The increase of carbon dioxide in the atmosphere and its possible negative effects on the biosphere and mankind

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Abstract

Some scientists of “Anthropogenic Global Warming” (AGW), such as M. T. Boy Koff, A. M. McCright et al., claim that the increase in atmosphere of greenhouse gas carbon dioxide (CO$_2$) coming from anthropogenic burning fossil fuels will cause a rising of air temperature that, in a few decades, will create severe uncountable problems for mankind and the biosphere. On the contrary, other scientists who support the thesis of “Not Anthropogenic Global Warming” (NAGW), the so-called “skeptics”, such as L. Weinstain, N. Scafetta et al., affirm that the increase of CO$_2$ coming from the various human activities will not be able to increase air temperature in the atmosphere in such a way as to cause dangerous consequences for the biosphere. For “skeptics” the rising of temperature in the atmosphere is caused mainly by a natural mechanism of the planetary system and other natural causes not strictly connected with anthropogenic activities. Moreover, they rely on theories based on the thermodynamic and physical-chemical equilibrium on the Earth’s atmosphere and based on the variation of both CO$_2$ concentration and air temperatures down the ages. The aim of this paper is to demonstrate that both AGW and “skeptics” scientists, when analyzing the different problems caused to mankind and the biosphere were referring to only one of the two sides of the same medal. Based on this concept, the paper investigates:

- the changes on the increase of CO$_2$ in the Earth’s atmosphere both in a human and in a geological scale of time;
- the most convincing theories that justify the “skeptics” statements;
- the negative effects of rising CO$_2$ concentration in the human scale of time.

Keywords: global warming, greenhouse gas, skeptics.
1 The debate over AGWT

As is well known, CO$_2$, NO$_2$ and CH$_4$ coming from human emissions into the atmosphere [1, 2] (figure 1), according to the “Anthropogenic Global Warming Theory” (AGWT), have caused more than 90% of “Global Warming” (GW) since 1900 and almost 100% since 1970, resulting in a raising of atmosphere temperature of about 0.8°C (figure 2). This rise is due to “radiative forcing” as defined by IPCC [3].

![Figure 1: Radiative forcing [3].](image)

![Figure 2: Increase of atmosphere temperature [3].](image)

The AGWT theories [4, 5] have been the foundations for the most intervention recommended by the “Intergovernmental Panel on Climate Change” (IPCC), the leading organization for assessment of climate change instituted by the “United Nations Environmental Program”, and by “World Meteorological Organization”. Essentially, AGW scientists assert that maintaining the current trend of anthropogenic emissions into the atmosphere, especially CO$_2$, will result in the raising in a global surface temperature (shown in figure 3), which also shows the observations of Scafetta [6] about the failure in predicted scenarios.
Figure 3: Rise in global surface temperature.

The raising varies in function of the adopted model. A first Report of IPCC came to the conclusion that a doubling of anthropogenic CO₂ in the atmosphere could increase the average global temperature by 2.5 °C to 4.5°C which could alter the fluid dynamic and thermodynamic of the Earth, threatening the natural equilibrium of the Earth. The result of the AGW theory can be seen in the so-called “Hockey Stick” effect (figure 4).

Figure 4: “Hockey Stick” graph (from the IPCC Third Assessment Report) [3].

However, the AGW models contrast with the thesis of significant number of international scientists, the so called “skeptics” [6, 7], which discuss the several thermodynamic and fluid dynamic parameters that are not included in the climate models used by AGW scientists. The “skeptics” affirm that climate issue should be analysed more carefully to avoid incorrect environmental policies which could lead to extensive damage.
2 Analysis of the elements influencing the debate

The environmental balance of our Planet depends on multiplicity of parameters all of them directly or indirectly interrelated. For this reason first of all it is necessary to consider all the phenomena related to the increase of atmospheric temperatures and to try to answer the following essential questions:

- Which has been the trend of atmospheric temperature of our Planet starting from geologic ages to present time?
- How much CO₂, in all its chemical forms, the Earth contains and which are the exchange of CO₂ among the various holders in our Planet?
- How many starting hypothesis about AGW have been modified day to day and how the models adopted are reliable with reference to “Radiative Forcing” (RF)?
- Is the “greenhouse” effect in Earth’s atmosphere actually taken in place?
- Which are the real radiative exchanging between the Sun and the Earth and between ground and atmosphere? Are the exchanges stable along time or variable in function of planetary parameters?
- What has produced the variation on time of some of main indicators of Earth (glaziers, oceans, lakes etc.)?
- Which objections of “skeptics Scientists” are based on grounded scientific foundations?

The response to these questions is the right way to resolve accurately the debate avoiding emotional, political, or business pressure. It is impossible to complete the discussion in this short paper but the global temperature and CO₂ variations are the main elements that influence the various parameters as shown below.

3 Temperatures trend with time

Figure 5 [8] shows the variation of mean global temperatures in the last 2000 years. The Earth had various consecutive periods of cooling and warming during the course of centuries. The diagram, however, pertains to indirect measurement of temperatures and for this reason susceptible to criticisms and different interpretations. It is certainly not prone to misinterpretations the trend of temperature shown in Figures 6a) and 6b) [9] as the diagrams has been achieved by measurements at 280 meteorological stations and satellite temperatures between the years 1979 and 2011.
Figure 5: Temperature averages in the last 2000 years.

Both diagrams show a similar fluctuating trend of consecutive cooling and warming periods, that is also taking place at present.

Figure 6: a) Temperature measurements at 280 meteorological stations; b) satellite temperature measurements.

Figure 7: a) Satellite image of the distribution of Mount Pinatubo’s sulfur dioxide and dust aerosol plume [5]; b) warm water pool associated with the El Niño [6].
Moreover, some periods of significant warming and cooling occur at the same time of natural occurrences such as Vulcan Pinatubo (Manila) eruption (1991) that threw about 20 billion tons of SO$_2$ into the air (Figure 7a) causing a proportion of the sun’s energy to be reflected back into space and so making the years 1992–1993 the coldest during the 1990s. The opposite effect was due to “El Niño” (Figure 7b) that causes an anomalously warm ocean water temperature that occasionally develops of the western coast of South America causing first warmer temperature into atmosphere and after the so-called “La Niña” (Figure 8) that affect the colder temperature (1997–1999) [12].

Figure 8: “La Niña” climate impact during the northern hemisphere winter.

A much alike fluctuating trend can be observed in Figure 9 [13].

Figure 9: AO Index and US/Europe/Japan mean temperature anomaly.
All of these figures show the trend of temperature anomalies measured from 1950 to 2010 in different parts of Earth that are subsets of global system of the lower atmosphere shown in Figure 5.

The analysis of measured data (Figure 5) leads to the following results:
- during the 1979–2012 period of significant industrial development and as a consequence of human emission of CO\textsubscript{2} into atmosphere, there has been in an average temperature increase of only + 0.34°C;
- both indirect and direct measurements diagrams show consecutive periods of cooling and warming along the years;
- increase of temperature is smaller than forecasted by ICCP models.

4 The CO\textsubscript{2} in the Earth’s atmosphere

As shown in Figure 10, derived and adapted by Woods Hole Research Center [14], the maximum content of CO\textsubscript{2} in the atmosphere range between 800 and 850 petagram (Pg).

![Atmospheric CO\textsubscript{2} concentrations.](image)

However, there are exchanges among the atmosphere and elements of planet, such as plants, soils, oceans etc. that need be considered to have a correct knowledge of phenomena connected with rising of atmospheric temperatures. The amount of CO\textsubscript{2} emissions attributable to human activities, as combustions of coal, oil, gas etc. etc. are about 7.7 Pg of Carbon per year (Fig 11a) [15]. Moreover, CO\textsubscript{2} is stable in liquids at temperatures such as those of ocean waters. Fig. 11b) [16] shows that the amount of CO\textsubscript{2} in the atmosphere has increased from 1956 to 2007 to reach a Pg. Furthermore, Fig. 11b shows the trend of atmospheric CO\textsubscript{2} coming from measurements of Manua Loa Observatory (Manila) since 1959. It is possible to notice 820 Pg into atmosphere represent only 0.0167% of the weight of the atmosphere which convert 393 ppm as depicted in Figure 11b) [16].
The data reported in the previous figures highlight that the human emissions of fossil fuels never result in the doubling of present contents of CO₂ into atmosphere and could not cause the increase temperature of 2.5–4°C as forecasted by the IPCC models.

The dilution by exchanging with plants, soils and oceans does not happen instantly as the reachable level of CO₂ is in proportion to its time of release.

5 Some preliminary consideration

The initial screening of data coming from indirect and direct measuring of temperature trend (empirical measurements by satellite or by steady meteorological stations), as well as the data for very long geological time (geological samples of various type), it could be evident consecutive cycles of cooling and warming of the Earth’s atmosphere, due to geophysical natural occurrences. It is important to evidence that the Sun is one star that supplies to Earth thermal energy by a radiative process. This energy coming from Sun is the cause that produces the variation of temperatures into atmosphere.

It is essential to evidence that:
- “the changing of the angle of incidence of solar radiation with atmosphere may have a cyclical trend and may change cyclically the amount of radiative energy received by Earth” [17].

The solar radiation energy striking the Earth (Figure 12), is obtained by the following equation [18]:

$$h_{\lambda \varphi} = \lim_{\Delta A \Delta \omega \Delta \lambda \to 0} \frac{q_{\omega \lambda \varphi}}{\Delta A \Delta \omega \Delta \varphi} = \int_A \int_\omega \int_\lambda q_{\omega \lambda \varphi} \ d\lambda d\varphi d\omega$$  (1)

$h_{\lambda \varphi}$ = intensity of radiation;
$dA$ = infinitesimal portion of space passed through solar radiations in the direction of the Earth;
$n$ = perpendicular line to $dA$;
$do$ = infinitesimal solid angle with axis in direction of the Earth;
$d\lambda$ = infinitesimal interval of wavelengths of solar radiation;
$q_{\omega \lambda \varphi}$ = radiative energy flux coming from space.
Cyclic movement of the solar axis can be caused by the gravitational pull of other planets of solar system and the particular alignment of the planets with the large mass such as Jupiter and Saturn.

The cyclic moving of solar axis, even though very small is able to change the radiative energy received by the Earth that may cause cyclic raising and decreasing of atmosphere’s temperature (Figure 13).

The question is: if the rising of temperature blamed on the CO$_2$ effect by the AGW scientist is comparable to those caused by solar cycles?”

6 Conclusions

The data presented in this paper and its interpretation does not fit well with the conclusions deriving from the AWG’s theories. However, before we can drew any final conclusions we need to analyze the following issues:

- Are the CO$_2$ releases of sufficient strength to significantly influence the Radiative xxx in the atmosphere?
- Can the “greenhouse effect” really exists in an open thermodynamic system such as the Earth atmosphere?
- What is the actual radiative exchange between the Sun and the Earth?
References


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