Could geomagnetic reversals and excursions relate to extinctions and collapses of civilizations?

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Abstract

The stimulus for writing this article came from a new perspective to climate change and other phenomena. They could be argued to reflect the ethical and moral decay of our civilization. Could there be a much deeper reason for these phenomena and could they be unavoidable and implied by the basic physics? To put it provocatively: could our ethical and moral standards correlate with our physical environment in some sense?

The field body (magnetic or electric) is a key notion of TGD inspired quantum biology. It carries macroscopic quantum phases and serves as the "boss" of the ordinary biological body. The aging of the field body induces the loss of the control over the biological body and eventually leads to biological death.

This inspires the proposal that extinctions and collapses of civilizations could reflect the aging of the magnetic body of Earth leading eventually to the decay of the magnetic body and re-organization to a new magnetic body with reversed orientation of the magnetic field. A concrete quantitative model for what might be involved leads to a prediction of hierarchy of time scales for long lasting global reversals, temporary global reversals (excursions) and local and excursions.

Contents

1 Introduction **2**
1.1 Some interesting observations 2
1.2 Could the entropization of field bodies lead to magnetic reversals and excursions explaining extinctions and declines of civilizations 3

2 A concrete model for the geomagnetic reversals and excursions **4**
2.1 Could the period perturbation due to the precession of the equinox or planet Sedna relate to the magnetic reversals and excursions? 4
2.1.1 The precession of equinox 4
2.1.2 Could Sedna or/and Planet 9 cause the periodic perturbation? 4
2.2 Could p-adic length scale hypothesis imply a fractal hierarchy of time scales for global and local reversals? 5
2.3 Could stochastic resonance be involved? 5
2.4 Connection with the esoteric world views 6

1 Introduction

The stimulus for writing this article came from a new perspective to climate change and other phenomena. They could be argued to reflect the ethical and moral decay of our civilization. Could there be a much deeper reason for these phenomena and could they be unavoidable and implied by the basic physics? To put it provocatively: could our ethical and moral standards correlate with our physical environment in some sense?

Climate warming and other phenomena that cause disorder in the biosphere bring to mind the second law of thermodynamics. Could a deeper explanation be based on the second law of thermodynamics of its generalization. We turn too much ordered energy into dis-ordered energy. Could carbon dioxide emissions be a secondary phenomenon?

I did not take these considerations very seriously because it is difficult to see the reduction to the atomic level. The loss of order also manifests itself in a rather abstract form, for example on a social level as violence and inequality. Recently, however, I saw a mention of a study in which I claimed that the increase in entropy produced by human energy consumption starts to be significant at the atomic level. Could the decline of civilization have an explanation in terms of a generalization of the second law forced by TGD?

1.1 Some interesting observations

There are several interesting observations which have stimulated the ideas to be discussed in the sequel.

1. The Earth's magnetic field is changing rapidly near the poles (see this). Interestingly, global warming is fastest near the poles. It is expected that the direction of the field can change within a very short period of time. The shortest known polarization change has occurred in a year and global polarization reversals can last hundreds of years. Bjarne Lorentz has proposed on basis of correlations between temperature and the strength of the global magnetic field (see this) that the geomagnetic reversal could relate to global warming because it no longer protects the biosphere from cosmic radiation.

   This proposal however forces us to give up the standard view about dynamo mechanism as the origin of the Earth's magnetic field. The dynamo mechanism has severe difficulties: in particular, the magnetic field should have disappeared a long time ago. The TGD view of magnetic fields deviates dramatically from the Maxwellian view and leads to an explanation for the stability of the Earth's magnetic field and also predicts a mechanism for the polarization reversals [L2]. This mechanism has been also applied to the polarization reversals of the solar magnetic field [L3].

   In TGD, the magnetic bodies of ordinary physical systems carry macroscopically quantum coherent phases of matter being able to control the associated systems consisting of ordinary matter. TGD inspired quantum biology relies on this notion. Therefore there are good motivations to ask whether the correlation between the weakening of magnetic field and climate warming could exist.

   Mainstream scientists do not take the proposal seriously (see this) since there seems to be no standard physics mechanism justifying the claim. Also I am personally skeptical about the proposal that standard physics mechanisms could relate global warming and geomagnetic reversal.

2. In the last global reversal of the direction of the magnetic field about 41,000 years ago, the Neanderthals disappeared, although the reversal was short-lived about 250 years. The average period between reversals between long lasting global reversals is 450,000 years. For short lasting global reversals created in excursions, the average period is 10 times shorter, about 45,000 years (see this). There can also be local excursions and the strength and direction of the magnetic field of Earth indeed fluctuates.

3. Callahan have studied magnetic fields around the world [I2, I1] (see this) and noticed that the magnetic field and as a consequence the Schumann resonance can be very weak, for instance in the Near East. There are serious social problems in these areas. Why would the strength

of the magnetic field correlate with the coherence the social atmoshere? Could the magnetic field strength correlate with the coherence of collective consciousness?

1.2 Could the entropization of field bodies lead to magnetic reversals and excursions explaining extinctions and declines of civilizations

The above considerations lead to the key idea.

1. Magnetic bodies control biomatter in TGD. Specifically, the Earth's magnetic body, which would determine the collective consciousness of the Earth's and also affect the consciousness of living organisms since their magnetic bodies interact with the Earth's magnetic body.The magnetic body of the Sun would be also involved.

2. Could the fundamental cause of the problems of humanity and the biosphere be the increase of entropy at the level of magnetic bodies. The ageing magnetic body would be due to entropization. This mechanism could also explain the aging of biological organisms [L5]. The entropization would lead to a loss of quantum coherence and the magnetic body would gradually lose control over the processes at the level of the biological body. This would eventually lead to a death struggle of the magnetic body and magnetic body.

   More concretely, the monopole flux tube pairs of the Earth's magnetic field would split to short flux tubes. Later they could fuse back to flux tubes with a reversed direction of magnetic field. The process would be the same as in the reversal of the solar magnetic field.

   As a result, the quantum coherence scales would shorten and the control of the magnetic body over the bio-matter would be lost. Biomatter would be forced to cope without the help of the magnetic body. During sleep a similar situation takes place and during motor activities and sensory input are absent. The decay of the flux tubes can be local or global and the resulting magnetic flux tubes could be long lasting or only temporary.

3. In zero energy ontology (ZEO), the transition period leading to regeneration of the monopole flux tube would correspond to two "big" state function reductions (BSFRs) in macroscopic scale. It can be local or global and also short-term. In BSFR, the magnetic body would lose its consciousness reincarnating with an opposite arrow of time. In the second BSFR it would wake up with the original arrow of time.

4. One life cycle of the Earth's magnetic body would end (or a little more gently, the magnetic Mother Gaia would fall asleep and live in another direction of time). Eventually, a new cycle would begin with a new magnetic field. These cycles are analogous to the counterpart of sunspot cycles with a duration of 11+11 years. Could one think of a year cycle with a period about 45,000 years in which the magnetic field with reverted direction is short lived. For us, it might mean the collapse and rebirth of civilization. One can wonder what our fate in the next reversal is?

5. There are reasons to ask whether our species is approaching extinction. On the other hand, an enormous progress in science and technology is being made at the same time. This paradox applies more generally, as, for example, biologist Jeremy England has observed [I3]. Biological evolution is generally accompanied by an increase in entropy. p-Adic vision about cognition leads to exactly this prediction [L1]. When the p-adic negentropy associated with quantum entanglement as a measure for the amount of conscious information is large, the standard entropy is also large. The smarter we get, the more we produce entropy.

6. Homo sapiens appeared 300,000 years ago. The oldest Neandertal fossils are 430,000 years old. The most recent global and long-lasting direction change, the Brunhes–Matuyama reversal, occurred 780,000 years ago.

   45,000 years is a reasonable estimate for the average period for the magnetic excursions (see this). The last magnetic excursion was 41,000 years ago. The reversal lasted only 250 years but Neanderthals disappeared. Also now, a change in direction is taking place: could it lead to the extinction of our species or at least the destruction of civilization within a few hundred years? If these temporary reversals are periodic, our species would have survived 7 reversals.

This gives a cause for optimism. But on the other hand, we are doing our best to destroy our civilization.

Is it possible to estimate time scales for the duration of the magnetic field orientation from basic physics? The durations of the episodes seem random and the durations of the transitions also vary. p-Adic length scale hypothesis suggests that the periods come in powers of two. Surprisingly, also an esoteric view of the evolution of consciousness predicts so called Yuga cycle (see this predicting octaves of the basic period and giving nearly the same quantitative predictions. Period doubling and stochastic resonance, requiring the presence of a periodic perturbation and noise, could explain these characteristics. The first candidate for the periodic perturbation is the period of equinox precession. A better candidate is the orbital period of planet Sedna to which Earth would have monopole flux tube contacts. The noise would be thermal noise due to the aging of the magnetic body of Earth leading to its "death" and reincarnation by magnetic reversal or excursion.

2 A concrete model for the geomagnetic reversals and excursions

In the following a concrete model for the mechanism leading to the geomagnetic reversals and global and local excursions will be developed.

2.1 Could the period perturbation due to the precession of the equinox or planet Sedna relate to the magnetic reversals and excursions?

One can imagine two candidates for the periodic perturbation related to the magnetic reversals and excursions.

2.1.1 The precession of equinox

Could the period of precession of the equinox define the fundamental time scale related to the geomagnetic reversals and excursions?

1. The precession of the equinox means that at the spring equinox the sun's position in relation to the fixed stars of the Milky Way changes very slowly at a rate of 1 degree per 71.6 years, so that the entire 360 degree cycle corresponds to 25,800 years. This corresponds to the precession of the Earth's axis of rotation, i.e. the change of the axis around which the rotation axis rotates (nutation).

2. This phenomenon cannot be explained by the gravitational physics of the solar system, and I have proposed several TGD-based models for it [K2]. Monopole flux tubes connecting the Earth to some external object play a central role in these models. The flux tubes would pass through the Earth via the poles. For the first option they would not be quite straight and would rotate and in this way induce the precession. Another option is that the faraway ends of the flux tube move along a circular orbit and induce the precession.

This raises two questions.

1. Could the orbital period of the object involved with the magneic reversals and excursions relate to the period of 25,800 years for equinox precession somehow.

2. Could the proposed period 45,000 years for the global magnetic excursions (see this) relate to the equinox precession? The equinox period gives as its first sub-octave 51,600 years, which is too long as compared to the period of about 45,000 years of excursions.

2.1.2 Could Sedna or/and Planet 9 cause the periodic perturbation?

The trans-Neptunian object Sedna (see this) has an extra-long and unusually elliptical orbit around the Sun ranging between 76 AU and 938 AU. Its rotation period is T= 11,400 years. The emergence of agriculture 11,000 years ago is consistent with the Sedna hypothesis. The first octave of the

Sedna period is 22,800 years. The second octave of T is $4T = 45,600$ years and rather near to the proposed period of excursions so that the flux tube connections to Sedna explain them.

Planet 9 (see this), a hypothetical object having a rotation period in the range 9,900-15,400 years and proposed to be a primordial blackhole, could explain the orbital characteristics of Sedna. Its rotation period could coincide with the equinox precession period or with the rotation period of Sedna. Why would Earth be connected to Planet 9 by flux tubes? Could the argued blackhole property of Planet 9 relate to this somehow? Earth would belong to a flux tube network and nothing prevents Earth from having flux tube connections to both Sedna and planet 9, in particular if they have the same rotation periods. Also flux tube connections to an object with rotation period equal to the equinox period are also possible.

By Kepler's laws one has $T^2 = kR^3$, where T and R are the period and radius of the planet and k depends only on the mass of the star. In the Oort cloud there the typical rotation period of a comet is 1000 years and by factor 10 smaller than the time scales considered. Nottale hypothesis [E1], assumed also in TGD [K2], states that planets move along Bohr orbits. The value of the gravitational Planck constant introduced by Nottale is $\hbar_{gr} = GM/\beta_0$. This would give $R \propto n^2$, where n is a principal quantum number for the Bohr orbit.

2.2 Could p-adic length scale hypothesis imply a fractal hierarchy of time scales for global and local reversals?

How could the octaves of fundamental period emerge? p-Adic length-scale hypothesis serves as a guideline as one tries to make the proposal quantitative. Preferred harmonics and subharmonics come as octaves of the fundamental period. One can consider two options corresponding to the 25,800-year period for the precession of the equinox and to the rotation period of Sedna as fundamental period.

1. Consider first sub-harmonics. Period doubling is universal in non-linear systems and leads to chaos. A period of 45,000 years for global but short-lived reversals of direction is 10 percent smaller than the period 51,600 years obtained by a period doubling.

   For the Sedna option, the period $4 \times 11,400 = 45,160$ years is rather near to the estimated value for the period estimated for excursions. If one takes this at the face value, the recent change of the direction of the magnetic field could be global. The period 11,600 years could relate to the emergence of agriculture about 11,000 years ago. If this were the case, the next major event in this time scale would be within 600 years. The role of agriculture has been taken over by industry and it may be that this transition is already happening.

2. Harmonics are obtained in any non-linear system. The changes of the direction of magnetic field could be local and seen at the level of individual civilizations and also the transition periods and durations of reversals would be shorter. For the Sedna option the periods would be 11,400, 5,700, 2,850, 1,475, 737.5, 378.8, 189.4, 94.7, 47.35, 23,6, 11,8 ,.. years. Could these periods correspond to biorhythms as harmonics associated with the Sedna rotation period? It would be fascinating if even the time scales assignable to biological organisms and humans could be induced by the flux tube connections to Sedna (and possibly also Planet 9).

2.3 Could stochastic resonance be involved?

I have discussed stochastic resonance from the TGD point of view earlier in [K1] and recently in [L4]. Also the reversal of the stochastic resonance plays a key role in TGD inspired quantum biology.

1. Stochastic resonance appears in bistable systems in presence of a periodic perturbation when the amplitude of the external noise is suitable. The frequency of stochastic resonance equals $f_{spont} = 2f$. f_{spont}, defined as the frequency for the transitions between the two states of the bistable system, is determined by the amplitude of the noise. f_{spont} is proportional to an Arrhenius factor having also interpretation as (quantum) tunnelling probability, whose dependence on the amplitude of the noise is exponential. Also the harmonics nf_{spont} of this frequency are induced but are exponentially damped.

2. In the recent case the two states of the bistable system correspond to the orientations of the Earth's magnetic field. The thermalization of the Earth's magnetic body would cause the noise leading to stochastic resonance inducing the polarization flip. The periodic driving force with period T could be caused by Sedna or equinox precession. The period T_{exc} for excursions would be $T_{exc} = T/2$ or its sub-harmonic.

3. The period $T_{prec} = 25,800$ years for the precession of equinox gives $T_{exc} = 12,400$ years, which might correspond to the period assignable to local reversals of the magnetic field. The absence of a noise with a correct amplitude could cause long periods without reversals and excursions and also the occurrence of only few excursions. The harmonics of f_{spont} would give periods T_{exc}/n and as special case sub-octaves $6,200$ years, $3,100$ years, etc... suggested by the p-adic length scale hypothesis.

4. If the rotation of Sedna defines the periodic perturbation, stochastic resonance gives the period $5,200$ years plus its subharmonics, in particular sub-octaves 2,600 year, etc..

Stochastic resonance cannot explain the proposed excursion period of 45,000 years. Here period doubling, also conforming with the p-adic length scale hypothesis, seems to be the only explanation and applies for both equinox and Sedna option.

2.4 Connection with the esoteric world views

There is an interesting connection with esoteric world views. Ville-Einari Saari sent me a link to the article "The Yuga Cycle And The 25,800-Year Precession Cycle Of The Earth" by Bibhu Dev Misra (see this) presents arguments based on what is known about the emergence of civilizations at different parts of the globe.

1. In ancient cultures, it has been believed that consciousness is associated with what could be called the Yuga cycle which has a period of 24,000 years, somewhat shorter than T= 25,800 years for the equinox precession cycle. The ancient cultures were aware of the precession of the equinox. However, it must be taken into account that in these cultures the accuracy of the measurements was at a completely different level, so the difference cannot be considered decisive. The first octave of Edna rotation period 22,800 years.

2. 3 octaves of this period are assumed to be important. The Kali Yuga cycle is divided into two 12,000-year cycles, which are further divided into four 3,000-year cycles with a 300-year transition period. The periods of these 3 cycles of octaves from the basic period. So we would get cycles of 24,00, 12,000, 6000, and 3000 years. The period doubling would give a 48,000 year cycle. These periods are rather near to the periods 22,800 11,400, 5,700, 2,850 years predicted by the Sedna hypothesis.

3. Misra suggests that the 3000-year cycle with a period rather near to 2,850 years is related to the rise and fall of civilizations on a global scale. The civilizations would disappear and regenerate as waves that spread across the globe. This process would be induced by the decay and regeneration of flux tubes at an expanding wave front The transition period, which in TGD would correspond to a time-reversed "sleep" period, would be short, hundreds of years or even shorter.

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