HONOR THE FATHER AND THE MOTHER
(NO CARBON - NO LIFE)

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Chapter 1-Introduction.

All the vegetable and animal beings of this planet Earth of ours originated from two common ancestors who started and continue to support that unique and unrepeatable process in our universe which is called LIFE.

These ancestors of ours that are the basis of our existence and fundamental for our survival are called Carbon Dioxide (CO_2) and Water (H_2O) which together with other elements present in nature constitute a thin envelope that envelops our planet on the border between the Lithosphere and the Atmosphere and takes the name of Biosphere.

All the basic chemical processes that have occurred and are taking place in this thin layer in which we live are made possible by solar radiation, that is, from an energy source that we can consider inexhaustible over millions of years, but they need a series of concomitant factors which contribute to the develomwent of life and which are themselves determined by radiation.

For over one hundred thousand years the human species has joined the other living species in adapting to natural cycles in order to survive and be able to reproduce in a continuous process of evolution that has significantly changed their physical appearance, constructive and innovative capacities and intellectual faculties.

Man's relationship with nature was a reverential relationship dictated by his awareness of being completely irrelevant in determining the course of all those events that favored the birth and development of life but which were often also the origin of destruction and death: the reverential relationship materialized in a form of respect for man for nature which assumed a connotation of a religious nature such that special and disastrous events were interpreted as divine punishments. Over the last millennia of our history, therefore, the myth of the golden age and of the earthly paradise has developed, that is a state of initial perfection which is followed, due to man's fault, by a sudden deterioration that we are struggling to repair with a hard and tiring work of redemption.

The concept of "Climate Change" that dominates today's debate on the greenhouse effect unwittingly refers to this initial state of perfection which in biological terms was denied by Darwin's evolutionary theory and in cosmological terms by the Big Bang theory.

The whole current debate on climate change is based on this initial assumption accepted by almost all professionals and by the majority of public opinion, but not proven: CO_2 causes the earth's temperature to rise because it absorbs infrared radiation that Earth's surface emits in its quality of black body, absorption which partially inhibits the ability of the earth to cool itself through the radiative processes that dissipate the energy absorbed by the sun.

The cause of this process which is improperly called the "Greenhouse Effect" is attributed to anthropogenic activities that emit CO_2 in increasing quantities following the excessive exploitation of fossil fuels, causing the warming of the earth's atmosphere with the consequent melting of ice, devastating atmospheric phenomena and impending catastrophes.

This ideological prejudice has led in recent decades to a real campaign of criminalization of CO_2 by the catastrophists who in their theoretical elaborations and in their global simulations have completely neglected the role and meaning that CO_2 and H_2O have had and they still have in the formation and development of the Biosphere.

Parallel to the criminalization of CO_2, the false illusion has developed that the problems of global warming can be solved through the decarboxylation of energy sources, a process that requires enormous energy and financial expenditure and that will cause not the solution but the worsening of the current situation.

The first works and the first simulations of atmospheric physicists, begun in the second half of the last century, took as the starting point of this degenerative process the beginning of the industrial era which occurred in the mid-nineteenth century, when the population of the earth was about a billion

people with a life expectancy that was about half of the current one and a standard of living that would be unimaginable today.

The radiative energy balance was the subject of the first experimental investigations to measure the magnitude of the greenhouse effect and its correlation with the concentration of CO_2 in the air. The measurement was made at the limit of the atmosphere where with a bolometer the incident radiation coming from the sun and the total radiation coming from the earth was determined which consisted of the visible light reflected from the earth and the infrared radiation emitted by the planet determined by subtraction by inserting a filter that completely cut off the IR.

Another field of investigation was the determination of the annual carbon balance necessary to know the increase in the concentration of CO_2 in the atmosphere resulting from the use of fossil fuels.

Carbon increase which is naturally also correlated to the quantity of biomass currently present on our planet.

The title and motivations of this article were determined by the need to deal with the topic of climate change in the general context of the formation of the biosphere derived from the photosynthesis reaction between CO_2 and H_2O, molecules at the basis of organic chemistry that can generate life thanks to the presence of solar radiation and the ability of water to thermostatize the environment, through its changes in state of aggregation.

Fossil fuels, i.e. coal, oil and natural gas, which are considered as elements altering an optimal balance that nature has reached after millions of years, are the result of millions of years of photosynthetic activity that nature has carried out in the various geological eras and which has made it possible to transform the radiant energy of the sun into chemical energy directly usable by the living beings that populate our planet, themselves generated by millennia of evolution of organic and biological molecules.

What modern technologies are desperately trying to develop and increase, namely the capture of the sun's radiant energy and its accumulation in usable forms and in a way that is not harmful to living beings, nature has already been doing for about 2.7 billion. years through the transformation of radiant energy into chemical energy using chlorophyll photosynthesis.

Chapter 2- Life on Planet Earth.

a) The Atmosphere.

Despite the countless studies and research carried out in recent centuries, the origin of Life has not yet been ascertained, that is, that phenomenon and that magical moment that started it on our planet have not been identified; however, the mechanisms by which it regenerates and propagates and what are the necessary conditions for this to happen are perfectly known.

Physics, Chemistry and Biology are the sciences that are involved in this process of creation and reproduction of living beings on this planet of which we are part.

The first necessary condition for our existence and our survival is given by the presence of the earth's atmosphere, that is, of that gaseous envelope that surrounds our globe, about 50 kilometers thick whose total mass has been estimated at 5.150 10^{21}grams (i.e. about $1/10^6$ of the total mass of the earth which is $5{,}972 \times 10^{27}$ g) and which surrounds an area of 5,101 10^{14} m^2.

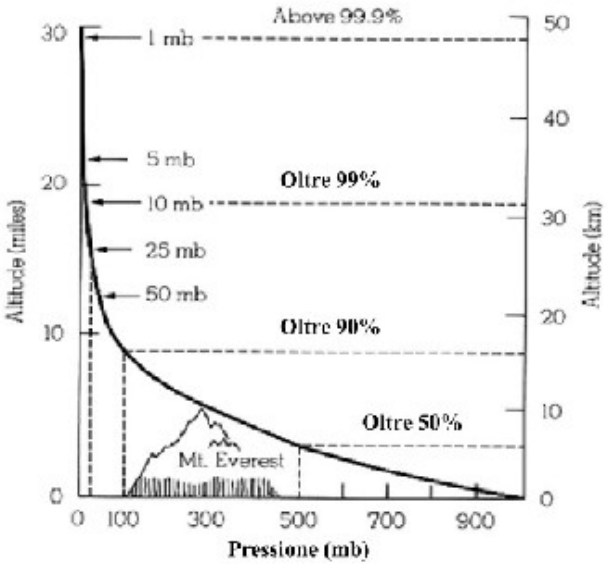


FIGURE 1

The average chemical composition of the atmosphere on the ground and in the absence of water vapor is the following:

Nitrogen mw=28amu(78.084%vol. 75.50%by weight) Oxygen mw=32amu (20.946% vol. 23.15% weight) Argon mw=39.95amu (0.934% vol. 1.29% weight) CO_2 p.m. = 44amu (0.0415% vol 0.063% weight) other gases (0.036% v.).

Nitrogen and Oxygen together constitute 99% (98.65%byweight). The amount of CO_2 in the atmosphere can be estimated at 896.4 GtC (see chap. 4b) which are in equilibrium with 550 GtC of total biomass on earth. (Chap. 2c) In the absence of winds or convective motions, the distribution of gases in the atmosphere is determined by their molecular weight so that carbon dioxide is found mainly in the troposphere which is the lowest layer, and in a greater percentage at sea level. The quantity of water can vary from 0 to 6% (average 0.33% that is 8 times greater than CO_2).

The atmosphere therefore contains the chemical elements that are fundamental for the presence of life on our planet, that is, the carbon that is present in the CO_2, the hydrogen that is present in the water and the oxygen that is present in both.

However, the atmosphere does not limit its action to that of depositing the main chemical elements necessary for life but, thanks to the presence of water, it exerts a stabilizing function of the temperature of the atmosphere itself and a redistribution function over the entire earth's surface of the necessary chemical elements to life.

The thermostabilising effect of water depends on the chemical-physical characteristics of this molecule which is fundamental for life on our planet. It is present on earth in its three states of aggregation, that is solid, liquid and vapor with the possibility of changing the state of aggregation as a function of temperature. A lowering of the temperature makes it possible to pass from the liquid state to the solid state, a transition that releases what is called the latent heat of crystallization and which constitutes a negative feedback, that is, it opposes the cause that determined it. The same happens when we pass from the gaseous state to the liquid state in which the latent heat of vaporization comes into

play. In the reverse process, i.e. in the solid-liquid-vapor passage, the heat that was previously released is now absorbed, therefore in the melting of the ice the heat is absorbed and the temperature of the solid-liquid system in equilibrium does not change until the ice is completely melted. The same type of mechanism occurs in the liquid-gas system in which the vaporization and condensation processes counterbalance the heating and cooling processes of the atmosphere.

Since the earth's temperature is essentially determined by solar radiation which logically depends on the alternation between day and night and on seasonal variations, it follows that the heating is not uniform on the earth's surface and causes variations in air density with consequent atmospheric perturbations that contribute themselves to the thermostabilization of the atmosphere. Furthermore, the formation of clouds tends to diffuse solar radiation and therefore to decrease the radiation that caused them.

The electromagnetic energy coming from the sun is found in the visible-near infrared range of the electromagnetic spectrum, and is partly re-radiated into space at the same wavelength as the incident light, partly used in the processes of photosynthesis and partly absorbed according to of the chemical composition of the surface and instantly transformed into thermal energy.

This process of thermalization of the radiation occurs due to the non-radiative decay from the molecular electronic levels excited by the incident radiation to the fundamental energy level, decay which is very fast and therefore very efficient.

Therefore the heat absorbed by the seas and by the emerged surfaces determines an increase in temperature of an entity inversely proportional to the thermal capacity of the same and is dissipated through two main mechanisms, one of the thermal-kinetic type which, as we have seen, causes the evaporation of water which cools the surface by subtracting the latent heat of evaporation, the other through direct contact with the molecules of atmospheric gases that heat up by conduction, determining their thermal expansion and creating ascending and translational currents, thus creating atmospheric perturbations that have the task to transfer energy, water, CO_2, O_2 and other atmospheric gases to less sunny areas of the earth mainly due to seasonal variations.

A third type of energy dissipation is due to the phenomenon of irradiation, i.e. the same type of phenomenon that occurs in the sun that generates the electromagnetic energy that heats us with the difference, however, that, being the temperature of the earth much lower than that of the sun , the radiative emission occurs in the mid-far infrared area of the electromagnetic spectrum, a characteristic area of the vibro-rotational bending transitions of the water and CO_2 molecules which it absorbs at 667 cm^{-1}.

The infrared energy emitted by the earth's surface is then absorbed by these molecules, defined as greenhouse gases, which however redistribute this energy to the surrounding gas molecules through the usual non-radiative decay process in the form of kinetic energy. However, these molecules have the intrinsic possibility of emitting electromagnetic radiation when they are in particular rarefied conditions, that is, when the probability of non-radiative decay is very low due to the distance between these molecules and the other molecules that make up the atmosphere. This irradiation is responsible for the thermal excursion that is observed between day and night on the emerged lands and minimally on the oceans, it is present both in summer and in winter and is attributable almost exclusively to the molecules of H_2O which being the lightest of the molecular mix of atmospheric gas are affected to a lesser extent by gravitational attraction and therefore more easily populate the upper layers of the atmosphere which are the most rarefied, behavior contrary to that of CO_2 which, being the heaviest molecule, tends to arrange itself in the densest layers in contact with the earth's surface.

b) Photosynthesis.

Therefore, CO_2, being the heaviest molecule in the atmosphere (except for Ozone O_3 which however is present in a negligible quantity) constitutes a blanket adhering to the terrestrial sphere which contributes together with water and direct conduction processes to heat the atmosphere. to make it suitable for the formation and maintenance of the Biosphere.

Its presence is therefore a necessary but not sufficient condition to maintain and conserve life on our planet which requires the presence of H_2O and light as constituent elements for photosynthesis and temperature conditions suitable for the production of organic material.

Photosynthesis is the way that nature has adopted to transform the electromagnetic energy of the sun into chemical energy necessary for living beings, both plants and animals. Energy that has been stored over millions of years and which constitutes the true resource of renewable energy because it can be regenerated in a new process of photosynthesis starting from the CO_2 generated through respiration and combustion.

Before moving on to analyze the conditions necessary for the formation of organic molecules, let's take a look at the chemical reaction scheme and the energies involved.

The mechanism by which starting from CO_2 and H_2O it is possible to synthesize organic matter is called Chlorophyll Photosynthesis which, as the name implies, needs, in order to be implemented, the presence of light, i.e. electromagnetic radiation whose energy is

$$e = h\nu = hc / \lambda$$

(where h is Plank's constant, ν is the frequency, λ is the wavelength and c the speed of light) and which comes directly from the sun.

The photosynthesis reaction is a fairly complex process that takes place within the chlorophyll, that is an organic macromolecule which, starting from CO_2 and water, gives rise to organic matter through the following typical reaction:

$$6CO_2 + 6H_2O + 54E \rightarrow C_6H_{12}O_6 + 6O_2$$

in which one molecule of glucose and six molecules of oxygen are formed from six molecules of water and 6 of carbon dioxide.

The symbol E indicates the energy of 1 Einstein which indicates the energy of a number of photons equal to the number of Avogadro N_A, being the energy of a photon $e = hc/\lambda$ it results that

$$E = N_A e = N_A hc/\lambda = 28{,}600/\lambda,$$

where E is in kilocalories and λ is given in nanometers (1 nm = 10^{-9} meters).

The part of the solar spectrum used for photosynthesis is therefore estimated to be around 570 nm

$$1E = 28{,}600/570 = 50 \text{ kcalories.}$$

The number 54 in the previous formula is the minimum number of E to obtain the photosynthesis of 6 moles of O_2 formed, therefore each mole of O_2 needs 9 E, i.e. 1 mole of O_2 needs

$$9x50 = 450 \text{ kcal (i.e. } 0.52335 \text{ kWh} = 1884.06 \text{ kJ).}$$

In theory, this is the minimum energy to transform 12 grams of carbon present in a CO_2 gram molecule (MW 44 amu) into biomass, it follows that the minimum energy required to obtain 1 g of C present in the biomass is

$$523.35/12 = 43.6 \text{ Wh/1g C}$$

The energy provided by 1 g of C in the combustion process is much less. In 2019, 11.5 10^{15} gC = 11.5 PgC (GTC) were released into the atmosphere, which provided an energy of 143967 TWh [fig. 4c] or 144 10^{15} Wh, for which each gram of Carbon provided an energy of 144/11.5 = 12.5 Wh/1g C

it therefore follows, always in theory, that the energy supplied in combustion by one gr of Carbon is

12.5 / 43.6 Wh = 28.7%

of that absorbed for photosynthesis.

But the yield of the photosynthesis process is much less than 28.7% compared to the light radiated by the sun, this is because in the first place, more than half of the incident sunlight is composed of wavelengths too long to be absorbed and part of the remainder is reflected or lost in the leaves. As a result, plants can only absorb about 34% of the incident sunlight at most.

Second, plants must carry out a variety of physiological processes in non-photosynthetic tissues such as roots and stems; these processes, as well as cellular respiration in all parts of the plant, consume stored energy [autotrophic respiration].

Third, the rates of photosynthesis in full sunlight sometimes exceed the needs of plants, resulting in the formation of excess sugars and starch. When this happens, the plant's regulatory mechanisms slow down the photosynthesis process, allowing the most absorbed sunlight to go unused.

Fourthly, in many plants, energy is used by the process of heterotrophic photorespiration, that is, of other living beings that feed on the plants.

Finally, the vegetative season can last only a few months a year; sunlight received during the other seasons is not used.

However, photosynthesis is the only fundamental natural mechanism for accumulating electromagnetic energy and transforming it into chemical energy, energy which is subsequently transformed by living organisms into mechanical energy with the production of CO_2. Without carbon dioxide, there is therefore no life and no oxygen.

Solar radiation and the presence of water and CO_2 in the atmosphere and the huge reserve of water in the oceans, seas and lakes and rivers, guarantee the creation of the climatic conditions necessary for life that we will examine in a subsequent paragraph.

c) Biomass.

[https://doi.org/10.1016/j.cub.2007.01.054]

The final product of photosynthesis is constituted by Biomass. Currently, the total terrestrial biomass has been estimated at 550 gigatonnes of Carbon (GtC), i.e. 550 PgC = 550 10^{15} gC, a measure that refers to the amount of carbon contained in the entire community of both plant and animal living beings.

The amount of CO_2 in the atmosphere transformed into biomass in a year is defined as GPP (Gross Primary Production) which in 2015 amounted to about 250 PgC.

But not all the electromagnetic energy transformed into chemical energy can be accumulated, in fact a part of it is used by plants for the growth process so that about 50% of the absorbed carbon of the atmosphere is returned to it as CO_2 through the process of autotrophic breathing.

The remaining 50% of the carbon absorbed constitutes NPP (Net Primary Production) (125 PgC in 2015 of which 60 PgC/y on land and 65 PgC/y in the oceans) is largely used by other living organisms such as for example animals through a process called heterotrophic respiration.

The remainder which is defined as NEP (Net Ecosystem Production) constitutes the part of the biomass that remains on the surface of the earth and which is destined to become a fossil source of energy in future millennia. By 2015, NEP had reduced to 5 PgC yr^{-1} on land and 11 PgC yr^{-1} in the oceans for a total of 16.5 PgC.

These values are of the same order of magnitude as those relating to the emission of CO_2 into the atmosphere due to anthropic activities (9 PgC yr^{-1} in 2015) strongly indicating that fossil fuels not only provide energy for human activities but are also necessary for the production of biomass essential to sustain life on our planet. It therefore follows that 896.4 PgC present in the atmosphere in the form of CO_2 are in equilibrium with 550 PgC present on earth in the form of Biomass.

Every year 250 PgC are taken from the atmosphere to be used in the reactions of photosynthesis but half of this carbon is returned to the atmosphere as CO_2 due to the autotrophic respiration processes of the plants that grow while 125 PgC remain in the land and in the oceans in almost equal percentages.

d) The climatic conditions.

As previously mentioned, climatic conditions, that is, temperature, humidity and the circulation of winds, are crucial for the photosynthesis reaction to be successful. The driving phenomenon in determining climatic conditions is undoubtedly the irradiation which is determined by many factors.

If we consider the earth as a perfect sphere of black color, that is, it absorbs all the incident radiation and we are in the absence of an atmosphere, then the solar radiation that reaches one square meter of the earth's surface will be a function of the angle that forms the perpendicular of the surface taken in consideration with the direction of propagation of the solar rays which are supposed to be of the same intensity and parallel to each other.

In general, according to the classical wave interpretation, the energy possessed by the electromagnetic field is attributable to the amplitude (precisely the square of the amplitude) of the wave that describes its propagation.

The Electric Field vector E which vibrates perpendicularly to the direction of propagation of light can therefore be expressed as the vector sum of two components, one of which lies on the plane parallel to the illuminated earth surface which determines the electromagnetic energy that causes heating and the other in the direction perpendicular to it.

It follows that if we consider a square meter of land at the intersection between the zero meridian and the equator at 12 o'clock on the day of the equinox, the light intensity is 1362W [https://www.mdpi.com/2072-4292/9/11/1143] intensity that varies if we consider a different meridian always moving along the equator that is as a function of longitude, as shown by the red curve in the following figure. The same argument can be repeated if on the same day and in the same hour and in the same minute we consider a square meter of land that is located at a higher or lower parallel with respect to the equator, that is, at a different latitude always maintaining the same longitude, the blue curve therefore represents the light intensity as a function of latitude and longitude.

Integrating for a whole day, that is, from sunrise to sunset, the blue curve represents the amount of radiation absorbed per 1 m^2 of land which must be divided by two if we want to mediate between day and night.

Regardless of the diffusion phenomena caused by humidity and other atmospheric gases, irradiation strictly depends on the alternation of day and night, the seasons and the latitude that characterizes the climatic zones.

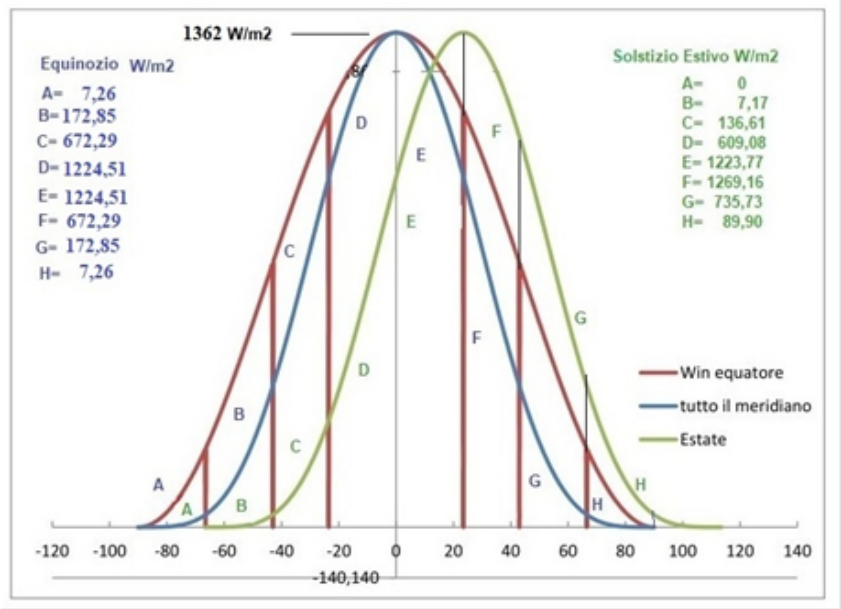


FIGURE 2

The letters represent the various climatic zones, that is, A and H are the zones of the Antarctic and Arctic polar circles respectively (from 66.55 ° to 90 °), the letters B and H are the first temperate zone (from 43 ° to 90 °). 66.55 °) the letters C and G are the second temperate zone, the one closest to the equator that is from (23.45 ° to 43 °) while the letters D and E are the tropical zones.

In the figure above, the red line represents the intensity of the radiation recorded on the same day and at the same instant along the equatorial line as a function of the angle between the direction of light propagation and the perpendicular of the surface under consideration. The blue line, on the other hand, represents the distribution over the entire terrestrial hemisphere of light that affects not only the equator but also the entire meridian on the same day and at the same time.

The green line instead represents the distribution observed in the same place and at the same time but on the day of the summer solstice in which it is clearly seen that the maximum irradiation (1362 W/m^2) occurs in correspondence with the tropic of cancer, which is 23,45 ° North, naturally in the case of the winter solstice the image would be symmetrical with the maximum shifted to the left of the figure, that is, on the tropic of capricorn. In this calculation, the effect due to the variation of the distance between the earth and the sun has been completely neglected.

Of course not all the energy calculated above in the previous graph reaches the earth's surface due to various phenomena, one of which is Rayleig scattering, i.e. an elastic diffusion interaction between the radiation and the molecules present in the atmosphere (it is the phenomenon that colors the sky blue) furthermore there is diffusion due to water vapor and clouds and finally, since the earth is not a black body, part of the incident radiation is reflected depending on the color of the surface and the intensity of the color itself.

It is evident, however, that the life processes in our planet are strongly dependent on seasonal variations deriving from the extent of solar radiation, but the arrangement and size of the land emerged in relation to the marine surfaces which make up 71% of the surface of the land and which determine the availability of water.

The different territorial conformations, the latitude and the different heat capacity of the land with respect to the surfaces of the oceans lead to strong differences in terrestrial warming that give rise to various convective motions of the atmosphere that determine the climatic conditions and the concentration of water in the atmosphere.

The heat accumulated during the day begins to disperse during the night through a process of radiative emission which, in analogy with solar emission, is called black body emission. The physical significance of this process, which is an ideal process, lies in the fact that the population of molecular energy levels, both electronic and vibrational and rotational, can occur not only through the absorption of electromagnetic radiation but also as a result of thermal energy transfers due to the transfer of kinetics energy through collisions between molecules, in practice, the population of these levels depends on the temperature of the environment in which these molecules are found and the form of the emission of

these molecules follows a theoretical law and is represented as the emission of a black body. (see figure below.)

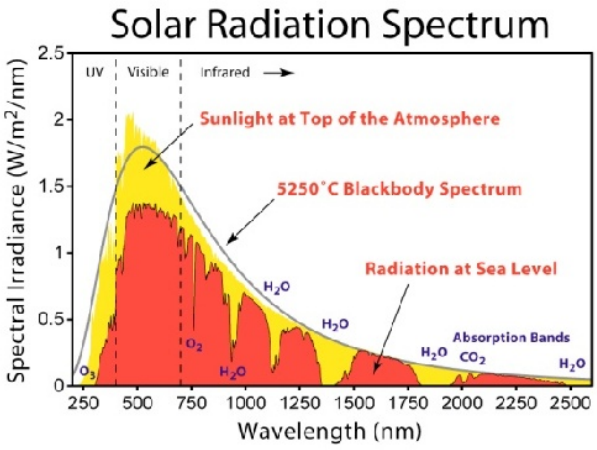


FIGURE 3

The emission of the sun follows this law quite faithfully and its temperature can be extrapolated from the shape of the curve, but a black body is classified as a body that emits all the energy it absorbs and the earth in which we live certainly cannot be classified as a black body for several reasons, the most important of which are: 1) Part of the light energy coming from the sun is transformed into chemical energy through the process of photosynthesis. 2) part of the energy is absorbed but part of it is reflected, just look at a photo of our planet taken by satellites orbiting the earth,

3) while in the black body we have a continuous distribution of electronic levels within the material such as, for example, a conductive metal at high temperatures (incandescent lamp), on the earth's surface we have crystals and molecules that have a discrete distribution of electronic levels due to the formation of chemical bonds and that therefore can emit radiatively only at certain frequencies.

Chapter 3- What is the Greenhouse effect?

The greenhouse effect includes all that series of phenomena that occur inside a greenhouse, that is a particular environment that is used for the cultivation of vegetables or even tree crops in the territories and in the seasons in which the solar radiation is not sufficient. to heat the atmosphere up to the temperature necessary to obtain photosynthesis.

The main characteristics of a greenhouse are two: the first is that it is a closed environment and therefore does not allow direct heat exchange with the outside through the convective motions of the air, the other is that it is made entirely of glass , that is, of a material that lets the visible light that comes from the sun through and that is partly reflected from the earth's surface, re-crossing the glass surfaces in the opposite direction to that of origin.

The energy related to the part of light that is absorbed is in turn used in part for photosynthesis and in part is transformed into thermal energy due to the non-radiative decays from the electronic levels excited at the moment of absorption.

The thermal energy accumulated inside the greenhouse can in turn cause the excitation of solids and molecules at vibrational and rotational levels at higher energy than the ground state with the emission of infrared radiation according to the law of emission of the black body by Stephen and Boltzmann, an emission which in turn is reflected by the glass walls of the greenhouse opaque to radiation of this wavelength.

This phenomenological model has been inappropriately applied to the study of the greenhouse effect in our planet with three fundamental gaps that affect its reliability and above all the predictions in future developments.

The first and most important gap in the evaluation of the energy balance between the energy absorbed by solar radiation and the energy diffused by radiation was that of neglecting photosynthesis, that is, completely disregarding the processes of storage and accumulation of chemical and biochemical energy. Assuming a state of ideal equilibrium located at the beginning of the industrial era, the evolutionary processes of the biosphere and the human species were not taken into account.

Atmospheric physicists have neglected chemistry and biology and have considered our planet on a par with all other planets in the universe.

The second shortcoming is that in all the models developed for the simulation of the effects generated by anthropogenic activity there is no reference to the processes of non-radiative decay from excited electronic, vibrational and rotational levels. [The undersigned has spent most of his professional life as a researcher experimentally measuring the life times of vibrational populations using time-resolved spectroscopic techniques that have demonstrated the importance of these mechanisms].

The third gap that makes the term "greenhouse effect" even inappropriate consists in not having adequately considered the fact that our planet is a closed but not isolated Thermodynamic System, that is, it is not a globe enclosed in a glass sphere like a greenhouse, but it can radiate electromagnetic energy to the outside through the black body mechanism through the vibrorotational transitions of the so-called greenhouse gases (CO_2 and H_2O) which are however in complete thermodynamic equilibrium with each other and with the other gases in the atmosphere and exchange thermal energy between them they emit radiation only from the upper layers of the atmosphere, that is when non-radiative decays are impossible.

The first works in this field, motivated by the observation of a progressive melting of the ice of the Arctic cap and of the terrestrial glaciers, (in part counterbalanced by an increase in the ice in Antarctica) and of the parallel expansion of desertification, focused on mainly on the determination of the energy imbalance (EEI = Earth Energetic Imbalance) measured at the limit of the atmosphere (TOA = Top Of Atmospheres) completely neglecting the presence of the Biosphere and its implications in the energy field.

Melting ice and desertification were related to the progressive increase, starting from the pre-industrial era, in the concentration of CO_2 which was indicated as the main cause of the increase in terrestrial temperatures.

The calculation programs developed were based on the following assumption: the energy balance of the earth system is preserved when the energy of the visible radiation absorbed by the atmosphere and the earth's surface (oceans + land) is equal to infrared energy radiated by the Earth System considered as a black body. Any imbalance observed at the upper limit of the atmosphere (TOA) was to be attributed exclusively to the presence of greenhouse gases (GHG = Green Haouse Gas) that is substantially CO_2 and H_2O which absorbed infrared radiation and re-emitted it in part also towards the earth's surface causing the rise in temperature. Since the purpose of the research was exclusively to demonstrate that the only responsible for climate change was the increase of CO_2, the role of H_2O in this energy balance was completely neglected, equally neglecting the energy absorbed by the biosphere and the energy produced in the combustion processes of fossil fuels in turn responsible for the emission of greenhouse gases.

The hypothesized mechanism was of this type: We start from a situation of perfect balance between absorbed energy and radiated energy, if we introduce a perturbation by adding CO_2 into the atmosphere, we intercept part of the infrared radiation emitted by the surface of the earth to reflect it back towards the surface itself. This means that instantly the radiation emitted at the top of the atmosphere decreases by the same amount as that intercepted. The system reacts to this perturbation through an increase in the temperature of the earth's surface (determined by the surplus of infrared energy received) and the consequent greater irradiation of infrared energy until it restores the equilibrium to the values prior to the perturbation. The final result of this operation is that the earth's surface is actually at a higher temperature but the amount of infrared emission at the top of the atmosphere does not change.

This type of simplified approach is challenged by the experimental data. The figures below show the results of the measurements made between 1985 and 2018 relating to the infrared emission (OLR) at top of the atmosphere, the concentration of CO_2 and the rise in temperature.

It can be clearly seen that during this period there was an increase of 2 W/m^2 in the OLR [Fig. 4a] (outgoing longwave radiation) [Remote Sensing Devitte 2018: https://www.mdpi.com/2072-4292/10/10/1539/htm] compared to an increase in CO_2 concentration of 70 ppmv [Fig. 4b] and about 0.7 g C [Fig. 4c] of temperature.

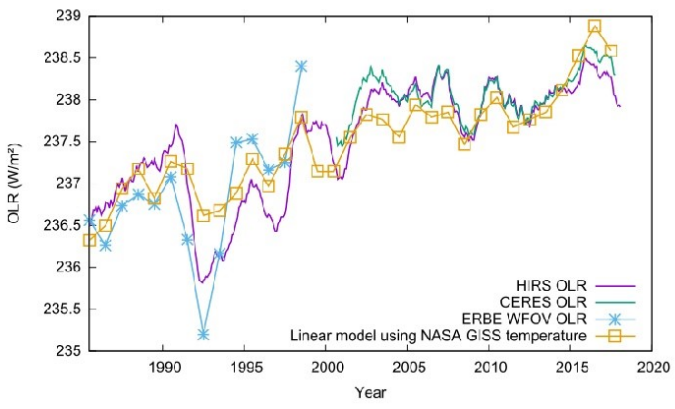


FIGURE 4a

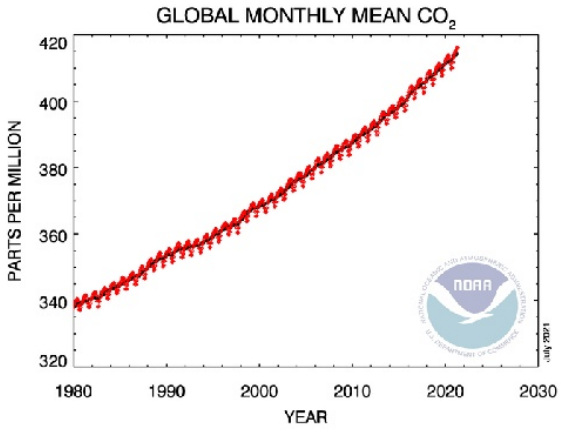


FIGURE 4b

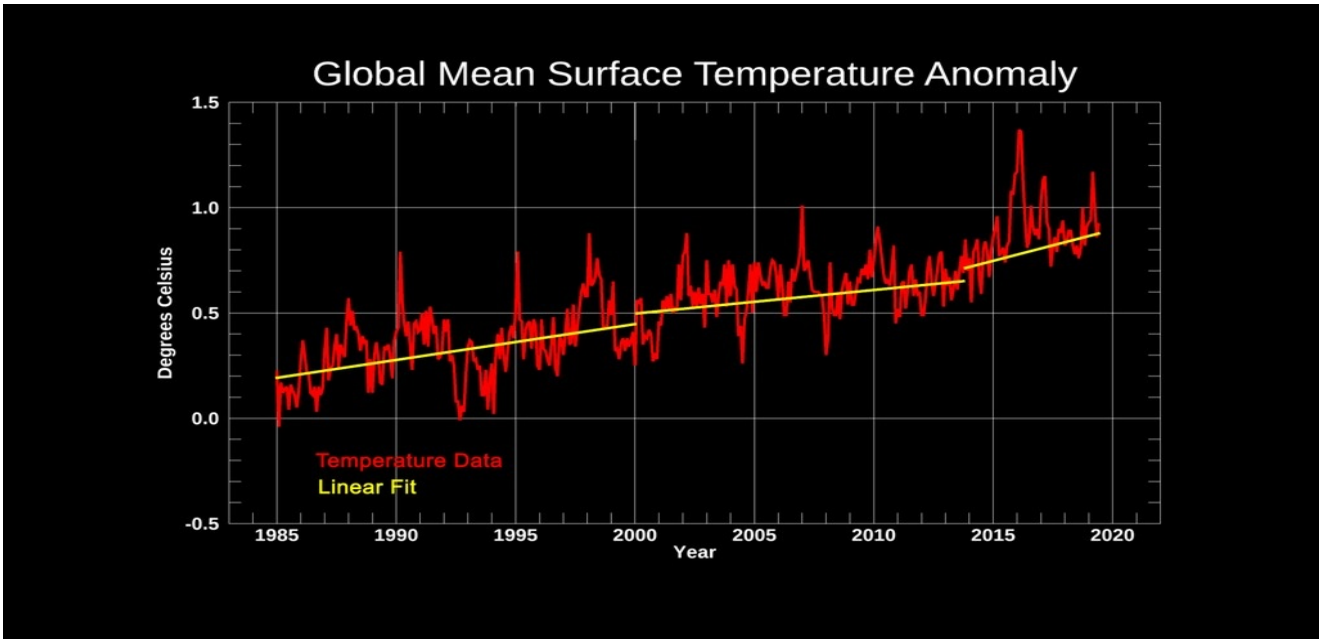


FIGURE 4c

The model adopted above is therefore completely inadequate to describe the causes and effects of global warming. A somewhat clumsy attempt was made to justify the unexpected and unjustifiable increase in the OLR recorded. [OLR enancement 2014: https://www.pnas.org/content/111/47/16700] The authors call into question a positive feedback, that is an amplification process in a system in equilibrium whereby a decrease in OLR causes an increase in the visible radiation absorbed also by aerosols and therefore an increase in temperature and evaporation of water which results in an increase in the OLR higher than the decrease that generated it.

This type of amplification is impossible in an equilibrium system where each action corresponds to an equal and opposite reaction. There are amplification effects in nature but these only occur in out-of-equilibrium systems such as in atomic explosions in which large quantities of radioactive isotopes are accumulated or in LASER amplification in which a population inversion is artificially created with a pumping system between the electronic levels of a molecule that allows the subsequent amplification of the laser radiation in a narrow range of frequencies at the expense of an enormous absorption of energy at other frequencies.

In reality, the evaporation process is an endothermic process that attenuates the heating due to CO_2 and the additional water vapor that is partially distributed even in the upper layers of the atmosphere increases the effects of radiation in space at high altitudes and above all screens, through the clouds, solar radiation both in the infrared and in the visible up to causing recondensation and aqueous precipitations.

In order to account for the experimental evidence it is necessary to take into consideration the chemical-physical characteristics of the two molecules (CO_2 and H_2O) which are considered to be the protagonists of the so-called greenhouse effect.

The CO_2 molecule, which exists in nature only in the gaseous phase is the basis of the Biosphere and participates in all vital processes on earth, from the formation of organic molecules to respiration through the production of Oxygen, has a molecular weight of 44 amu and has an atmospheric concentration of 410 ppm (0.0407% vol) [285 ppm in pre-industrial era]. The CO_2 molecule, except for the ozone molecule O_3 which is however quite rare in the troposphere, has the highest molecular weight of the other atmospheric gases and therefore in absence of perturbations due to the force of gravity, occupies the region closest to the earth's surface. while the water molecule (mw 18 amu) has the possibility of populating the highest layers of the troposphere and acts, with its changes of state, to thermostate the planet.

Both molecules have contiguous absorption bands in the infrared spectrum zone characteristic of black body emissions between 286K and 213K which are the average temperatures of the earth's surface

and of the tropopause, however they have a different behavior determined precisely by their different molecular weight.

They are excited at vibrorotational levels higher than the ground state by the electromagnetic energy emitted by the black body but they decay immediately through non-radiative processes, that is through collisions with other molecules of Nitrogen, Oxygen and also of CO_2 or H_2O. The absorbed energy is transformed into thermal energy, that is, kinetic energy that determines the temperature of the atmosphere. As we move away from the earth's surface, the atmosphere begins to thin out, so that collisions between the gas molecules become less likely, it is at this point that the processes of radiative emission begin to be competitive, until they become preponderant and exclusive. The radiation therefore originates from the upper area of the troposphere where the concentration of CO_2 is practically zero and is attributable almost exclusively to the H_2O molecules. The strong temperature variations between day and night that are observed in the Sahara desert or in the starry autumn or winter nights in temperate zones are due to this process of irradiation that cause the formation of dew or frost mists (thermal inversion).

A research by Koll and Cronin [Earth's outgoing longwave radiation linear due to H_2O greenhouse effect Daniel DB Koll and Timothy W. Cronin : https://www.pnas.org/content/115/41/10293] arrived at similar conclusions in identifying the preponderant function of water in infrared radiation processes. infrared emission (OLR) from the various areas of the earth's surface as a function of the temperatures recorded in them.

Since, according to the current theory, these emissions are due to the black body radiation, a variation of intensity that depends on the fourth power of the absolute temperature should have been found, as specified by the Stephen-Boltzman law. In reality, a linear trend was found between the temperatures of 200 and 320 K which was interpreted as due to the presence in the atmosphere of water vapor which is a condensable gas (which acts as an attenuator) and that this trend is independent of the CO_2 concentration.

The change in OLR with temperature is expressed by the following linear regression

$$OLR\ (\Delta T) = OLR_0 + (dOLT/dT) \times \Delta T \quad (1)$$

In which OLR_0 and (dOLT/dT) are the parameters of the regression with respect to the global surface temperature In which the derivative dOLT/dT = 2.93 W/m^2K. If the earth were a black body we would have dOLT/dT = 3.3 W/m^2K.

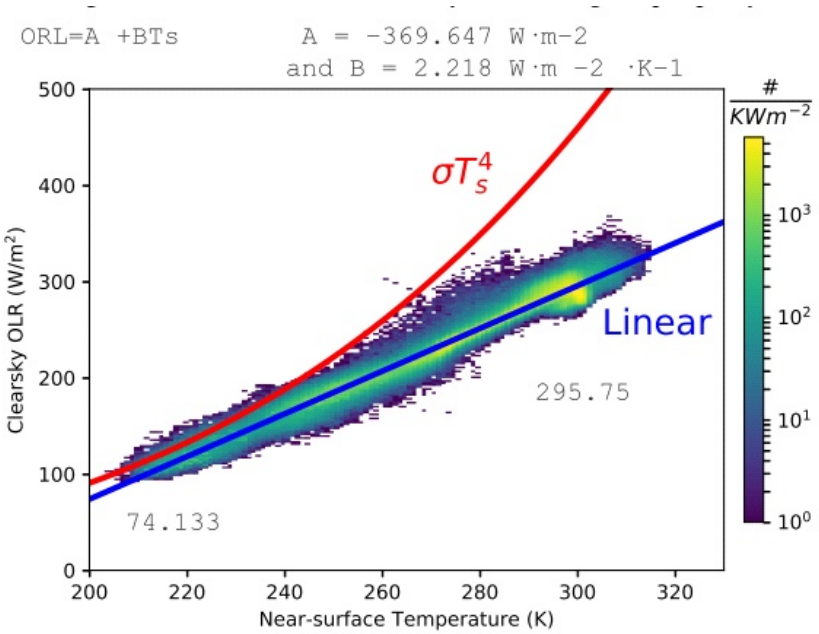


FIGURE 5

Koll and Cronin calculated the contribution of the two components of the greenhouse effect that make the coefficient B (evaluated at 2.218 W/m^2 K in clear and vapor-free sky conditions) and that make the OLR trend linear for over 60 K of thermal excursion noting that the concentration of CO2 has practically no effect in determining B as a function of T.

A further confirmation of the mechanism proposed above comes from the analysis of the infrared radiative emission spectra recorded at the peak of the atmosphere.

Figure 6 below shows the infrared absorption spectrum of CO_2 and H_2O present in the atmosphere relating to low-frequency roto-vibrational vibrations obtained from the site [Introduction | Atmospheric Infrared Spectrum Atlas - EODG]

On the left [Fig.6a] is shown the absorption spectrum of water (blue) and black CO_2 in the concentration similar to that observed in the atmosphere, on the right [Fig.6b] shown the amplified spectrum in which the maximum optical thictness is 1 that is beyond this value there is no transmission of light. The absorption spectrum of an isolated molecule has a very narrow shape which is called the Lorentzian shape, if the molecule is surrounded by many other molecules of the same or different type, the absorption band widens considerably due to the anharmonic interactions that modulate the vibrational levels of the molecules that interact and assume a Gaussian form, this is what is observed in the spectrum on the right shown below. Furthermore, we are in conditions of saturation, since all the infrared radiation in that area is all absorbed and an increase in the concentration of CO_2 cannot lead to greater absorption.

Carbon dioxide (black spectrum) represents a very small part of the molecules present in the atmosphere, ie 0.042% [in the pre-industrial era it was 0.028%] and is found, as mentioned, mainly in the lower layers of the atmosphere. Despite this, as can be seen in the following fig. 7, it absorbs all the radiation emitted by the earth's surface in the infrared spectrum area between about 600 and 800 cm^{-1}, i.e. in the zone centered approximately around 667 cm^{-1} which is the zone of absorption of the bending vibration of the CO_2 molecule.

In [Fig.7] we see that the infrared emission spectrum from the earth's surface is composed of two parts, a first part is the emission spectrum of the gases found below the tropopause which behave as a single black-body at a temperature of 213 degrees Kelvin, the second part is given by the emission spectrum of the surface which is at 286 degrees Kelvin, in this part the absorption of water gives rise to the jagged spectrum that can be seen. In the zone around 667 cm^{-1} which is the characteristic zone of the CO_2 absorption band there is no further infrared emission than that of the black body at 213 K, indicating that there is complete absorption by this molecule. The only small emission is found in the thin band observed at 667 cm-1 which corresponds to the frequency of the CO_2 bending band.

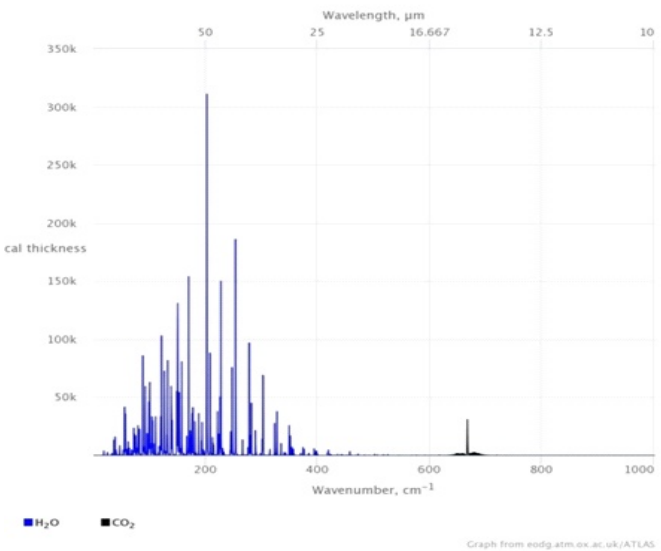


FIGURE 6a

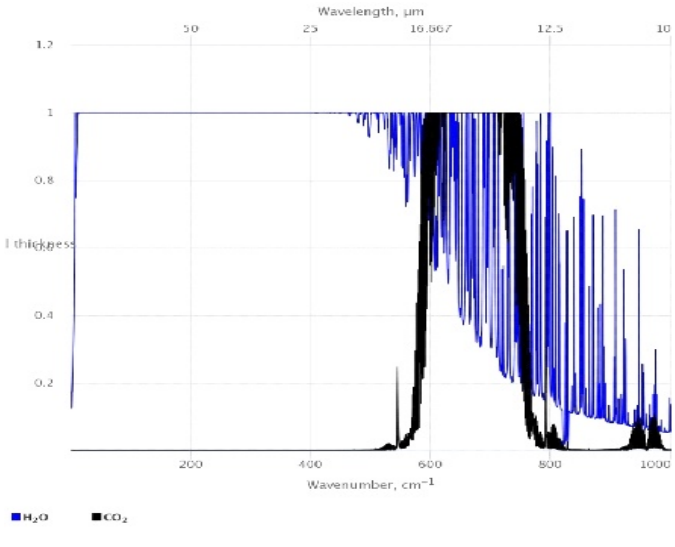
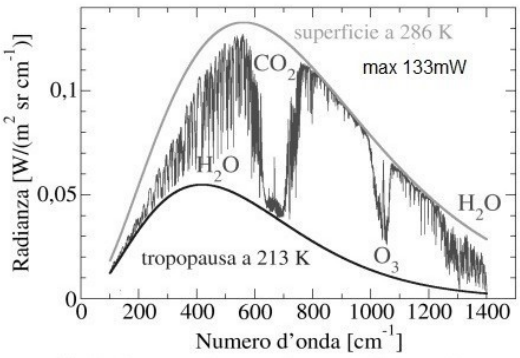


FIGURE 6b



Emissione al vertice dell'atmosfera spettralmente risolta (atmosfera standard, medie latitudini).

FIGURE 7

Carbon dioxide therefore does not alter the efficiency of the infrared radiative emission from the earth's surface, which occurs through the molecules of water, and it follows that an increase in its concentration in the atmosphere does not in itself cause an increase in temperature. global. What can happen instead is a different distribution on the earth's surface of the non-radiative decay processes with the consequent variation of the convective and translational motions of enormous masses of atmospheric gas and the related perturbations causing what are currently defined as "climate changes".

The following video [Fig.8] published by NASA Goddard in 2014 is extremely significant by the way, it shows how CO_2 is distributed by atmospheric perturbations over the entire earth's surface, it is noted that the greatest concentration is observed in the northern hemisphere where there is the largest surface area made up of land and the largest population and that this concentration is drastically decreased in the Spring-Summer period due to photosynthesis, demonstrating that a decrease in CO_2 can compromise the growth of the biomass necessary to feed an ever-expanding world population.

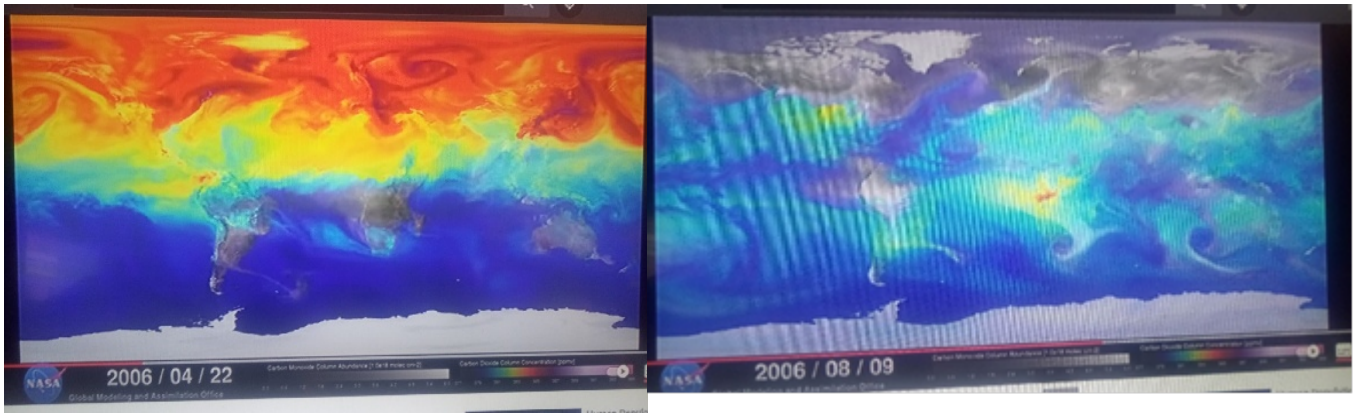


FIGURE 8

Video: https://www.youtube.com/watch?v=x1SgmFa0r04

Chapter 4- Integrated Global Report.

Let us now summarize the experimental data acquired on our planet earth which are essentially divided into three chapters

a) Balance of radiative fluxes at the edge of the troposphere. Energy Balance (ERB) Earth Radiation Badget.

As already mentioned above, the radiative energy balance was the subject of the first experimental investigations to measure the extent of the greenhouse effect and its correlation with the concentration of CO_2 in the air.

The instrument initially used was a bolometer with a small entrance hole that was placed at the apex of the TOA (Top of Atmosphere) atmosphere and measured the incident radiation from the sun TSI (Total Solar Irradiance). This instrument, with a wider entrance hole, was turned towards the earth in order to record the total radiation coming from it which is composed of the light reflected in the visible field, RSF (Refected Solar Flux = albedo) plus the infrared radiation emitted by the land surface OLR (Outgoing Longwave Radiation). The two components were separated by introducing a filter that only let visible light pass and cut the infrared.

The problems of this type of measurements, in addition to the instrumental ones of sensitivity, calibration and stability, were mainly linked to the determination of the light incident on the various areas of the earth's surface due to the reflection due to clouds and other atmospheric phenomena. For this reason, these measurements were subsequently integrated with surveys carried out with scanning instruments that photographed the earth's surface and with thermal measurements carried out in the oceans.

The synthesis of this type of measurement was carried out by S. Dewitte in a publication of 7 November 2017 [Remote Sensing Devitte Review 2017: https://www.mdpi.com/2072-4292/9/11/1143]

The value of TSI = 1362 W/m^2

This value has been divided by 4 (which is the ratio between the surface of the circle that projects solar radiation on the earth and the surface of the earth itself)

The albedo value (RSF) is 101.6 W/m^2

The OLR value is 238 W/m^2

From which we deduce that the radiative forcing at TOA is 1362/4 -238 - 101.6 = 0.9 W/m^2.

That is, this is the energy imbalance that, according to these studies, causes the earth to overheat and therefore climate change. This OLR(T) imbalance is correlated with the temperature by the relationship $dOLR(T)/dT = 2.93$ W/m^2 K in reality this imbalance also includes the part of energy used for the formation of the Biomass.

b) Balance of annual carbon redistribution in the atmosphere and in the biosphere. [Global Carbon Budget 2020].

[https://essd.copernicus.org/articles/12/3269/2020/]

For a correct correlation between the imbalance of energy flows at the top of the atmosphere, the increase in temperature and the concentration of CO_2 in the atmosphere, an assessment was made of the emission of CO_2 due to human activity and its distribution in the globe.

The emissions from fossil sources (EFOS) were taken into consideration with and without considering the emissions due to the production of cement which involve an initial emission and

subsequent reabsorption, furthermore the emissions due to the change in land use were considered and to deforestation (ELUC = land-use change), these anthropogenic emissions are counterbalanced by an increase in gas in the atmosphere (GATM) an absorption by the earth's surface (SLAND = Sink Land) and by the ocean (SOCEAN) the observed imbalance (BIM = Budget Imbalance) was attributed to an incorrect evaluation of the quantities involved.

The growth rate of CO_2, calculated on average over three consecutive decades (1985-1995, 1995-2005 and 2005-2015), went from 1.42 ppm/year to 1.86 ppm/year and 2.06 ppm /year (tot. = 53.4 ppm). CO_2 levels today are 48% higher than the pre-industrial level. In the last decade, about 45% of CO_2 has remained in the atmosphere, 22% was absorbed by the ocean and 30% by land, 3% is not attributed.

From these data it can be seen that the new CO_2 introduced due to anthropogenic activities is roughly divided into two parts, i.e. 47% remains in the atmosphere while 48% is absorbed by the oceans and the earth's surface, these percentages are roughly equal to those found for the biomass balance, demonstrating that the C introduced is an integral part of the biomass balance that is the mechanism that generates and sustains life in our planet.

c) Balance of energy content and distribution.

Admitting an energy imbalance of 0.9W/m ^{2} at the TOA, being the surface of the earth equal to 5.101 10^{14} m^2 and there being 31.536 10^6 sec in one year. We will have that in one year the accumulation of surplus energy is 144.779 10^{20} j = 4.0216 10^{18} Wh = 4.0216 10^6 TWh = 4021.6 PWh/y.

In 2015 the total production from photosynthesis is 250 PgC of which 125 PgC turned into Biomass while 125 PgC returned to the atmosphere due to autotropic respiration. And 125 PgC (65 on land and 60 in ocean) made up the NPP that is the net primary production. In the previous chapter dedicated to photosynthesis we saw that the minimum energy required to obtain 1 g of C present in the biomass is 43.6 Wh. However, part of this energy necessary for photosynthesis is largely returned to the environment in fact the energy content of 1g of C is lower and it can be calculated by dividing the energy introduced by fossil fuels (in 2019) which is 143.967 PWh (fig .4c) (which represents 3.58% of the energy imbalance) for the weight of the carbon introduced which is 11.5 PgC. From which it can be deduced that the energy content of 1 g C = 12.5 Wh.

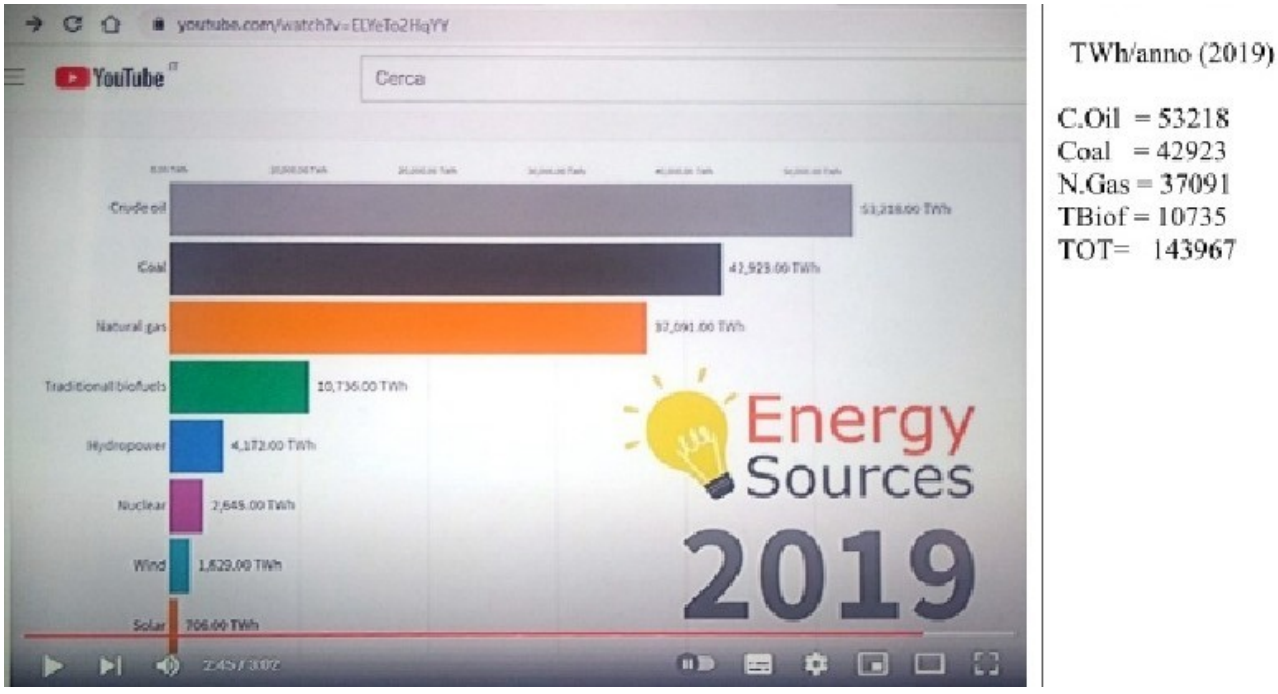


FIGURE 9

video: https://www.youtube.com/watch?v=ELYeTo2HqYY

It follows that the energy captured for the production of biomass is given by the product of 125 PgC per 12.5 Wh of each gram of carbon therefore it is 1563 PWh/y but the energy necessary for the photosynthesis reaction to take place is 125 PgC per 43.6 Wh = 5450 PWh/y which is the energy needed to overcome the activation energy of the various photochemical reactions. These numbers, although necessarily approximate, show that about 38.9% of the imbalance at the TOA is transformed into biomass but that the rest of the energy is needed (at least in large part) to create the conditions necessary for photosynthesis.

This energy imbalance to the TOA was implicitly and erroneously attributed to anthropic activity and determined by the presence of CO_2 indicated as the cause of terrestrial warming in reality it plays a fundamental role in photosynthesis and in maintaining life on our planet.

Chapter 5-What is the cause of terrestrial warming?

At this point, then it is legitimate to ask: What is the cause of the earth's warming? And why was a correlation found between the increase in the earth's temperature and the concentration of CO_2 in the atmosphere?

The slight increase in temperatures observed at a planetary level in the last two centuries is therefore not due to the increase in the concentration of CO_2 which was able to totally absorb the radiative emissions of the terrestrial surfaces in the zone between 550 and 800 cm^{-1} already in the pre-industrial era but it is simply due to the fact that energy consumption has increased dramatically, and therefore heating, in our planet mainly due to two main reasons, namely the enormous increase in the world population which has gone from about one billion in the pre-industrial era to nearly eight billion in the current era and above all the enormous change in our standard of living accompanied by a significant lengthening of life expectancy.

We use the heat derived from fossil sources to power our factories, build our homes, work our fields, for our farms, for our means of transport, to heat our homes in winter and cool them in summer. All this inevitably involves global warming that is independent of the type of energy source we refer to.

The increase in the concentration of CO_2 in the atmosphere is therefore not the cause of terrestrial warming but is only an index of the production of energy obtained from fossil sources which are currently the predominant form of energy.

The so-called energy transition therefore requires an in-depth examination and a careful evaluation of the pros and cons of the measures that are intended to be taken to keep the earth's temperature rise within 1.5 ° C from the beginning of the industrial era.

The decarbonisation of the atmosphere with the ambiguous definition of "zero emissions" entails the high risk in the medium and long term of removing raw material from the process of chlorophyll photosynthesis which is essential for maintaining life on our planet.

Nature has shown us that the path of photosynthesis is the most suitable for conserving our planet, and our task is **to favor this process and to increase the reforestation of our lands**.

The utopia of an unlimited source, at no cost, to fuel infinite economic growth is completely misleading and devastating and will ultimately exacerbate the climate problems we are currently facing.

The so-called use of renewable energies that will allow us unlimited growth is a pure illusion, in fact the use of any type of energy will involve the intake of heat that will be used as it is or transformed into work with the need to dissipate residual heat. which will be carried out through radiative processes due to water molecules in the upper states of the atmosphere. CO_2 is like the mercury in old thermometers that measures the heat absorbed by the body, and therefore the temperature, but it is not the cause of the increase in temperature.

Using other types of energy sources will decrease the release of other CO_2 into the atmosphere but not the amount of heat that will be accumulated in our planet, and which will be dissipated by radiative processes that will re-establish equilibrium at a necessarily higher temperature or transformed into chemical energy through photosynthesis.

The energy of fission nuclear power plants and even fusion power plants will be transformed into heat in the cooling processes of the plants themselves.

Even the photoelectric cells used in the photovoltaic system, which are notoriously black in color, lead to an increase in the absorption of solar radiation in the solar fields which are destined to partially replace the meadows, forests and crops of our countryside.

Chapter 6- Photovoltaic Energy.

In the previous figure we have seen that in 2019 the energy derived from fossil sources was 144 PWh while the carbon introduced was 11.5 PgC for which each gram of Carbon provided an energy of

144/11.5 = 13.878 Wh i.e. 12.52 Wh/gC.

Let's try to see what happens if this energy were to be supplied by photovoltaic systems: a photovoltaic system has a yield that depends on many factors, on average a 3kW peak polycrystalline system occupies an area of 20 m^2 and has an annual energy production that it depends on the orientation and geographical position, which in Italy is on average 3.5 MWh. That is, 100m^2 produce 17.5 MWh per year, therefore each square meter annually produces 175 KWh which, dividing by the total number of hours in a year, corresponds to 19.977 watts in 1 hour = 20Wh.

Since an hour consists of 3600 seconds, it follows that of all the energy incident in a m^2 of solar panels (340.5 W/m^2) only 5.55mW are converted into electricity

So 1 m^2 of photovoltaic panels produce 20 Watts in one hour and 175KWh in 1 year. If we divide by the energy content of 1 gr of C (12.52Wh) we have that 1 m^2 of panels in a year is equivalent to 13978gr = 13.978 Kg of C.

To fully compensate for fossil energy in a year EFOS = 9.6 PgC, an area covered with solar panels of 822.7x10^3 Km^2 would be needed (i.e. 9% of the surface of the Sahara desert which is 9000x$10^3$$Km^2$)

If we consider the electricity supplied to the meter, we have that the energy yield is even lower than the previously found 12.5 Wh/gC and stands at 10.4Wh/gC.

[http://kilowattene.enea.it/KiloWattene-CO2-energia-primaria.html]

From an energy-only aspect, photovoltaics are much more efficient than photosynthesis. In fact, the following table shows the energy productivity of some crops in different areas of the earth's surface.

Rapporto 2020 Produzione annua Carbonio in GtC (1 PgC =1 10^{15} gC = 3,667 10^{15} PgCO2)

	Periodo 2010-2019	Anno 2019	
EFOS	9.6 GtC yr^{-1} (9.4 GtC yr^{-1})*	9.9 GtC yr^{-1} (9.7 GtC yr^{-1})*	
ELUC	1.6 GtC yr^{-1}	1.8 GtC yr^{-1}	
Tot Out	11.2 GtC yr^{-1}	11.5 GtC yr^{-1}	
GATM	5.1 GtC yr^{-1} (45.5%) (2.4 ppm yr^{-1})	5.4 GtC yr^{-1} (46.9%) (2.5 ppm yr^{-1})**	
SOCEAN	2.5 GtC yr^{-1} (22.3%)	2.6 GtC yr^{-1} (22.6%)	
SLAND	3.0 GtC yr^{-1} (30,4%)	3.1 GtC yr^{-1} (26.9%)	
BIM	−0.1 GtC yr^{-1}	−0.3 GtC yr^{-1}	

(* considerando la ricarbonatazione del cemento)
(** 1 ppm =5.4/2.5=2.16 GtC; carbonio totale in atmosfera = 415ppm x 21.6GtC = 896.4 GtC)

As regards the Italian territory, from a poplar biomass plant, with specific clones, with a two-year cycle, on fertile and duly irrigated soil, a maximum production of 600 quintals of wet wood mass per hectare is obtained, equal to a production of 300 quintals/year per hectare of biomass which are reduced to about 100 quintals/year of dry matter per hectare, that is 1kg/m^2.

Since the heating power of 1kg of wood is 17 MJ it follows that this cultivation produces 17 10^6j/3600 sec. = 4,722 kWh/m^2 while 1m^2 of photovoltaics in Italy produces 175kWh/m^2 (630Mj) in a year, that is 37 times higher.

However, the most important problem remains that of the storage of this energy which naturally depends on the insolation of the photoelectric cells which in turn varies with the day-night cycle, with latitude and with the seasons.

Furthermore, in order to carry out the photovoltaic conversion it is necessary to produce and install these photocells which obviously involves an energy consumption, recently it has been calculated that the TRE, i.e. the energy return time or the time to recover the energy spent in construction and installation varies from 1.5 to 4.4 years this means that if we were able to produce and install these panels immediately without giving up the current standard of living, we would have to double the consumption of fossil fuels for the same amount of time.

But this huge conversion is not only reduced to an energy balance but it heavily and irreversibly disrupts our ecosystem due to the mining excavations to find the materials necessary for construction and above all for the storage of the electricity produced.

Chap.7-Conclusions: Energy Transition or Economic Transition?

Summarizing and synthesizing the above, we can state that:

1) The CO_2 molecules present in the atmosphere completely absorb the infrared radiation emitted by the earth's surface in the area between 550 and 750 cm^{-1} and therefore a further increase in CO_2 concentration does not involve any further increase in absorbed energy.

2) The energy absorbed by the CO_2 and H_2O molecules found in the lower layers of the atmosphere is immediately transformed into thermal energy through the non-radiative decay processes and distributed to the other molecules that make up the atmosphere, i.e. mainly Nitrogen and Oxygen that come into thermal equilibrium with the molecules of CO_2 and H_2O.

3) The radiative emission observed at the limit of the tropopause consists of the black body emission at a temperature of 213 K plus the radiative emission of water molecules at a temperature of 286 K which is the average temperature of the earth's surface. This emission is due to the fact that the H_2O molecules, being the lightest, can reach the highest layers of the atmosphere where, being the rarefaction much greater, the radiative emission processes compete with the non-radiative decay processes.

4) The observed correlation between the increase in CO_2 concentration, the increase in black body emission (OLR (Outgoing Longwave Radiation $2W/m^2$)) and the increase in the earth's temperature (0.7 °C) that has been interpreted as direct evidence of the responsibility of carbon dioxide in determining climate change is simply due to the fact that the growth of CO_2 is an indication of the enormous increase in energy that took place in the 20th century derived substantially from fossil deposits and not the cause of global warming.

5) The presence of CO_2 in the atmosphere is not only not harmful but it is necessary to maintain life on our planet and that through photosynthesis can be transformed into chemical energy to be used immediately to meet the needs of an ever-increasing population or to store for future generations.

The problem of global warming therefore takes on a very different aspect: it is not a question of seeking alternative forms of energy (clean energy, i.e. without CO_2) with the illusion of being able to continue this unbridled race to increase GDP through consumerism and the exploitation of resources but in becoming aware that a sparing use of the goods that nature makes available to us is necessary.

The industrial revolution that began at the end of the 18th century has radically changed the way in which the goods necessary for the survival and development of the human species are produced. The individual farmer or craftsman who provided alone the family needs of sustenance and production of movable and immovable property, was replaced by an organized structure where individuals enormously increased their production capacities in an assembly line in which, with the help of machinery, each dedicated themselves to a single detail of a complex object.

Steam engines, internal combustion engines and electric motors replaced the muscle energy of humans and animals. The living conditions of the inhabitants of industrialized countries improved considerably but in order to sustain such a rapid and ever more extensive development it was necessary to resort to the exploitation of fossil fuels such as coal, oil and natural gas.

Unfortunately, an industrial society born with the intention of satisfying the needs and requirements of the population has been replaced by a consumer society in which the production of falsely innovative and not strictly necessary goods is increased by dramatically increasing the exploitation of raw materials with pollution problems, waste disposal and impoverishment of the least developed countries.

This degeneration of industrial society induced and ridden by an archaic capitalism aimed exclusively at the growth of profit at the expense of an organic and harmonious development of our

planet and its inhabitants has inevitably caused the birth and growth of environmental movements that have posed the problem environmental sustainability of indiscriminate economic growth models both locally and globally.

Finally it has been realized that a generalized growth in consumption does not correspond to an individual and collective development of the population and the environment that surrounds it but on the contrary impoverishes our planet with the consequent and imaginable destruction of our species and life on the planet we live on.

Even the very meaning of the word Economy has changed and has passed from the original "organization of the use of scarce resources (limited or finite) implemented in order to best satisfy individual or collective needs (formal meaning)" to the "system of the economy market to achieve maximum profit, increasing individual productivity and decreasing the cost of labor through the technological development of machinery capable of dramatically enhancing the speed of exploitation of raw materials and energy of nature including the populations of poor countries.

A perverse mechanism has been established in Western society in which in order to continue to increase profit it has been necessary to proceed with the promotion of consumption by creating false needs or even through the industrial practice of Programmed Obsolescence which is a real criminal act against nature.

Perhaps the time has come to abandon old taboos and start a new model of Sustainable Development through an Economic Transition and an industrial policy that, with the same value and performance of the product puts energy saving in the foreground by adopting some simple and immediate practices that can be adopted in a very short time and which are summarized below.

1) Adapt the production chain in order to highlight not the productivity of the workforce but environmental sustainability in terms of energy consumption and the use and regeneration of raw materials.

2) Design and innovate products in order to significantly extend their average life, thus allowing to amortize the environmental impact linked to their production in a greater number of years through the use of more durable materials and a modular construction structure with standardized elements in order to facilitate the finding and replacement of worn parts.

3) Adopt a consumption policy with zero kilometer products in order to avoid industrial relocations and food imports pursued for the sole purpose of increasing profits without taking into account the environmental impact generated in the countries of production.

4) Promote and pursue the goal of food and industrial autonomy in order to achieve the goal of economic and financial independence in relation to multinationals and investor cartels.

5) Promote literacy and industrialization in third and fourth world countries in order to discourage the phenomenon of migration by offering job and development opportunities in vast areas of the planet relegated to mere containers of raw materials and labor .

6) Proceed with the care of the territory and reforestation in order to convert the CO_2 produced in the combustion of fossil energy sources into chemical energy destined to feed a world population in continuous growth and to satisfy their primary needs.

7) Pursue the goal of a planet in thermal equilibrium, with zero waste and with a dignified and non-destructive standard of living.