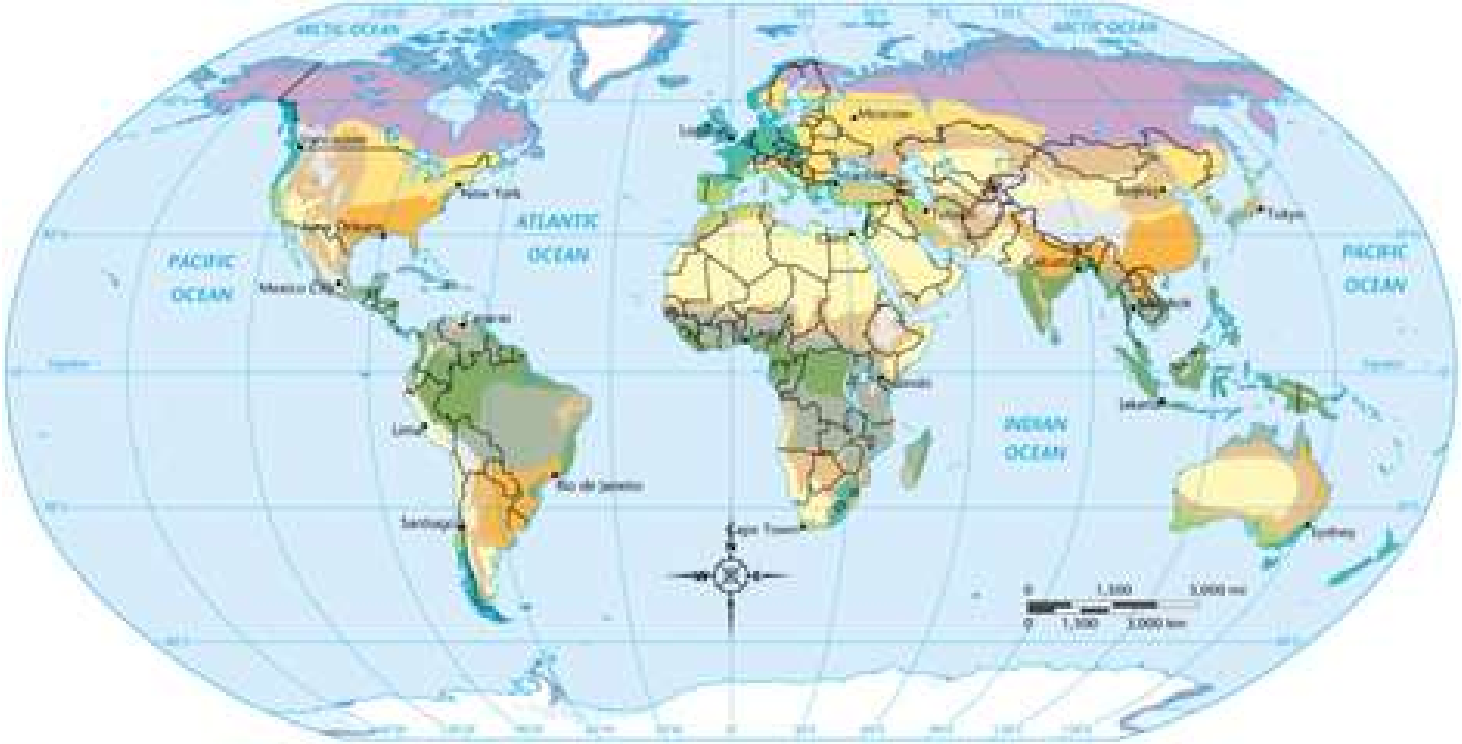
Seasons - a time of the year marked by particular weather patterns and daylight hours, resulting from the earth's changing position with regard to the sun.

Climate variation - short-term changes in climate that take place over months, seasons and years. This variability is the result of natural, large-scale features of the climate

Climate change - a change in climate patterns from that can occur across decades to millions of years

Climate - the AVERAGE weather conditions in a location over a long period of time (30 years)

There are 12 different climate zones on the Planet



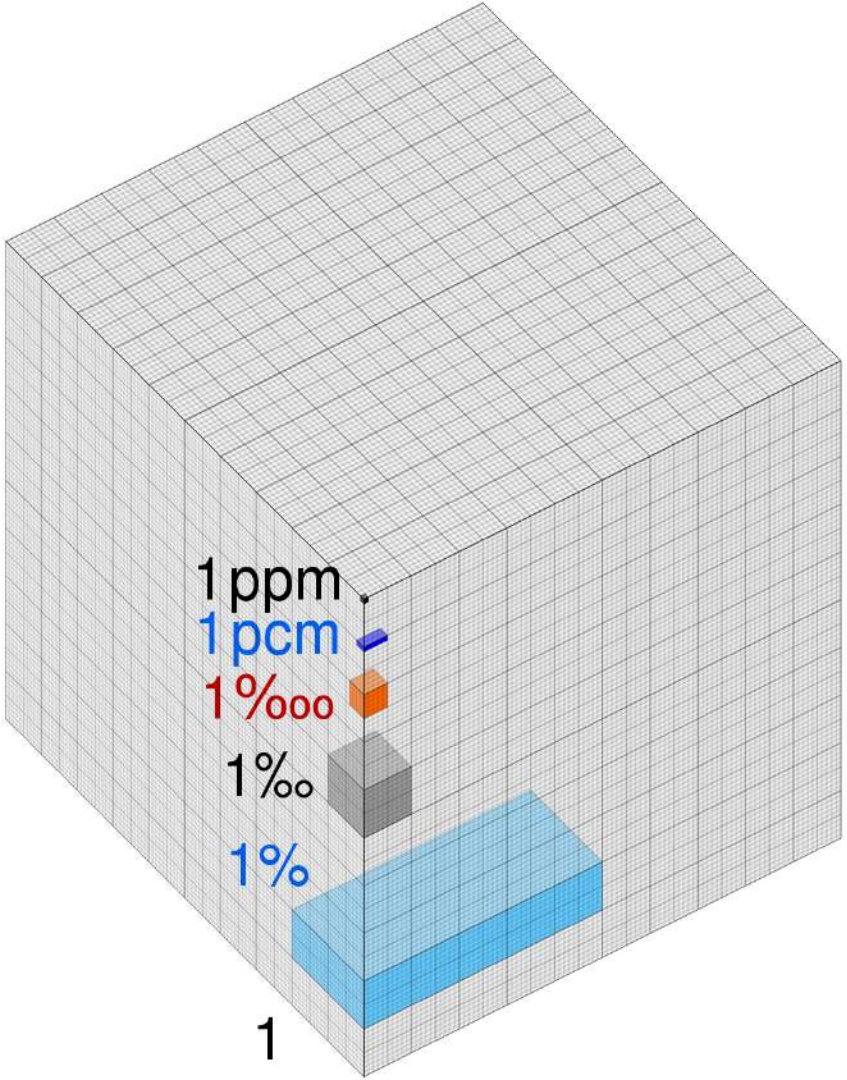
How are Climates formed?

Interaction between the **hydrosphere**, **atmosphere**, and **cryosphere**

Atmosphere

Remember what the atmosphere is made of

- 78% Nitrogen
- 21% Oxygen
- 400 ppm Carbon Dioxide

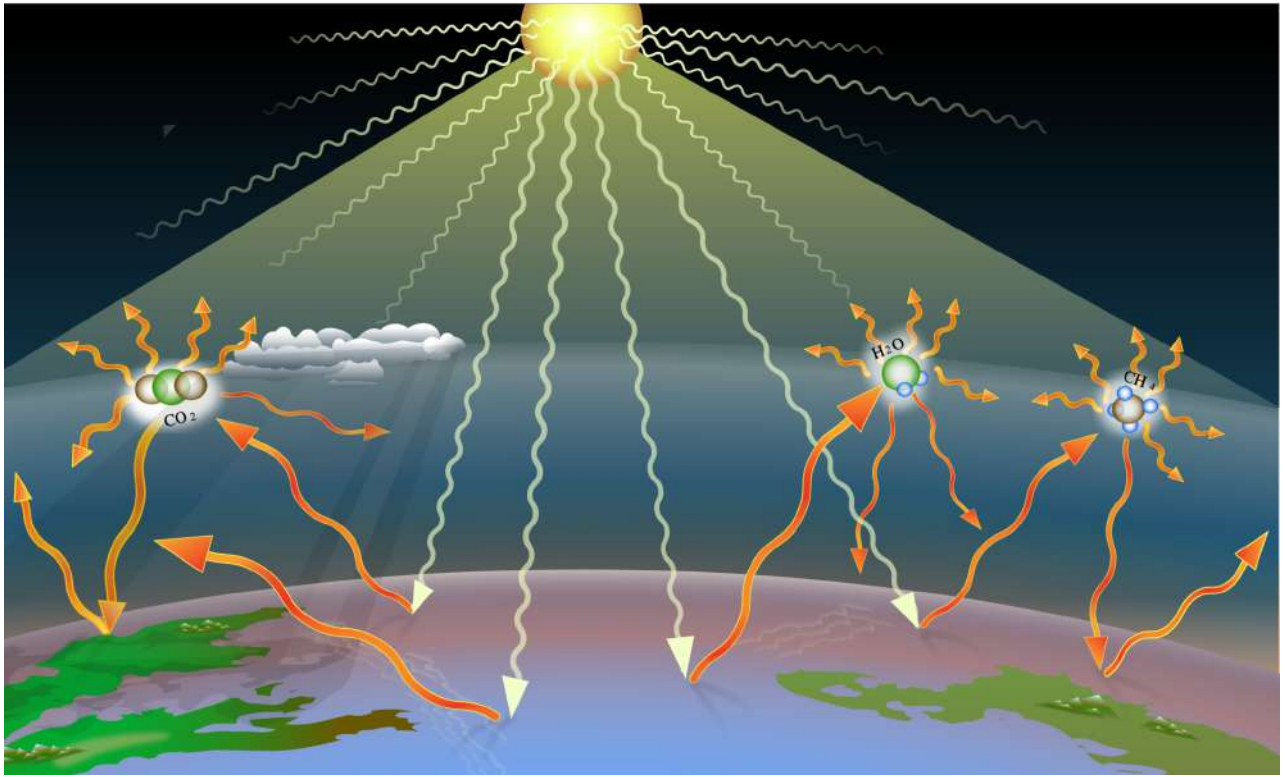


Atmosphere

How does CO2 affect the atmosphere?

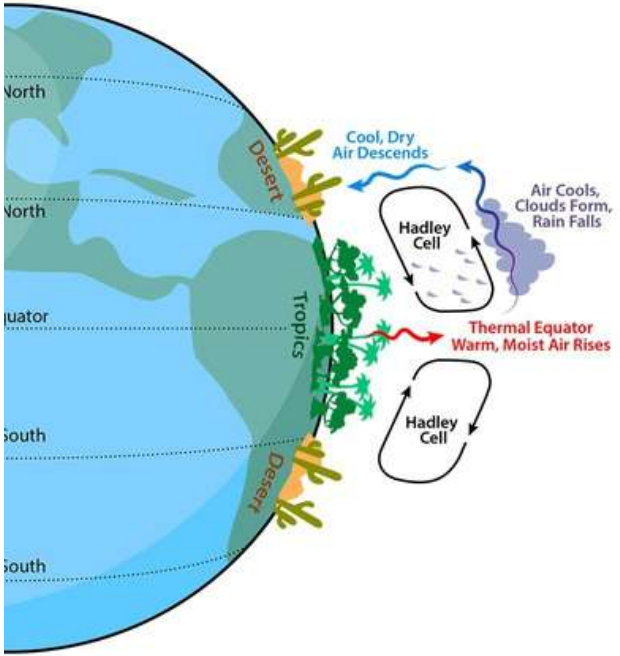
What would happen if there were too little CO2?

What would happen if there were too much CO2?



Atmosphere

- Uneven heating of the earth creates circulating air cells
  - Hot air rises - low pressure - rain
  - Cold air falls - sunny - dry
- Warm air comes away from the equator
- Cold air comes away from the poles
- The circulation of the atmosphere distributes carbon dioxide evenly around the globe

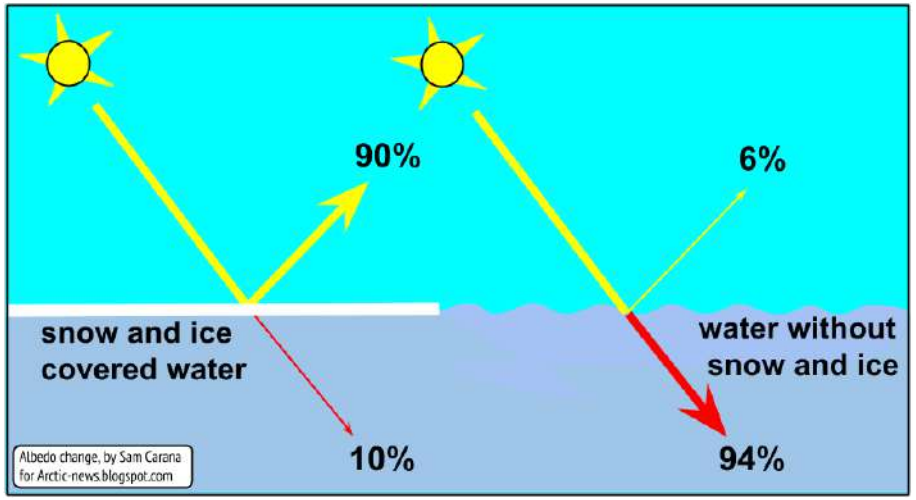


Oceans

The oceans have absorbed 90% of the heat gained by the planet

Without the oceans the planet would be about 122° F

The ocean is dark in color and has a low albedo. Absorbs light and traps heat

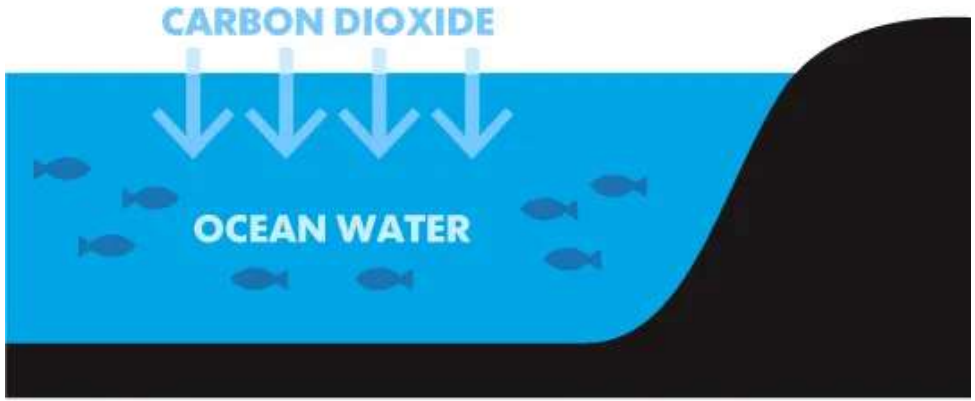


Oceans

The oceans holds 50 times as much carbon dioxide as the atmosphere

Carbon dioxides comes out of the atmosphere and can get caught in the ocean to be stored for a period of time.

Warmer waters don’t hold as much carbon dioxide as cold water



Oceans

Ocean circulation distributes heat and carbon dioxide around the planet

Warm water moves away from the equator

Cold water moves away from the poles

Water temperature determines the climate of coastal regions

The UK is warmer than Alaska, but they are at the same latitude

Cryosphere

What is the cryosphere? The region of the Earth's water and soil that is frozen

Benefits of ice

- High albedo reflects light and keeps the area cool
- Ice cools the air and oceans which circulate cool air and water around the planet
- Traps water to keep ocean level down
- Ice traps CO_2 that had been circulating in the ocean and the atmosphere

Cryosphere

Glaciers - large frozen rivers - usually terminate at the ocean

Ice Sheets - large areas of land covered in ice. Bigger than glaciers and icebergs

Icebergs - Ice in the Ocean

Permafrost - frozen soil. Traps a lot of carbon dioxide and methane.