

Terrestrial Overheating Analysis

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Abstract:- The research aims to verify whether the total amount of heat emitted in the combustion processes, in synergy with the effect induced by greenhouse gases, can be considered as the primary cause of Earth's overheating.

Keywords:- heat; greenhouse gases; combustion; synergy; strategy.

I. INTRODUCTION

In the available scientific literature, and in the corrective actions undertaken so far, the concentration in the atmosphere of Carbon Dioxide and other greenhouse gases, is considered as the main cause of the global temperature increase.

I wonder the reasons why these gases would raise the temperature, and after a long search I found the only explanation for the phenomenon in [6].

It shows a VERY IMPORTANT graphic pattern, representing the Earth's thermodynamic equilibrium process, with the percentages of heat exchange between the Sun and the Earth, and between the Earth and Space, with an explanation of the effect caused by GREENHOUSE GASES.

It is reported that 88% of total HEAT produced on Earth, by human activities, is again irradiated on the earth's surface by the GREENHOUSE GASES present in the atmosphere, consequently increasing the temperature of the atmosphere and the underlying Oceans.

It means that only a 12% of HEAT is lost in space.

From [5] and in all the other documents I have consulted so far, I have not found any mention of the HEAT effects related to human Energy production processes, and this prompted me to do personal research on the subject.

II. METHOD

At first, I believe it is necessary to summarize the relationships between numeric prefix, its abbreviation, and the consequent scientific annotation.

kilo. k 10^3
Mega. M 10^6
Giga. G 10^9
Tera. T 10^{12}
Peta. P 10^{15}
Exa. E 10^{18}
Zeta. Z 10^{21}
Yota. Y 10^{24}

That being stated, I looked for a relation that would allow us to calculate the temperature variation that occurs in the elements involved, in this case the Atmosphere (AIR) and the Oceans (Water):

$$\begin{aligned} T^\circ &= \text{Temperature variation} \\ E &= \text{Energy Emission} \\ SH_w &= \text{Water Specific Heat} \\ SH_a &= \text{Atmosphere Specific Heat} \\ m_w &= \text{Water Mass} \\ m_a &= \text{Atmosphere Mass} \\ T^\circ &= E / [(SH_w \cdot m_w) + (SH_a \cdot m_a)] \quad (1) \\ \{C^\circ &= J / [(J / \text{kg } ^\circ\text{C}) \cdot (\text{kg})]\} \end{aligned}$$

The unknowns to which it is necessary to assign a numerical value are:

- Total Energy Emission
- Specific HEAT: Water and AIR
- Involved Mass: Water and AIR

The energy produced is a very laborious and long calculation because each resource used has a different calorific value (quality), and a requirement (quantity) that varies continuously over the time.

In [13] I found [3]:

I get the Total Energy Supply (TES) referred to the "ton of oil equivalent" in the period 1990÷2018.

Looking at the data, related to the year 2000, I estimated an approximate value of 10 Gtoe.

From [12] I get:
1 toe = ~ 42 GJ, it follows that
1 Gtoe = 42 EJ

From [11] I have extracted the useful elements for the calculation:

Specific heat WATER = 4.2 kJ / kg °C.
Specific heat AIR = 1.0 kJ / kg °C.

From [7] I could have an order of magnitude of the volumes of the Oceans = 1,5 G km³: equivalent to a first approximation mass = 1.5 Z kg (~ density = 1)

In [10] I found the total mass of atmosphere, that is: 5.15 E kg.

From these overall data relating to WATER and AIR, it is necessary to define the respective masses involved annually in the seasonal climate cycle.

From [9] I obtained the data of the WATER involved in the annual cycle, that is 580000 km³, equal to 580 Pkg.

Having no guiding elements for the quantities of AIR involved, I hypothesized that the mass of the atmosphere was equal to the mass of the ocean multiplied by the ratio between the respective values of the specific heat,

(WATER) $4.2 / (\text{AIR}) 1.0 = 4.2$.

So: $580 \text{ Pkg} \cdot 4.2 = 2.44 \text{ Ekg}$,

corresponding to $\sim 47\%$ of the total mass of the atmosphere; I think it is a fairly congruent value.

III. RESULTS

Replacing the values in (1) we obtain:

$10 \cdot 42E / [(4.2k \cdot 580P) + (1.0k \cdot 2.44E)] = 0.086 \text{ }^\circ\text{C}$,
equivalent to: "0.0086 $^\circ\text{C}$ for 1Gtoe".

With these premises I am going to calculate theoretical variation of temperatures in the period 1990 ÷ 2018.

From [3] I made the following approximations:

1990 ÷ 2000 (8 Gtoe ÷ 10 Gtoe): Total = 90 Gtoe

2000 ÷ 2018 (10 Gtoe ÷ 14 Gtoe): total = 216 Gtoe

Hence: 1990 ÷ 2018 = 306 Gtoe.

So: $306 \cdot 0.0086^\circ = + 2.63 \text{ }^\circ\text{C}$ (28 years)

From [2] I have extrapolated the values relating to the Energy produced in the period:

1860 ÷ 1990, obtaining ~ 327 Gtoe

So: $327 \cdot 0.0086^\circ = + 2.81 \text{ }^\circ\text{C}$ (130 years)

From [4], I considered what James Lovelock indicated in the date of 1712 to be the period where human activities began to interfere with Earth's self-regulation system, baptized "Gaia".

In practice, man was able, using "ideas" and fire (HEAT), to produce steam under pressure to use it through increasingly complex machinery, to do useful work, in this specific case a pump that kept the galleries of the coal mines dry, assisted by a self-regulation system.

Having no data available for the period in question, I hypothesized a linear increase in the period 1712 ÷ 1860 from 0.0 Gtoe ÷ 0.7 Gtoe,

getting: $(0.7 \cdot 148) / 2 = \sim 52\text{Gtoe}$.

So: $52 \cdot 0.0086^\circ = + 0.44 \text{ }^\circ\text{C}$ (148 years)

Chronological summary of theoretical temperature variation:

1712 ÷ 1860 (52 Gtoe): $+ 0.44 \text{ }^\circ\text{C}$ (148 years)

1860 ÷ 1990 (327 Gtoe): $+ 2.81 \text{ }^\circ\text{C}$ (130 years)

1990 ÷ 2018 (306 Gtoe): $+ 2.63 \text{ }^\circ\text{C}$ (28 years)

1712 ÷ 2018 (685 Gtoe): $+ 5.88 \text{ }^\circ\text{C}$ (306 years)

To date, the only known energy sources that do not produce HEAT & CARBON DIOXIDE, should be hydroelectric, wind and photovoltaic and should therefore be subtracted from the total; at present I left them.

IV. DISCUSSION

From [1] I found the diagram relating to the "real" measurements of terrestrial temperatures made over the years.

I estimated that up to 2018, the increase in the average earth measured temperature was $\sim 1 \text{ }^\circ\text{C}$ from the pre-industrial period (\sim before Second World War).

I made the following considerations:

The increase of temperature in the annual water and atmosphere cycle, can be absorbed by ICE Mass present in Greenland and Antarctica, with following change of state from SOLID to LIQUID.

Since the exchange of HEAT is possible between the atmosphere (gas) and:

WATER VAPOR (gas)

WATER PRECIPITATIONS (liquid)

ICE (solid)

and between

WATER and ICE directly

(Ocean's stream, Rivers and Rain and Greenland + Antarctica + Land glaciers), at the end, in a stable equilibrium point, the only possible transformation is the change of state from:

SOLID to LIQUID

The atmosphere is always in a gas state.

At this point I extrapolated up to 2018, the amount of Energy produced WITHOUT HEAT and CARBON DIOXIDE emissions, that should be Hydraulic, Wind and Photovoltaic processes, getting approximately 14 Gtoe.

Therefore: $685 \text{ Gtoe} - 14 \text{ Gtoe} = 671 \text{ Gtoe}$

(Relating only to the COMBUSTION PROCESSES)

$671 \text{ Gtoe} \cdot 88\% = \sim 590 \text{ Gtoe}$

(Related to the effect of GREENHOUSE GASES)

Currently I have no other data, so I have assumed Greenhouse gas effect as a constant value applied from 1712 up to now.

It would be more appropriate to have the Real Earth's dispersion capacity over the years in which the research has been made, from 1712 up to now.

Keeping these CONSIDERATIONS in evidence, I calculate the theoretical mass of ICE transformed into WATER up to 2018, assuming a temperature increase of 1°C .

Replacing the values in (1):

$590 \cdot 42E / [(4.2k \cdot \text{"WATER Mass"}) + (1.0k \cdot 2.44E)] = 1^\circ\text{C}$

This means that Numerator and Denominator must be equal; for this reason it must be that:

"WATER Mass" = $\sim 4.62 \text{ E kg}$, corresponding to = 4.62 M km^3

At this point I feel the need to display this value:

It is equal to a SQUARE BASE PARALLELEPIPED with a SIDE length of 1000 km and a HEIGHT of 4.62 km.

Truly IMPRESSIVE as a value.

A fraction of total ICE must be considered in Land glaciers reduction volumes; at this stage I considered this reduction of volume concentrated ONLY in Greenland and Antarctica areas.

The degree of reliability of this theoretical result could be verified through the analysis of the spatial images and with Climate Calculation Models.

From [8] I made the following consideration:

since the water of the Oceans acts mainly on the edge of the areas of Greenland and Antarctica through sea currents, I approximated the respective surfaces with the equivalent circumference radius, and I obtained the respective theoretic percentage values of the total amount of ICE transformed into LIQUID H₂O, up to 2018.

For Greenland (1.7 M km³):

$735/2730 = \sim 27\%$.

Therefore: $4.62 \text{ M km}^3 \cdot 27\% = 1.24 \text{ M km}^3$

Using ice volume of Greenland equal to 2.8M Km³, we obtain: $2.8\text{M} - 1.24\text{M} = 1.56\text{M km}^3$.

That is 55% of remaining ICE in 2018 .

For Antarctica (12.5 M km³):

$1995/2730 = \sim 73\%$.

Therefore: $4.62 \text{ M km}^3 \cdot 73\% = 3.37 \text{ M km}^3$.

Using ice volume of Antarctica equal to 30M Km³, we obtain that $30\text{M} - 3.37\text{M} = 26.63 \text{ M km}^3$.

That is 89% of remaining ICE in 2018.

Lastly, I wanted to underline that volumes of FLOATING ICE, and in any case below sea level, have NO INFLUENCE on the increase in the level of the oceans during the transformation process from SOLID to LIQUID (deduced from the Archimedes principle).

V. CONCLUSIONS

I have asked myself: why did we forget, in the whole scientific literature, to consider the HEAT effects?

At first because we imagined to solve our main living problems through COMBUSTION PROCESSES and start the innovation in technology and science research.

Second because at the beginning the magnitude was VERY LOW, and we ONLY realized that MORE ENERGY PRODUCED means LIMITLESS MORE POWER (personal, regional, National).

Now that both HEAT from COMBUSTIONS and GREENHOUSE GASES EFFECTS, have reached a CRITICAL SYNERGY POINT, we are beginning to perceive their negative influence for SURVIVAL and are worried about future.

I would like to remind that with each change of state, in this case the transformation from ICE (solid) into WATER (liquid), the temperature of the environment tends to remain

constant until all the ICE has been converted into WATER; after this point it begins to grow, EXPONENTIALLY.

At the moment the increasing is still linear.

It alerts me in a worrying way what is happening today, in July 2021 Climate situation, and that a GLOBAL COMMON STRATEGY between Nations IS STILL MISSING.

The picture that materializes into my mind get closer and closer to the pictorial representation of "The Garden of Earthly Delights", triptych by Hieronymus Bosch, datable to around 1480-1490 and kept in the Prado Museum in Madrid.

In a more recent past, the "Club of Rome" had come to similar conclusions, indicating in 2030 a limit defined as: "The chasm ahead", concepts such as the "limits of development" have begun to make their way, preparing the ground for an ever more conscious awareness.

If the whole overheating process began about three centuries ago as I have assumed, human evolution, whose foundations date back to more than 6000 years of history, could mean that, even without being fully aware of it, human being lived until ~1700, in Harmony with what I consider One of the Main Law of Nature:

"Living using as few resources as possible, and learning from NATURE EVOLUTION to rely on the ONLY Source of Energy EXTERNAL to the planet, the SUN."

HEAT and CARBON DIOXIDE are two side of the same coin, and we HAVE TO CONSIDER these TWO INTERDEPENDENT FACTORS, in SINERGY between them, if we want to succeed in our efforts, to REDUCE and/or REVERSE EARTH'S OVERHEATING PROCESS.

In particular, I believe we CANNOT produce MORE HEAT than our PLANET is ABLE to TRANSFER into SPACE, and according to this point of view, this is the MAIN TIPPING POINT TO ACTIVATE.

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