No second chance?
Can Earth explode as a result of Global Warming?

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Abstract: The heat generated inside our planet is predominantly of radionic (nuclear) origin. Hence, Earth in its entirety can be considered a slow nuclear reactor with its solid "inner core" providing a major contribution to the total energy output. Since radionic heat is generated in the entire volume and cooling can only occur at the surface, the highest temperature inside Earth occurs at the center of the inner core. Overheating the center of the inner core reactor due to the so-called greenhouse effect on the surface of Earth may cause a meltdown condition, an enrichment of nuclear fuel and a gigantic atomic explosion.

Summary: Consequences of global warming are far more serious than previously imagined. The **REAL** danger for our entire civilization comes not from slow climate changes, but from **overheating of the planetary interior.**

Life on Earth is possible only because of the efficient cooling of the planetary interior - a process that is limited primarily by the atmosphere. This cooling is responsible for a thermal balance between the heat from the core reactor, the heat from the Sun and the radiation of heat into space, so that the average temperature on Earth's surface is about 13 degrees Celsius.

This article examines the possibility of overheating and the "meltdown" of the solid planetary core due to the atmospheric pollution trapping progressively more solar heat (the so-called greenhouse effect) and reducing the cooling rate of the planetary interior.

The most serious consequence of such a "meltdown" could be centrifugal segregation of unstable isotopes in the molten part of the spinning planetary core. Such segregation can "enrich" the nuclear fuel in the core to the point of creating conditions for a chain reaction and a gigantic atomic explosion. Will Earth become another "asteroid belt" in the Solar system?

It is common knowledge (experiencing seasons) that solar heat is the dominant factor that determines temperatures on the surface of Earth. Under the polar ice however, the contribution of solar heat is minimal and this is where the increasing contribution of the heat from the planetary interior can be seen best. Rising polar ocean temperatures and melting polar ice caps should therefore be the first symptoms of overheating of the inner core reactor.

While politicians and businessmen debate the need for reducing greenhouse emissions and take pride to evade accepting any responsibility, the process of overheating the inner core reactor has already begun - polar oceans have become warmer and polar caps have begun to melt. Do we have enough imagination, intelligence and integrity to comprehend the danger before the situation becomes irreversible? There will be NO SECOND CHANCE...

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2 This article was written to be understood by the greatest number of people possible, not only by experts and scientists. Due to the wide range of disciplines considered in this article to support its conclusions (from physics and mathematics to ancient literature and linguistics) brief explanations accompany references. That way reading is longer, but concepts are easier to understand when the reader's initial understanding of considered disciplines is limited.

What is inside our planet?

On the outside, Earth is known to be a nearly spherical object with radius of about 6371 km.

Our knowledge of the inner structure of Earth comes principally from seismology. Naturally occurring local earthquakes generate seismic waves that travel **through** the entire planet. Hundreds of seismic measurement stations distributed around the globe monitor and keep track of a multitude of waves from each and every earthquake, their reflections, refractions, interference and timing. For several decades now the accuracy and sensitivity of such measurements is high enough to extract a significant amount of information from them. For example, an underground nuclear test can be distinguished from a natural earthquake. From refractions, reflections and travel times of various kinds of seismic waves around the globe, natural oscillations of the entire globe - selected properties of Earth's interior can be indirectly estimated.

The existence of a solid inner core in the center of Earth was first suggested in 1936 by a Danish seismologist Miss I. Lehmann [1] who tried to explain the observed "shadow zone" - a range of locations on Earth where direct waves from earthquakes were consistently absent. The actual presence of the solid inner core inside Earth was proven after the great Alaska earthquake of 28 March 1964 and is no longer questioned today. Estimating properties of this inner core, however, remains a major challenge.

Today, the main tool for reconstruction of properties of the inner Earth from seismic measurements is the technique called seismic tomography. In essence, seismic tomography aims to solve an inverse problem - it aims to determine the best parameters of the pre-determined mathematical model by matching results of measurements and behavior of the model using a least-square fit criterion. One of the first comprehensive models of Earth's interior obtained by solving such an inverse problem was the Preliminary Reference Earth Model (PREM) published by Dziewonski and Anderson [2] in 1981.

Although seismic tomography is a very useful tool that produces spectacular computer images of the Earth's interior, its results **must** be considered with great caution. The reasons for caution are as follows:

1. The inverse problem that is implemented in tomography **does not have a unique solution**. In particular, obtained results strongly depend on the initial values assigned to parameters of the model and hence are **strongly biased by assumptions and expectations** of the person who defines such initial values. Tomography, as an iterative multi-parameter estimation method, can produce a multitude of "local" minima for any chosen least square error function. There is no guarantee and no proof that it finds the "global" minimum or even a realistic solution. To complicate things even more, there exist almost an infinite number of ways to define the "error" function that is minimized by a least-square fit criterion. Needless to say, each such function produces a different result.
2. The Earth's interior model, parameters of which are determined by a least square fit, is determined and limited by the imagination and expectations of its designer. For example, if a designer of such a model failed to include in it a solid inner core (or any other feature, such as core eccentricity [3] for example) - it would never be found using tomography. On the other hand, if a model had a feature that didn't exist in Reality - some parameters of such a feature would be found as if the feature actually existed.

From the above it becomes obvious that tomography is useful only for a person who knows exactly what to look for. Simply speaking, finding a sensible answer using seismic tomography requires a good guess for the final result to begin with. In summary, seismic tomography can be considered an excellent tool to refine values for parameters of the Earth's interior that are already reasonably well known.

For this reason, tomographic models, such as PREM [2] and their later refinements, represent the global mechanical features of Earth's interior satisfactorily only up to the depth of about 2800 km (the crust and the mantle), simply because for this range of depths reasonable initial values for the associated parameters can be established from geology - by examining minerals found on the surface of the Earth. In general - the deeper a feature - the less accurate is the tomographic reconstruction of its parameters. Specifically, parameters of the "core" (the part of Earth's interior inside the 3470 km radius) reconstructed from seismic tomography are the least accurate.

Several facts about the core, however, can be established directly from the seismic data with quite considerable certainty:

1. The "inner core" (the part inside the 1220 km radius) **is a solid** (because it transmits shear waves and only a solid can do this)[2].
2. The "outer core" that surrounds the solid inner core appears to be a fluid - due to the absence of shear waves there.
3. To a seismologist, who performs observations with respect to the surface of Earth, the solid inner core seems slightly anisotropic (a few %) and this anisotropy seems "spinning" inside the planet about 4% faster than the planet spins around its own axis [4].

Eccentric core

One of the great unsolved mysteries in the planetary science today is the origin of the Earth's magnetic field and its reversals. Measurements confirming that the planetary magnetic field originates in the planetary core led to the developement of a belief that the core is composed from some ferromagnetic alloy that somehow stays magnetized in the high temperatures of the planetary interior.

There exists a more plausible explanation of the origin of the planetary magnetism and magnetic pole reversals. It has been demonstrated [3], that if a solid core exists in the liquid planetary interior, it must be eccentric. It means, that what is currently interpreted as a "spinning inner core anisotropy" is actually caused by the eccentric planetary core, phase locked to the position of the Moon. Since the eccentricity follows the Moon - it performs one full rotation with respect to the surface of Earth in about 27.3 days, exactly as the Moon does and hence the associated "anisotropy" appears to rotate about 3.7% faster than Earth itself.

An electrically charged eccentric core that follows the Moon provides a comprehensive explanation of the origin of planetary magnetism. Temporal changes in its electrical charge, explain magnetic pole reversals ("pole shifts"), that are so well recorded in the magnetized mineral deposits around the globe [6]. Since the eccentric core needs to change its electrical charge in time - it is almost certain that it contains unstable isotopes that slowly decay, thereby providing the mechanism for change in core composition and charge.

Hence, the eccentric planetary nucleus can be considered a nuclear fission reactor that generates heat as a result of decay of its unstable isotopes.

It is well known that the fate of an atom is determined by processes in its nucleus. It seems that the fate of a planet is also determined by proceses in its nucleus. The importance of understanding the behavior of the inner core shouldn't be underestimated - the intellectual and material future of our entire civilization may depend on it [8].

Overheating the reactor

One of the well-established paradigms of nuclear science is that the "half-life", or "decay constant" of any given isotope is nearly independent of extra-nuclear considerations [7]. It means, that the rate of decay and hence the rate of produced heat practically does not depend on factors such as temperature, pressure, electrical potential and other environmental conditions around the decaying isotope. According to our knowledge today, the rate of decay can only be accelerated significantly by delivering enough energy **directly** to atomic nuclei. For example this can be accomplished by disturbing atomic nuclei with sufficiently fast moving neutrons.

The best known example of such an acceleration of the nuclear decay is the so-called **"chain reaction"**. A chain reaction occurs when sufficiently many atoms that decay naturally by ejecting neutrons are brought sufficiently close together so that neutrons produced by a nucleus of one atom can stimulate disintegration of other atomic nuclei nearby. The minimum number of such atoms that can sustain such a process is defined by the so-called critical mass. As you know, a chain reaction leads to a quick release of significant amounts of energy in a process that we call an atomic explosion.

From the above it becomes obvious that the Earth's interior, as any nuclear fission reactor, will continue to release heat whether it is sufficiently cooled from the outside or not. It is very important to note that in a nuclear reactor **heat is generated in the entire volume** of the nuclear fuel, but **cooling can occur only at the surface**. The temperature inside the reactor's core depends on the amount of cooling. The better the cooling - the lower temperatures inside the reactor core. When the cooling is reduced - temperatures inside the nuclear reactor rise. See Appendix 1 for details.

The cooling of the reactor called Earth is determined and controlled by the atmosphere. It is well known today that burning fossil fuels on a large scale produces large amounts of gasses that make the atmosphere "trap" progressively more solar heat. This increased capacity of the atmosphere to hold more of the solar heat is called today the "greenhouse effect". Any reduction of the cooling capacity of the atmosphere causes a corresponding increase of the interior temperatures. Appendix 1 clearly demonstrates that **the tiniest reduction in the cooling capacity of a spherical reactor, when sustained for a sufficiently long time, causes extreme temperature increases at the center of the reactor**.

How much can we possibly overheat the inner core reactor? Even if we do overheat it a little, it is likely to generate exactly the same amount of heat. The interior of our planet will just get warmer. So, perhaps there is nothing to worry about? Perhaps. There is however one particular condition of the reactor that deserves special consideration. It is the meltdown condition.

When there is a meltdown in a nuclear reactor such a Chernobyl, there is no nuclear explosion, even though the amount of nuclear fuel is significant. The reason for it is simple. The nuclear fuel that is used in a typical reactor contains only about 2% of unstable isotopes that undergo spontaneous fission. These isotopes are too far from one another in the fuel to sustain a chain reaction. When the meltdown occurs, the molten nuclear material "sinks" into the ground and becomes dispersed. Dispersion of the overheated material provides more surface area for its cooling and eventually some thermal equilibrium is reached. The area remains hot and highly radioactive, but there is no danger of a nuclear explosion.

In order to create conditions for a chain reaction and make an atomic bomb, the nuclear fuel needs to be "enriched". In essence, such an "enrichment" process utilizes the fact that different isotopes have different specific weights so that they can be separated by weight and hence concentrated.

When there is a "meltdown" in the inner core of a planet - it is likely to occur at the hottest point - in the center of the core. From there - there is nowhere to "sink" and nowhere to "disperse". The molten nuclear fuel just remains molten.

We do not know what the exact composition of the solid inner core is in its very center, but just from the fact that it has been decaying for millions of years we can establish with considerable certainty that it should be quite a complex mixture of isotopes, even if we do not yet know any of these isotopes. When a mixture of isotopes becomes and remains molten, conditions arise for stratification of individual isotopes by their weight due to centrifugal motion of the planetary core. In essence, this process is very similar to the process that is used to "enrich" a nuclear fuel in centrifugal equipment in order to make an atomic bomb.

If the molten volume of the inner core is large enough for a sufficient amount of time - the continuing stratification of isotopes will eventually lead to some of them achieving a "critical mass". When this occurs - the nuclear energy that was scheduled to be released over many millions of years may get released very quickly. A chain reaction will result in a gigantic atomic explosion.

Can a planet explode?

If a planet can indeed explode, and there was at least one such event somewhere in our Solar system in the distant past, we should be able to find the evidence of it today. This is due to the fact that the debris from the exploded planet would not vanish. Bits and pieces would not only remain, but their collective presence should still mark a trajectory (the orbit around the Sun) of the planet that exploded.

It is a well-known fact that there exists the so-called "asteroid belt" in our Solar system. It is a "belt" of a large number of asteroids that orbit the Sun along orbits that are located between Mars and Jupiter. At least 40,000 of these asteroids are thought to have diameters larger than 0.8 km (0.5 mile). The largest asteroid in the asteroid belt, called Ceres, is about 930 kilometers across.

The existence and the origin of the entire asteroid belt are long standing scientific puzzles. Why does the asteroid belt exist only between Mars and Jupiter and there are no asteroid belts between other planets?

The present belief is that planets in the solar system formed out of randomly distributed dust and other bits and pieces. Hence, it is also believed that the growth of a full-sized planet between Mars and Jupiter was "aborted" during the early evolution of the solar system.

The explosion of a planet that existed between Mars and Jupiter is a much more logical and plausible explanation.

In Greek Mythology there is a story about a planet that exploded. The planet was called Phaëthon. In the myth Phaëthon was *"destroyed by a thunderbolt"*. Did our ancestors embed this event in their belief system because they actually witnessed a planetary explosion and they just couldn't explain it any other way? Can we determine **today** what is a myth and what is an actual fact? Plato, one of the greatest writers and philosophers of all time, was aware that the story of Phaëthon *"destroyed by a thunderbolt"* had its origin in a real planetary event. He wrote [9] : *"Now this has the form of a myth, but really signifies decline of the bodies moving in the heavens..."*.

The meaning of the word "phaëthon" ($\varphi\alpha\varepsilon\theta\omega\nu$) in ancient Greek is "giving light, luminous, brilliant, shining" [10]. Note that words "phaëthon" and "photon" originate from the same root ($\varphi\alpha o\varsigma = \varphi\omega\varsigma$) [10]. In the myth, Phaëthon is known as "*the son of Helios*" (the son of the Sun) [9]. Doesn't this hint that the planet Phaëthon was one of the brightest objects in the sky at night? Isn't it obvious that the disappearance of such an object would attract attention of even a casual sky observer? The story of the destruction of Phaëthon "*by a thunderbolt*"[9] indicates that our ancestors perceived its explosion to be **as bright as lightning**. Should we ignore a witness report of our ancestors embedded not only in their heritage but also **in their language**?

Early symptoms

Let's examine some early symptoms of overheating of the planetary interior.

It is common knowledge (we all experience seasons) that solar heat is the dominant factor that determines temperatures on the surface of Earth. Under the polar ice however, the contribution of solar heat is minimal and this is where the increased heat contribution from the planetary interior can be seen best. Rising polar ocean temperatures and melting of polar caps should therefore be the first symptoms of overheating of the inner core reactor.

Accelerated melting of polar ice caps, heated from underneath have already been observed and quantified. It has been found that large Antarctic glaciers increased their melting rate up to 8 times in just 3 years [11][12].

It is astonishing that among 10 scientists who reported the accelerated melting of Antarctic glaciers in 2 articles [11][12] not even one was curious as to where the energy needed to increase the glacier melting rate 8 times comes from. From elementary physics we know that the melting rate is proportional to the amount of heat delivered to the melting medium. Hence, increasing the melting rate 8 times requires 8 times more energy. Now, the Sun does not deliver 8 times more energy under the polar ice, does it? My private communication with Australian Antarctic researchers confirms that they are aware that the Antarctic glaciers melt because they are heated from **underneath**.

If any of the Antarctic glaciers slide into the ocean we will observe a significant (and instant) rise in sea level. Unexpectedly quick global flooding is a real possibility. Has it happened before in history of humanity?

Evaporation from increased ocean surface will provide a heat sink for the planetary interior heat, but will also cause more frequent torrential rains and floods when it condenses. If, despite the above described cooling mechanisms, the polluted atmosphere is unable to allow radiation of enough heat into space, the planetary interior will continue to accumulate heat.

Warming of the planetary interior will accelerate tectonic motions (slip) of plates, continents and subduction zones due to increased temperatures in their respective plastic slip zones. An example of a recently reported event of an accelerated subduction zone slip in British Columbia, Canada, has been called a "silent earthquake" [13]. Many more of these should be expected.

The next set of symptoms should be progressive activation of volcanoes around the globe. Heating and progressive melting of certain parts of the mantle and the crust will absorb significant amount of heat from the inner reactor and will also take time. This is why activation of volcanoes will be delayed in time.

The next stage will be a systematic increase in volcanic eruptions and the associated tectonic activity. Crystallization of the molten lava brought to the surface will release its heat into the atmosphere. Transport of hot lava in large amounts will be the last attempt of Nature to cool the planetary interior.

If at this stage the atmosphere is unable to allow enough heat radiation into space - the overheating of the inner core reactor will continue. The meltdown zone in the core will become established and will grow. It may take many months of horrific cataclysms on the surface of Earth before conditions for a chain reaction and subsequent explosion are created.

The best case scenario?

If we choose to ignore the early symptoms of overheating of the planetary interior, what is the best case scenario?

Imagine the first few hundred volcanoes exploding rather than simply erupting. Volcanic explosions release huge amounts of volcanic dust very high into the atmosphere. Imagine that the amount of dust is such that Sun rays do not reach the surface of the Earth. Sunlight becomes reflected by dust particles into space.

The surface of Earth without sunshine will freeze and will remain frozen until the dust in the atmosphere falls down. This process may take a long time. We may experience an ice age for several decades. In the meantime, the planetary interior will have an opportunity to cool down, because the amount of solar heat delivered to the surface of the planet will be dramatically reduced. Increased temperature difference between the hot core and the frozen surface of Earth will speed up the cooling process. Isn't this a compelling mechanism for the development of an ice age? Is an ice age a natural mechanism for cooling the reactor called Planet Earth when it overheats for one reason or another?

Surprising support for the likelihood of the above scenario comes from archaeology. Apparently, the last "mini" ice age on Earth occurred between 536 and 540 AD. Following the explosive eruption of just one or two volcanoes - trees on the entire planet stopped growing for several years. For several years there was no summer... [14] This is not a theory. The evidence is quite compelling. Disruption in tree growth is well documented and very accurately dated in the "rings of growth" of very old trees that **still grow** on all continents. The evidence of a large amount of volcanic gasses in the atmosphere around 504 ± 40 AD has been found embedded in polar ice caps at both poles.

The ice age of 536 AD was caused by the explosion of one or two volcanoes. Can you imagine the consequences of explosive eruptions of several hundred volcanoes?

To be or Not to be?

While politicians and businessmen still debate and dispute the need for reducing greenhouse emissions and take pride to evade accepting any responsibility, the process of overheating the inner core reactor has already begun - **polar oceans have become warmer** and **polar caps have begun to melt** [11][12].

Although the danger seems to come from the inside of our planet, the actual **reason** for the coming disaster is the pollution of the atmosphere [15], which is clearly our responsibility. At present, the atmospheric pollution increases daily...

Do we have enough imagination, intelligence and integrity to comprehend the danger before the situation becomes irreversible? There will be NO SECOND CHANCE...

Increase in solar activity is known to cause global increases in the average temperature on Earth. Do we know enough to predict the intensity of solar activity in the next decade or two? Peaks of solar activity are known to occur in 11 year intervals. What if the next peak of Solar activity is larger than usual and coincides with increased emissions of "greenhouse" gases?

We are not the first "civilization" on Earth to be wiped out due to the lack of understanding of Nature, but we can be the last one...

Save the planet?

Should we attempt to save the planet?

For **WHOM**?

For those who do not care?

For those whose ultimate dream is to win the lottery in order to do nothing, NOT EVEN THINK?

For those whose favourite activity is to intoxicate and entertain themselves in order to FORGET Reality?

For those who are ready to kill or spend their lives fighting for a piece of land or property?

For those who allow their minds to become cluttered with doctrines, misinformation and deceit?

For those who blindly follow the flock - unable and unwilling to THINK?

For those who prefer to cultivate animal instincts rather than intellect?

Wouldn't it be better if such narrow-minded people stopped existing as soon as possible? Wouldn't it be better for everyone else in the Universe if the entire "system" for propagating a narrow-minded mentality on Earth didn't exist?

Are there any people with enough intelligence, integrity and imagination for whom it is actually **worth** saving the planet? Where are they? Do you know anyone?

Everything material in the Universe is temporary anyway. The only thing in the Universe that is theoretically and actually sustainable is our consciousness [8]. The reason for this is simple: information can exist indefinitely, even if the storage medium that holds it is temporary. All that needs to be done to maintain the information indefinitely is to make a fresh copy of it before the storage medium that holds it becomes useless. Don't we do it to hard disks in our computers?

Incidentally, our consciousness is the only thing in the Universe that we can truly call "ours". After several decades of studying the Self I am absolutely certain that I will be able to sustain my consciousness after my physical body disintegrates. What about you?

Contact

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References

[1] I. Lehman, *Bur. Cent. Seismol. Int.* A14, 3 (1936)

[2] A.M. Dziewonski, D.L. Anderson, *Phys. Earth Planet Inter.*, **25**: 297-356 (1981)

[3] T.J. Chalko, Estimating Eccentricity of Planetary and Stellar Cores. *NU Journal of Discovery*, Vol 4, p1-8,

(2004) http://NUjournal.net

[4] Su W-J, Dziewonski A.M, Jeanloz R., Planet Within a Planet: Rotation of the Inner Core of Earth, *Science* **274** 1883 (1996)

[5] Anderson D.L., *Science* **223** 4634 (1984)

[6] Roberts P.H., Geomagnetism, *Encyclopedia of Earth System Science*, Vol **2**, p 277-294, Academic Press (1992)

[7] Emery G.T., Perturbation of Nuclear Decay Rates, *Annual Review of Nuclear Science*, Vol **22**, p 165 (1972)

[8] Chalko T.J., Is chance or choice the essence of Nature? *NU Journal of Discovery*, Vol 2, p 3, (2001) http://NUjournal.net

[9] Plato, Timaeus, The Dialogues of Plato, The Great Books Vol 7, Encyclopedia Britannica, Inc. ISBN 0-85229-163-9 (1975)

[10] $\Delta\eta\mu\eta\tau\rho\iota o\upsilon, \Delta., N\varepsilon o\nu\ O\rho\theta o\gamma\rho\alpha\varphi\iota\kappa o\nu\ \Lambda\varepsilon\xi\iota\kappa o\nu,\ X\rho.\ \Gamma\iota o\beta\alpha\nu\eta,$ 1970

[11] Scambos, T. A.; Bohlander, J. A.; Shuman, C. A.; Skvarca, P., Glacier acceleration and thinning after ice shelf collapse in the Larsen B embayment, Antarctica, Geophys. Res. Lett., Vol. 31, No. 18, L18402

[12] Rignot, E.; Casassa, G.; Gogineni, P.; Krabill, W.; Rivera, A.; Thomas, R., Accelerated ice discharge from the Antarctic Peninsula following the collapse of Larsen B ice shelf, Geophys. Res. Lett., Vol. 31, No. 18, L18401

[13] Dragert H., Wang K., James T.S., A Silent Slip Event on the Deeper Cascadia Subduction Interface *Science* May 2001, p 1525-1528. (2001)

[14] David Keys, Catastrophe, Century (1999) and Gunn J.D.,(ed) The Years without Summer. Tracing A.D. 536 and its aftermath. *British Archaeological Report* (BAR) S872 2000, ISBN 1 84171 074 1.

[15] Desmarquet M., Thiaoouba Prophecy, Arafura Publishing, ISBN 0-646-31395-9, (2000), first published in 1993, e-book: http://www.thiaoouba.com/ebook.htm

[16] T.J. Chalko, The Freedom of Choice, Scientific Eng Research, Melbourne, TheFreedomOfChoice.com, ISBN 0 9577882 1 5, (2000)

[17] Thomas, The Gospel of Thomas, Translation from the Coptic original by M.Meyer in "Secret Teachings..." Random House, NY, 1984, ISBN 0-394-74433-0

Appendix 1: Temperature distribution in a spherical reactor

Let's consider a homogenous spherical core reactor cooled from the outside. The differential equation governing the conduction and the heat storage in a solid is

$$\nabla^2 T + \frac{q}{k} = \frac{1}{\alpha}\frac{\partial T}{\partial t} \tag{1}$$

where t is time, ∇^2 is the Laplace operator in the spherical system of coordinates (r, φ, θ), $T(r, \varphi, \theta, t)$ is the temperature distribution, q is the heat generation rate per unit volume of the reactor, k is thermal conductivity and α is thermal diffusivity of the material of the reactor. In the case of spherical symmetry, the temperature distribution T becomes a function of the radial position r and time t only and the equation (1) becomes simplified as follows:

$$\frac{\partial^2 T(r,t)}{\partial r^2} + \frac{2}{r}\frac{\partial T(r,t)}{\partial r} + \frac{q}{k} = \frac{1}{\alpha}\frac{\partial T(r,t)}{\partial t} \tag{2}$$

The core is cooled by convection, i.e thermal energy is transferred between the eccentric solid core and the fluid that flows around it when the planet spins. The amount of the convection cooling determines the temperature gradient at the surface of the core $\left[\frac{\partial T(r,t)}{\partial r}\right]_{r=R} = \Delta_T(t)$. This condition, together with the obvious condition that the temperature of the outside surface of the core is $T(R,t) = T_0(t)$, defines boundary conditions required to solve the equation (2). Although the partial differential equation (2) with the above boundary conditions can be solved analytically, we focus on its steady-state solution $\left(\frac{\partial T(r,t)}{\partial t} = 0\right)$, simply because such a solution is sufficient to illustrate the key point of this article. The exact steady state solution of (2) is:

$$T(r) = -\frac{1}{6}\frac{q}{k}r^2 + C_1 + \frac{C_2}{r} \tag{3}$$

Constants C_1 and C_2 determined from the boundary conditions are: $C_1 = \frac{qR^2}{2k} + R\Delta_T + T_0$ and $C_2 = -(\frac{qR}{3k} + \Delta_T)R^2$. It is interesting to note that the constant C_2 is zero $(C_2 = 0)$ only if the temperature gradient on the surface of the reactor (determined by the convection cooling) is $\Delta_T = -\frac{qR}{3k}$. The tiniest changes to the convection cooling of the reactor, and the corresponding gradient Δ_T, lead to the extreme temperature changes in the center of the spherical reactor $(r = 0)$. The larger R - the stronger the effect.

Theoretically the temperature at the center of the core $T(0)$ can become infinitely large, but only when the reduction in cooling (Δ_T) is maintained indefinitely long. (We have to remember that the expression (3) is a steady-state asymptotic solution of the equation (2)). In reality, the temperature gradient Δ_T fluctuates around the value $\Delta_T = -\frac{qR}{3k}$. When cooling is reduced for whatever reason - the reactor accumulates heat, its temperatures rise and the convection cooling becomes more efficient. This in turn causes changes in the gradient Δ_T and the center of the core reactor cools down. Due to the non-linear (hyperbolic) relationship (3), the self-excited thermal oscillations are maintained. Can a similar process in the solar core explain fluctuations in the activity of the Sun?

Back on Earth, our results clearly indicate that the slightest reduction in the convection cooling of the core (Δ_T), when maintained for a sufficiently long time, leads to the extreme thermal conditions in the center of the core. The cause-effect relationship is not linear. It is HYPERBOLIC. Hence, if we do not address the greenhouse effect problem early enough - we are highly likely to cause the meltdown of the inner core reactor and its subsequent explosion. Am I expressing myself clearly enough? Good planets are not easy to find...

It is interesting to note, that overheating of the planet near $r = 0$, described by equation (3), can be very difficult to notice by observer on the surface of the planet.