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Report

An alternative description of paleo-astrogeophysics process and origin of Earth based on Low Temperature Physics, including an outline to mitigate increasing Earth surface temperature

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ABSTRAK

Dalam artikel sebelumnya di Jurnal BPAS Geology Section, dengan judul: "How Shannon Entropy perspective provides link among exponential data growth, average temperature of the Earth, declining Earth magnetic field, and global consciousness" (*BPAS Section F, Geology, 2019*), penulis membahas antara lain data sunspot sepertinya menunjukkan bahwa Matahari kemungkinan akan memasuki Maunder Minimum, yang dapat berarti rendahnya aktivitas Matahari kemungkinan dapat menyebabkan rendahnya suhu di Bumi, sementara itu kita mengalami suhu permukaan Bumi yang semakin tinggi. Kita juga harus mengingat perubahan iklim global yang akan terjadi dalam waktu dekat (cf. Toffler, *The Eco-spasm report*, 1975). Fenomena ini kemudian membuat kami bertanya: apa yang dapat kita lakukan sebagai manusia di Bumi untuk menunda atau menghindari memburuknya suhu pendinginan Bumi di tahun-tahun mendatang? Kami pikir ini adalah masalah yang lebih mendesak dan merupakan bahaya nyata saat ini yang kita hadapi di Bumi. Seperti yang telah kami bahas sebelumnya, di sini kita akan membahas pendekatan fisika suhu rendah terhadap alam semesta awal bersama dengan bumi ini, yang tampaknya terkait dengan proses paleo-astrogeologi Bumi kita, serta model interaksi Matahari-Bumi dalam kaitannya dengan entropi Shannon. Karena entropi Shannon dapat dinyatakan sebagai bit informasi, maka ini berarti kita mungkin dapat melakukan sesuatu terhadap suhu bumi dengan mengontrol jumlah transfer dan penyimpanan informasi di bumi. Alternatif yang dapat dipertimbangkan dalam hal ini adalah dengan memantau dan mendinginkan perikanan laut dalam, karena beberapa jenis ikan laut dalam kemungkinan besar akan mempengaruhi suhu laut global, dan kemudian suhu permukaan global cenderung meningkat.

Kata kunci:
Asal usul Bumi, paleo-astrogeology, Kitab Kejadian, dinamika nonlinier, peran Roh Kudus

ABSTRACT
In a previous article in a Journal, with title: "How Shannon Entropy perspective provides link among exponential data growth, average temperature of the Earth, declining Earth magnetic field, and global consciousness" (*BPAS Section F, Geology*, 2019), we discussed among other things that the sunspot data seems to indicate that the Sun is likely to enter Maunder Minimum, then it will mean that low Sun activity may cause low temperature in Earth, while in the meantime we experience increasingly high Earth surface temperature. We shall also keep in mind impending global climate changes in the near future (cf. Toffler, *The Eco-spasm report*, 1975). This phenomenon then causes us to ask: what can we do as human being in Earth to postpone or avoid the worsening situation in terms of Earth cooling temperature in the coming years? We think this is a more pressing problem for the real and present danger that we are facing in the Earth. As we discussed earlier, we would discuss here a low temperature physics approach to early Universe along with this earth, which seems to be linked to paleo-astrogeological process of our Earth, along with a model Sun-Earth interaction in terms of Shannon entropy. Since Shannon entropy can be expressed as bits of information, then it would mean that perhaps we can do something with Earth temperature by controlling the amount of information transfer and storage in the Earth. An alternative way that can be considered in this regard is to monitor and cool deep-ocean fisheries, because several kind of deep-sea fishes are likely to affect the global sea temperature, and then the global surface temperature tends to increase.

Keywords:
Origin of Earth, paleo-astrogeological process, nonlinear dynamics, book of Genesis, role of the Holy Spirit

Introduction

In a previous article in BPAS Geology Section, with title: "How Shannon Entropy perspective provides link among exponential data growth, average temperature of the Earth, declining Earth magnetic field, and global consciousness" (*BPAS Section F, Geology*, 2019), we discussed among other things that the sunspot data seems to indicate that the Sun is likely to enter Maunder Minimum, then it will mean that low Sun activity may cause low temperature in Earth, while in the meantime we experience increasingly high Earth surface temperature. We shall also keep in mind impending global climate changes in the near future (cf. Toffler, *The Eco-*

spasm report [22]). This confluence of factors compels us to ask a crucial question: what proactive measures can humanity take to mitigate increasing Earth surface temperature or avert the impending scenario of Earth's cooling in the coming years? We propose that this issue presents a more pressing and tangible danger compared to other potential threats (cf. Nick Bolstrom *et al*, existential risks).

Building upon our previous work, this article delves into a low-temperature physics approach to understanding the early universe and its connection to Earth's formation. This investigation will incorporate the concept of paleo-astrogeological processes that shaped our planet, alongside a model for Sun-Earth interaction based on Shannon entropy.

Methodology

Our methodology will encompass two primary approaches:

Low-Temperature Physics Framework: We will employ the principles of low-temperature physics to analyze the early universe and Earth's formation. This approach will provide insights into the physical conditions that existed during the universe's infancy and how they influenced the formation of our planet.

Paleo-Astrogeological and Sun-Earth Interaction Model along with Shannon entropy description: We will construct a model that integrates paleo-astrogeological processes, which shaped Earth's geological history,

with Sun-Earth interactions mediated by Shannon entropy. This model will enable us to explore the potential links between solar activity, Earth's temperature, and the planet's overall geological evolution.

By combining these methodologies along with relevant literature review, we aim to gain a deeper understanding of the factors that have influenced Earth's climate and develop a framework for assessing potential future scenarios.

Results and discussion

The historical recognition that the Sun warms the Earth has suggested a direct connection between the average global temperature and solar activity. Consequently, any significant changes in solar activity should result in equivalent changes in the Earth's global temperature. The literature on the solar influence on the Earth's temperature is quite extensive, indicating the importance of the problem [5]. What is mostly missing in that discussion, is that there is likely a *Low Temperature Physics* explanation for such an early Universe dynamics and also early Earth's past history. And the present review article is intended to bring clarity to these issues.

First of all, allow us to cite our previous exploration with the Ermakov equations cf. [17][18]. These equations, describing the behavior of certain non-linear systems, hold remarkable sway over the Bose-Einstein universe,

the primordial soup from which our cosmos is believed to have sprung. It is here, at the dawn of time, that the connection between symmetry and duality takes center stage.

In the context of early Universe cosmology, local rotations (vortices) play a role in radical stabilization of the cosmological singularity in the retrospective extrapolation, making possible a static or steady-state (on the average) Universe or local region. Therefore, for instance, Einstein could " permit " the galaxies to rotate instead of postulating a cosmological constant *ad hoc* in his general-relativistic consideration of a static Universe. Though, it does not necessarily mean that the cosmological constant is not necessary for other arguments. In this section, more realistic one is suggested, based on Newtonian cosmology model but here we include the vortical-rotational effect of the whole Universe [15][16].

We review a Riccati-type equation obtained by Nurgaliev, and solve the equation numerically with Mathematica. It is our hope that the new proposed method can be verified with observation data. In this section, we will derive a Riccati-type equation following Nurgaliev [15]. Then we will solve it numerically using Mathematica 11.

After he proceeds with some initial assumptions, Nurgaliev obtained a new simple local cosmological equation:[16]

$$\dot{H} + H^2 = \omega^2 + \frac{4\pi G}{3}\rho, \quad (1)$$

Where $\dot{H} = \mathrm{dH/dt}$. The angular momentum conservation law ωR^2 = const = K and the mass conservation law $(4\pi/3)\rho R^3$ = const = M makes equation (1) solvable:[16]

$$\dot{H} + \mathrm{H}^2 = \frac{K^2}{R^4} - \frac{\mathrm{GM}}{R^3}, \quad (2)$$

Or

$$\ddot{R} = \frac{K^2}{R^3} - \frac{\mathrm{GM}}{R^2}. \quad (3)$$

Equation (3) may be written as Ermakov-type nonlinear equation as follows;

$$\ddot{R} + \frac{\mathrm{GM}}{R^2} = \frac{K^2}{R^3}. \quad (4)$$

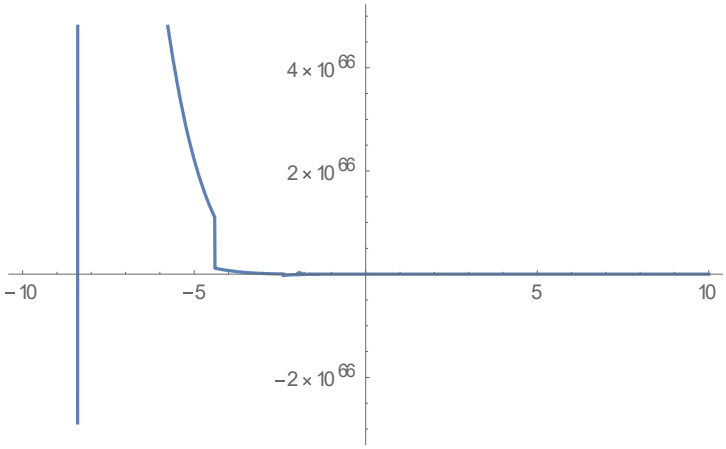
Nurgaliev tried to integrate equation (3), but now we will solve the above equation with Mathematica 11. First, we will rewrite this equation by replacing GM=A, K^2=B, so we get:

$$\ddot{R} + \frac{A}{R^2} = \frac{B}{R^3}. \quad (5)$$

As with what Nurgaliev did in [15][16], we also tried different sets of A and B values, as follows:

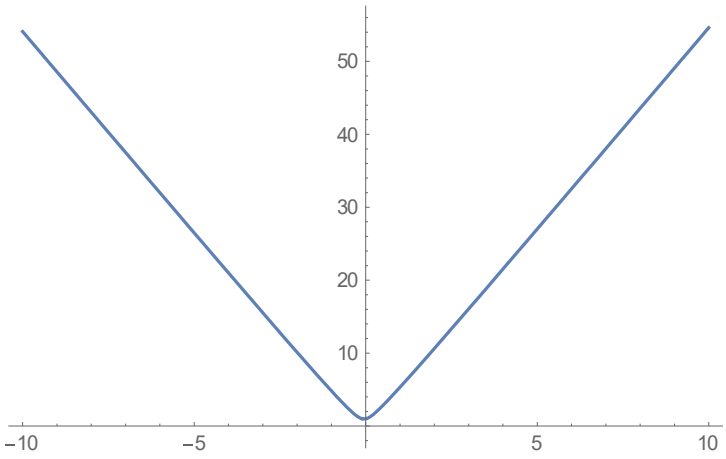
- A and B < 0

```
A=-10;
B=-10;
ODE=x''[t]+A/x[t]^2-B/x[t]^3==0;
sol=NDSolve[{ODE,x[0]==1,x'[0]==1},x[t],{t,-10,10}]
Plot[x[t]/.sol,{t,-10,10}]
```



•A < 0, B > 0

```
A=-10;
B=10;
ODE=x''[t]+A/x[t]^2-B/x[t]^3==0;
sol=NDSolve[{ODE,x[0]==1,x'[0]==1},x[t],{t,-10,10}]
Plot[x[t]/.sol,{t,-10,10}]
```



•A > 0, B < 0

```
A=1;
B=-10;
ODE=x''[t]+A/x[t]^2-B/x[t]^3==0;
sol=NDSolve[{ODE,x[0]==1,x'[0]==1},x[t],{t,-10,10}]
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Plot[x[t]/.sol,{t,-10,10}]
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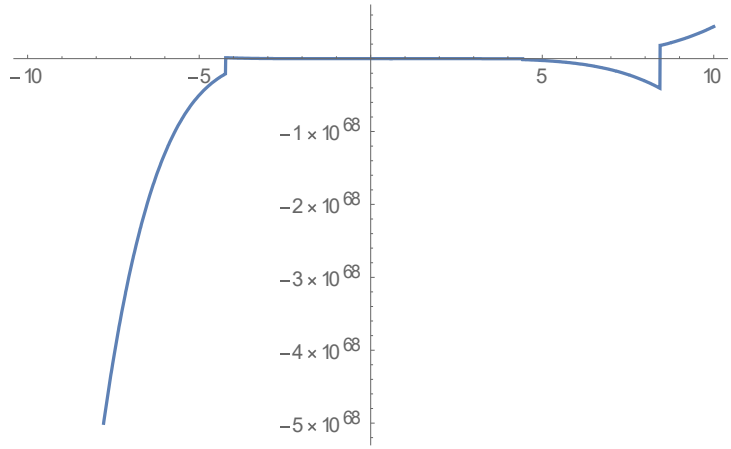

From the above numerical experiments, we conclude that the evolution of the Universe depends on the constants involved, especially on the rotational-vortex structure of the Universe. And what is interesting from the above simulations is that the last simulation plot seems to suggest a possibility of interpreting Ermakov equations in term of spontaneous emergence of early Universe out of a long period of stagnation (*Note:* This feature of *spontaneous emergence of Creation* reminds us to sacred narrative such as in the book of Genesis chapter 1:1-5).

Outline of new framework to describe early Universe and early Earth history from low temperature physics

As Rev. John Polkinghorne, the late professor of mathematical physics and priest, wrote: "The idea of a ready-made world was replaced by that of a creation so endowed by its Creator with potentiality that creatures could be allowed 'to make themselves' (Charles Kingsley) through

the explorations of evolutionary process. The history of the world is to be understood as an unfolding act of continuous creation. Such a creation is a great good, but it has an inescapable shadow side for evolution results not only in great fertility but also in blind alleys and extinctions. Genetic mutation produces both new life forms and also malignancy, and one cannot have the one without the other. Theology can find here some help from science as it wrestles with the perplexities of natural evil and suffering." (cf. Polkinghorne, The University of Edinburgh, 2009). Notably several scholars have come up with different arguments to criticize Darwin's evolution theory, for instance Ernst Cassirer or Vern Poythress with *Interpreting Eden*, and Jaroslav Flegr, with his book *Frozen evolution*, *that is not the way it is, Mr Darwin*. The present review is intended to bring more arguments in particular from recent development of low-temperature physics and its connection to cosmology.

While the "Darwinian revolution" often receives sole credit, the story behind this pivotal book is more nuanced than commonly portrayed. While discussion on random mutation can be largely influenced by any kind of argument regarding selection/random selection etc, we would like first to mention a number of fallacies in Darwin's propositions, first on his quite careless influenced by Lamarck and also Malthus. This section explores how the ideas of Jean-Baptiste Lamarck, Alfred Russel Wallace, and Thomas Malthus played crucial roles in shaping Darwin's revolutionary tome. We

argue here that it is possible to conceive history of hominid without considering Out of Africa hypothesis. Moreover, as other authors also criticize Darwin's theory, such as Ernst Cassirer and Abdul Ahad (2014), others have brought up influence to economists, such as Hayek's evolutionary epistemology (Krstic, 2012, Marciano, 2009). Based on one of our colleague's observation (FS) to Galapagos islands, and also Smarandache & Vatuiu's hypothesis of spiralling neutrosophic theory, allow us to consider several arguments in the following paragraphs (Smarandache, 2017; Smarandache, 2017; Smarandache & Vatuiu, 2019).

Revised Young Earth theories: beyond deep time and exploring the "*Spontaneous Emergence Creation*" Model

The vast expanse of cosmic history, stretching back billions of years, has long been dominated by the "Big Bang" and "*evolution-only*" paradigm. These models, while supported by considerable evidence, leave certain lingering questions unanswered. This article delves into alternative cosmological perspectives, particularly the fascinating concept of "Spontaneous Emergence Creation" (SEC) proposed by Per Bak and the potential reconciliation with religious narratives like Genesis. (In Per Bak, his model is known as self-organized criticality, or more known as avalanche phenomenon).

Challenging the Deep Time Narrative:

While the standard cosmological model enjoys scientific consensus, some scientists and theologians propose alternative possibilities. Young Earth theorists, for instance, advocate for a compressed timescale of Earth's history, aligning with a literal interpretation of biblical accounts. Others, like Per Bak, explore models like SEC, suggesting the universe's emergence not from a singularity but from a state of inherent potentiality.

Spontaneous Emergence Creation: A New Paradigm?

Perbak's SEC model can be interpreted that the universe arises spontaneously from a self-organized critical state without needing a Big Bang singularity. This model resonates with the Genesis 1:1-2 description of the Holy Spirit bringing order to a chaotic void. While this connection remains a matter of theological interpretation, the SEC model presents a scientifically intriguing proposition that offers an alternative perspective to the traditional Big Bang narrative.

Non-linear Ermakov Equations and the Dance of Order and Disorder.

One interesting solution of the non-linear Ermakov equations appears to exhibit SEClike behavior. This solution shows a system transitioning from a disordered state to one exhibiting complex structures, reminiscent of the creation described in Genesis. While not definitive proof of SEC, it provides

a tantalizing glimpse into the potential for such models to explain cosmic and biological emergence.

Ultimately, the quest for understanding the universe's origins requires an open mind and a willingness to explore all avenues of inquiry. Rigorous scientific investigation, open-mindedness to alternative models, and respectful dialogue between science and faith traditions can pave the way for a richer understanding of our cosmic and existential place in the grand scheme of things.

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Possible correspondence between low temperature physics and cosmology

In previous sections of this review, we explored the intriguing possibility of reconciling scientific understanding of the early universe with the creation narrative presented in Genesis 1:1-2. We ventured into the fascinating realm of gap theory, which posits a period of "gap" or dormancy between the initial burst of creation and the subsequent shaping of the Earth and its inhabitants (cf. Gen. 1;2, cf. also Walton, *the Lost World of Genesis One*). Today, we delve deeper into this intriguing proposition, specifically examining how certain solutions of nonlinear Ermakov equations, utilized in lowtemperature physics, might hold the key to unlocking this cosmic secret.

The connection between Ermakov equations and the gap theory lies in their shared ability to depict sudden transitions from a state of stasis to

one of dynamic change. Just as these equations, employed in low-temperature physics, describe abrupt shifts in the behaviour of superfluid helium atoms, the gap theory envisions a similar leap from the initial, formless "void" described in Genesis to the subsequent flourishing of the universe. Here, imagine the universe in its nascent state as a superfluid-like entity, governed by the Ermakov equations. In this primordial stillness, a quantum fluctuation, a subtle perturbation in the energy field, acts as a critical trigger (which alternatively, such an epoch can be interpreted as an act of God's creation).

Of course, this theoretical bridge between science and faith is not without its challenges. Critics might argue that invoking physics as an interpretive tool for scriptural passages introduces unnecessary complexity and risks diluting the core message of divine creation. Others might point to the inherent limitations of scientific models in capturing the full sweep of spiritual truths. Yet, the very act of seeking dialogue between seemingly disparate fields of knowledge

– science and religion – holds immense value. It fosters mutual understanding, encourages deeper reflection on the mysteries of existence, and compels us to constantly revisit our assumptions about the universe and our place within it. The *gap theory*, viewed through the lens of dynamics of nonlinear Ermakov equations, may not definitively prove or disprove the divine hand in creation. But it offers a unique perspective, a

tapestry woven from threads of scientific rigor and scriptural interpretation. And perhaps, in that weaving, lies the spark of a deeper understanding, a glimpse into the grand symphony of existence that unites the quantum dance of atoms with the majestic pronouncements of Genesis.

This is just the beginning of our exploration. In the next section, we will delve deeper into the scientific and theological intricacies of this topic, examining the challenges and possibilities it presents. Let us embark on this intellectual journey with open minds and a spirit of inquiry, embracing the potential for discovery that lies at the intersection of science and faith.

Pan-Christic Biogenesis and the Hidden Forces of Life

The Darwinian paradigm of random mutation and natural selection, fueled by a Malthusian struggle for survival, has long dominated our understanding of life's evolution. Yet, its mechanistic lens seems to falter before the complex dance of life's emergence and dynamism. Could there be hidden forces at play, orchestrating this symphony of change beyond the simple tug-of-war between chance and competition?

Historically, Francesco Redi's famous experiment in 17th century, demonstrating spontaneous generation of organic compounds shall always start with life substance, reminds us that biogenesis is woven into the fabric of our universe. This prompts us to seek alternative frameworks, models that resonate with the inherent vibrancy and purposefulness of life.

One such lens is adapted from Lewin's force field theory of change, where both driving and restraining forces interact to determine a system's trajectory.

In this light, let us envision life's evolution as a dynamic interplay of three hidden forces:

1. Spontaneous order : Order maintains coherence and structure, while disorder injects novelty and creativity. Life emerges and thrives in this delicate balance, where structures adapt and mutate, and new forms arise.
2. Synchronization and Individuality: This tension reflects the interconnectedness of life and the unique spark within each organism. Synchronization allows communities to thrive through coordinated action, while individuality drives differentiation and innovation. Life flourishes as these forces dance in harmony, enabling collaboration and the emergence of diverse expressions within a unified whole.
3. Life Essence: This is where we venture beyond the purely material, acknowledging the inherent spark of life within every living being. We propose that this "life essence" is not merely a passive product of chance and selection, but an active principle, a divine breath imbued in all forms by the *ultimate Source of Life*, which Leibniz, in his pan-Christic vision, might call the Monad.

This life essence is not to be confused with panentheism or old idea of vitalism in biology, where the divine permeates the universe but doesn't

actively participate. Nor is it monadism, where individual monads are self-contained and uninfluenced by each other. Pan-Christic biogenesis posits that the life essence is not static, but dynamic, actively involved in the unfolding of life, guiding its trajectory, and imbuing each creature with a unique potential for growth and transformation. In our reading of Genesis 1:1, in Hebrew Bible, we shall read the first verse as follows: "bereshit bara Elohim (et)," where *aleph tav* is not prononunced but it can be understood as presence of **Christ in His pre-existence**. That is our interpretation of both pan-Christic biogenesis, and in a consistent interpretation with Hebrew meaning of *dabar* or Logos who was with God since the beginning, cf. John 1;1, Colossians chapter 1.1.[1]

Leibniz's "monads with windows" beautifully capture this notion. Each monad, representing a living being, houses its own life essence, its unique spark of the divine, while remaining open to influences from other monads and the overarching divine influence. This interconnectedness fosters both individuality and a shared essence, creating a tapestry of life woven from both autonomy and unity. Pan-Christic biogenesis, with its focus on the hidden forces of order, disorder, synchronization, and life essence, offers a framework for understanding life that transcends the limitations of purely materialistic perspectives. It recognizes the interplay of chance and determinism, competition and cooperation, and acknowledges

[1] With special thanks to Prof Pramod, an earlier version of our interpretation of Genesis 1:1 has been presented at 1st Conference of Philosophy Research, held at Malla Reddy University, India, Aug. 2022.

the presence of a divine spark within every living creature.

To find traces of Pan-Christic biogenesis origin in proto-solar system

The alluring hypothesis of pan-Christic biogenesis, with its focus on hidden forces and divine essence intertwined with evolution, invites us to peek beyond the established narratives of life's emergence. To lend concreteness to this theoretical framework, let's turn our gaze towards the very birth of our solar system, seeking traces of pan-Christic biogenesis in the primordial dance of dust and gas that gave rise to our celestial home.

The early solar system, a swirling nebula known as the protoplanetary disk, presents a compelling canvas for this exploration. This cosmic cradle contained a rich tapestry of organic compounds and complex prebiotic molecules – the building blocks of life – as evidenced by meteorites and comets, remnants of that ancient era. These celestial wanderers carry within them a whisper of the past, a potential Rosetta Stone of pan-Christic origins.

1. The Whispers of Life in Comets: These icy celestial bodies are time capsules, frozen in the deep space for billions of years. Their pristine makeup holds traces of the protosolar nebula, offering a glimpse into the primordial soup from which life may have arisen. Recent missions like Rosetta have detected a remarkable variety of complex organic molecules within comets, including amino acids, the very building blocks of proteins. Could these be mere random products of cosmic chemistry, or do they

resonate with the "life essence" proposed by pan-Christic biogenesis? Perhaps their specific arrangement, their very presence within the icy embrace of a comet, speaks of a guiding force, a hidden order beyond the realms of pure chance.

2. Asteroids: Fossilized Seeds of Pan-Christic Potential: While lacking the icy embrace of comets, asteroids offer another window into the early solar system. Composed of rocky remnants from the protoplanetary disk, they too can harbor organic compounds and offer insights into the initial distribution of these life-giving molecules. The presence of complex amino acids in certain meteorites further fuels the fire of pan-Christic inquiry. Could these be traces of a proto-ecosystem, an early spark of life nurtured by the "order and synchronization" forces within the protoplanetary disk? Or are they merely echoes of a cosmic game of chance, devoid of any divine orchestration?

3. The Link Between Proto-Solar System and Life's Essence: Tracing the connection between these primordial traces of life and the pan-Christic concept of "life essence" requires venturing beyond the realm of physical evidence. It asks us to contemplate the interplay between the material and the divine, the dance between the building blocks of life and the spark that animates them. Perhaps the protosolar nebula, with its rich prebiotic soup and intricate dance of forces, represents not just a random scattering of materials, but a crucible where the "life essence" first infused into

existence, imbuing even the nascent forms of life with a potential for growth and evolution.

While definitive proof of pan-Christic biogenesis may remain elusive, the very act of seeking its traces in the proto-solar system pushes the boundaries of our understanding. It compels us to consider the possibility that life is not merely a product of chance collisions and ruthless competition, but a symphony orchestrated by hidden forces, both material and divine. The whispers of life in comets, the fossilized potential in asteroids, and the grand cosmic story of the protoplanetary disk all become potential clues in this grand detective story, urging us to listen for the echoes of pan-Christic biogenesis in the very origins of our solar system.

The search for life's origins, then, becomes not just a scientific pursuit, but a philosophical and spiritual one as well. It invites us to embrace the mystery, the interconnectedness, and the possibility of a universe imbued with meaning beyond the material. And perhaps, in this very act of seeking, we may uncover not just traces of life, but a deeper understanding of our own place within the grand symphony of existence.

Two possible ways to soothe impending global climate changes: Discussions on Shannon entropy, increasing Earth surface temperature, and deep-sea fisheries

First, we shall discuss that there are certain kind of fishes which are likely to affect global sea temperature, then in turn it will also affect global climate changes. Recent research suggests a link between specific deep-sea fish populations and ocean temperature regulation.[20] These specialized fish, through their biological processes and ecological roles, might play a part in maintaining a natural oceanic balance. Uncontrolled deep-sea fishing in recent decades could have inadvertently disrupted this delicate equilibrium, contributing to rising global temperatures.

Design thinking, with its emphasis on human-centered solutions and iterative problem-solving, offers a framework to address this challenge. Here's how Ikigai principles can be integrated:

- Empathize with the Ocean: Understanding the ocean ecosystem, including the role of deep-sea fish, becomes paramount. Scientific research and data analysis are crucial at this stage.
- Define with Purpose: The problem statement needs to consider not just temperature reduction but also protecting biodiversity and ensuring a sustainable future for the oceans. Ikigai's focus on purpose can guide this definition.
- Ideate with Innovation: Brainstorm a range of solutions that go beyond

simply banning deep-sea fishing. This could involve: Identifying specific fish species critical for temperature regulation. Implementing quotas and regulations for sustainable deep-sea fishing. Exploring alternative fishing practices with minimal ecological impact.

- Prototype with Responsibility: Pilot programs can be implemented to test the effectiveness of proposed solutions. This phase can involve collaboration with fishing communities to find workable solutions.

- Test with Impact: Continuously monitor the impact of implemented solutions on deep-sea ecosystems and global temperature. Ikigai's emphasis on finding solutions that create a positive impact becomes crucial here.[20]

Secondly, in this regards, allow us to reiterate our previous article, that it is very important to note here that some reports made by climate experts have indicated that it is highly likely that the Sun will enter into a Maunder minimum in the next couple years, which will last for 20-30 years to come. Since the Sun activity highly affects Earth temperature, then it can be expected that the Earth will experience cooling, which some climatologists refer to as the Little Ice Age. This global cooling can be observed in recent extreme climate conditions such as snow storms in some regions in USA in January-February 2014 and also during this winter (January 2015). Other

indication includes the fact that the Arctic Ice has increased 29% in size from 2012-2013, which indicates the coming of "global cooling" [9].

Such a global cooling phenomenon has been related to low Solar activity, as reported by Mr. John Casey (www.spaceandscience.net) and Dr. Dong Choi (www.ncgt.org). This phenomenon then causes us to ask concerning what we can do as human being in Earth to avoid the worsening situation in terms of Earth cooling temperature in the coming years.

Background theory on information entropy

In the mean time, it is well known that Shannon information entropy can reduce to the Boltzmann entropy, but in literature we are not sure yet how temperature in thermodynamics sense can be related to the information entropy measures.

Shannon information entropy is defined as follows [1, p.4]:

$$S = -k \sum_{i=1}^{W} p_i \ln p_i \tag{6}$$

For the uniform distribution, then the Shannon entropy takes on its maximum value and it reduces to be Boltzmann entropy [1, p.5]:

$$S = k \ln W \tag{7}$$

And then we conclude that both equations essentially correspond to the same process, i.e. the sending and receiving of information, provided we

assume that the Earth is a large information retrieval system. Therefore we can accept that actually Boltzmann entropy is neatly related to information entropy, and therefore we can proceed further to accept that the thermodynamics temperature of the Earth corresponds neatly to the amount of information sent and received in the Earth. Note Actually Boltzmann himself did not realize the full implications of his thermodynamics equation, because he did not know beforehand how the Sun activity actually corresponds to the ambience temperature of the Earth.

The correspondence between the process of information retrieval and thermodynamics entropy can be expressed as follows [2, p.6]:

$$\left| \frac{\delta Q}{dS/(\ln 2)} \right| \geq kT \,.\, \ln 2 \qquad (8)$$

where the principle is based on Clausius inequality and states that many-to-one operations like erasure of information requires the dissipation of energy. And the right hand side of the inequality is known as Landauer bound.

In other words, one should be very careful because sending and receiving useless information can affect temperature without one realizes it, although how precisely the mechanism that information can affect global temperature remains mystery. This increasing information content of the Earth has been discussed in a few papers, see for instance Hosoya-Buchert-Morita ' s paper [3], although they figure out the problem without

connecting it with the increasing of temperature of the Earth. It is because they assume that the increasing information content is related to the Relative Information Entropy of a cosmological model containing dust matter [3]; but actually the increasing information content in the Universe corresponds strongly to the increasing use of online information in recent decades.

That effect can also be related to what Nicola Scafetta and Bruce West wrote [5], that Earth's short-term temperature anomalies and the solar flare intermittency are linked, and the relation can be expressed in terms of Shannon entropy, S(t):

$$S(t) = -\int_{-\infty}^{\infty} p(x,t)\ln[p(x,t)] = A + \delta \ln(t), \quad (9)$$

Where A is constant and δ is found to be 0.67 for global temperature data between 1860-2000. However, since 2000 the global temperature shows declining change significantly caused by low Sun activity.

It should be emphasized here that Solar activity is not the only factor that affects Earth's temperature, other factors may include planetary synchronicity [6].

Moreover, it should be noted that there is a critique on the hypothesis that Solar activity affects global temperature, see for instance Gil-Alana et al. [8], nonetheless their arguments have been refuted by Scafetta in his recent paper [7].

Therefore, the conclusion is that there is nonlinear relationship between Sunspot number and Earth temperature. In the subsequent section, we will discuss a possible model in terms of Momentary Information Transfer as proposed by Runge *et al.*

Further discussion

While our proposition here is somewhat simplified, here we discuss further how things are possibly linked:

Global data growth → Shannon entropy → global average temperature → Schumann resonance

For instance, some researchers have shown:

1. Global average temperature is linked to Schumann resonance

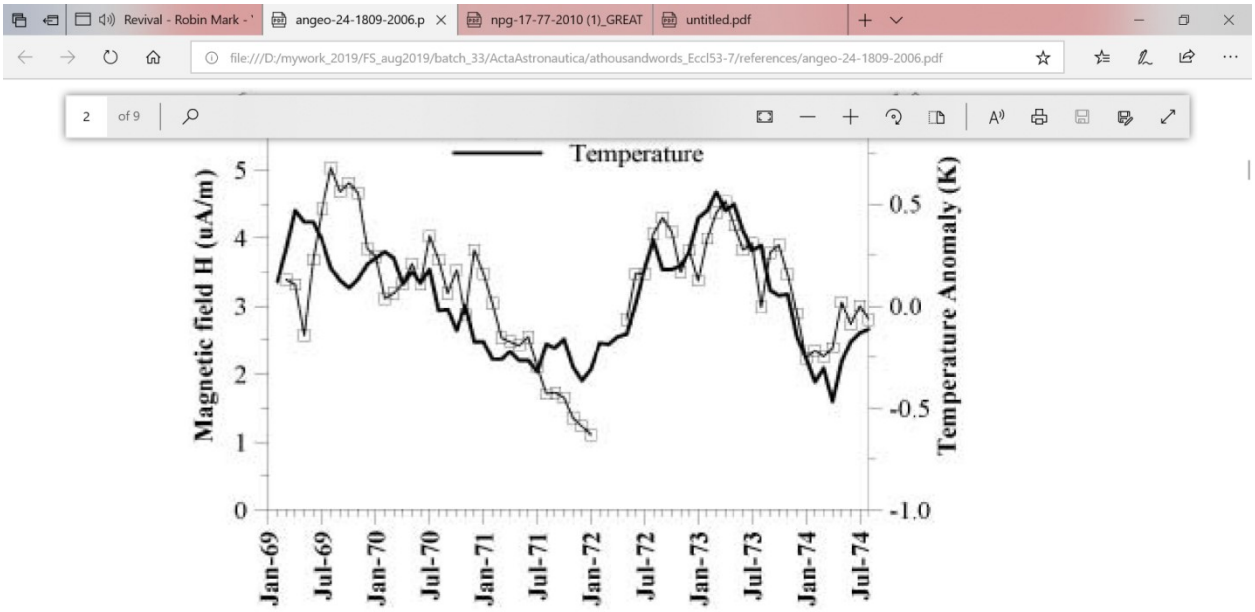
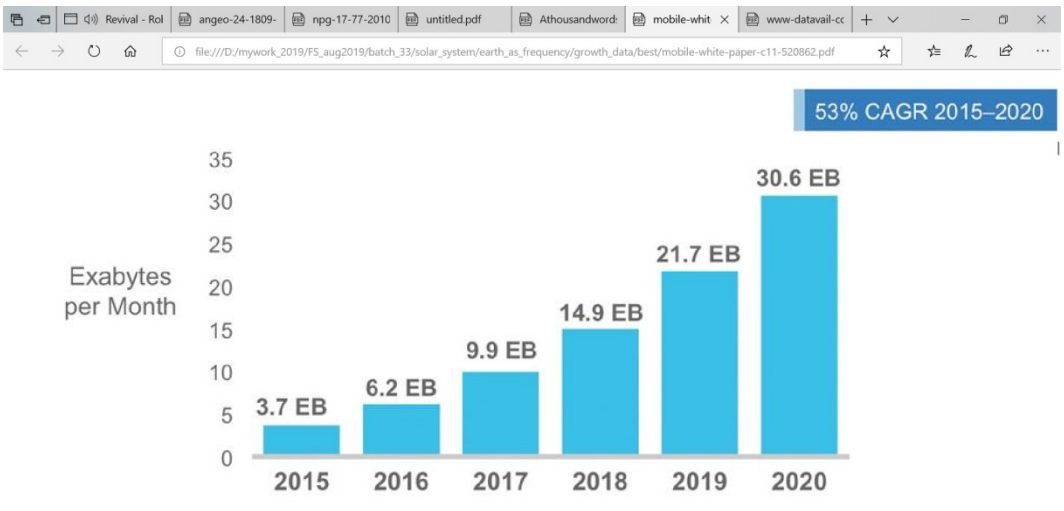


Fig. 1. Correlation between the global temperature and the intensity of Schumann resonance oscillations (adopted from Williams, 1992).

Source: ref. [12]

Note: since Schumann resonance seems to be related to human/global consciousness, we can also hypothesize that variation in Schumann resonance frequency also affects global consciousness. As global data is increasing exponentially, almost following Moore's law.



Source: Cisco VNI Mobile, 2016

Figure 2. Source: Cisco VNI Mobile, 2016. See [10][11]

2. and Shannon entropy is also linked to variation of Earth magnetic field (using Kolmogorov or k-entropy). See ref. [13].
3. Declining Earth magnetic field is also linked to Earth climate, as emphasized by Campuzano et al. in a recent report in Plos ONE [14]:

> "The debated question on the possible relation between the Earth's magnetic field and climate has been usually focused on direct correlations between different time series representing both systems. However, the physical mechanism able to potentially explain this connection is still an open issue. Finding hints about how this connection could work would suppose an important advance in the search of an adequate physical mechanism. Here, we propose an innovative information-theoretic tool, i.e. the transfer entropy, as a good candidate for this scope because is able to determine, not simply the possible existence of a connection, but even the direction in which the link is produced. We have applied this new methodology to two real time series, the South Atlantic Anomaly (SAA) area extent at the Earth's surface (representing the geomagnetic field system) and the Global Sea Level (GSL) rise (for the climate system) for the last 300 years, to measure the possible information flow and sense between them. This connection was previously suggested considering only the long-term trend while now we study this possibility also in shorter scales. The new results seem to support this hypothesis, with more information transferred from the SAA to the GSL time series, with about 90% of confidence level. This result provides new clues on the existence of a link between the geomagnetic field and the Earth's climate in the past and on the physical mechanism involved because, thanks to the application of the transfer entropy, we have determined that the sense of the connection seems to go from the system that produces geomagnetic field to the climate system. Of course, the connection does not mean that the geomagnetic field is fully responsible for the climate changes, rather that it is an important driving component to the variations of the climate."

Urgent recommendation

Now we obtain that temperature of the Earth can be modeled by assuming that *the Earth is a large information-retrieval system*, therefore Shannon information entropy can be used to represent the amount of information sent and received in the Earth. Therefore if many people send and receive information to the system without taking care to its effects to the temperature of the Earth, then the accumulative result can be dangerous to the entire system, including to the human population and environment of the Earth. Now we see that the use of online information is already increasing rapidly in recent years largely because of the Internet, and as a result it contributes to the declining temperature in this Earth, and it enters beyond Terabytes data (even going to EB scale).

Therefore, we urge that server administrators of the online information, including online email servers, to reduce the amount of information which are put 'online'. This action shall include reducing the amount of emails which are put online, and reserve those emails into offline databases. But this action shall be made carefully and responsibly, otherwise it may cause Ice Age again in this Earth, and also disturbance of environment stability, because of rapid decreasing of temperature.

The effect of reducing the amount of online information can be observed and felt almost immediately, because of the entropy and

temperature is transmitted immediately; it is because the Earth is intertwined to the Universe.

We hope this short article will be read in front of other physicists and also in front of all server administrators of online information channels, including Yahoo!, Google, and other large email servers etc.

Concluding remark

Ultimately, the quest for understanding the universe's origins requires an open mind and a willingness to explore all avenues of inquiry. Rigorous scientific investigation, open-mindedness to alternative models, and respectful dialogue between science and faith traditions can pave the way for a richer understanding of our cosmic and existential place in the grand scheme of things.

What we are suggesting in this paper is that perhaps it is possible to model Sun-Earth interaction in terms of Shannon entropy. Since Shannon entropy can be expressed as bit of information, then it would mean that perhaps we can do something with Earth temperature by controlling the amount of information transfer and storage in the Earth.
Since Shannon entropy can be expressed as bits of information, then it would mean that perhaps we can do something with Earth temperature by controlling the amount of information transfer and storage in the Earth.

Alternatively, we also consider another perception to reduce the increasing deep-sea and Earth surface temperature and related impending global climate changes, by monitoring and controlling population of deep-sea fishes which are likely to alter deep-ocean temperature.

Acknowledgement

Many thanks to Dr. Dong Choi who confirms the investigation on global cooling made by Dr. John Casey. Special thanks to Dr. James F. Peters who has given answer to this writer concerning my question at researchgate.net: "Is it possible to describe sub-earth interaction as a function of Shannon entropy?" He also pointed to a very useful unpublished dissertation by Jakob Runge (2014), which is cited here too [4]. Discussion on Shannon entropy and relation to physics of information can be found in an excellent volume edited by W.H. Zurek (1990) *Complexity, entropy and the Physics of Information*, Addison-Wesley, Inc.[2] One of us (VC) also wishes to thank Prof. Thee Houw Liong, PhD. for suggesting him to read materials related to Schumann resonance, and also to Prof. Florentin Smarandache, Prof. Carlos Castro Perelman, and Robert Neil Boyd, PhD. for discussions and encouragement. The present review article was partly based on earlier discussion on age of Earth by two of us, VC and IS, around 3 or 4 years ago.

Maranatha!

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