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INTEGRATED SOLAR SYSTEM THERMODYNAMIC MECHANICS APPLIED TO GEOLOGICAL ENGINEERING

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ABSTRACT

Regarding the problem of evolutionary thermodynamics related to Geophysics and Heliophysics, it is proposed to study solutions to terrestrial warming and cooling cycles. An answer is in Solar System plasma conditions generated from the Heliosphere, their effects on the Geospheric warming and cooling cycles and geological strata, and further geoengineering structures based upon geochemical mechanics of said Earth Geosystem.

Keywords: Tesla-Schumann Resonances, heliosphere, computational geology, navier-stokes, quantum geochemistry.

INTRODUCTION

The Earth and near Solar system are demonstrated as dynamo-like energy resources. Massive piezoelectric electrostatics are noted in important geological strata (Christodoulou *et al*., 2015), from induced power similar to lightning strikes from the ionosphere to the geosphere. The reasons for the cited variations in Quasi-Biennial Oscillation [QBO] are because of earth-based oceanic and atmospheric currents which are mostly generated by wave resonance interdynamics between sun, heliosphere, geosphere, interplanetary medium and earth whether atmospheric, oceanic or terrestrial. Systemic heuristics in this research are important for computer modeling and algorithm programming of strong isomorphic ocean-based meteorological dynamics and related climatological patterns and processes.

Systemic variable mechanics have direct correlation to the heliosphere and 11-year solar radiative electronic and magnetic cycles (Wilson *et al*., 2008), and the resulting ionization schemes of the geochemical and geophysical atmospheric heat exchanges on entire earth-based climatological and ecological systems.

Regarding space weather generating solar warming trends regarding geochemical and geophysical alterations in minerals and geology, the viewpoints are considered for global warming [on earth and other solar system planets]:

Indeed, Gerald Meehl of the National Center for Atmospheric Research (NCAR) presented persuasive evidence that solar variability is leaving an imprint on climate, especially in the Pacific. According to the report, when researchers look at sea surface temperature data during sunspot peak years, the tropical Pacific shows a pronounced La Nina-like pattern, with a cooling of almost 1o C in the equatorial eastern Pacific. In addition, "there are signs of enhanced precipitation in the Pacific ITCZ (Inter-Tropical Convergence Zone) and SPCZ (South Pacific Convergence Zone) as well as above-normal sea-level pressure in the mid-latitude North and South Pacific," correlated with peaks in the sunspot cycle (NASA, 2013).

It has been demonstrated that the sun's output in photonic heat, gravity, and magnetic emissions have direct affect on the earth's atmospheric weather patterns, such as warming, static or cooling geosphere, geophysics and space weather, through solar winds driving geospheric variability (Davy and Troccoli, 2012). What warms the earth's interior, exterior-terrain, and atmosphere is the sun's light and heat from the actions of the solar wind and corona, followed by atmospheric factors like $\mathbf{CO_2}$ emissions increase and Ozone $\mathbf{O_3}$ depletion, being warmed by the combination of the heat from the sun and the earth's heat from gases, oceanic evaporation, and other pollutants and particulate aggregations.

Therefore, planetary climates of the entire solar system are affected by total solar radition regimes. A 360-degree view of the Sun's effect on warming trends across the entire solar system are required (NASA, 2022). The earth's warming may be added to by $\mathbf{CO_2}$ emissions and ozone depletion:

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David Tholen, an astronomer at the University of Hawaii who measured the size of Pluto in the late 1980s using a series of occultations and eclipses involving Pluto's satellite, noted that even though Pluto was closest to the sun in 1989, a warming trend 13 years later shouldn't be unexpected. "It takes time for materials to warm up and cool off, which is why the hottest part of the day on Earth is usually around 2 or 3 p.m. rather than local noon, when sunlight is the most intense," Tholen said. Because Pluto's year is equal to about 250 Earth years, 13 years after Pluto's closest approach to the Sun is like 1:15 p.m. on Earth. "This warming trend on Pluto could easily last for another 13 years," Tholen estimated (MIT, 2002).

Proposal and Study

To promote the Geophysical Engineering research, Nikola Tesla's Advanced Magnifying Transmitter [AMT] power-generation and relay device are demonstrated for the purpose of estimating the relay and capacitance integrity of high-voltage, high-frequency AC electricity:

The Wave structure for impulse-driven transmission from the propagating system can be advanced given minimax burst-frequency of surface-Zenneck [++], transverse-Hertzian [+-], and scalar- [-+] longitudinal-Tesla electrical [—] transmission loss. This effect can be proposed for re-engineering for greater accuracy of lesser [-5%] loss mechanics from Tesla ground-and-air generation to upper atmosphere at 400 kV at 50,000 m (Bearden *et al*., 2000), relay and generation harmonic mechanics in multiple lower-atmospheric geolocations with given Magnifying transmitter stations (The Nikola Tesla Institute, 2022).

To advance this hypothesis, Tesla's Advanced Magnifying Transmitter [AMT] stations are constructed to engineer inherent and transient electrostatic and ionized plasma from branched atmospheric electrical circuit discharges. Electrical output potentials for magnifying transmitters and capacitance technologies for contiguous types of power relay, absorption or dissipation systems are thereby utilized. Additionally, Photovoltaic fields and Photovoltaic stations, and SCADA applied remote topographical computing (Carvalho *et al*., 2015) are utilized for Photovolatic renewable energy engineering sites.

Regarding contemporary and future geoengineering technology atmospheric wave-dynamics can be estimated. The differences in planetary mass and geochemistry, distance from the sun, rotational and revolutionary velocity and angle are therefore taken into account for the time and kinds of differences in warming actions as noted by Tholen. Given this data it seems more likely that the earth's global warming trends are in an important proportion caused by the Heliosphere's action upon the Geosphere and Geo-magnetically-Induced Currents [GIC].

MATERIALS AND METHODS

Topological defects per Kibble-Zurek Mechanism [KZM] given Time freeze-out where

$$\bar{t} = [\lambda(\bar{t})]^{-z\nu} \Rightarrow \bar{t} \sim \nu^{-z\nu/(1+z\nu)},$$

given length scale

$$\bar{\xi} \equiv \xi[\lambda(\bar{t})] \sim \nu^{-\nu/(1+z\nu)}$$

[Formula 1]

in the stable crystal structure of minerals, geostones, elements in earth are demonstrated to operate as resonant quantum information keys for computation of physical material. It is proposed they utilize a Topological Quantum Field Theory [TQFT] memristance, in quantum decoherence and entanglement regimes. Given that 1D, 2D and 3D structures using Graphene are useful for rapid electrical charge and discharge, high-density, ductile chemical elements as materials can additionally be used in conjunction with plasma for ultra-high power generation systems for industrial use (Weidman *et al*., 2016). **H** or **Na**-type batteries are ostensibly cheaper than **Li** or **Ni** and worthwhile for stationary applications. However **Si** batteries are demonstrated to be cheaper, and possibly, better technology, in that **Si** batteries are more versatile, of a more durable structure for engineering medium-scale power usage requirements, and are more ready-recyclable, than **Na**-type batteries.

From the Quantum-to-Atomic scales it has been demonstrated bacteria can be utilized for recycling **Fe** to build a Geochemical Capacitor Array [GCA] of types of microbial systems for the purpose of electronic exchange (Byrne *et al*., 2015). These act as cellular automata to activate and sustain electrical exchange in geological strata as well as hydrological dynamics. In Topological Quantum Field Theory [TQFT] magnetic quantum crystals can be utilized for quantum computation resistors in **Rb** checkerboard. As secondary Geophysical energy sources alkaline battery cell structures such as Fe are mined from the earth's crust. **C** can be engineered from coal or graphite and has a cheaper, stronger and more electrically-efficient atomic structure. It is noteworthy that increasing surface area and concentration power of the photoelectric materials, are integral for photovoltaics to build heat and heat-to-potential-electrical-power storage reserves for distribution, for advanced generations of integrated renewable energy systems.

Mathematical Formulas

The initial source of terrestrial power generation from space weather (Cannon *et al.*, 2013) is inherent in the Dynamo theory of Geophysics, which is utilized as a working theory for energy harvesting of Geomagnetically-Induced Currents [GIC], such as types of telluric currents at frequency and velocity as Extremely Low Frequency [ELF].

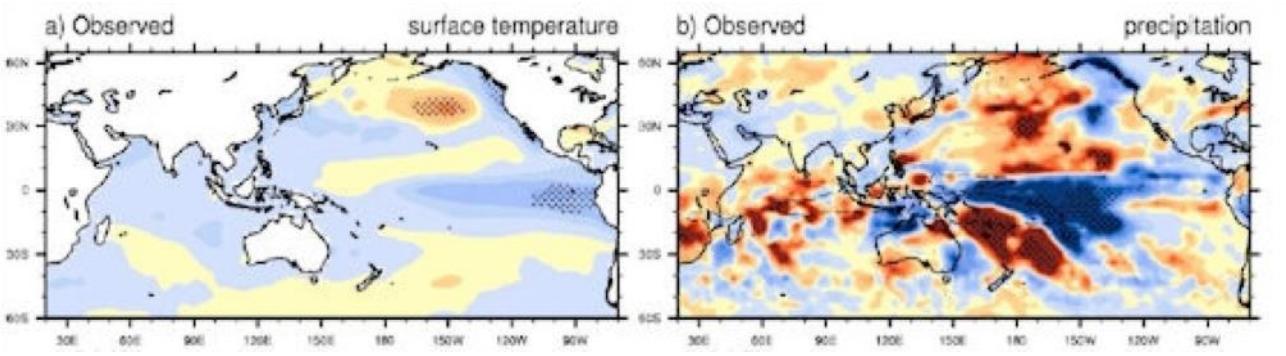

Fig. 1. Composite averages for December-January-February for peak solar years. (Source: Meehl *et al*., 2009; reprinted with permission from AAAS; Phillips, 2013).

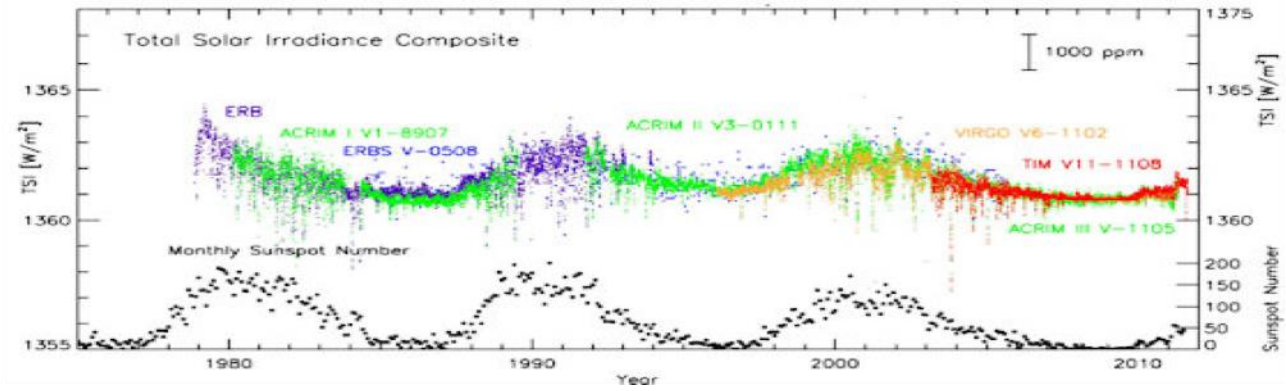

Fig. 2. Space-borne measurements of the total solar irradiance (TSI) show ~0.1 percent variations with solar activity on 11-year and shorter timescales. These data have been corrected for calibration offsets between the various instruments used to measure TSI. (Source: Courtesy of Greg Kopp, University of Colorado; Phillips, 2013).

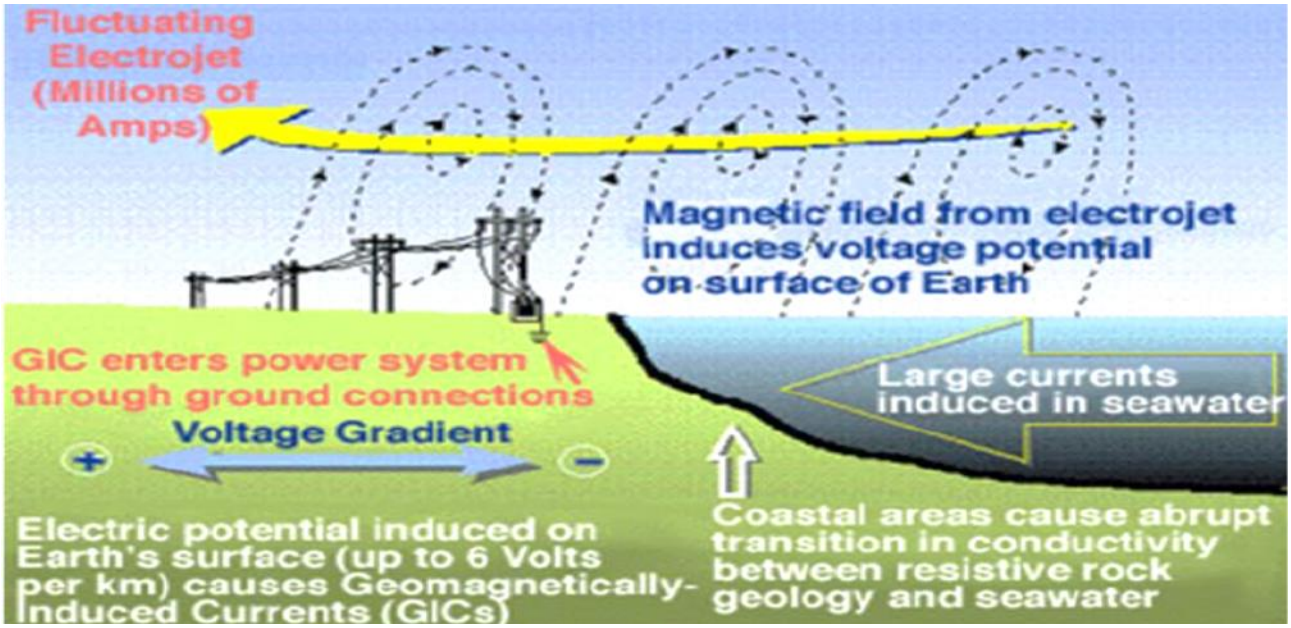

Fig. 3. Space Weather Impact on the Scandinavian Interconnected Power Transmission System. Report number: EUR 27571 EN Affiliation: European Commission, Joint Research Centre DOI: 10.2788/939973] (Piccinelli and Krausmann, 2015).

The earth's internal, surface and atmospheric Electro-magnetic gravitics can be engineered globally and locally from the Coriolis magnetic induction

$$\frac{\partial \mathbf{B}}{\partial t} = \eta \nabla^2 \mathbf{B} + \nabla \times (\mathbf{u} \times \mathbf{B})$$

and

$$\eta = 1/\sigma\mu.$$

[Formula 2]

Navier-Stokes fluid density dynamics equation is therefore utilized from the Cauchy momentum where

$$\frac{\partial}{\partial t}(\rho \mathbf{u}) + \nabla \cdot (\rho \mathbf{u} \otimes \mathbf{u} + p\mathbf{I}) = \nabla \cdot \boldsymbol{\tau} + \rho \mathbf{g}$$

[Formula 3]

from

$$\frac{\mathrm{D}\mathbf{f}}{\mathrm{D}\boldsymbol{\pi}} = -\Delta^{\flat} + \nu\Delta_{\mathfrak{z}}\boldsymbol{\pi} + \flat_{\backslash}^{\mathfrak{g}} + \Im\mathfrak{V} \times \boldsymbol{\pi} + \mathfrak{V} \times \mathfrak{V} \times \mathbf{B} + \mathfrak{I} \times \mathbf{B}$$

[Formula 4]

Dynamic pressure parameters are utilized where

$$Ra = \frac{g\alpha T D^3}{\nu\kappa}, E = \frac{\nu}{\Omega D^2}, Pr = \frac{\nu}{\kappa}, Pm = \frac{\nu}{\eta}$$

[Formula 5]

Ionic monocrystal **Li**-compound [**Li9.54Si1.74P1.44S11.7Cl0.3** and **Li9.6P3S12**] (Pirjola, 2007) and also earth batteries singly or in concurrent circuits joined or separate from power transmission grids from ELF ground 3 to 60 hz primary cell to capacitance terminal demonstrate timed electrical grids or natural synchronous circuit propagation and solid-state durability across high temperature fluctuations. Earth batteries utilize **Fe** and **Cu** discrete flux differentials, to propagate current-branching differentials.

These are proposed to attract dynamic or localized Geomagnetically-Induced Currents [GIC] (Molinski, 2002) thereby propagating controlled voltage channels and circuit relays toward geographic nodal points, based upon solenoid-delegation of local electrical resistance:

$$R=V/I\ ,\ G = I/V = 1/R,$$

[Formula 6]

and in Ohm's Law:

$$R = \rho\ l/A, \text{ and } G = s\ A/l$$

[Formula 7]

in given Geological and confluent, interacting atmospheric dissipative systems. Electrical power is defined where:

$$P = \text{work done per unit time} = VQ/t = VI.$$

[Formula 8]

DISCUSSION

Geothermal electric power can be utilized for the purpose of generation and distribution from geothermal station capacitors and dynamos as primary generating station, therein utilizing various materials for differing engineering challenges.

Solid-state phosphoresence, developing a phosphorescent crystal structure activated by light storage from **Na**-vapor lamp however in solid-state (Bolton *et al*., 2011) such as **ZnS** that can furthermore be grown, and the Zero-instruction-set programmed as a solid-state memory device for a given spatial area. This state can make current design times redundant and save more power generation, transmission or diffusion costs.

Hydropower [**H_20**], including coastal and river tidal- and hydro-wave power dynamics and technology are accessible to most regions and have continual power regeneration, similar to solar or photovoltaic energy, or plasma energy sources. Methods to absorb, transduce and generate Hydro-power for electrical capacitance and propagation include turbines, dams, pendulums and hydro-wave-harnessing systems. To advance maximal efficiency of power generation criteria include:

I. Number many maximal site potentials for this tidal generator are there in the region.
II. Criteria for what constitutes maximal site including thermoentropy, water depth, rate velocity schedules of currents, wave anomaly schedules.
III. Weather criteria sets such as chronological storm schedules, which may increase or decrease power uptake for this tidal generator type.

These **Fe**, **$Fe^{2+}Fe^{3+}{}_2O_4$ Magnetite**, or **Cu** induction capacitances, or **SiO_2 Quartz** relay units, are utilized at the classical scale for purposes of magnetic moment resonances fields, for geospatial and geomagnetic Renewable Energy utilization. The purpose is to drive computation of orbital resonance across the Electromagnetic spectrum from Gamma [300 EHz, 1pm, 1.24 MeV] through Extremely-Low Frequency [ELF] [3 Hz, 100 Mm, 12.4 feV], and solitonic activation in probability amplitudes, and quantum entanglement.

Mathematical Formulas

Therefore in a nonlinear system time-scale calculus where

$$f: \mathrm{T} >> \mathrm{R}, \text{ from } t : t \text{ set } T$$

[Formula 9]

we can estimate

$$|f(\sigma(t)) - f(s) - f^{\Delta}(t)(\sigma(t) - s)| \leq \varepsilon|\sigma(t) - s|$$

[Formula 10]

Across Time-scales in given time-intervals as a dynamic system therefore

$$\int_r^s f(t)\Delta t = \int_{[r,s)} f(t) d\mu^{\Delta}(t)$$

.

[Formula 11]

CONCLUSION

The importance of the Heliosphere-to-Geosphere wave function regime continuum to growth and combination of elemental, and crystal structure atoms, is demonstrated in spectroscopy, geochemistry, crystal mechanics, for the purpose of engineering power generation and relay systems.

Mechanics for evolutionary algorithmic landscapes of these Geophysical frequency arrays are, from the Planckscale, based upon electromagnetic and entropic qualities of phononic and solitonic phases. These phases are inherent to the crystal-structure hardness and electro-magnetic permeability of geological Carbonide material, demonstrated from **C: Graphite**, **Graphene**, **Diamond**, **Diamondite**, to **$ZnCu_3(OH)_6Cl_2$ Herbertsmithite**.

Experimental allegories to the purpose of the baseline structure of material are to be demonstrated in potential computation. Nikola Tesla proposed a scalar effect of longitudinal waves through geophysical material transduction in Geomagnetically-Induced Currents [GIC] in geological strata (Baird *et al*., 1967) and in measured Tesla-Schumann Resonances at 7, 14, 20, 26, 33, 39, 44 to 50 Hz *via* downward currents of the ionosphere. Quantum entanglement properties of photovoltaic crystals have been demonstrated in the literature, regarding engineering semiconducting solar cells (Liew and Savona, 2012).

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