

Is Human Activity Linked to Climate Change?

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Abstract

This paper establishes the link between human activity and climate change, e.g., more frequent and devastating typhoons, tornadoes, bushfires, droughts, floods and snowstorms and melting of the northern polar ice cap and recent occurrences of super typhoons and tornadoes. Qualitative mathematics and modeling (QMAM) explains this link and its remarkable verification based on the grand unified theory (GUT).

Keywords

Chaos; Coriolis Effect; Earthly Turbulence; Coefficient of Elasticity; Electromagnetic Wave; GUT Technology; Nested Generalized Fractal; Northern Pacific Wind Cycle; Primum; Superstring

1. Introduction

Is there a direct link between human activity and climate change? The answer is a categorical *yes*. Specifically, we have seen frequent and devastating typhoons, tornadoes, bushfires, droughts, floods and snowstorms and their verification has been quite astounding in recent years. In the last two years we experience the devastating impact of super typhoon Haiyan in the Philippines and the super tornadoes in Oklahoma State. The melting of the northern polar ice cap has been detected in recent years. They are the direct impact of the increased carbon level in the atmosphere due to factory emissions and fossil based technology exhausts. We provide the explanation of this link based on the grand unified theory and state categorically that the traditional methodology of quantitative modeling (formerly called mathematical modeling) cannot resolve this issue.

2. Physical Concepts and Natural Laws

We introduce the relevant physical concepts *partially* until they are well defined by laws of nature. As in mathematics where undefined concepts (by the basic premises or axioms) are inadmissible, so are undefined physical concepts (by natural laws) since they bring in ambiguity. A *physical concept* is a mathematical model that

its physical referent (e.g., a piece of rock) that exists in nature (our universe) regardless of any observer. In contrast, a *mathematical* or *abstract* concept is created by thought (intelligence) and has no physical referent, e.g., distance. In fact, mathematics like any other language is a creation of thought. Traditional science deals with the appearances of nature (natural phenomena). Quantitative modeling *describes* them mathematically its tools computation and measurement. *Energy* is motion of matter; therefore, matter and energy are never separate and anything that has energy, e.g., photon, has *mass*. *Wave* is suitably synchronized vibration of its medium but does not go with it; it results from the resolution of contending forces in the medium. In water wave, for instance, they are gravity and pressure and every molecule in its path vibrates but does not go with it [1]. Its propagation follows the natural law discovered while explaining the disastrous final flight of the Columbia Space Shuttle in 2004 [2]:

Resonance Law. Maximum resonance between waves, oscillation or vibration occurs when they have exactly the same characteristics with wavelength or frequency as the principal factor. The degree of resonance declines with the difference between wave characteristics. However, at suitably high order of magnitude of frequency the infinitesimal effect of orders of magnitude nearby becomes significant.

Dark matter, one of the two fundamental states of matter, consists mainly of non-agitated superstrings [1] [3]; being not observable, it is known only by its impact on *visible* or *ordinary* matter, the other fundamental state. The *superstring* is the fundamental building block of matter discovered in 1997 [4] but embellished with structure, properties and behavior by natural laws in a series of papers consolidated as GUT in 2008 [5].

Basic cosmic or *electromagnetic wave* is generated by the natural vibration of atomic nucleus propagated across dark matter that fills up the Cosmos [1]. Nuclear vibration is due to the impact of electromagnetic waves coming from all directions its characteristics determined by the structure of the atom in accordance with this natural law introduced by Frederick Engels (modified) [6]:

Internal-External Factor Dichotomy Law. The interaction, dynamics and physical characteristics of a physical system are shaped by internal and external factors; in general the internal is principal over the external and the latter works through the former.

Flux is motion of matter with identifiable direction at each point, e.g., wave. *Turbulence* is coherent flux e.g., typhoon, which is stable during its duration. *Chaos* is mixture of order none of which is identifiable, e.g., at the onset of a typhoon trillions of air molecules rush towards tropical depression; the motion of a molecule cannot be predicted due to the immensity of rushing molecules and their collisions in view of the uncertainty of large and small numbers [7]. However, every molecule is subject to natural laws that define its order.

3. The New Methodology

Quantitative modeling has inadequacy that left long standing problems unsolved, e.g., the gravitational n-body and turbulence problems [4] [8], and fundamental questions unanswered, e.g., what the fundamental building block of matter and structure of the electron are. The remedy is qualitative mathematics and modeling (QMAM), the main contribution of [9], that *explains* not only natural phenomena but also how nature works in terms of its laws its tool qualitative mathematics, the complement of computation and measurement, so that, in a sense, these two methodologies are complementary. QMAM was applied to physics for the first time to solve the gravitational n-body problem in 1997. Qualitative mathematics involves the following activity:

Making conclusions, visualization, abstraction, thought experimentation, learning, creating concepts for building mathematical space, intuition, imagination, trial and error to sift out what is relevant, negating what is known to gain insights into the unknown, altering premises to draw out new conclusions, thinking backwards, finding basic premises for a mathematical space and devising techniques that yield results.

Qualitative mathematics was the crucial factor in the critique-rectification of mathematics that led to the development of the new real number system, complex vector plane, nested generalized physical fractal and generalized integral and derivative that constitute the mathematics of GUT [7] [10]-[13] and its development of GUT and theoretical and practical applications [4] [5] [13]-[15]. GUT which originated in physics unifies the natural sciences on the superstring and makes physics the only truly basic science that underlies every discipline of natural science. While quantitative modeling is concerned with the appearances of nature, QMAM is concerned with nature itself and provides the leap from traditional to the new science articulated by GUT. Moreover, only QMAM is capable of proving scientific truth deductively with utmost mathematical precision and rigor from natural laws.

4. The Superstring

We recount the discovery of the superstring using QMAM starting with the following fundamental natural law, an enrichment and extension of the first law of thermodynamics to dark matter that says,

Energy Conservation Law. *In any physical system and its interaction, the sum of kinetic (visible) and latent (dark) energy is constant, gain of energy is maximal and loss of energy is minimal.*

This law has various expressions below.

Energy Conservation Equivalence Law. *Energy conservation has many expressions or forms: order, symmetry, economy, least action, optimality, efficiency, stability, self-similarity (nested fractal), coherence, resonance, quantization, synchronization, smoothness, uniformity, regularity, motion-symmetry balance, non-redundancy, non-extravagance, evolution to infinitesimal configuration, helical and related configuration such as circular, spiral and sinusoidal and, in biology, genetic encoding of advantageous physical characteristics, reproduction and order in diversity and complexity of functions and configuration that provides optimal advantages and capability.*

Each component here is called physical principle. The next natural law was inspired by a high school experiment.

Flux-Low-Pressure Complementarity Law. *Low pressure sucks matter around it and the initial rush of matter towards a region of low pressure stabilizes into local turbulence, e.g., vortex flux; conversely, coherent flux creates low pressure around it.*

The next law is central to primal and cosmological interactions. We first state its broad form.

Flux Compatibility*. *Two fluxes of the same direction attract, two fluxes of opposite directions repel.*

We now track down the superstring. The masses of bodies in the Cosmos add up to only 5% of our universe [12]. At the same time, it is known that matter forms in the Cosmos steadily at one star per minute [16]-[18]. It follows from Energy Conservation that what appears empty between bodies in the Cosmos, e.g., star, is matter that accounts for the 95% “missing” matter of our universe. We have called it dark matter since it is not detectable. Therefore, the question of what constitutes dark matter is not vacuous and our answer is: the *superstring*. We embellish it with structure, properties and behavior in accordance with natural laws.

What are the requirements on the superstring? It must be *indestructible*, otherwise, our universe would have collapsed a long time ago; it did not and has existed for 8 billion years [5]. It follows from being the fundamental building block of matter that, like the electron, there is only one superstring with unique structure, etc. By Resonance, the only force that interacts with it is electromagnetic wave [1]. When hit by suitable electromagnetic wave a non-agitated superstring (a) is thrown by its impact, bounces with others and comes to rest in dark matter when the imparted energy dissipates or (b) gets close to its earlier path, is sucked by it, by Flux-Low-Pressure Complementarity, and forms a loop, the original non-agitated superstring called toroidal flux traveling through the loop at $7(10^{22})$ cm/sec [19] [20]. By Energy Conservation and Energy Conservation Equivalence, its path shrinks and evolves to energy-conserving form: circular helical loop, its toroidal flux traveling through its cycles at this speed. By the fractal principle its toroidal flux, being a superstring, has toroidal flux, a superstring, traveling at this speed, etc., leading to formation of fractal sequence of toroidal fluxes, each a superstring, *without a last element*. The first term of the sequence is a semi-agitated superstring identified with the fractal superstring itself since its interactions are determined by it. We summarize our findings as a natural law.

Existence of Basic Constituent of Matter and its Generalized Nested Fractal Structure. *The basic constituent of dark matter is the non-agitated superstring, a circular helical loop and nested fractal sequence of superstrings or toroidal fluxes, with itself as first term; each toroidal flux in the sequence is a superstring having toroidal flux, a superstring, traveling at $7(10^{22})$ cm/sec through its cycles, etc.; each superstring except the first, is contained in and self-similar to the preceding term in structure, behavior and properties.*

This structure called *nested generalized physical fractal* [11] makes the superstring indestructible. The first term in the fractal sequence looks like a lady’s spring bracelet (Figure 1, [19]). *Self-similarity* means that each term in the fractal sequence except the first is similar to the preceding in structure and properties, in this case, being helical circular loop its toroidal flux—a superstring—traveling at $7(10^{22})$ cm/sec.

A superstring is non-agitated if its cycle length (CL) is less than 10^{-16} meters, semi agitated if $10^{-16} < CL < 10^{-14}$ meters and agitated if a segment has $CL > 10^{-14}$ meters.

By the quantization and synchronization principles, this speed of $7(10^{22})$ cm/sec is a constant of nature, e.g., speed of electric current. There is another possibility: (c) hit by suitable electromagnetic wave the first term of a

non-agitated superstring expands and becomes semi-agitated. In both cases (a) and (b) the superstring is a generalized nested physical fractal sequence of superstrings. Its latent energy comes from the motion of its toroidal fluxes, a super, super huge amount due to its fractal sequence structure and natural vibration.

When suitable electromagnetic wave hits semi-agitated superstring a pair of mutually exclusive events occurs: (d) the first term of its fractal superstring bulges to retain the toroidal flux speed despite imparted energy turning it into agitated superstring called *primum*, unit of visible matter, its toroidal flux non-agitated, or (e) the first term breaks, its toroidal flux remaining non-agitated (dark). We articulate our findings.

Dark-to-Visible-Matter Conversion Law. *When suitable electromagnetic wave hits a semi-agitated superstring one of these occurs: (a) the outer superstring breaks, its toroidal flux remaining non-agitated superstring; (b) a segment bulges into a primum, an agitated superstring and a unit of visible matter.*

When electromagnetic wave hits a superstring at most the first terms of its fractal sequence of superstrings breaks leaving the rest intact and nested fractal sequence of superstrings, *i.e.*, a superstring. Thus, this structure insures its indestructibility. It follows that the Universe of dark matter has no beginning and no end and by Flux-Low-Pressure Complementarity, it is unbounded and infinite, and our universe is a finite local bubble in it among other universes [21] [22].

By the Resonance Law, a physical system is observable with light if its size is comparable with the finest wavelength of visible light [2] [15].

When the toroidal flux along its cycles is hit by cosmic waves coming from all directions it is thrown into erratic motion and collides with other superstrings turning it into a *spike* with the centroid traveling through the cycles at $7(10^{22})$ cm/sec. It pulls the superstrings around the *primum* into its induced vortex flux with axis coinciding with the axis of the *primum* inside the cylindrical eye making it a magnet, its polarity in accordance with the right hand rule of electromagnetism (Figure 2, [19]). The induced vortex flux is counterclockwise for a positive *primum*, by convention, negative otherwise. The plane through the apex of its profile and normal to its axis is called the equatorial plane its intersection with the *primum* the equator.

The induced vortex flux is measured as charge, its unit the electron's charge: -1 . The electron, +quark, $-$ quark, charges -1 , $2/3$, $-1/3$, respectively [23], are basic *prima* since they comprise the atom. Seismic waves generated by the micro component of turbulence at spinning core of a cosmological vortex [24] converts dark to visible matter at staggering rate of one star per minute [16]-[18].

The latent energy density of dark matter is 10^{26} joules/cubic ft (de Broglie [25]) or $8(10^8)$ volts/cm (Seike Jr. [25]) and the equivalent of 18 kg/cu meter according to Gerlovin [23] using relativistic conversion.

The next natural law is a special form of Flux Compatibility* that applies to vortex fluxes of superstrings in quantum and macro gravity directly.

Flux Compatibility. *Two prima of opposite toroidal flux spins attract at their equators but repel at their poles; otherwise, they repel at their equators but attract at their poles. Two prima of same toroidal flux spin connect equatorially only through a primum of opposite toroidal flux spin between them called connector.*

5. Primal Interaction

Primal interaction is governed by Flux Compatibility and Flux-Low-Pressure Complementarity. The proton consists of two +quarks joined by a $-$ quark at their rims, by Flux Compatibility (Figure 6(a), [19]), their axis coplanar, by Energy Conservation, and its charge: $2/3 - 1/3 + 2/3 = 1$. Thus, the proton has counterclockwise vortex flux spin. Since a simple *primum* is charged, the neutral neutrino is a coupled pair of simple *prima* of numerically equal but opposite charges, say, $+q$ and $-q$, so that its charge is $+q + -q = 0$, neutral [26].

By Flux Compatibility, stability and optimality, the electron attaches to both +quarks beside the $-$ quark but away from the negative quark of the proton, by Flux Compatibility, their centers viewed from the north pole form the vertices of a quadrilateral. Their coherent fluxes make its interior a region of low pressure that sucks only light neutral *primum* (since charged *primum* is repelled by a charged *primum* already in the coupling). This is the configuration of the neutron and its charge: $+2/3 - 1/3 + 2/3 - 1 + 0 = 0$, *i.e.*, neutral (Figure 6(b), [19]).

Since the masses and composition of these *prima* are known [26] we can compute the neutrino's mass:

1) Neutron: $1.674(10^{-27})$ kg; proton: $1.672(10^{-27})$ kg; electron: $9.611(10^{-31})$ kg.

Converting to atomic mass unit (amu) their masses are:

2) Neutron: 1.0087 amu; proton: 1.0073 amu; electron: $5.486(10^{-8})$ amu, and the neutrino's mass is: $\eta = 8.5(10^{-8})$ amu or 1.55 times electron's mass which is 1840 times proton's mass.

6. Atom, Heavy Isotope and Molecule

The protons are first to form the nucleus of the atom (Figure 7, [19]). When there is only one proton it coincides with the eye of its vortex flux. If there are more their vortex fluxes add up to form the vortex flux around the protons which are joined pairwise by $-$ quarks [27]. Clearly, the nucleus is fractal, the electromagnetic wave it generates fractal and endowed with huge energy.

As positive coupled primum, the nucleus is a magnet of positive polarity with the vortex flux around it providing the magnetic field. Viewed from the north-pole the vortex flux of a free atom spins counterclockwise (right hand rule).

The electrons being negatively charged are attracted to the vortex flux away from the eye but being light they are swept into orbit by the vortex. By centrifugal force, the most energetic orbital electrons are closest to the equatorial plane; they form the outermost subshells [27]. The least energetic cluster near the poles and form the lowest orbital shells. A stable atom has orbital electrons equal to the number of protons in the nucleus. Otherwise, it is a positive or negative ion and reacts with other prima. Moreover, the eye sucks non-agitated superstrings that accumulate in the nucleus as mini black hole [1], the principal source of nuclear energy in nuclear fission [1]. In fact, every charged primum, simple or coupled, sucks and accumulates mini black hole in the eye. This was confirmed for the proton at CERN [28] by the great burst of energy attributed to the Higgs boson released when two protons collide at great speed. Thus, the Higgs boson is the mini black hole in the eye of a primum.

When two atoms join together in a molecule they share two valence electrons as connectors, one from each [1] [27].

7. Macro Standard Dynamics

We provide a sweeping overview of our universe and its cosmology, *i.e.*, its birth, evolution destiny (details in [29]). *Macro gravity* that includes astrophysics is the science of our universe as a super, super galaxy, *i.e.*, a super, super massive cosmological vortex flux of superstrings whose core (accumulated mass around the eye) is a compact cocoon-shaped galaxy clusters 650 million years across discovered by French Astronomers in 1994. Our universe is a local “bubble” in the boundless, timeless Universe of dark matter, a new perspective where previously it was thought our universe was *the* Universe, a source of error in the estimate of its age [5], especially, with the discovery of stars in the Milky Way older than the Big Bang [30]. It is a special universe that created a super, super depression which traces its origin to the Big Bang, explosion of a super, super massive black hole [31] 8 billion years ago [5], that has evolved to a super, super galaxy. Our universe has satellite galaxies its minor cosmological vortices, each galaxy has star satellites its minor cosmological vortices, each star has planetary satellites its minor cosmological vortices, etc. Thus, our universe is nested generalized physical fractal sequences of cosmological vortices, with itself as the common first element, that extend all the way through the atoms and superstrings. The destiny of the core of a cosmological vortex is a super, super massive black hole (super, super massive concentration of non-agitated superstrings) [24].

We focus on the solid Earth we are standing on together with its atmosphere as the core of a cosmological vortex flux of superstrings called gravitational flux. We recall that the standard dynamics is a cycle that starts with normalcy like a calm summer day in the Pacific Ocean. Then change in conditions occurs that induces passage to the transitional and unstable phase of chaos. Energy Conservation induces its transition to turbulence until the change in the normal conditions that served as initial boundary conditions vanishes and the cycle is completed as the conditions become normal [3] [8].

7.1. Earthly Turbulence

Our discussion is based mainly on [3]. Our universe is turbulence from the super... super galaxy itself all the way through cosmological vortices, atoms, prima and superstrings. But, we focus on Earthly turbulence and on only four of them that fall under the standard dynamics: earthquake, volcanic activity, typhoon and tornado.

7.2. The Coriolis Effect

We use an analogy to understand the *coriolis effect* that determines the spin of atmospheric and water vortices. This effect is seen on rapids. Suppose the current goes from west to east. Due to the combination of water vis-

cosity and friction with the river banks, there is steady flow gradient or relative water lag so that if we take a point on the middle line of the stream every point left or north of it moves in the opposite direction relative to it, *i.e.*, east to west. This is true of every point left or north of the middle line and a second point left or north of it and this goes all the way up to any point on the stream off the bank (This motion has a mirror image on the right side of the middle line). If we take a narrow strip of water left or north of and parallel to the middle line and represent its current by an arrow, the adjacent strip to its left (north) lags behind (countercurrent in the opposite direction) and we represent it by a short arrow pointing in the opposite direction, *i.e.*, west. By Flux-Low-Pressure Complementarity, this countercurrent, *i.e.*, the left (north) strip, pulls the forward tip of the right strip or arrow pointing east so that the latter veers north then west, by Flux Compatibility, then south, by Flux-Low-Pressure Complementarity and east, by Flux-Low-Pressure Complementarity and Flux Compatibility, and merges with the right strip. This is the mechanics of formation of an eddy all the way from the middle line through the north edge of the spring where eddies no longer form, *i.e.*, a lag no longer exists. (This motion has a mirror image south of the middle line) Thus, eddies or water vortices are formed north of the middle line that spin counterclockwise. The whole process that forms an eddy and determines its spin is called the *coriolis* effect which is an expression of Energy Conservation because its south rim repels the north rim of an eddy adjacent to it, by Flux Compatibility, and creates a gap between them that minimizes friction due to viscosity and facilitates the flow.

We leave the rapids and go to dark matter. The Earth's rotation is due to the pull by its gravitational flux, a vortex flux of superstrings with counterclockwise spin viewed from the North Pole so that its linear motion goes from west to east. If we take strips of the gravitational flux north of the Equator we find their steady lag from the Equator to the North Pole (the extremity of the cylindrical eye of the Earth's gravitational flux) that becomes 0 there. This is called the *polar lag* [32]. Although the polar lag is diminished by the *layer lag* [32] that decreases with increasing density of matter towards the inner core (layer lag in inverse proportion to the density of matter being pulled by the gravitational flux) where it is also 0 at the boundary of the eye, the net polar lag still remains and decreasing from the Equator to the North Pole (The Sun's polar lag was measured on the surface and found to be 30% of the Sun's linear speed at the equator midway between the Equator and the North Pole; it should be checked if this is a constant of nature for cosmological vortices). This polar lag gradient determines the spin of every vortex in the Northern Hemisphere like that of a typhoon or tornado which is counterclockwise [32]. However, when a typhoon starts in the Southern Hemisphere (with clockwise spin) and crosses the Equator over to the Northern Hemisphere it retains its spin as a vortex due to its momentum. Of course, this behavior has mirror image in the Southern Hemisphere relative to the Equator.

7.3. Ocean and Wind Cycles

We start with the Northern Pacific Ocean Current (NPOC). The effective pull on the Earth by the gravitational flux is proportional to the density of the Earth's material and the linear displacement in inverse proportion due to sliding. Since the Earth's crust is denser than that of, say, the Pacific Ocean there is a net flow of the Ocean, a layer lag, that constitutes the Pacific Ocean Current along the Equator going west starting off the coast of Ecuador. By Energy Conservation, the current finds the most energy conserving path to form a loop. It splits along the Equator off the eastern coast of the Asian mainland with the northern strip (west of the Philippines) veering north, northeast (southeast of China) and east in succession off the southern coasts of South Korea and Japan, heads east south of Siberia, veers southeast west of the western seaboard of Canada and the US and veers southwest and west to form a loop with the Equatorial current from East to West and completes the Northern Pacific Ocean Cycle (NPOC). There are, of course eddies along the Cycle used by ancient traders for local travel (map in [33]).

We apply the same analysis to map the Northern Pacific Wind Cycle (NPWC) [32] [34]. Since the atmosphere is less dense than the Pacific Ocean there is a lag in the form of air current that starts off the Coast of Ecuador going west called the Trade Winds used by traders in the past to cross the Pacific Ocean along the Equator. It goes west into the Western Pacific, splits off east of the eastern Philippines coast, the northern strip veering northwest then north scraping Vietnam then northeast scraping Southern China, crossing North and South Korea and Japan and becoming the jet flow south of Siberia that airlines use going east to save on fuel. Then it heads east across the Bearing Sea as it crosses Southern Alaska, veers southeast as it crosses Canada and south into the Tornado Belt in the US [32]. It veers southwest then west and joins the Trade Winds off the coast of Ecuador

and completes the NPWC with clockwise flow (map in [34]). The wind cycles determine the paths of typhoons in the Pacific Ocean. A similar North Atlantic Wind Cycle (NAWC) determines the paths of typhoons in the Atlantic Ocean. Together, they play major roles in the formation and paths of destruction of typhoons and tornadoes in Tornado Belt in the US. They both have their respective mirror images in the southern Pacific with counterclockwise flow [32] [34].

7.4. Typhoon and Tornado

We first look at the conditions that give rise to a typhoon (hurricane in the Eastern Pacific and the Caribbean) [32]. The Earth is studded with under-ocean volcanoes, especially, along conservative plate boundaries called trenches. We consider the Marianas Trench, a constructive tectonic plate boundary in the Western Pacific made up of a string of volcanoes about 1500 miles east of the Philippines above the Equator. Active volcanoes along the Trench erupt periodically, heat up the ocean surface and produce pockets of warm water called *el niño* [32]. When the pockets are sufficiently close together and broad, say, as broad as the Australian landmass, the *el niño* heats up the lower atmosphere sufficiently and creates a tropical depression region of low pressure. The depression sucks air around it, by Flux-Low-Pressure Complementarity, and the initial rush and ensuing collision of trillions of air molecules create chaos that, by Energy Conservation, gives way to a typhoon, a vortex flux of air molecules which is turbulence belonging to the standard dynamics [8] [32] that spins counterclockwise due to the *coriolis* effect on the dark component of the vortex at resonance with dark matter. Typhoon follows the Northern Pacific Wind Cycle and eddies along it but is affected by the temperature variation over the Philippine Deep (a trench underneath) and around Mayon Volcano [8] [32]. This information allows precise prediction of the course of a typhoon in this region. Typhoon can be deflected but that would be impractical as other countries in the region may object.

The trench under the Philippine Deep gives rise to drought instead of typhoon; why? The string of volcanoes is located too deeply under the ocean that it only produces scattered *el niño* instead of broad depression that gives rise to chaotic wind motion that blocks normal water evaporation that produces rain.

Another destructive Earthly turbulence is the tornado. We look at the Tornado Belt in the US, a 1000- by 650-mile rectangular region that extends from Oklahoma to Florida and from the Midwest to Texas [8] [32]. The Northern Pacific Wind Cycle interfaces with the narrower Northern Atlantic Wind Cycle over the Belt called the main interface. The latter has the same flow (clockwise) as the Northern Pacific Wind Cycle but opposite flux at the interface. The interface wobbles over and across the Tornado Belt between its western and eastern edges in Oklahoma and Florida, respectively, during spring as eddies form on both sides of each cycle like ball bearings that facilitate flow, by Flux Compatibility and Energy Conservation. The cycles press against each other at the main interface, by Flux Compatibility.

During spring, the Northern Pacific Wind Cycle pulls the cold air from the Arctic, by Flux-Low-Pressure Complementarity, and brings it over the Tornado Belt at the interface between the Cycles. At the same time, the Northern Atlantic Wind Cycle brings the warm air from the Equator, especially, the Caribbean, over the Belt also at the interface. The warm and cool air press against each other, by Flux Compatibility, and forms a sharp interface between them that thrusts the lighter warm air upwards and the denser cool air downwards and creates a horizontal cylindrical vortex flux of air. Its northern end tilts downwards due to Resonance, Flux Compatibility and the *coriolis* effect and the vertical vortex spins counterclockwise. By Newton's Action-Reaction Law the suction by this vortex of the denser cool air beneath it induces a downward pull on the vortex until it touches down and hugs and sucks the ground and forms the funnel of a full tornado. Minor tornadoes form along the interfaces of eddies and random interfaces of wind flow on both sides of the main interface.

To know how a full tornado that just touched down moves on the ground we first locate the main interface. Since the NAWC is much narrower than the NPWC, the interface at the lower portion of the Belt goes from south to north at about a third of the way northward; then it curves eastward gradually along a circular arc so that by about three fourths of the way north the interface goes in the northeast east direction towards the Atlantic Ocean, especially, over the northernmost states of Minnesota, Wisconsin and Michigan (based on path of previous tornadoes). Moreover, the main interface does not cross thickly populated areas or foundries that produce sufficient warm air overhead for they blur the warm interface between cool and warm air that gives rise to and sustains tornado. In the former the warm air comes from appliances on the ground. The interface only goes over

and along the periphery of a major city and across small townships and open spaces. If the downtown area of a major city is in the direction of an approaching tornado it detours around the city along its southwestern, western and northern periphery and continues its course on the other side (the author was witness to this phenomenon in Madison, Wisconsin in the late 1960s and in Chicago in the 1970s) (The details in this paragraph are of interest to those into the construction tornado breaker but we have included them to give the reader an intimate sense of the tornado).

7.5. Geological Turbulence

We consider solar eclipse, tidal cycle and earthquake. Earthquake occurs 1) when huge rock across fault line snaps due to uneven motion of the interfacing crust, 2) when a big chunk of the Earth's crust falls (e.g., at ocean cliff over the Philippine Deep), 3) when motion of huge amount of volcanic lava move underground and 4) when one of two interfacing tectonic plates (40 km below sea level) pressing against each other "subducts", *i.e.*, the ocean tectonic plate goes under the continental plate causing powerful tremor and allowing lava from Earth's interior to ooze out of the interface [32].

Since the Moon has the same spin as the Earth's its gravitational flux pushes the Earth's gravitational flux (by Flux Compatibility) and the ocean to a low tide which, in turn, pushes the ocean tectonic plate down underneath. When both the Moon and Sun, which have the same spin, are overhead, their gravitational fluxes push the ocean and tectonic plate underneath more than the continental plate due to the porous land mass so that this action dis-aligns the oceanic and continental or land plates with the former going farther down. This is reinforced by the Sun's gravitational flux when it is on the other side of the globe since it reinforces the Earth's flux on this face and pulls the ocean and plates towards the center. This steady push that occurs several times over a 24-hour period (even when the two are at radial angles apart) creates increasing dis-alignment until the oceanic plate subducts and causes an earthquake.

During solar eclipse, especially, of long duration, the rate of dis-alignment of the land and ocean plates rises dramatically due to perfect alignment between the Sun and Moon, advancing occurrences of earthquakes. The aftermath of the eclipse of long duration in September 1999 saw major earthquakes in Turkey (twice), Taiwan (twice), China, Iran, Indonesia, Mexico, the Philippines and Los Angeles and minor ones in the Philippines (thrice), Indonesia, Japan and Malaysia within six months. During the same period several volcanic eruptions occurred stretching from Sicily through El Salvador. Since plates are interconnected around the globe, earthquake triggers movement of plate boundaries worldwide that enhances outflow of lava.

Compression, grinding and lateral tension at geological faults and tectonic plate boundaries involving millions of tons of force causes collision and energetic vibration of atoms and molecules induced by the micro component of turbulence. Since this happens at the interface of turbulence the dark components of the interfacing turbulence compose, generate and propagate seismic waves. Present seismograph detects only their visible high-frequency wave components and its envelope is visible to the naked eye, e.g., wave motion of the ground surface. Seismic wave is actually a nested fractal sequence of waves from the visible or macro through the micro and then dark component that ends up at the interface, each of the interfacing parts containing its respective fractal sequence of waves (Figure 8, [19]). The waves we see on the ground during earthquake are the visible envelopes of seismic waves. They are actually nested fractal sequences of waves that end up as (energetic) dark cosmic waves at the interface propagated radially from the source. They soften or melt metal and crack or pulverize brittle material [35].

The micro component of seismic waves irritates the brains of animals causing erratic behavior: horses and water buffalos jumping and running around erratically; dogs howling in distress; ants and termites coming out of their mounds and hives; roaches flying like bees to escape irritation at wall crevices and ceiling; schools of whales and jellyfish leaving the ocean depths for shallow waters; they are signs of impending earthquake. The high intensity of seismic waves just before an earthquake convert superstrings to prima that form atoms and molecules, e.g., earthlights and volatile gases like radon that shoot off flames from the ground, combined with change in water level at open wells and widening of geological faults; they are danger signs the Chinese are adept at interpreting to predict earthquake.

Previously labeled UFO, earthlights of varied colors, intensity and motion have been sighted in California (along Andreas fault), Colorado, South Wales and Mexico. Geologists associate them with earthquakes but have no theory to explain them. Earthlights were sighted over Mexico City two years before the devastating earth-

quake of 1985.

Physical characteristics of earthlights have predictive value. Bluish earthlight being energetic indicates high compression and tension at plate interface and faults and reddish one (less energetic) indicates low compression and tension. Just like the guitar string, greater tension on it produces energetic vibration and higher pitch. Then the impending earthquake can be assessed for its intensity. Analyzing shock waves from earthquake provides information about the interior of the Earth. Since seismic waves travel faster on denser materials scientists are able to measure the specific gravity of the Earth's inner and outer core. Its core is extremely hot due to staggering spin. Therefore, only prima and light elements like hydrogen exist there that makes it compact and highly dense (specific gravity, 150), compression by gravity is a secondary factor. Like any vortex flux of superstrings, the Earth's eye accumulates a black hole.

Along geological fault or conservative plate boundary, two kinds of dynamics stemming from independent motion of the interfacing parts and the law of uneven development occur due to the turbulent motion of the Earth's mantle under the Earth's crust. In compression and lateral tension there is grinding, interpenetration and energetic vibration of the atoms and molecules that generate and propagate seismic waves. This dynamics cannot be reproduced in man-made laboratory due to the huge forces involved. Verification requires simulation, observation at faults and plate boundaries and gathering data from the literature, US Geological Survey databases and even features by Sky Cable's Discovery (e.g., Hostallen Project) and National Geographic.

Lateral tension also involves compression due to uneven interfaces at faults (macro sinusoidal). Therefore, it generates seismic waves which can be monitored the levels of compression and tension measured. This motion has macro impact, e.g., the two parts of Andreas Fault in California are moving in opposite directions that a mountain near Lake Tahoe now was in Mexico millions of years ago [34]. The two parts of the Alpine Fault in New Zealand has now slid past each other by 300 km [34]. Wavy fault interface adds to resistance and power buildup that lead to earthquake when obstacles, e.g., huge rocks between sliding parts snap and break sending seismic waves and powerful shock waves. However, it is seismic waves that soften metals and crack or pulverize concrete and cause much destruction. They can be analyzed to study fault and plate boundary dynamics and distribution that may have practical applications, e.g., earthquake prediction.

Engineers thought that shock waves and jolting movement caused by earthquake damage high-rise structures and towers and in the 60s put rollers and springs at their base to absorb the shocks and jolting action. It did not work. The remedy is non-existent yet but can be a target for research and development: alloy and composite resistant softening and cracking or pulverizing impact of seismic waves, respectively.

Geological fault is either extension of tectonic plate boundary or crack in it. It is irregular, usually sinusoidal, so that the relative movement of the interfacing plates causes friction between interfacing parts.

In the interfaces of compressed lava laminas or slabs moving unevenly along the Earth's crust crevices compression and grinding also occur that generate seismic waves. They send out seismic waves that convert superstrings to prima and photons and produce earthlights (in the mesosphere) and balls of fire balls of fire that hover just above ground or ocean surface. Their physical characteristics shed light on accumulation of lava long before they reach ground level. They can be used for calculating the power of impending eruption and predicting its occurrence. Like visible components of shock waves from seismic activity they are detected as high-frequency waves by the seismograph. The fractal structure of seismic wave is reflected in the structure of the lava outflow. It can be studied (with appropriate technology) to get underground information.

(GUT technologies (based on GUT) run on clean, free and inexhaustible dark matter abundant every everywhere in the Cosmos now the subject of research and development, some already in operation [36] [37]).

8. Climate Change

We recall that every piece of matter has normal or residual vibration (kinetic energy) due to impact of cosmic waves (via resonance with its dark component) coming from all directions its characteristics determined by its internal structure (Internal-External Dichotomy Law). This is the reason it has absolute temperature above 0°K. When agitated by external source, e.g., sunlight, it absorbs heat (kinetic energy) by raising its vibration frequency and, naturally, temperature. The stronger a malleable (opposite of brittle) material is in terms of molecular bonding, the higher the coefficient of elasticity, the greater the kinetic energy it stores and the higher its temperature becomes. Steel is an example such metal. When exposed to sunlight it attains very high temperature (see detail in [35]).

Among gases, carbon has the strongest bonding [38]. In fact, when hot carbon is cooled quickly (in relative terms) underground it becomes the strongest crystal—diamond. Carbon has relatively high coefficient of elasticity among gases in the atmosphere due to strong bonding, stores more kinetic energy from sunlight and maintains relatively higher temperature than other gases. Despite natural formation of these gases including carbon, the atmospheric temperature remained constant even after the industrial revolution in Europe during the 18th Century until the 1960s when scientists began to observe significant rise in atmospheric temperature called Global Warming or Green House Effect which they attribute to increased carbon emissions by the industrial countries, particularly, the US and Europe and now China also. The carbon-enriched atmosphere is distributed evenly around the world along both sides of the Equator by the gravitational flux of the Earth and global wind circulation. However, due to centrifugal force imparted by the Earth's gravitational flux, its concentration rises from insignificance in each of the polar regions to greatest concentration above the Equator.

The increase in atmospheric temperature raises the temperature of tropical depression, pulls down its pressure and raises its suction of air around it and the power and breadth of the tropical cyclone it gives rise to. Thus, the recent super typhoon Haiyan that hit the Philippines and the world for the first time was not surprising. Moreover, minor tropical depressions of the past that did not develop into typhoons now do due to the rise in atmospheric temperature resulting in increased frequency of occurrence in recent years. Ten years ago typhoons hit the Philippines 19 times a year on the average. Now, this has gone up to 26.

Higher atmospheric temperature raises the rate of evaporation of sea water that accumulates in the atmosphere and eventually comes down as rain. This accounts for the high frequency of devastating floods, snowstorms, erosions, etc., around the globe in recent years and melting polar ice caps that was not seen in the past. Naturally, it also raises the frequency of bushfire.

The NAWC brings warm air at higher temperature from the Equator now than in the past due to global warming and brings it to its interface with the NPWC in the Tornado Belt in the US that pulls the cold air from the arctic, by Flux-Low-Pressure Complementarity. During late spring and early autumn the difference between the interfacing hot and cold air is greater than in the past, again, due to global warming and this accounts for the super tornado that hit Oklahoma in the spring of 2013. Like typhoons the increased frequency of occurrence of tornado is due to global warming.

We have just established the direct link between human activity that results in raised carbon emissions and these types of turbulence with remarkable verification. This is an issue that has bogged down conferences on climate change the last one being in Warsaw while typhoon Haiyan was unleashing its fury in the Philippines. The issue is whether man-made carbon emissions contribute to global warming. In the absence of a definitive study on this issue like this paper the industrial nations have blocked initiatives to control global warming. And yet, there is a remedy [39] [40].

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