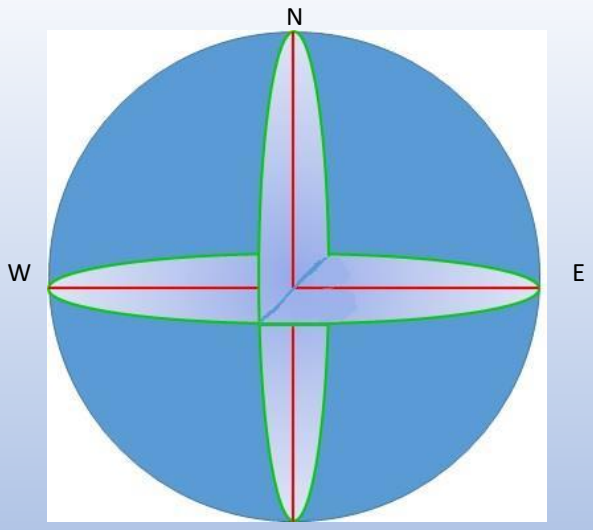
This is a small presentation about the atmosphere

My Name is **GIORGIO**

My name is Giorgio and I am a former jet and helicopter pilot. I am a member of the Royal Aeronautical Society, Prestwick Branch and leave in Ayr.



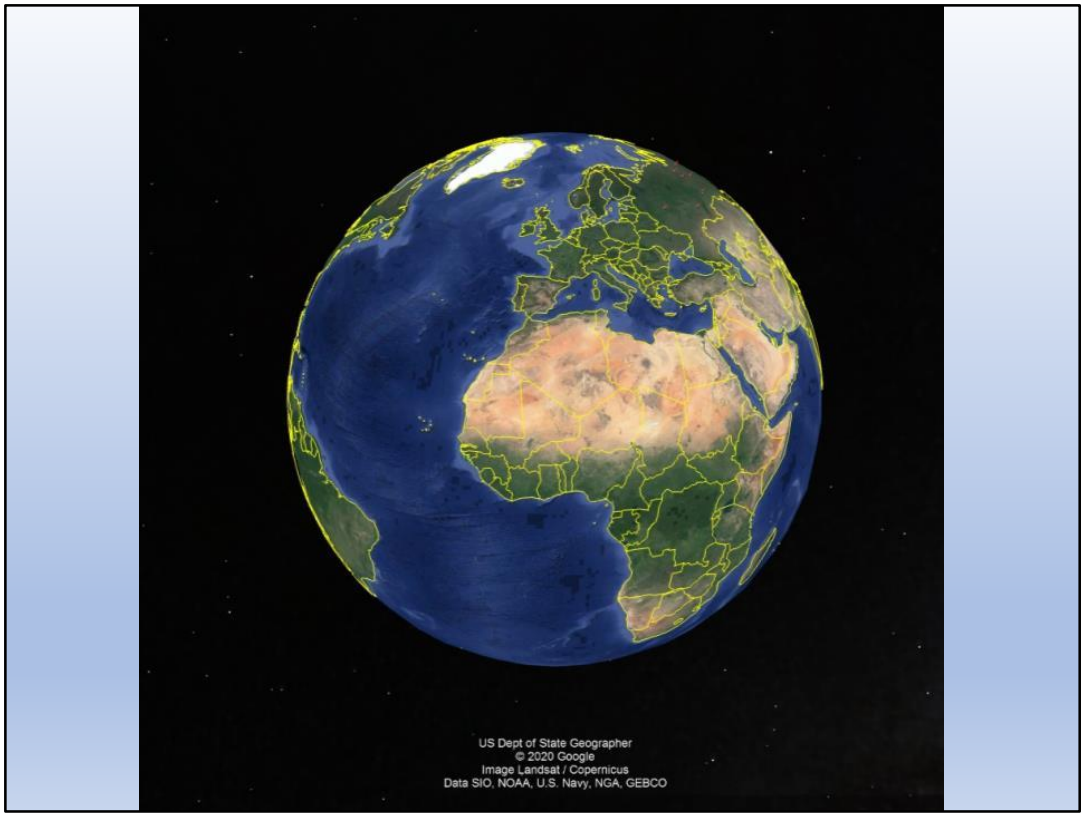
Equator circumference = 40,075 km (24,901 mi)

Poles circumference = 40,007.863 (24,859.734 mi)

Equator diameter = 12,756.3 km (7,926.4 mi)

Atmosphere = 100 km

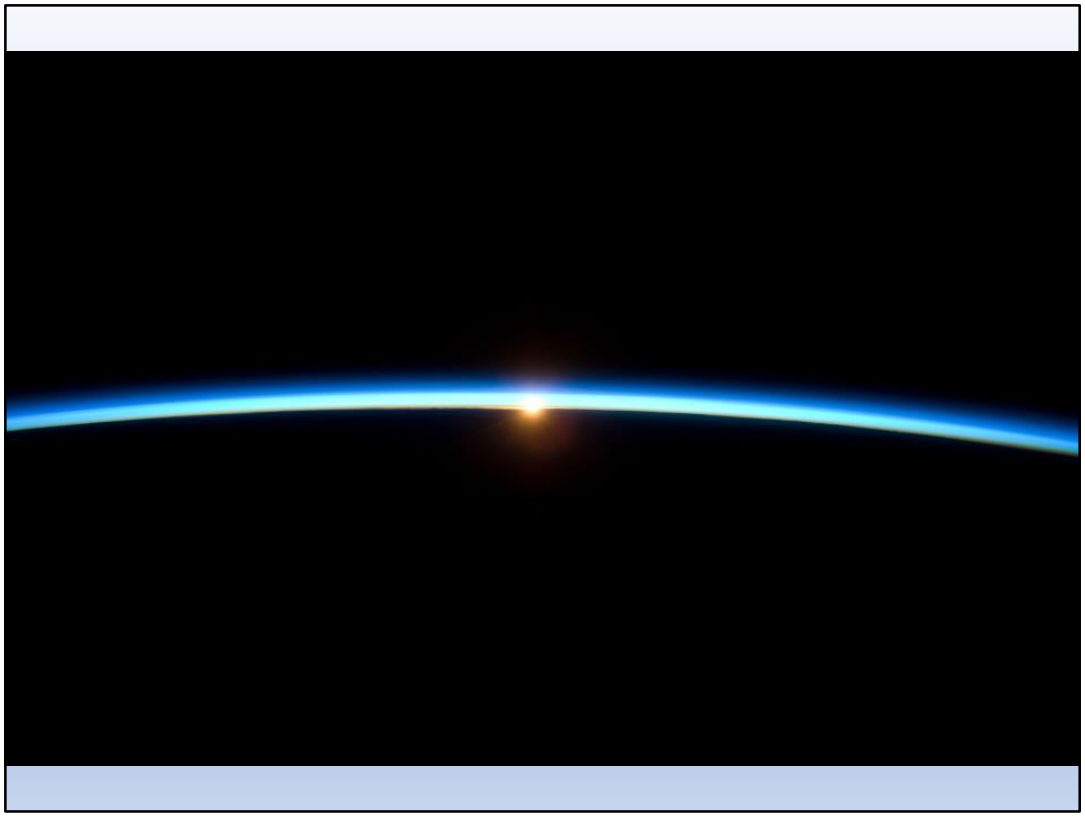
First of all, let's look at earth dimensions.
The earth's circumference is about 40,000 kilometres, a bit more on the equator than around the poles.
The equator diameter is about 12,756 kilometres
We are saying this to have a comparison with the size of the atmosphere.
The atmosphere thickness is about 100 kilometres



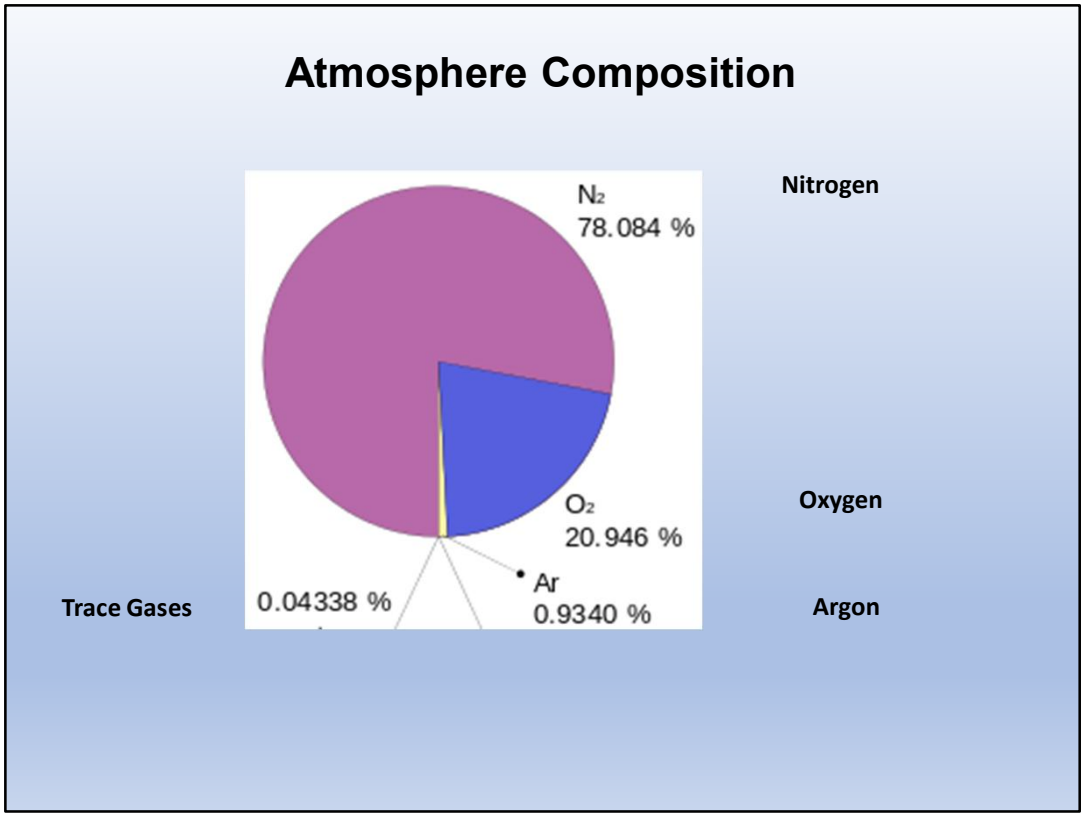
This is a representation of the earth without atmosphere

This a representation of the earth with atmosphere.
As you can see there is hardly a visible difference.

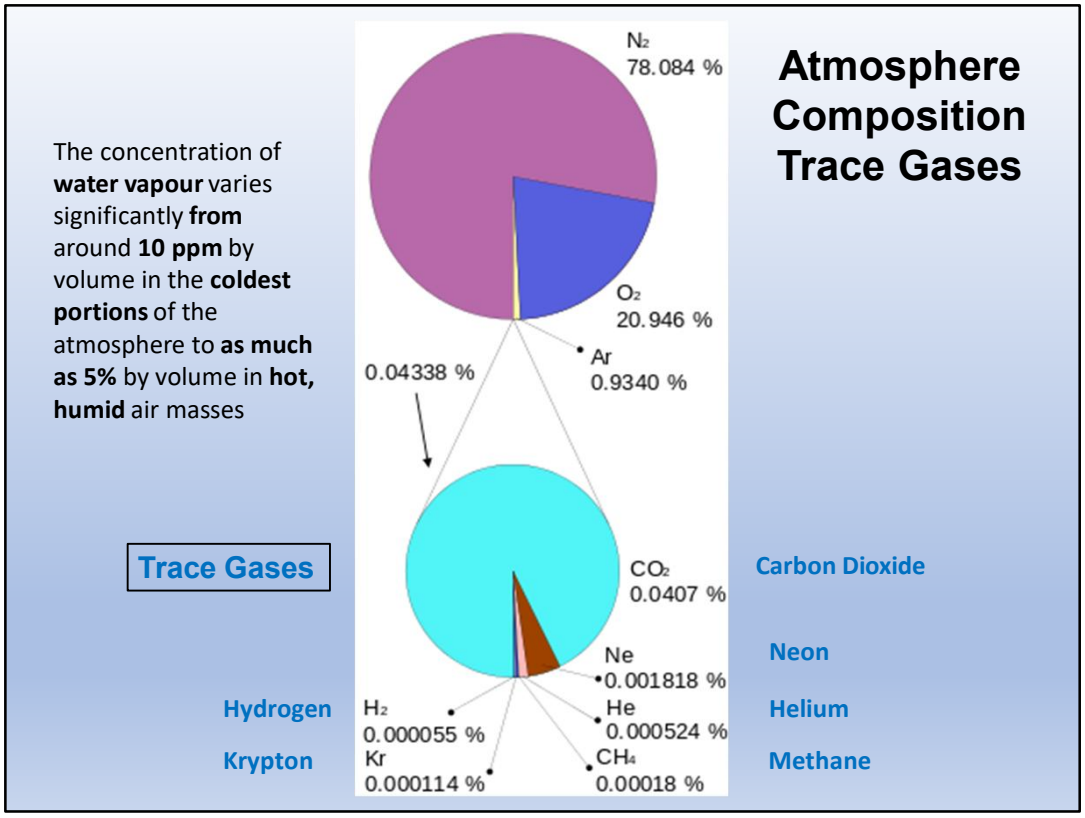
Here you can see better how thin the atmosphere is in relation to the earth's diameter



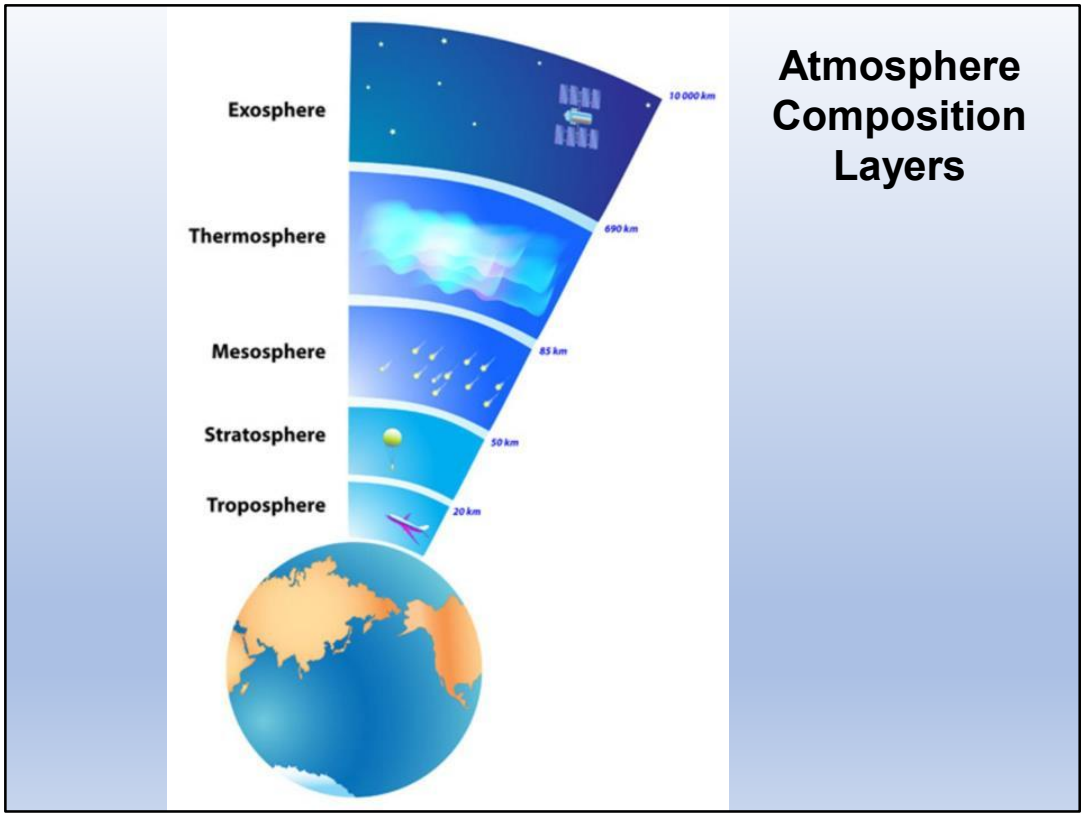
This is an actual picture taken from space of a sunrise, where the thinness of the atmosphere is clearly represented.
QUESTION to Audience: What do you think the atmosphere is made of?



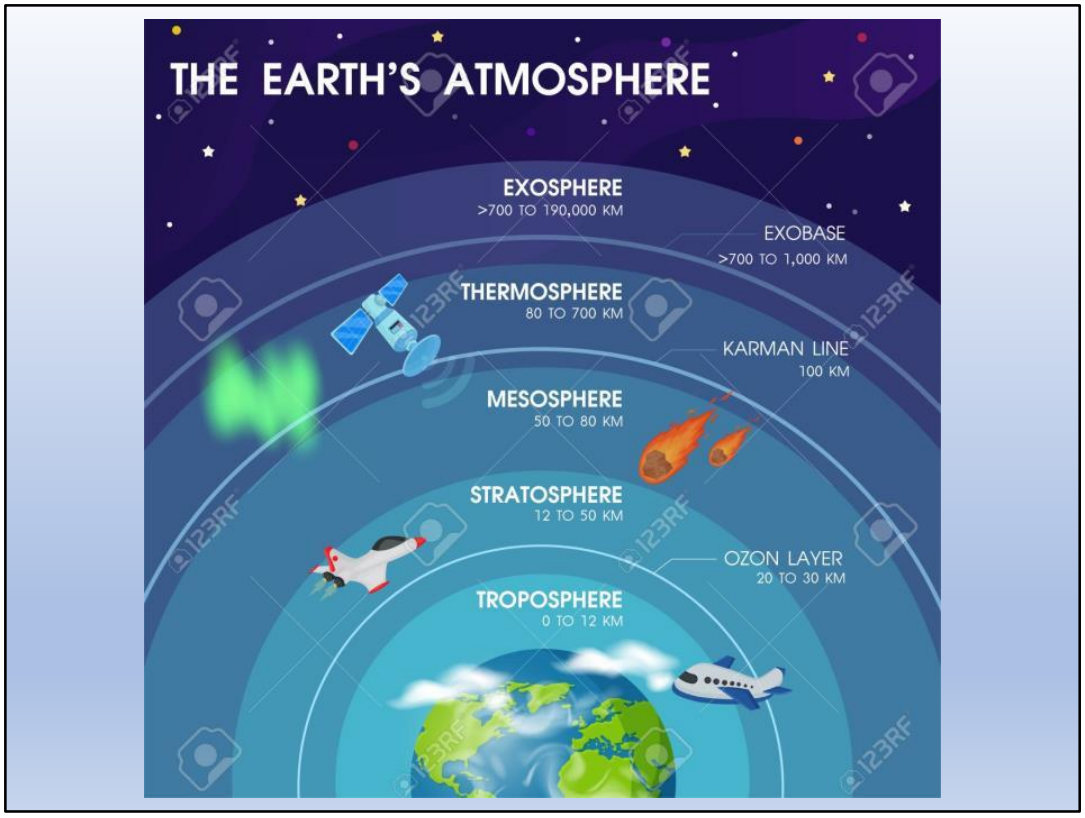
The atmosphere is made of gasses.
Four major components: Nitrogen about 78%; Oxygen about 21%; Argon less than 1% and the so called Trace Gasses about 0.043%



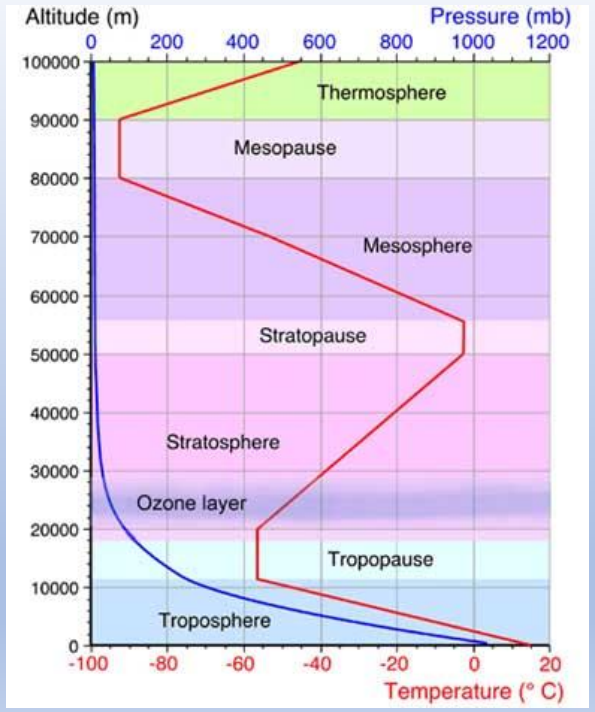
The Trace Gasses comprise six different gasses.
Carbon Dioxide 0.0407%; Neon 0.001818%; Helium 0.000524%; Methane 0.00018%; Hydrogen 0.000055% and Krypton 0.000114%
The concentration of **water vapour** varies significantly from around 10 parts per million (ppm) by volume in the coldest portions of the atmosphere to as much as 5% by volume in hot, humid air masses.



The Atmosphere consists of FIVE layers, each one with its own name and thickness.
They are the TROPOSPHERE the one closest to earth surface; the STRATOSPHERE; the MESOSPHERE; the THERMOSPHERE; and finally the EXOSPHERE.

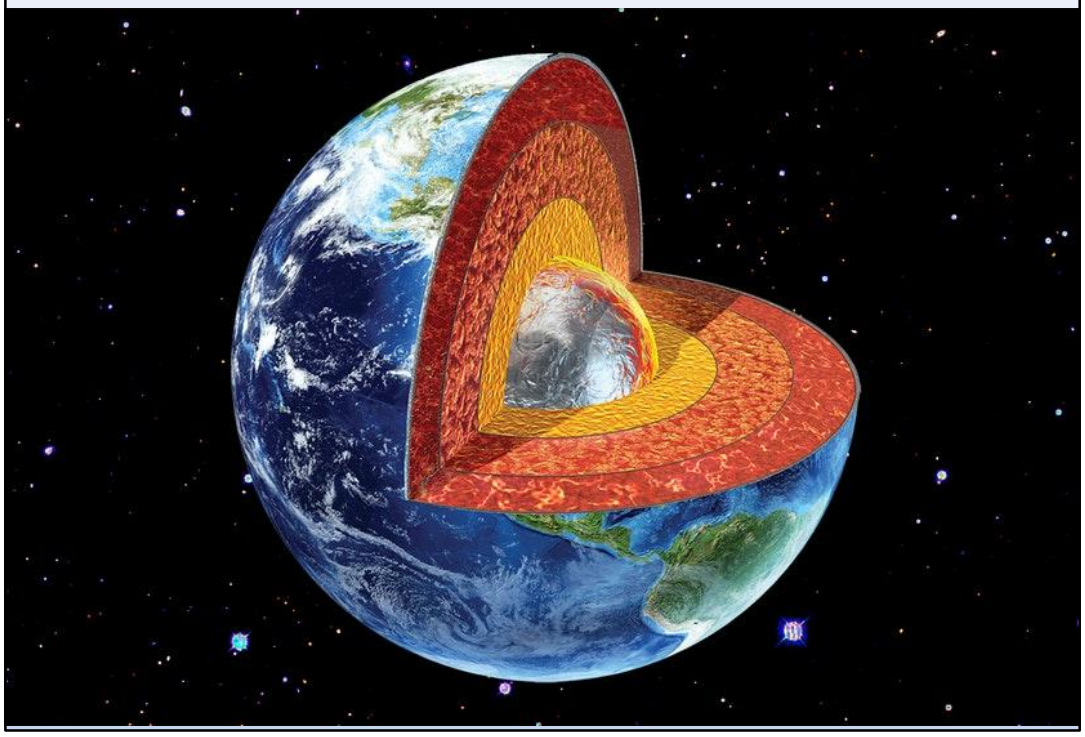


Here you can have an idea of the sizes of each layer.
Things to notice:
The TROPOSPHERE, inside which all weather phenomena occur, is about 12 kilometres high.
The OZON Layer is relatively close to the earth surface, between 20 and 30 Kilometres inside the STRATOSPHERE Layer.
The asteroids normally burn out in the MESOSPHERE, between 50 and 80 kilometres.
The KARMAN LINE, which represents the agreed external limit of the atmosphere is named after Theodore von Karman, a Hungarian scientist who was the first person to calculate the altitude at which the atmosphere becomes too thin to support aeronautical flight through aerodynamic lift.
The NORTHERN LIGHTS occur in the THERMOSPHERE.



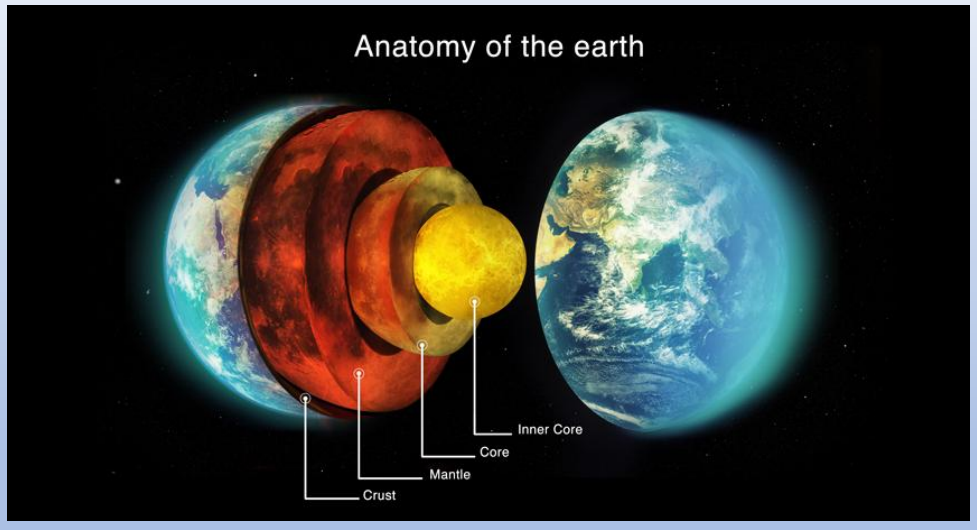
Here we can see the way temperature and pressure change with Altitude.
Things to notice:
In the Troposphere, the change of temperature and pressure with altitude is constant about 6.5° C per 1000 metres or 2° C per 1000 feet and about 71 hPa per 1000 metres
When we go up a mountain, we get to a point where we cannot breathe anymore, not because there is less oxygen (the oxygen component is always 21%) but because the atmospheric pressure is so reduced that in our lungs the oxygen cannot transfer into the blood anymore.

The Earth – Source of Internal Energy



The earth has two sources of energy
One internal, generated by the heat from the melted inner core, rising to the surface via the crust; and

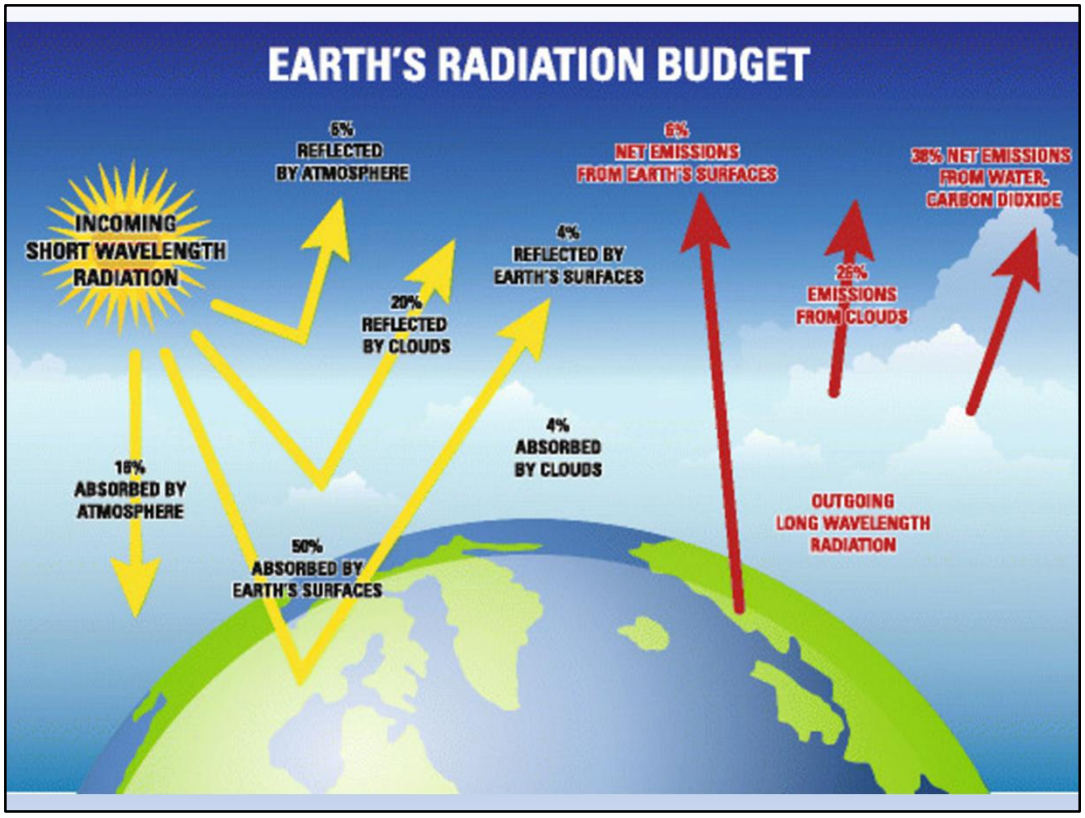
The Earth – Source of Internal Energy



Different "exploded" view of the earth anatomy

The Sun – Source of External Energy

The earth has two sources of energy
One external, energy generated by the Sun and received from the sun

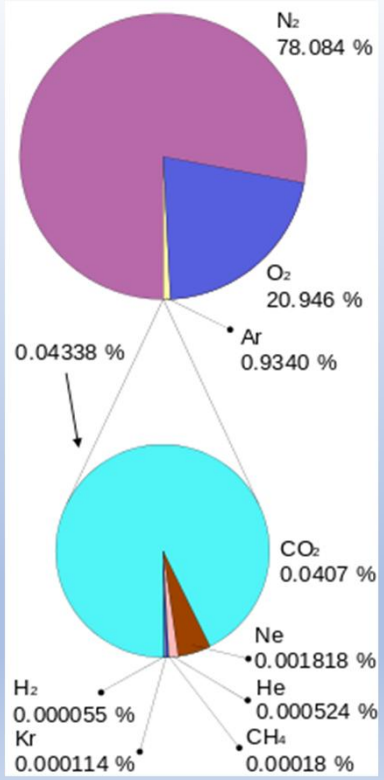


In this slide we can see the earth's radiation balance between the energy received from the Sun and that produced internally by the Earth.

Short video clip about the Sun's activity.
It is important to understand that the energy received from the Sun by the earth is not constant. It is not the same every day of every year. It changes with the sun activity; that is why we have change in the weather and in the earth's surface radiation.

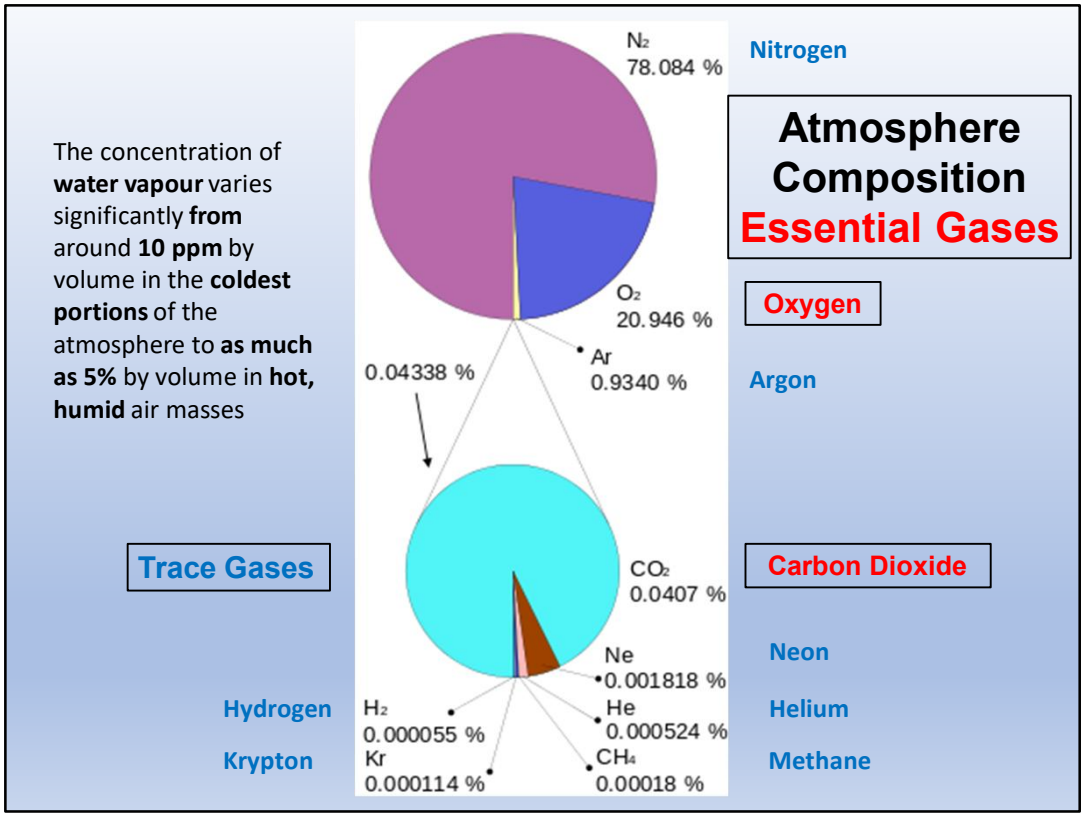
The concentration of **water vapour** varies significantly **from** around **10 ppm** by volume in the **coldest portions** of the atmosphere to **as much as 5%** by volume in **hot, humid** air masses

Trace Gases

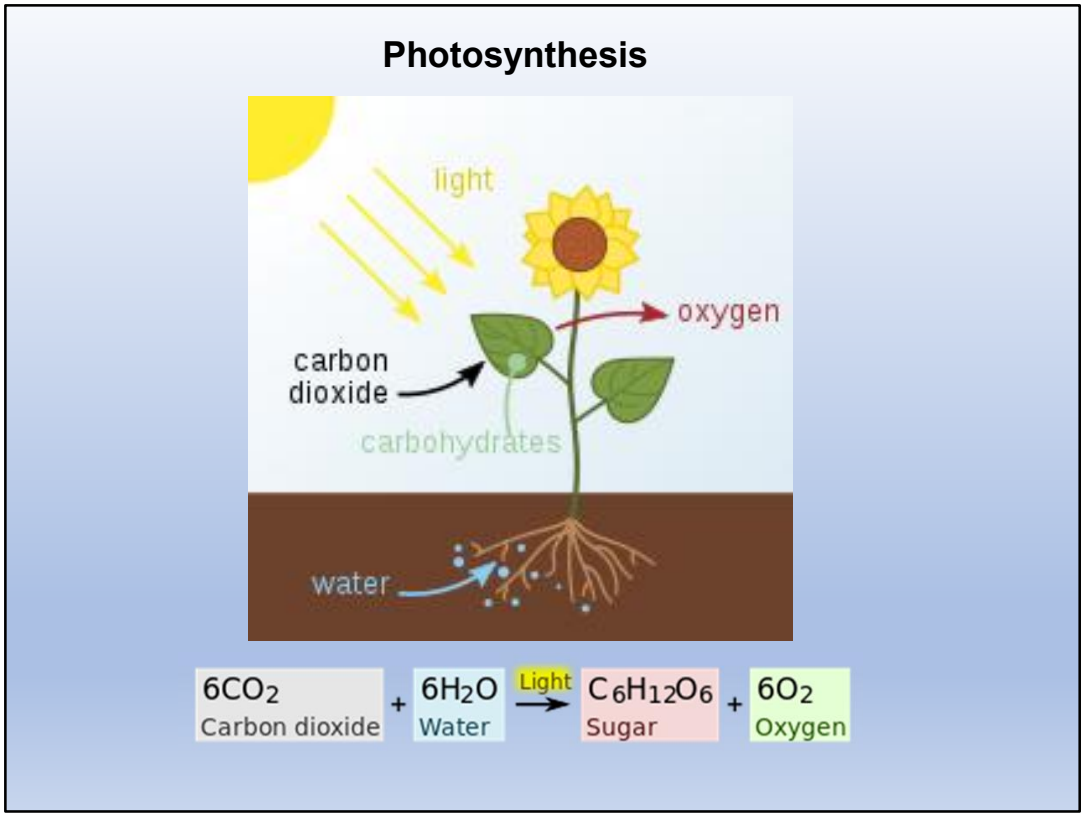


Atmosphere Composition
Essential Gases

Going back to the atmosphere's composition, there are two gasses that are essential for Human Life.
QUESTION to Audience: Which are these two gasses?



They are OXYGEN and CARBON DIOXIDE
Without oxygen we cannot breathe and therefore we cannot live.
Without Carbon Dioxide there would be no plants, also there would be no oxygen in the atmosphere.

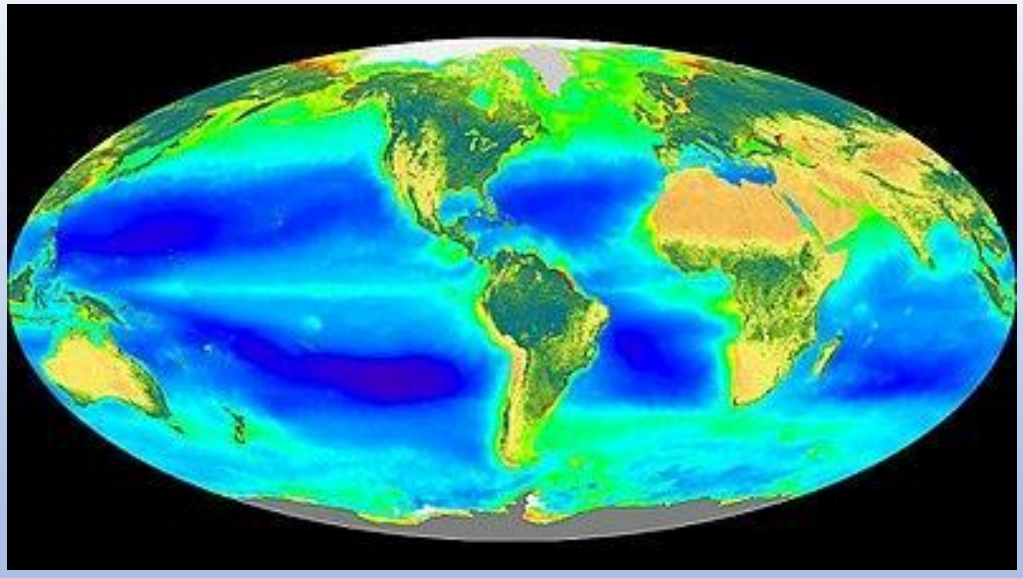


Carbon Dioxide is used by plants on land and sea (phytoplankton - microscopic marine plants) to produce carbohydrates AND oxygen via the photosynthesis process.
Almost all oxygen content present in the atmosphere is produced and maintained by the photosynthesis process.

Photosynthesis is a process used by plants and other organisms to convert light energy into chemical energy that can later be released to fuel the organisms' activities. This chemical energy is stored in carbohydrate molecules, such as sugars, which are synthesized from carbon dioxide and water – hence the name *photosynthesis*, from the Greek φῶς, *phōs*, "light", and σύνθεσις, *synthesis*, "putting together". In most cases, oxygen is also released as a waste product. Most plants, most algae, and cyanobacteria perform photosynthesis; such organisms are called photoautotrophs. Photosynthesis is largely responsible for producing and maintaining the oxygen content of the Earth's atmosphere, and supplies all of the organic compounds and most of the energy necessary for life on Earth.

The concentration of water vapour varies significantly from around 10 ppm by volume in the coldest portions of the atmosphere to as much as 5% by volume in hot, humid air masses.

Photosynthesis in the BIOSPHERE



Sea
70.8%

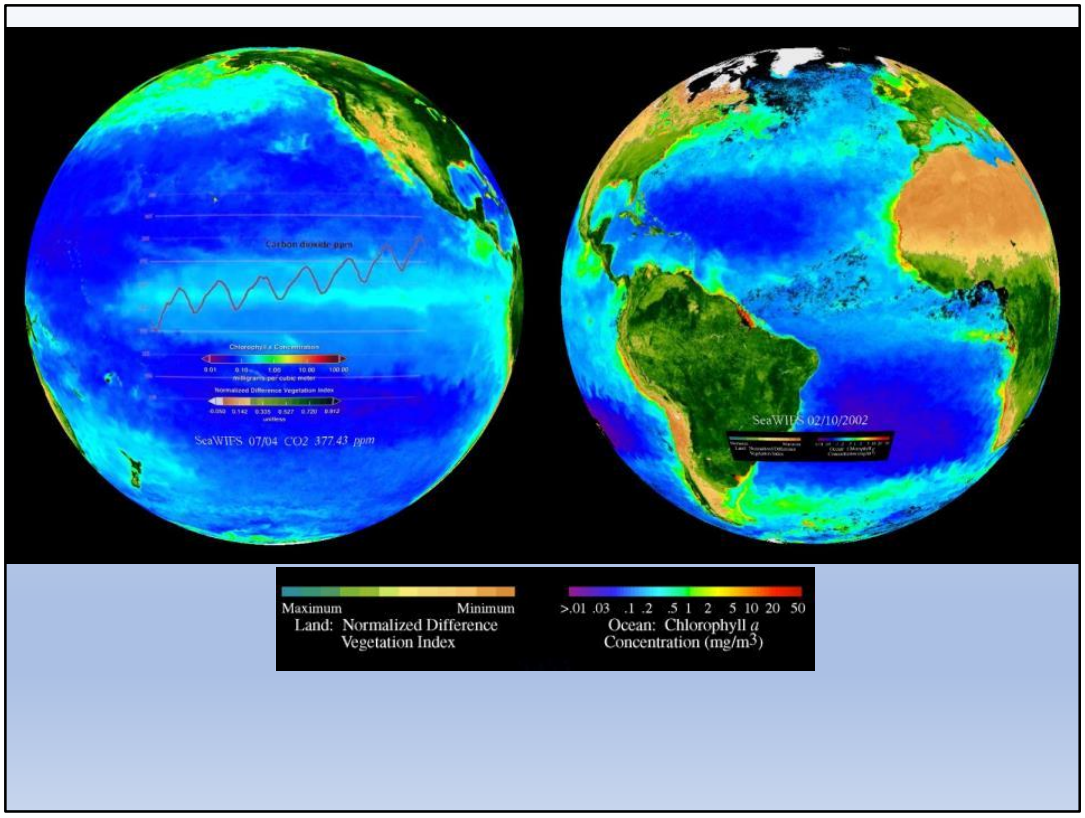
Ecosystem comprising the entire Earth and the living organisms that inhabit it

Land
29.2%

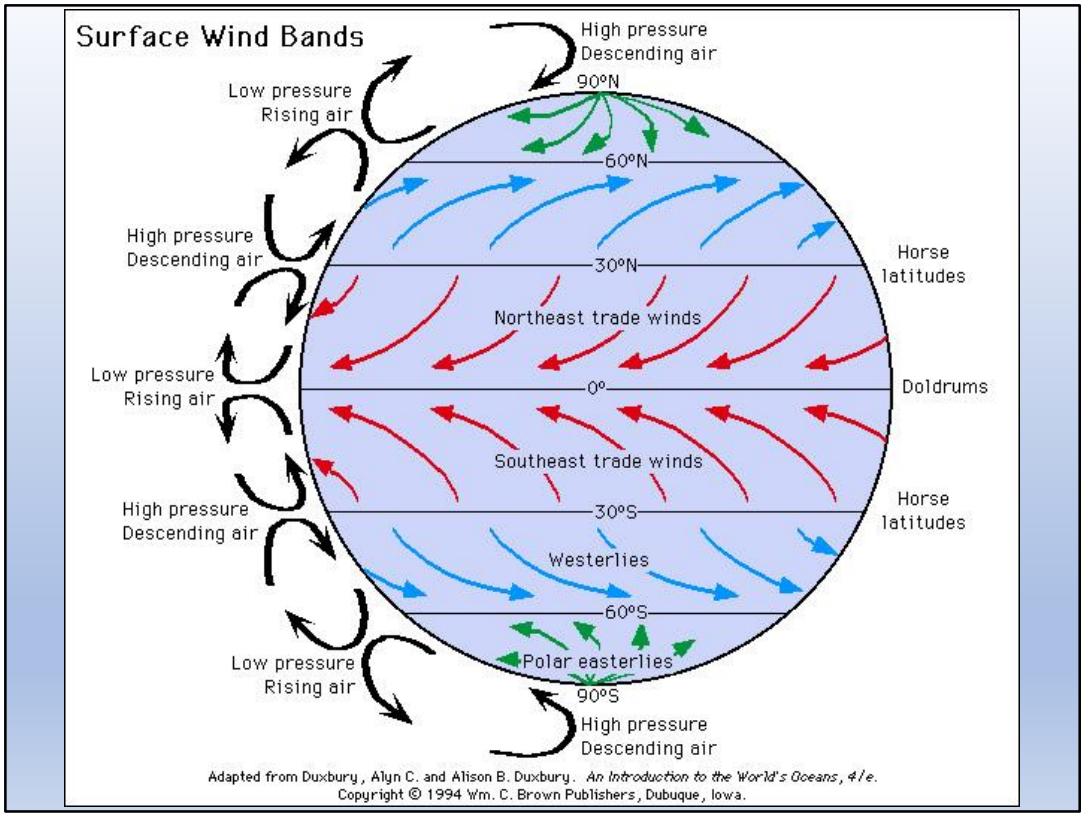
The Biosphere is defined as the part of the earth's crust, waters, and atmosphere that supports life.
It is also defined as the ecosystem comprising the entire earth and the living organisms that inhabit it.
70.8% of the earth surface is covered by water and 29.2% by land

Biosphere is the part of the earth's crust, waters, and atmosphere that supports life. the ecosystem comprising the entire earth and the living organisms that inhabit it.
The **biosphere** (from Greek βίος *bíos* "life" and σφαῖρα *sphaira* "sphere"), also known as the **ecosphere** (from Greek οἶκος *oîkos* "environment" and σφαῖρα), is the worldwide sum of all ecosystems. It can also be termed the zone of life on Earth, a closed system (apart from solar and cosmic radiation and heat from the interior of the Earth), and largely self-regulating.[1] By the most general biophysiological definition, the biosphere is the global ecological system integrating all living beings and their relationships, including their interaction with the elements of the lithosphere, geosphere, hydrosphere, and atmosphere. The biosphere is postulated to have evolved, beginning with a process of biopoiesis (life created naturally from non-living matter, such as simple organic compounds) or biogenesis (life created from living matter), at least some 3.5 billion years ago. Subtle changes in ocean colour signify various types and quantities of **marine**

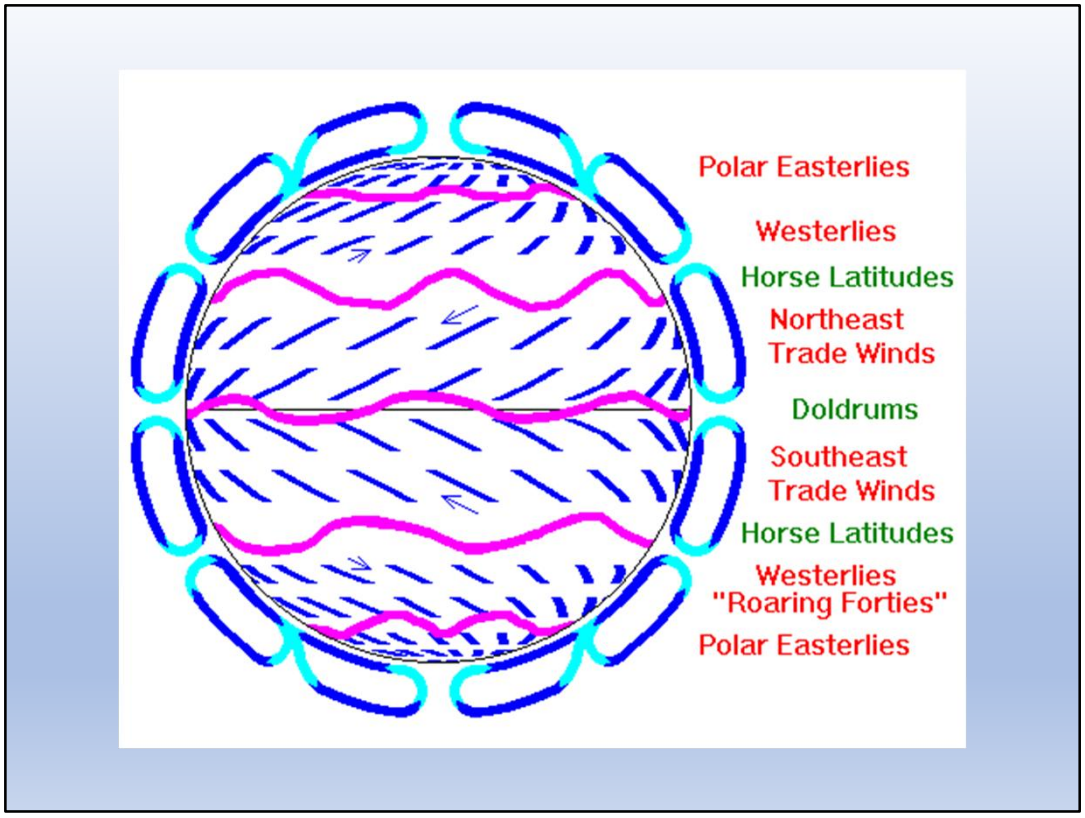
phytoplankton (microscopic marine plants)
Knowing where plant-life in both the ocean and on land is abundant is important to scientists because plants remove carbon from the atmosphere.



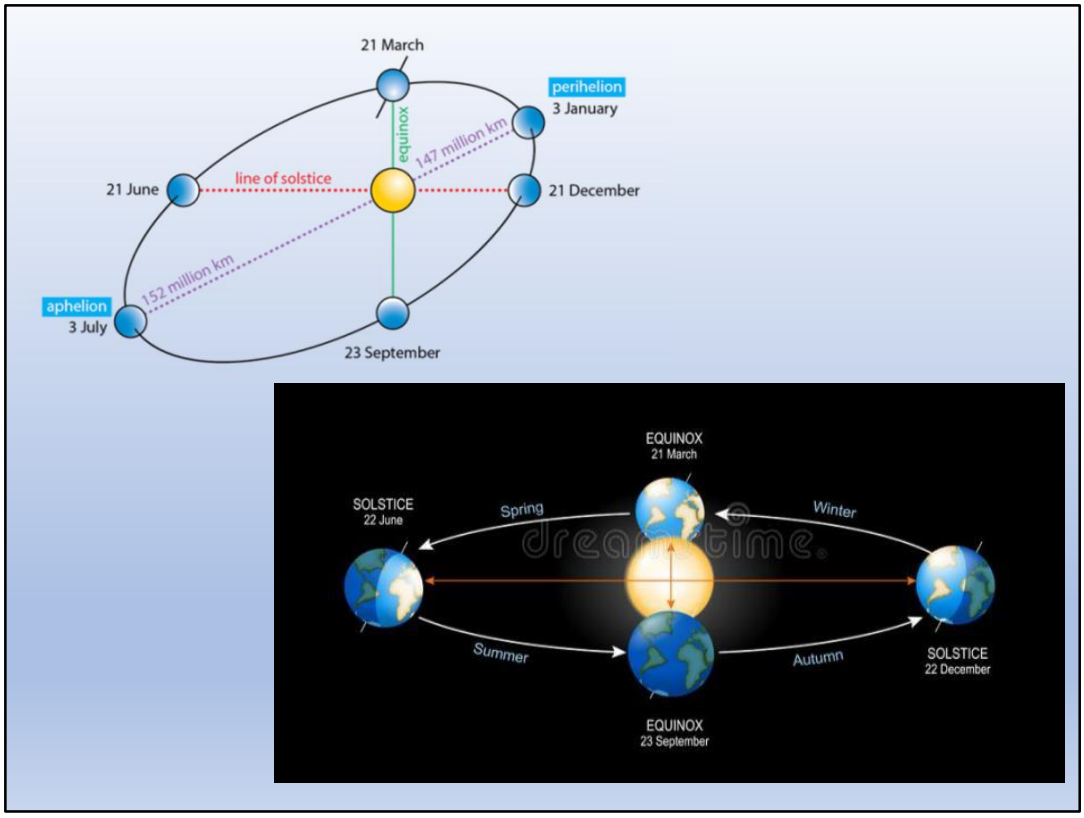
Here we can see a summary of the photosynthesis activities on land (plants) and on sea (phytoplankton)



As we said, the first layer of the Atmosphere, the TROPOSPHERE; here is where all weather phenomena occur.
The air masses are moved around by winds and also go up and down from the earth surface to the TROPOPAUSE, which is the border between the Troposphere and the Stratosphere (see slide 11)



This should be a GIF Image showing the air masses movement



In this slide we want to give a brief introduction to how the earth rotation around the sun generates the four seasons

The earth orbit around the sun describes an ellipsis, with the sun in one of the focus of the ellipsis.

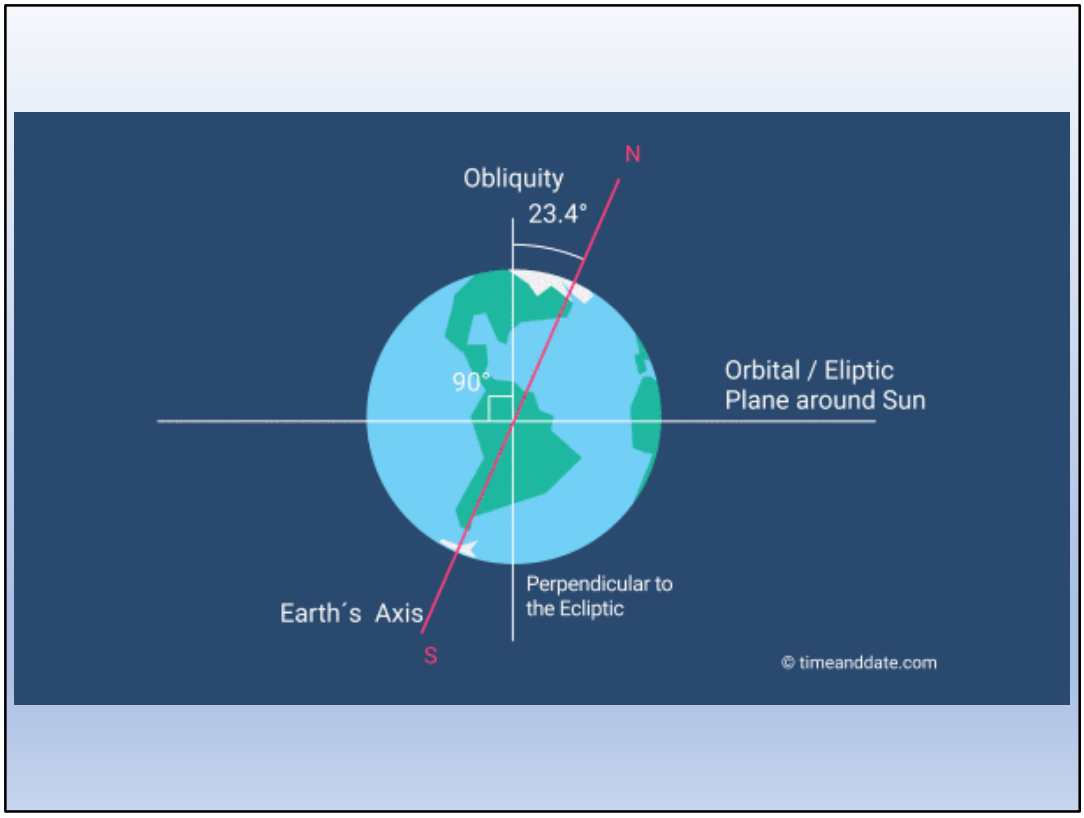
Perihelion is the point in the orbit at which the earth is closest to the sun.

Aphelion is the point in the orbit at which the earth is farthest from the sun.

Equinox is the point in the earth's orbit when the length of day and night in a day are the same (12 hours each)

Solstice is the point in the earth's orbit when the day's length is greatest compared to the night's length (Summer Solstice) and when the night's length is greatest compared to the day's length (Winter Solstice). This is for the Northern Hemisphere.

In the Southern Hemisphere the Solstices are inverted.



The seasons occur because the earth axis is tilted relative to the orbital plane around the sun by a value of 23.4°