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Earth's Energy Balance

Roberto Brusa[1]

[1]Independent Researcher
High School Diploma: Mechanical Expert Chief Technician
Olgiate Olona (VA), ITALY

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Abstract: The purpose of this work is to provide a representation of data over time, previously available only on personal paper notes. This work uses Excel to archive and verify, in a consistent, unambiguous, and repeatable manner, the evolving reference values made available by scientific organizations over the past seven years. This is done to present and verify proposed solutions to the global warming problem.

Keywords: *Demonstration; Error; Harmony; Intuition; Reflection; Spirituality.*

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I. INTRODUCTION

The first step was to create a database in Excel format, which allowed us to plot the evolution of the parameters used in the research over time. [24]

The database contains the values of the parameters considered essential for understanding and explaining the problem, summarized as follows:

- Average Temperature Diagram in ocean currents.
- Anthropic Heat Emission (AHE).
- Solar Energy Imbalance, related to albedo (SRI).
- Greenhouse Gas, related to Carbon Dioxide (GHG).

AHE and SRI, representing two aspects of the same problem, were added together to represent the evolution of the Total Energy Imbalance (TEI) as realistically as possible.

Observing data over time has made it possible to associate known and measurable physical phenomena with historical events that occurred during the same period.

For these associations to be considered, scientific evidence is needed to validate the results.

Where this is not yet possible, it is necessary to formulate hypotheses based on knowledge acquired in the past that is still considered valid.

II. METHOD

Among the immense amount of available data, it becomes necessary to try to identify the trend of the variables considered important in the analysis of a phenomenon.

The first reference used is the diagram of temperature variations in ocean currents, which group together measurements taken independently by various scientific organizations and universities. [19] [23]

From the overall seasonal fluctuations, it was possible to derive an average trend and the periods in which changes or reversals occurred.

For AHE, I used data calculated by [7] for the period 1990-2025, those provided by [6] from 1860-1990, and the starting zero indicated by James Lovelock in [20] in 1712, to which I applied a linear increase up to the value reached in 1860 [11]

Regarding SRI linked to Albedo variation, photographic archives show the beginning of the retreat of terrestrial snowfields and glaciers starting in 1880, the year in which the first data relating to the increase in terrestrial temperatures were recorded.[28]

From 1880 to 2002, I considered two parabolic variations in albedo in the periods 1880-1940 and 1965-2002, and a linear variation in the period 1940-1965.

The vertex of the first parabola is understood as the Neutral Equilibrium Value or Starting Zero, with Albedo = 0.294 in 1880, and the end point with Albedo = 0.2935 in 2002, as indicated by satellite data, limited to the period 1880-1940.

For the period 1940-1965, I considered a linear variation of opposite signs to best account for the reduction in temperatures recorded in ocean currents during that period.

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The vertex of the second parabola starts from the Albedo value reached in 1965, and arrives in 2002 with Albedo = 0.2935, as indicated by satellite data.

The reason for the exponential growth adopted is in accordance with the trend of satellite data which shows an exponential growth of energy absorption in the period 2002-2025.

GHGs emissions related to Carbon Dioxide, related to the overall AHE emissions correspond to 3,048.0Gton. [7]

Level referred as stable value during last 5,000.0 years of 250ppm is equal to 1,938.0Gton.

Nowadays level of 440ppm corresponds to 3,411.0Gton and the difference from (3411.0-1938.0) = 1,473.0Gton represents the increase measured in the Atmosphere.

This means that the difference between AHE Carbon Dioxide emission and the measured increase in the Atmosphere (3,048.0-1,473.0) =1,575.0Gtoe corresponds to Ocean and Terrestrial Autotrophic Organisms absorption, equivalent to 52% up to 2025.

These last updates values replace the results within previous publications [12] [18].

III. RESULTS

The first increase in temperatures measured in ocean currents depending on AHE occurred around 1910.

Until then, apart from periodic seasonal oscillations, the average temperatures measured were stable at ~-0.25°C.

This stability can be scientifically associated with the effect of the latent heat of fusion/solidification, which maintains temperatures stable until the complete change of state into the water mass involved in the annual seasonal cycle, in this case equivalent to $580 \cdot 10^3$ km³.[27]

Ice formation in fresh water occurs at 0°C, while in salt water it occurs in a range of -1.7° to -1.9°C as confirmed by recent measurements carried out with robots designed for this purpose. [26]

The AHE data from 1712 to 1910 provide a value of $4.08 \cdot 10^{21}$J, which corresponds to the energy required to increase the water mass involved in the annual cycle by ~1.67°C.

The relative contribution from SRI is $1.72 \cdot 10^{21}$J.

I considered that ~2/3 of the energy relative to SRI was related to the reduction of the surface area of terrestrial glaciers and snowfields, with the consequent decrease in Albedo.

The remaining 1/3 = $\sim 0.57 \cdot 10^{21}$J contributed to the overall increase of 1.7°÷1.9°C.

This consideration is consistent with considering the beginning of the progressive melting of the polar ice caps starting in 1910.

This warming process continued linearly until 1940, exceeding 0°C by a few hundredths of a degree.

Afterwards, a reversal of the trend was observed, again a few hundredths below zero in 1965.

The only explanation I have been able to imagine is that it refers to the change in Albedo caused by the diffusion of dust and gaseous compounds into the atmosphere during the Second World War, with the bombings, the nuclear explosions in Japan, and various nuclear tests conducted during the period considered.

This hypothesis is justified considering the effects of atmospheric dust emitted by the explosion of the Tambora volcano in 1815, which caused what is remembered as the "Year Without a Summer" (1816), with all its associated consequences such as the devastation of crops and subsequent periods of famine.[25]

In addition, we must consider the effects induced by nuclear explosions, which can be summarized by the concept of "nuclear winter."[25]

In the period 1940-1965, the AHE continued to increase, reaching an overall value of $3.07 \cdot 10^{21}$J.

The modest cooling of ~-0.03-0.05°C detected in ocean currents has been estimated at $\sim 130 \cdot 10^{18}$J.

In the period 1940-1965, I therefore considered an overall reduction in TEI equivalent to

$(3.07 \cdot 10^{21} + 130 \cdot 10^{18}) = 3.2 \cdot 10^{21}$J, to coherently account for the recorded temperature reduction.

I emphasize that even if this is only a working hypothesis, it was derived from values consistent with historical data from measurements carried out, combined with more precise satellite data starting in 2002.

Since 1965, temperatures have resumed a steady rise, with a steeper gradient than in the period from 1910 to 1940.

The intercepted solar radiation, due to the annual variation in the distance from the Sun related to the Earth's elliptical orbit, has a value of 1361 ± 3.4% W/m², which corresponds to a fluctuation of 93.2 W/m².[17]

Multiplied by the Earth Constant K = $4.02 \cdot 10^{21}$ m²•sec, this equals $\sim 375 \cdot 10^{21}$ Wsec or J. [18]

The data show that between 2022 and 2023, the TRI exceeded $375 \cdot 10^{21}$J: we have therefore exceeded the "Natural Limit of the Earth within the Solar System".

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This exceedance represents an even more significant turning point in terms of survival possibilities than the one that occurred in 1910.

Following the official announcement of the correct value of QuadBTU = 10^{15}BTU in July 2022 [13] and subsequent recalculations, it becomes evident that we have exceeded the Earth's Natural Limit in the Solar System between 2022 and 2023. [17] [18]

Since we are now beyond this limit, trend forecasts and many of the previously proposed solutions are no longer considered suitable for managing the problems and will become increasingly less so.

I believe that the possibility of reducing temperatures with dust, gas, or nuclear explosions, as occurred between 1940 and 1965, is no longer valid for meeting global safety parameters.

Regarding carbon dioxide emissions, the results show that at least so far, ~52% has been reabsorbed despite a reduction in the surface area of primary forests of $47•10^6 km^2$ out of the total ~$60•10^6 km^2$ present in 1700. [10]

The effect on temperature variations linked to the increase in Carbon Dioxide, according to comparisons made with other planets in the solar system, was found to be in the order of 0.0013°C, which I consider valid until proven otherwise. [18]

The extent of the increase linked to the effect of other GHGs is not currently quantifiable, and therefore it was not taken it into account.

In any case, the effect of GHGs on the overall variation in the possibility of energy exchange with empty space would only lower the stability threshold developed over the course of Earth's evolution.

This threshold, over the last 5,000 years and referred to as 250 ppm of CO2, is reported in scientific literature to be equivalent to 12% of the total. [22][25]

Taking the concept to its limit, the exchange of energy with empty space would therefore be within a range of 12% to 0%, which would still not solve the underlying problem.

The data analyzed demonstrates the validity of James Lovelock's assumptions regarding the onset of global warming due to AHE in 1712 [20].

The cross-checking of energy production and temperature rise in ocean currents confirms both the accuracy of the linear increase adopted for the period 1712–1860 and the end of the latent heat effect in the period 1910. [11]

In 1912, the tragedy of the sinking of the Titanic due to an anomalous iceberg is the first sign we have not understood: the beginning of a first major change.

In 1965, the temperature containment/reduction effects linked to World War II, related to atmospheric dust and the "nuclear winter" effect, ended.

An initial estimate of the decreasing trend recorded in the period 1940-1965 indicates that to return to the temperature levels present in 1910, -0.25°C, would have been necessary 2.5-3 centuries of sacrifice and deprivation.

Compared to today's situation, this trend would translate into a period of ~2 millennia to recover from the increase in temperature in ocean currents mainly caused by

AHE = $33.64•10^{21}$ J , which in 2025 reached ~ +1.5°C.

Considering the additional contribution due to the change in Earth's albedo, represented by a value of

SRI = $447.3•10^{21}$J, this leads to a

TEI = AHE + SRI = $481•10^{21}$J in 2025.

Translated into the time required to return to the initial parameters, it would take 28-30 millennia.

Finding a different solution to the problem is ESSENTIAL and VITAL.

From 2023, the time when the Earth's "Natural Limit in the Solar System" has been exceeded, extreme climate changes and their resulting devastating effects should be the primary factors in deciding the most appropriate collective choices to counteract and reverse the current trend.

We must address the issue that holds the greatest significance for change by restoring the key Natural Balance parameters, first and foremost the Earth's Albedo and Reforestation.

The fundamental issue concerns the recovery of the Natural Thermodynamic Equilibrium lost over the last three centuries with the reduction of the surface area of glaciers and snowfields, restoring the Equilibrium Albedo with artificial surfaces white or highly reflective. [14] [18]

Forest restoration, in addition to having a positive effect on Albedo variation by allowing solar energy to be chemically stored in the form of nutrients for all Heterotrophic Organisms, will strengthen natural barriers against erosion and desertification and will naturally vary the percentage of Carbon Dioxide in the atmosphere.

The need to express the Albedo change with at least six decimal places is another consequence of the officialization in 2022 of the correct value of the unit of measurement QuadBTU=10^{15}BTU. [13] [18]

This officialization led to a comprehensive recalculation of TEI by all the research institutions involved. [3] [4] [5][19].

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IV. DISCUSSION

I believe there are currently two viewpoints that lead to two different solutions to the problems.

The first refers to the idea that the effects produced by GHGs are the source of the TEI problems, which is valid for all intents and purposes at least until July 26, 2022.

The second refers to the idea that the effects of AHE+SRI=TEI, which were never properly considered, at least until July 26, 2022, are the source of the problems.

➢ *First Point of View.*

As I already pointed out in [13], if I had analyzed the temperature increase with a value of QuadBTU = 10^{12}BTU [30], I would have reached the same conclusions, as the overall temperature increase under thermodynamic equilibrium conditions would have been in the order of 0.0138°C in 2025.

GHGs, particularly Carbon Dioxide until now, would have been considered among the main suspects in global warming, as the concentration in the atmosphere has been measured to have increased from 250ppm to ~440ppm, corresponding to an increase of 190ppm or +76% compared to the stable condition of 250 ppm over the last 5,000 years.

These considerations have led almost all the stakeholders involved in the research and implementation of countermeasures to find answers that can be found in scientific and literary publications of the period.

I am referring to organizations such as the World Economic Forum, which have presented the changes to be implemented, which have been incorporated into the program known as the Great Reset.

Among other scientific bodies, there has been substantial convergence on the underlying causes: GHGs, with Carbon Dioxide at the forefront as the primary culprit.

The references used by all stakeholders are those provided by a very important figure, recognized worldwide: James Lovelock.

All his publications on the subject indicate the start dates of the phenomenon, its evolution over time, and the conclusions he reached.

Two of his last writings [20] [21], provide his interpretation of the solutions to the problem, which echo the assumptions subsequently adopted by almost everyone.

Not to mention just ideas, which can also be misunderstood in words, I wanted to highlight an aspect that troubled me and made me think a lot.

Since the primary cause was GHGs, with Carbon Dioxide as the main culprit, he argued that as a human population evolving both in numbers and consumption, we had outpaced the Earth's reaction and adaptation speed, understood as a single, comprehensive organism named Gaia, after the Greek goddess of the Earth.

James Lovelock then considered population growth, concluding that: “Personally I think we would be wise to aim at a stabilized population of about half to one billion, and then we would be free to live in many different ways without harming Gaia” [21]

I was really surprised that such a shocking conclusion, supported by one of the leading experts on the subject, became a milestone and that was accepted as an explanation, almost impossible to argue with.

The only mitigation factor that I am convinced should be applied to all human beings concerns the fact that “Errare Humanum Est” and that choices depend on the point of view, the results represent only the consequences.

But James Lovelock himself asked in an interview: "What did we forget to pack before leaving on a trip?"

The answer to this question, in my opinion, came on July 26, 2022, with the officialization of Quad BTU value.

For this reason, I really think that everything that has been thought by all the elements involved would have been valid only until July 26, 2022.

➢ *Second Point of View.*

When I was 18 in 1970, I had an overheating problem that occurred in summer with my first car, that lead me to think: “Are we crazy? We go around with a fireplace even in Sommer.”

In 2019, I began to formulate a different analysis of the problem, driven by the need to scientifically address that intuition.

Simply by coincidence, the different units of measurement I considered, SI “Joule”, were found to be consistent with the official announcement on July 26, 2022, of the unit of measurement to be used and its correct numerical value of QuadBTU = 10^{15}BTU.[9]

The overall temperature increase in the condition of thermodynamic equilibrium was calculated to be around +13.8°C in 2025, referring to the mass of water involved in the annual cycle of the seasons. [11]

This result is a thousand times greater than the previous one: this is the first worrying result obtained.

Regarding James Lovelock's thinking on population growth and consumption from 700M to 8G, identified as the problem, I verified that for 8 billion people to survive in a year in good health and at 37°C, we need the equivalent of 0.8 Gtoe = 33,6•10^{21}J, corresponding to 1/20 of the annual AHE in 2025. [16]

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Furthermore, this means that today's AHE corresponds to maintaining an equivalent population of 160G people alive and in good health.

So why are there still ~800G undernourished people and a similar number of overnourished people today?

I therefore believe that the real problem lies solely in a more equitable redistribution of available resources, simply that and nothing else.

The overall data analysis [24] allowed us to more accurately assess the relative importance of the two variables considered over the years:

AHE since 1712 and SRI since 1880. [20] [29]

In 1880, they were: AHE = 100% and SRI = 0%,

in 1922/1923 they both became 50%

in 2025, they are: AHE = 7% and SRI = 93%.

The reduction in the mass of polar ice caps has already passed the equilibrium point, and the direct reduction in ocean currents, the lifeblood of the planet, has already been felt.

After 2023, the increase in SRI will reduce the time available to change the situation.

In hindsight, I believe that in 1910, we were NOT sufficiently aware of the underlying causes of the already ongoing warming, motivated only by our sense of omnipotence linked to continuous scientific discoveries and the associated progress.

At that time, the environment was considered merely an unlimited resource to be exploited.

The presence of polar ice caps was often even considered an obstacle to the possibilities of development and progress.

But life on Earth can only evolve from Autotrophic Organisms, the only ones that have allowed and will continue to allow the chemical storage of Solar Energy in the form of nutrients such as carbohydrates and sugars for all Heterotrophic Organisms, NOT THE OTHER WAY AROUND.

In the 1970s, members of the "Club of Rome," in collaboration with MIT in Boston, analyzed the "Limits to Growth" perceived at that time, which led to the creation of the "World3" program, recently updated to "World4all" on the same basis. [2]

These initial approaches to the underlying problems did not contain any consideration regarding the increase in TEI=AHE + SRI.

The reason is related to the not correct value of QuadBTU=10^{12}BTU, that shows very small impact on temperatures.

The actions undertaken so far concern the reduction of consumption to extend the lifespan of so-called "non-renewable resources" connected to AHE and Lifestyle.

But what are we doing to counter the problem related to Albedo variation and SRI?

The only activities appear to be the release of specific gases into the atmosphere to reflect solar energy before it reaches the ground, or the installation of a solar umbrella in space to reduce the amount of incoming radiation.

Whether be appropriate for a world of robots generated by uncontrolled AI, but not for one inhabited by living beings, whether Autotrophs or Heterotrophs, where Empathy represents the only universal language of a Spirituality common to all subjects involved in Life.

It is up to us, as individuals and people, to manage the problem we must solve in Harmony.

This is the situation I have found today and in my opinion is the only that binds us firmly to the factual reality: what establishes the difference between theory and reality is the demonstration, beyond any reasonable doubt.

V. CONCLUSION

The need to restore the Equilibrium Albedo has become ESSENTIAL, because survival begins with the ability to return to SAFE PARAMETERS.

The first necessary step is to go back well below Earth's limit within the Solar System, i.e. $375 \bullet 10^{21}$J, with final target to restore the equilibrium like it was up to 1910.

Considering the introduction of an "Idle Gear" to reverse the current trend without altering the delicate Natural and Social Balance of the whole nowadays 8G population, represents the key to guiding and managing Future Sustainable Development. [18]

The continuous and coordinated updating of "Earth Science" [8] represents the indispensable reference point for avoiding useless efforts of the opposite direction, because it is always the sum that makes the total, and time moves inexorably.

Albedo values associated with Oceans=0.06, Forests=0.12, Bare Soil=0.17, Glacier= 0.6÷0.8, do not mean that they produce the same feedback effects.

Oceans and Forests, through their respective Autotrophic Organisms, store part of the Sun's energy as nutrients for the life cycle, while Bare Soil can only transform the absorbed Solar energy into Heat and compared to Glacier is 3.5÷4 times higher.

The first consideration suggests that only where there is Life can exist the Future, and reducing glacier extension has a very big impact on Thermal Equilibrium.

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It is essential to consider the contribution of different cultures, especially the most ancient ones, because their Spirituality is based on Consideration, Respect, and Conservation of the Planet for next generations, the foundations of “Earth Science" based on Natural Harmony.[8]

This renewal will not be limited to Science alone but will also constitute a turning point to reconsider past solutions, such as wars and unilateral acts of force, because it has been proven that create problems instead of solving them from more than 100 years now, even looking from a simply numerical point of view.

We will likely have to thank the social behavior of nations previously considered underdeveloped and critically examine the behavior of those considered developed.

I wanted to add one last aspect, stumbled upon by chance while trying to understand the concept related to Albedo.

The tilt of the Earth's rotation axis relative to its Orbital Plane means that the area between the two Tropics corresponds to half of the Earth's total area: I believe this represents wonderful design data.

I deduce that the Earth cannot freeze completely, but there is no constraint that can protect the Planet from global warming.

I believe that our role as Humanity is precisely to live in Harmony with the Earth and all living creatures that inhabit it, and to correct all aspects that tend to destroy Life and its Balance.

This task has been left in our hands, and therefore we must assume the responsibility for change if we are to survive.

It is necessary and urgent to create a global coordination body that, after thorough and unbiased analysis, can propose the most appropriate solutions to the main problems.

We must leave errors exposed and not hide or erase them, to raise the level of awareness of those who come after us.

For instance, if the numbers used and the logic processes behind them are correct, the results will also be correct, even if they are identified incorrectly [17], because "numbers don't lie."

After the official announcement of the value equivalent to QuadBTU=10^{15}BTU on July 26, 2022, I thought I had concluded my research with the solution I had found.

I had never imagined what I had found was just the tip of the iceberg.

I had thought that the problem depended solely on AHE, and that returning to a more basic lifestyle and reflecting into empty space the equivalent energy we need to live would be sufficient to resolve the situation over time.

But in 2024, data from the first global recalculations began to arrive with the correct value of QuadBTU=10^{15}BTU.

The results show the solution conceived for AHE took on even greater significance in the AHE+SRI=TEI analysis and solution.

Having found a reality that had existed in Spain since 1948, which was based on the same concept developed in the solution found, allowed me to quantify the solution with greater certainty. [18]

And this is the essence of the scientific method: correcting all results using the correct values, without fear or prejudice, and with humility, accepting that I have made mistakes.

We must move toward a New Renaissance if we are to survive, regardless of people from different Cultures or Religions, considering all the wonderful nuances of color and perspective of which we are capable.[14] [15] [16]

Spirituality is the ground that connects everything.

Looking at the evolution of human consciousness over time, I fully agree with the reflection on the thought and life of Saint Francis of Assisi, 1181–1226 AD, reported in [1].

“” Ultimately, the core of Franciscanism, the "common thread of thought," is not just poverty, it is not just love.

It is the idea that no one is saved alone. Each person is saved with the rest of humanity and creation.

We save ourselves by saving others and saving the world.

And the model Francis refers to is not at the top, but at the bottom of the social ladder: the humble, the weak, the sick, those who have nothing.

Meanwhile, the sources of enmity, war, and hatred among men are precisely money, property, power, and excessive inequality.””

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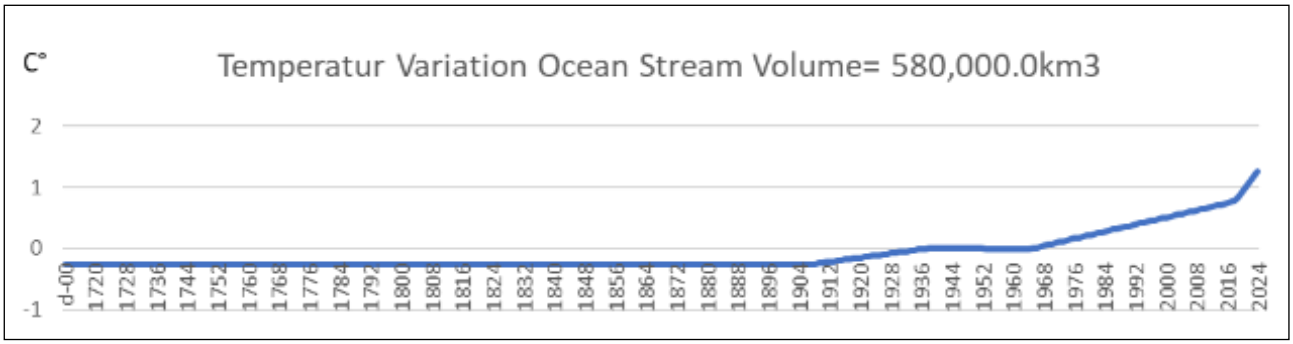

Fig 1 - Average Ocean Stream Temperature

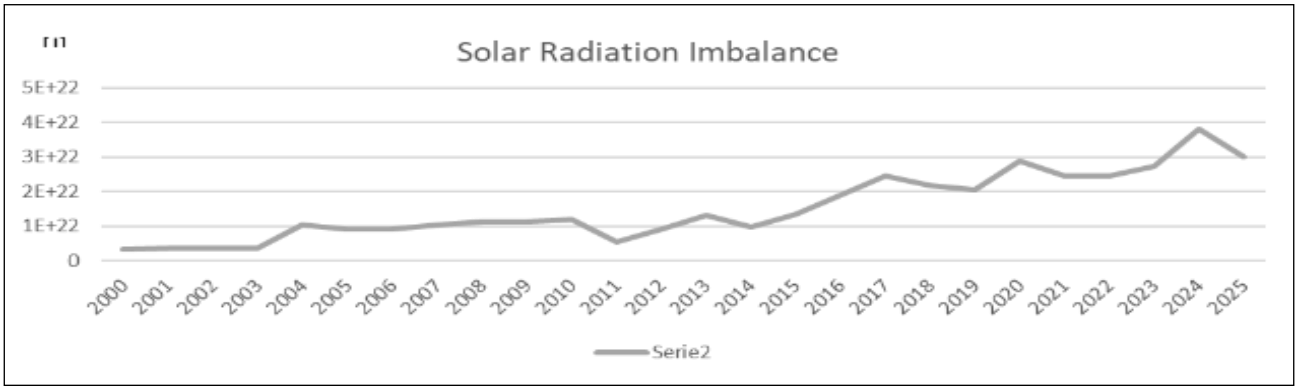

Fig 2 - ALBEDO Variation from CERES Satellites

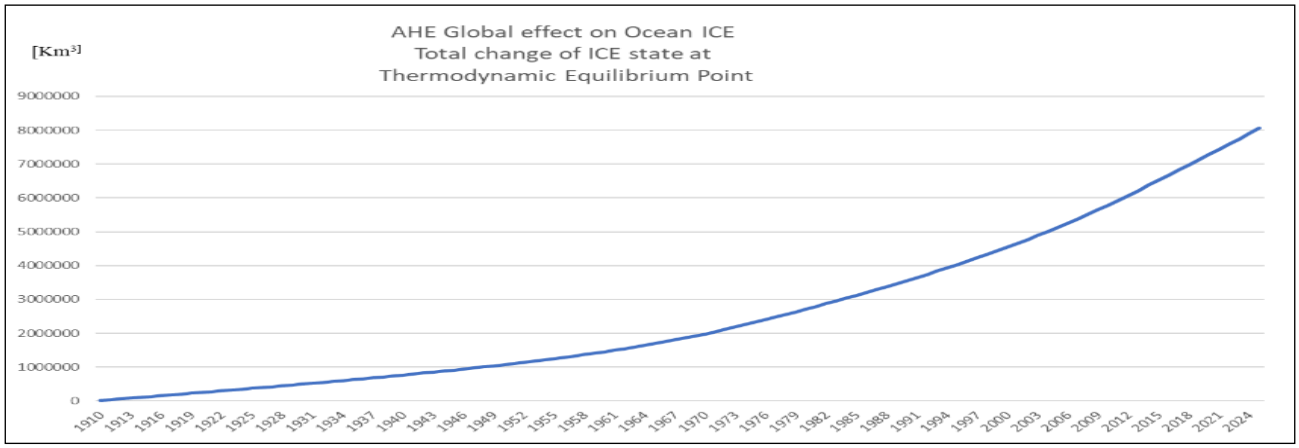

Fig 3 – ICE Change of state

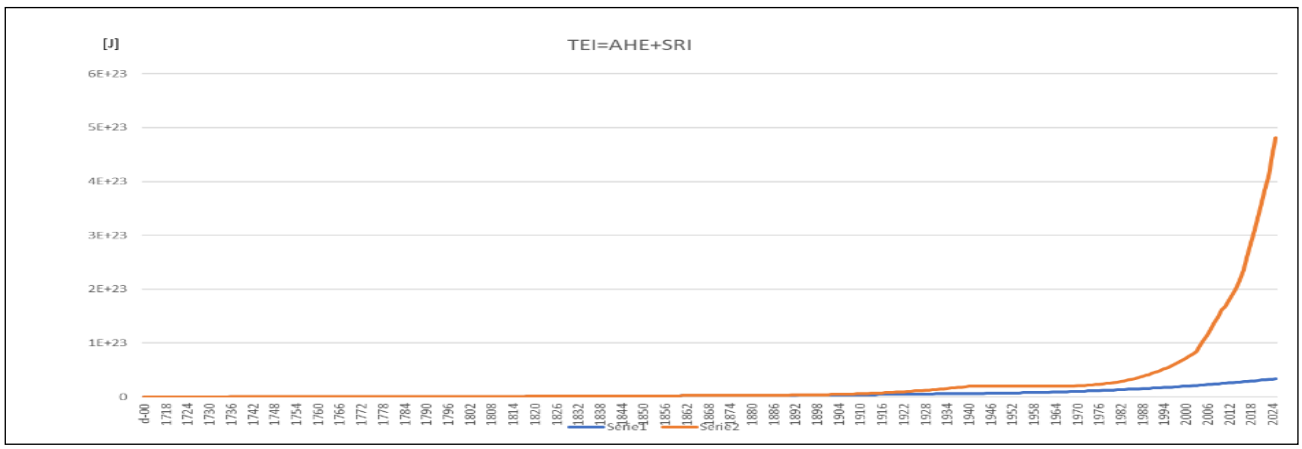

Fig 4 - Total Energy Imbalance

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