Article

The Convincing Cosmic Energy Gravitational Genesis of the Strongest Geomagnetic Anomalies of the Magnetic Field of the Earth

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Abstract: The author presents convincing evidence of the cosmic (planetary and solar) energy gravitational origin (related to the maximal and minimal combined planetary and solar integral energy gravitational influences on the internal rigid core of the Earth) of the maximal temporal intensifications of the global magnetic processes of the Earth. In fairly good agreement with the calculated date 2007.416666666 AD (of the local minimal planetary and solar integral energy gravitational influence on the internal rigid core), it was observed the very rapid changes of the geomagnetic field near the date March 2007 AD (corresponding approximately to 19-20 April 2007 AD). This fairly good agreement gives the additional convincing argument that the date March 2007 AD can be considered as the possible beginning of the geomagnetic reversal during the evaluated range (2007÷2216) AD. The strong magnetic anomaly occurred on 6 January 2020 AD in perfect agreement with the calculated date 2020.016666667 AD (corresponding to 6 January 2020 AD) related to the local maximal planetary and solar integral energy gravitational influence on the internal rigid core. In fairly good agreement with the calculated date 2023.26666666 AD (corresponding approximately to 7 April 2023 AD) of the local maximal planetary and solar integral energy gravitational influence on the internal rigid core, it was observed the strongest (during the last 6 years) magnetic anomaly on 23 March 2023 AD. These convincing agreements demonstrate the physical validity of the established global prediction thermohydrogravidynamic principles, which can be considered as the proven physical basis for the development of the general unified geophysical theory (describing the possible geomagnetic reversal during the evaluated range (2007 ÷ 2216) AD) combining the Special Theory of Relativity, the relativistic electrodynamics and the relativistic theory of the non-stationary gravitation, which can be developed based on the established physical analogy between the established relation for the energy flux (of the gravitational energy) and the Lorentz's calibration condition (for the vector potential related with the scalar potential of the non-stationary electromagnetic field).

Keywords: non-stationary gravitation of the solar system; generalized formulation of the first laws of thermodynamics; global seismotectonic and magnetic processes; the problem of the geomagnetic reversal; thermohydrogravidynamic theory and technology; global prediction thermohydrogravidynamic principles

1. Introduction

The closely related problems of the strong magnetic anomalies [1–6] and the reversals of the geomagnetic field [2, 3, 6–8] are a significant problems (of modern geophysics), the solution of which are very urgent for humankind. The problem of the long-term prevention of the strongest earthquakes [9] is also a significant

problem of modern geophysics [10]. We presented [11] the convincing evidence of "a possible cosmic energy gravitational genesis of the strong Chinese 2008 and the strong Japanese 2011 earthquakes" [12].

We presented the deduction of the thermohydrogravidynamic theory [2,3,6] concerning the cosmic (planetary and solar) energy gravitational origin of the forthcoming geomagnetic reversal of the Earth's magnetic field. The thermohydrodynamic theory is based on the author's generalized differential formulations of the first law of thermodynamics. Based on the established fundamental global seismotectonic, volcanic, climatic and magnetic time periodicities (702 ± 6) years and (6321 ± 3) years, we presented [2] the evidence of the combined cosmic (planetary and solar) origin of the forthcoming intensification of the global natural (seismotectonic, volcanic, climatic and magnetic) processes of the Earth since 2016 AD. We concluded [2] that the real observation of the strong changes of the geomagnetic field during the range (2006÷2008) AD can be considered as the geomagnetic precursor of the established [2] forthcoming intensification of the global natural processes of the Earth in the 21st century since 2016 AD. We suggested [2] to verify this range (2006÷2008) AD as the geomagnetic precursor of the established [2] forthcoming intensification of the global natural processes of the Earth since 2016 AD.

Taking into account the urgency of this verification, we established [3] that the mean date 2007 AD of the obtained range (2006 ÷ 2008) AD is in very good agreement with the real observed date 2007.3 AD [1] of the very rapid changes of the geomagnetic field. The obtained verification of the range (2006 ÷ 2008) AD (related to the established date 2007.3 AD [1]) gave [3] convincing evidence of the fundamental significance of the established [13] thermohydrogravidynamic processes (in the internal rigid core of the Earth and the turbulent boundary region between the internal rigid core and the fluid core of the Earth) on the global natural processes of the Earth.

Taking into account that the revealed date 2007.3 AD [1] is in very good agreement with the mean date 2007 AD (of the obtained [2] range (2006 ÷ 2008) AD), we concluded [3] that the revealed very rapid changes of the geomagnetic field [1] near the established date 2007.3 AD [1] can be considered as the possible beginning of the geomagnetic reversal during the evaluated [2,3] range (2007 ÷ 2216) AD.

The first aim of this article is related to the established additional argument concerning the cosmic energy gravitational origin of the possible beginning (2007 AD) of the geomagnetic reversal during the evaluated [2,3] range (2007 ÷ 2216) AD. To present the additional convincing argument that the date 2007 AD can be considered as the possible beginning of the geomagnetic reversal of the geomagnetic field of the Earth during the evaluated [2,3] range (2007 ÷ 2216) AD, it is necessary to demonstrate that the date March 2007 AD [1] of the very rapid changes of the geomagnetic field is determined by the established [13,14] global prediction thermohydrogravidynamic principles for the internal rigid core of the Earth) determining the maximal temporal intensifications of the global natural (seismotectonic and magnetic) processes near the corresponding time moments $t^*(\tau_{c.r})$ and $t_*(\tau_{c.r})$, respectively.

The second aim of this article is related to the presented theoretical and empirical fundamentals of the general unified geophysical theory (combining the non-stationary gravitational and electromagnetic fields of the Earth) describing the geomagnetic reversals determined by the cosmic (planetary and solar) gravitational influences on the internal rigid core of the Earth.

In Section 2 we consider the fundamentals of the thermohydrogravidynamic theory [2,3,6,11,13–16] applied for confirmation of the cosmic (planetary and solar) energy gravitational origin of the maximal temporal intensifications of the global natural (seismotectonic and magnetic) processes of the Earth. In Section 2.1 we consider the established [2,3,6,11,13–16] general generalized differential formulation of the first law of thermodynamics for moving individual finite continuum regions subjected to the combined terrestrial and cosmic (planetary and solar) non-stationary Newtonian gravitation and terrestrial stress forces.

In Section 2.2 we consider the established [2,3,6] generalized differential formulation of the first law of thermodynamics for the individual finite continuum region subjected to the combined terrestrial and cosmic (planetary and solar) non-stationary Newtonian gravitation, terrestrial stress forces and non-stationary electromagnetic field.

In Section 2.3 we consider the established [13,14] global prediction thermohydrogravidynamic principles used for convincing confirmation of the cosmic energy gravitational origin of the maximal temporal intensifications of the global natural (seismotectonic and magnetic) processes of the Earth near the corresponding time moments and respectively.

In Section 3 we present the confirmation of the cosmic (planetary and solar) energy gravitational origin of the maximal temporal intensifications of the global magnetic processes. Section 3 gives the application of the global prediction thermohydrogravidynamic principles for confirmation of the cosmic energy gravitational origin of the maximal temporal intensifications of the global magnetic processes of the Earth observed near the following dates: 2007.3 AD [1], 6 January 2020 AD [4], and 23 March 2023 AD [5].

In Section 4 we present the theoretical and empirical fundamentals for the development of the general unified geophysical theory describing the geomagnetic reversals of the Earth's magnetic field.

The Section 5 gives a summary of the main results.

The Section 6 gives the conclusions.

2. Thermohydrogravidynamic Theory

2.1. Main Concepts

The Equation (1) represents the established [15–17] generalized differential formulation of the first law of thermodynamics for individual finite one-component continuum region τ (see Figure 1) subjected to the terrestrial and cosmic (planetary and solar) non-stationary Newtonian gravitation and terrestrial stress forces.

$$dU_\tau + dK_\tau + d\boldsymbol{\pi}_\tau = \delta Q + \delta A_{np,\partial\tau} + dG \tag{1}$$

The Equation (2) means the classical microscopic internal thermal energy of the individual finite continuum region τ, u is the internal thermal energy per unit mass [18], ρ is the local density of mass distribution, t is the time, dV is the differential of the three-dimensional physical volume.

$$U_\tau = \iiint_\tau u\rho dV. \tag{2}$$

The Equation (3) means the macroscopic kinetic energy of the individual finite continuum region τ, $\mathbf{v}$ is the hydrodynamic velocity in the finite continuum region τ.

$$K_\tau = \iiint_\tau \frac{\rho\mathbf{v}^2}{2}dV. \tag{3}$$

The Equation (4) means the macroscopic potential gravitational energy (of the individual finite continuum region τ), ψ is the potential of the terrestrial and cosmic (planetary and solar) Newtonian non-stationary (depending on time t) gravitation.

$$\boldsymbol{\pi}_\tau = \iiint_\tau \psi\rho dV. \tag{4}$$

The Equation (5) means the classical differential (during the differential time interval dt) total heat flux related to the thermal molecular conductivity of heat across the boundary surface $\partial\tau$ of the individual finite continuum region τ, $\mathbf{J}_q$ is the classical [18] density of the heat flux across the differential surface element $d\Omega_\mathbf{n}$ of the continuum boundary surface $\partial\tau$ of the individual finite continuum region τ, $\mathbf{n}$ is the external unit vector normal to the differential surface element $d\Omega_\mathbf{n}$.

$$\delta Q = -dt\iint_{\partial\tau}\left(\mathbf{J}_q \cdot \mathbf{n}\right)d\Omega_\mathbf{n}. \tag{5}$$

The Equation (6) means the established [15−17] generalized differential work done by terrestrial stress forces acting on the boundary surface $\partial\tau$, $\mathbf{T}$ is the symmetric stress tensor [19].

$$\delta A_{np,\partial\tau} = dt\iint_{\partial\tau}\left(\mathbf{v} \cdot \left(\mathbf{n} \cdot \mathbf{T}\right)\right)d\Omega_\mathbf{n}. \tag{6}$$

The Equation (7) means the established [2,3,6,11,13−16,20] differential energy gravitational influence dG on the individual finite continuum region τ.

$$dG = dt\iiint_\tau \frac{\partial\psi}{\partial t}\rho dV = -dt\iint_{\partial\tau}\left(\mathbf{J}_g \cdot \mathbf{n}\right)d\Omega_\mathbf{n}. \tag{7}$$

The Equation (8) determines the established [2,6,13,14] energy flux $\mathbf{J}_g$ of the gravitational energy.

$$\rho \frac{\partial \psi}{\partial t} + \operatorname{div} \mathbf{J}_g = 0 \cdot \tag{8}$$
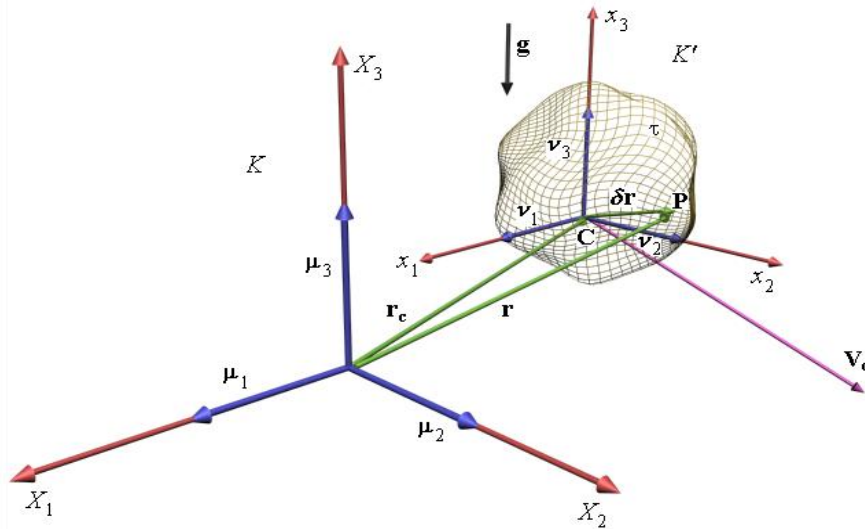

Figure 1. The individual finite continuum region τ subjected to the terrestrial and cosmic (planetary and solar). Newtonian non-stationary gravitation, terrestrial stress forces and non-stationary electromagnetic field.

The generalized differential formulation (given by the Equation (1)) gave [13,15,16] the classical [21,22] identical formulations of the first law of thermodynamics for the small continuum region τ of an ideal fluid subjected to stationary gravitation.

2.2. The Generalized First Law of Thermodynamics for Non-stationary Electromagnetic Field

The Equation (9) represents the established [2,6] subsequent generalization of the generalized differential formulation (given by the Equation (1)) of the first law of thermodynamics for moving macroscopic individual continuum region τ (see Figure 1) subjected to the combined terrestrial and cosmic (planetary and solar) non-stationary Newtonian gravitation, terrestrial stress forces and non-stationary electromagnetic field.

$$dU_\tau + dK_\tau + d\pi_\tau + dE_{e,m,\tau} = \delta Q_{e,m} + \delta Q + \delta A_{np,\partial\tau} + \delta\Phi_{e,m} + dG \cdot \tag{9}$$

The Equation (9) extends the Equation (1) by taking into account (along with the classical terms) the established [15–17] terms dK_τ (where K_τ is given by the Equation (3)), $d\pi_\tau$ (where π_τ is given by the Equation (4)), $\delta A_{np,\partial\tau}$ (given by the Equation (6)) and dG (given by the Equation (7)) and the following additional established terms [2,6]: the infinitesimal change $dE_{e,m,\tau}$ of electromagnetic energy $E_{e,m,\tau}$ of the individual region τ, the flux $\delta\Phi_{e,m} = -\delta F_{e,m}$ of the electromagnetic energy radiated by the region τ across the boundary surface $\partial\tau$, and the infinitesimal heating $\delta Q_{e,m}$ owing to the infinitesimal work of electrodynamic forces and owing to the dissipated electromagnetic waves inside of the individual region τ.

The Equation (10) represents the Lorentz's calibration condition [23], φ is the scalar potential of the electromagnetic field, $\mathbf{A}$ is the vector potential of the electromagnetic field, c is the speed of light.

$$\frac{1}{c} \frac{\partial \varphi}{\partial t} + \operatorname{div} \mathbf{A} = 0 \tag{10}$$

The Equation (8) is analogous to the Lorentz's calibration Equation (10).

2.3. The Global Thermohydrogravidynamic Principles

The Equation (11) represents the first global prediction thermohydrogravidynamic principle [13,14,20,24–26] formulated (for the internal rigid core $\tau_{c,r}$ of the Earth) based on the term dG (given by the Equation (7)) of the generalized differential formulation (given by the Equation (1)) of the first law of thermodynamics .

$$\Delta G(\tau_{c,r}, t^*(\tau_{c,r})) = \max_t \int_{t_0}^{t} dt' \iiint_{\tau_{c,r}} \frac{\partial \psi_{comb}}{\partial t'} \rho_{c,r} dV \ - \ \text{local maximum for time moment } t^*(\tau_{c,r}) \cdot \tag{11}$$

The Equation (12) represents the second global prediction thermohydrogravidynamic principle [13,14,20,24–26] formulated (for the internal rigid core $\tau_{c,r}$ of the Earth) based on the term dG (given by the Equation (7)) of the generalized differential formulation (given by the Equation (1)) of the first law of thermodynamics .

$$\Delta G(\tau_{c,r}, t_*(\tau_{c,r})) = \min_t \int_{t_0}^{t} dt' \iiint_{\tau_{c,r}} \frac{\partial \psi_{comb}}{\partial t'} \rho_{c,r} dV \ - \ \text{local minimum for time moment } t_*(\tau_{c,r}) \cdot \tag{12}$$

Here $\psi_{comb} \equiv \psi_{comb}(\tau_{c,r}, t)$ is the cosmic combined (planetary and solar) gravitational potential in the internal rigid core $\tau_{c,r}$. The Equation (13) approximates [14,25] the gravitational potential $\psi_{comb}(\tau_{c,r}, t)$.

$$\psi_{comb}(\tau_{c,r}, t) = \sum_{i=1, i \neq 3}^{5} \psi_{3i}(C_3, t) + \sum_{j=5}^{8} \psi_{3j}^{S}(C_3, t) \cdot \tag{13}$$

Here $\psi_{3i}(C_3, t)$ is the established [11,14,16,27,28] gravitational potential created (at the mass center C_3 of the Earth) by Mercury (i = 1), Venus (i = 2), Mars (i = 4) and Jupiter (i = 5); $\psi_{3i}^{S}(C_3, t)$ is the established [14, 25] gravitational potential (at the mass center C_3 of the Earth) created by the Sun for the system Sun-Jupiter (j = 5), for the system Sun-Saturn (j = 6), for the system Sun-Uranus (j = 7) and for the system Sun-Neptune (j = 8).

The Equation (14) represents the established [13] rewritten form of the general Equation (8) for the non-stationary gravitational potential ψ.

$$\frac{\partial \psi}{\partial t} + div(\psi \mathbf{v}_{ge}) = -\frac{(\mathbf{J_g} \cdot \nabla \rho)}{\rho^2} \equiv s_{ge}(\mathbf{r}, t) \cdot \tag{14}$$

Here $\mathbf{v}_{ge} = \frac{\mathbf{J_g}(t)}{\rho \psi}$ is the speed of propagation of the gravitational energy, $\rho \psi$ is the gravitational energy per unit volume, $s_{ge}(\mathbf{r}, t)$ is the source of the gravitational energy. The Equation (14) means [13] that the density gradients $\nabla \rho \neq 0$ (especially, between the rigid core and the fluid core of the Earth) are related with the sources $s_{ge}(\mathbf{r}, t) \neq 0$ of the gravitational energy radiated owing to the oscillatory motion of the rigid core relative to the fluid core of the Earth [11,14,27,28].

We established [24] that the first direct detection [29] of gravitational waves (occurred on 14 September 2015 AD) and the strongest (in 2015 AD) 8.3-magnitude Chilean earthquake (occurred on 16 September 2015 AD) are causally related to the local maximum (in 2015 AD) of the cosmic (planetary and solar) integral energy gravitational influence (given by the Equation (11)) occurred on the calculated (under the first approximation of the circular orbits of the planets around the Sun) date $t^*(\tau_{c,r}, 2015) = 2015.6833$ AD [24] corresponding approximately to 6 September 2015 AD.

The global prediction thermohydrogravidynamic principles (given by the Equations (11) and (12)) confirmed the cosmic energy gravitational genesis of the strongest Japanese, Italian, Greek, Chinese and Chilean earthquakes [24]. The principles (given by the Equations (11) and (12)) confirmed also the cosmic energy gravitational genesis of the strongest intensifications of the seismotectonic processes in California [30].

3. The Cosmic Energy Gravitational Genesis of the Maximal Temporal Intensifications of the Global Magnetic Processes

To present the additional convincing argument of the cosmic (planetary and solar) energy gravitational origin of the real beginning of the geomagnetic reversal of the Earth since the established date 2007.3 AD [1] of the very rapid changes of the geomagnetic field, let us demonstrate that the date 2007.3 AD [1] is consistent with the global prediction thermohydrogravidynamic principle (given by the Equation (12)) determining the corresponding time moment $t_*(\tau_{c,r}, 2007)$ near the established date 2007.3 AD [1]. Based on the global

prediction thermohydrogravidynamic principle (given by the Equation (12)) under the first approximation of the circular orbits of the planets, we calculate the time moment $t_*(\tau_{c,r}, 2007) = 2007.416666666$ AD (corresponding to 1 June 2007 AD) related to the local minimal (in 2007 AD) cosmic (planetary and solar) integral energy gravitational influence on the internal rigid core $\tau_{c,r}$ of the Earth. We see that the established date March 2007 AD [1] (corresponding approximately to 19-20 April 2007 AD) is in fairly good agreement with the calculated date $t_*(\tau_{c,r}, 2007) = 2007.416666666$ AD. This fairly good agreement is the convincing argument of the cosmic energy gravitational origin of the very rapid changes of the geomagnetic field occurred near the established date March 2007 AD [1]. This fairly good agreement gives also the additional convincing argument that the date March 2007 AD [1] can be considered as the possible beginning of the geomagnetic reversal of the geomagnetic field during the evaluated [2,3] range (2007 ÷ 2216) AD.

The strongest (during the range from 20 February 2007 to 10 September 2007 AD) earthquake (characterized by the maximal magnitude M = 8.1) occurred on 1 April 2007 AD (corresponding to the date $t_e(2007, loc.min.) = 2007.24914442$ AD) in the Solomon Islands near the calculated date $t_*(\tau_{c,r}, 2007) = 2007.416666666$ AD. This fairly good agreement (between the dates $t_e(2007, loc.min.) = 2007.24914442$ AD and $t_*(\tau_{c,r}, 2007) = 2007.416666666$ AD) is the convincing argument of the cosmic (planetary and solar) energy gravitational origin of the strongest (during the range from 20 February 2007 to 10 September 2007 AD) earthquake that occurred on 1 April 2007 AD. We see that the established date 2007.3 AD [1] is located between the real date $t_e(2007, loc.min.) = 2007.24914442$ AD and the calculated date $t_*(\tau_{c,r}, 2007) = 2007.416666666$ AD. It means that the date 2007.3 AD [1] of the very rapid changes of the geomagnetic field is causally related to the real date $t_e(2007, loc.min.) = 2007.24914442$ AD (of the strongest earthquake occurred on 1 April 2007 AD) and the calculated date $t_*(\tau_{c,r} 2007) = 2007.416666666$ AD of the local minimum (given by the Equation (12)) in 2007 AD.

The predicted (on 4 December 2019 AD [26]) date $t^*(\tau_{c,r}, 2020) = 2020.016666667$ AD (corresponding approximately to 6 January 2020 AD) is calculated based on the global prediction thermohydrogravidynamic principle (given by the Equation (11)) under the first approximation of the circular orbits of the planets around the Sun. We considered [26] the strong magnetic anomaly (observed on 6 January 2020 AD in Norway [4] in perfect agreement with the predicted date $t^*(\tau_{c,r}, 2020) = 2020.016666667$ AD) as the real confirmation of the cosmic energy gravitational origin of the maximal temporal intensification of the global magnetic processes of the Earth.

We calculated (in advance [31]) the date $t^*(\tau_{c,r}, 2023) = 2023.26666666$ AD related with the local maximal cosmic (planetary and solar) integral energy gravitational influence (given by the Equation (11)) on the internal rigid core $\tau_{c,r}$ of the Earth. The strongest (during the last 6 years) magnetic anomaly observed (on 23 March 2023 AD [5]) in fairly good agreement with the predicted date $t^*(\tau_{c,r}, 2023) = 2023.26666666$ AD (corresponding approximately to 7 April 2023 AD) is the additional real evidence of the cosmic energy gravitational origin of the maximal intensifications of the global magnetic processes of the Earth.

We see that strongest magnetic anomalies of the Earth (observed near the established date March 2007 AD [1], on 6 January 2020 AD [4], and on 23 March 2023 AD [5]) are determined (according to the global prediction thermohydrogravidynamic principles (given by the Equations (11), (12), and (11) respectively) by the cosmic (planetary and solar) integral energy gravitational influences on the internal rigid core $\tau_{c,r}$ of the Earth.

4. The Fundamentals for Development of the General Unified Geophysical Theory Describing the Geomagnetic Reversals

There is an obvious need of the general unified geophysical theory (combining the cosmic non-stationary gravitation and electromagnetic field of the Earth) describing the geomagnetic reversals of the Earth's magnetic field determined by the cosmic (planetary and solar) integral energy gravitational influences on the internal rigid core $\tau_{c,r}$ of the Earth. What are the established theoretical and empirical fundamentals to develop the general unified geophysical theory (describing the geomagnetic reversals of the Earth's magnetic field)?

We showed [2] that the established [13] synchronic fundamental seismotectonic, volcanic, climatic and magnetic time periodicities $T_{tec, vol, clim, m, sf} = (6321 \pm 3)$ years (determined by the combined predominant non-stationary energy gravitational influences on the Earth of the system Sun-Moon, Venus, Mars, Jupiter and the Sun

owing to the predominant gravitational interactions of the Sun with the Jupiter and Saturn) are really related with the revealed [32–34] geomagnetic reversals of the Earth.

We have demonstrated the convincing cosmic (planetary and solar) energy gravitational origin of the very rapid changes of the geomagnetic field occurred near the established date March 2007 AD [1] by the fairly good agreement between the established date March 2007 AD [1] and the calculated date $t_*(\tau_{c,r} 2007) = 2007.416666666$ AD of the local minimum (in 2007 AD) of the cosmic (planetary and solar) integral energy gravitational influence (given by the Equation (12)) on the internal rigid core $\tau_{c,r}$ of the Earth. The Equation (15) represents the evaluated [2] range (of the possible geomagnetic reversal of the magnetic field of the Earth)

$$-(10529 \pm 100) + 2 \times (6321 \pm 3) = (2113 \pm 106)\, AD = (2007 \div 2216)\, AD \qquad (15)$$

obtained by taking into account the evaluated [2] range $(10629 \div 10429)\, BC$ of the "late Weichselian palaeomagnetic reversal" [32] and the synchronic fundamental seismotectonic, volcanic, climatic and magnetic time periodicities $T_{tec, vol, clim, m, sf} = (6321 \pm 3)$ years [2,13]. The date 2007.3 AD (of the very rapid changes of the geomagnetic field [1]) is in perfect agreement with the beginning of 2007 AD of the evaluated [2] range given by the Equation (15).

We have demonstrated the convincing cosmic (planetary and solar) energy gravitational origin of the observed (on 6 January 2020 AD in Norway) strong magnetic anomaly [4] by the perfect agreement between the previously calculated [26] date $t^*(\tau_{c,r}, 2020) = 2020.016666667\, AD$ (corresponding approximately to 6 January 2020 AD) and the real date (6 January 2020 AD) of the observed [4] strong magnetic anomaly.

We have demonstrated the convincing cosmic (planetary and solar) energy gravitational origin of the strongest (during the last 6 years) magnetic anomaly observed on March 23, 2023 AD [5]) by the fairly good agreement between the observed date (23 March 2023 AD) and the previously calculated [31] date $t^*(\tau_{c,r}, 2023) = 2023.26666666\, AD$ (corresponding approximately to 7 April 2023 AD) related with the local maximum (in 2023 AD) of the cosmic (planetary and solar) integral energy gravitational influence (given by the Equation (11)) on the internal rigid core $\tau_{c,r}$ of the Earth.

The convincing cosmic energy gravitational origin of the strongest magnetic anomalies (observed near the established date March 2007 AD [1], on 6 January 2020 AD [4], and on 23 March 2023 AD [5]) of the geomagnetic field of the Earth is physically related with the existence of the identical term dG (in the generalized differential Equations (1) and (9) representing the first laws of thermodynamics) applied (in the global prediction thermohydrogravidynamic principles given by the Equations (11) and (12)) for the internal rigid core $\tau_{c,r}$ of the Earth subjected to the cosmic (planetary and solar) energy gravitational influences. We have obtained the convincing experimental evidence that the maximal and minimal (i.e., extreme) cosmic (planetary and solar) integral energy gravitational influences (given by the Equations (11) and (12), respectively) on the internal rigid core $\tau_{c,r}$ of the Earth result to the strongest magnetic anomalies of the geomagnetic field of the Earth.

The established [2,6,13] Equation (8) is the obvious physical analogue of the famous Lorentz's calibration Equation (10) in electrodynamics [23]. The convincing inherent physical analogy between the Equation (8) (for the energy flux $\mathbf{J}_g$ related with the scalar potential Ψ of the non-stationary gravitational field) and the Lorentz's calibration Equation (10) (for the vector potential $\mathbf{A}$ related with the scalar potential φ of the non-stationary electromagnetic field) gives the theoretical basis for the foundation of the relativistic theory of the non-stationary gravitational fields consistent with the Lorentz's transformations [23] and with the Einstein's Special Theory of Relativity.

5. Summary

We have presented in the Section 2 the fundamentals of the thermohydrogravidynamic theory applied for evidence of the cosmic (planetary and solar) energy gravitational origin of the strongest geomagnetic anomalies of the magnetic field of the Earth. We have presented in the Section 2.1 the established [15–17] generalized differential formulation (given by the Equation (1)) of the first law of thermodynamics describing the total energy transformation in the individual finite continuum region τ (considered in the Galilean frame of reference) subjected to the combined terrestrial and cosmic (planetary and solar) non-stationary Newtonian gravitation and non-potential terrestrial stress forces. The generalized differential formulation (given by the Equation (1))

generalizes the classical [21,22] formulation by taking into account (along with the classical terms) the established [15,16] differential energy gravitational influence dG (related with the non-stationary terrestrial and cosmic Newtonian gravitation) on the individual finite continuum region τ.

We have presented in the Section 2.2 the established [2,3,6] generalized differential formulation (given by the Equation (9)) of the first law of thermodynamics generalizing the generalized differential formulation (given by the Equation (1)) by taking into account the non-stationary electromagnetic field. The generalized differential formulation (given by the Equation (9)) generalizes the differential formulation (given by the Equation (1)) by taking into account (along with the classical and the established [15,16] term dG) the infinitesimal increment $dE_{e,m,\tau}$ of the electromagnetic energy $E_{e,m,\tau}$ of the individual region τ, the flux $\delta\Phi_{e,m} = -\delta F_{e,m}$ of the radiated electromagnetic energy across the boundary surface $\partial\tau$ of the region τ, and the infinitesimal heating $\delta Q_{e,m}$ due to the differential work of electrodynamic forces and due to the dissipated electromagnetic waves. In the Section 2.3, we have presented the established [13,14] global prediction thermohydrogravidynamic principles (given by the Equations (11) and (12) formulated based on the general term dG of the generalized Equations (1) and (9) applied for the internal rigid core $\tau_{c,r}$ of the Earth) determining the corresponding time moments $t^*(\tau_{c,r})$ and $t_*(\tau_{c,r})$, respectively, of the maximal temporal intensifications of the global magnetic and seismotectonic processes of the Earth.

We have presented in the Section 3 the convincing evidence of the cosmic (planetary and solar) energy gravitational origin of the maximal temporal intensifications of the global magnetic processes of the Earth. We have shown that strongest magnetic anomalies of the Earth (observed near the established date March 2007 AD [1], on 6 January 2020 AD [4], and on 23 March 2023 AD [5]) are determined (according to the global prediction thermohydrogravidynamic principles given by the Equations (11), (12), and (11) respectively) by the cosmic (planetary and solar) integral energy gravitational influences on the internal rigid core $\tau_{c,r}$ of the Earth.

We have shown that the very rapid changes of the geomagnetic field near the date March 2007 AD [1] were recorded in fairly good agreement with the calculated date $t_*(\tau_{c,r} 2007) = 2007.416666666$ AD of the local minimum (given by the Equation (12)) of the cosmic (planetary and solar) integral energy gravitational influence on the internal rigid core $\tau_{c,r}$ of the Earth. This fairly good agreement gives the first sign to develop the unified geophysical theory (based on the generalized differential Equation (9) combining the non-stationary cosmic gravitation and electromagnetic field of the Earth) describing the geomagnetic reversals of the Earth's magnetic field.

We have shown that the date March 2007 AD (of the very rapid changes of the geomagnetic field [1]) and the calculated date $t_*(\tau_{c,r} 2007) = 2007.416666666$ AD (of the local minimum given by the Equation (12)) are in perfect agreement with the beginning 2007 AD of the evaluated [2,3] range $(2007 \div 2216)$ AD (given by the Equation (15)) of the possible geomagnetic reversal of the magnetic field of the Earth.

This perfect agreement gives the second sign to develop the unified geophysical theory (based on the generalized differential Equation (9) combining the non-stationary cosmic gravitation and electromagnetic field of the Earth) describing the geomagnetic reversals of the Earth's magnetic field.

We have shown the strong magnetic anomaly (observed on 6 January 2020 AD [4]) was recorded in perfect agreement with the predicted [26] date $t^*(\tau_{c,r}, 2020) = 2020.016666667$ AD (corresponding approximately to 6 January 2020 AD) related with the local maximum (given by the Equation (11)) of the cosmic (planetary and solar) integral energy gravitational influence on the internal rigid core $\tau_{c,r}$ of the Earth. This perfect agreement gives the third sign to develop the unified geophysical theory (based on the generalized differential Equation (9) combining the non-stationary cosmic gravitation and electromagnetic field of the Earth) describing the geomagnetic reversals of the Earth's magnetic field.

We have shown that the strongest (during the last 6 years) magnetic anomaly (observed on 23 March 2023 AD [5]) was recorded in fairly good agreement with the predicted [31] date $t^*(\tau_{c,r}, 2023) = 2023.26666\,666$ AD (corresponding approximately to 7 April 2023 AD) related with the local maximum (given by the Equation (11)) of the cosmic (planetary and solar) integral energy gravitational influence on the internal rigid core $\tau_{c,r}$ of the Earth. This fairly good agreement gives the fourth sign to develop the unified geophysical theory (based on the generalized differential Equation (9) combining the non-stationary cosmic gravitation and electromagnetic field of the Earth) describing the geomagnetic reversals of the Earth's magnetic field.

We have shown in the Section 4 that the global prediction thermohydrogravidynamic principles (given by the Equations (11) and (12) formulated for the internal rigid core $\tau_{c,r}$ of the Earth) can be considered as the

confirmed theoretical basis to develop the general unified geophysical theory (based on the generalized differential Equation (9) combining the relativistic non-stationary cosmic gravitation and relativistic electromagnetic field of the Earth) describing the geomagnetic reversals of the Earth's magnetic field. The analogy between the established [2,6,13] Equation (8) (for the energy flux $\mathbf{J}_g$ related with the scalar potential Ψ of the non-stationary gravitational field) and the famous [23] Lorentz's calibration Equation (10) (for the vector potential $\mathbf{A}$ related to the scalar potential φ of the non-stationary electromagnetic field) gives the theoretical basis for foundation of the relativistic theory of the non-stationary gravitation consistent with the relativistic electrodynamics [23], with the Lorentz's transformation [23] and with the Einstein's Special Theory of Relativity.

6. Conclusions

We have established the convincing cosmic (planetary and solar) energy gravitational origin of the strongest geomagnetic anomalies of the magnetic field of the Earth related to the periodic recurrences of the local maxima and local minimal cosmic (planetary and solar) integral energy gravitational influences (given by the Equations (11) and (12), respectively) on the internal rigid core $\tau_{c,r}$ of the Earth. We can assume that the analogous physical mechanism of the geomagnetic reversals (considered as the very rapid and strong temporal changes of the Earth's magnetic field) is determined by the very extreme (extremely large and extremely small) cosmic (planetary and solar) integral energy gravitational influences (given by the Equations (11) and (12), respectively) on the internal rigid core $\tau_{c,r}$ of the Earth. Based on this physical understanding of the cosmic energy gravitational origin of the strongest geomagnetic reversals of the Earth's magnetic field, we can suggest a logically well-founded working physical hypothesis of the geomagnetic reversals (of the Earth's magnetic field) determined by the very extreme (extremely large and extremely small) cosmic (planetary and solar) integral energy gravitational influences (given by the Equations (11) and (12), respectively) on the internal rigid core $\tau_{c,r}$ of the Earth. It follows, therefore, from this hypothesis that the periodic recurrences of the very extreme (extremely large and extremely small) cosmic (planetary and solar) integral energy gravitational influences (given by the Equations (11) and (12), respectively) on the internal rigid core $\tau_{c,r}$ of the Earth (and the Earth as a whole) must lead to the geomagnetic reversals of the Earth's magnetic field. There is no doubt that it is a valid physical hypothesis of the geomagnetic reversals. That is why. We have previously established that the synchronic fundamental seismotectonic, volcanic, climatic and magnetic time periodicities $T_{tec, vol, clim, m, sf} = (6321 \pm 3)$ years [2,13] are related to the periodic recurrences of the very extreme (extremely large and extremely small) cosmic (planetary and solar) integral energy gravitational influences on the internal rigid core $\tau_{c,r}$ of the Earth (given by the Equations (11) and (12) respectively) determined by the combined predominant non-stationary energy gravitational influences of the system Sun-Moon, Venus, Mars, Jupiter and the Sun owing to the predominant gravitational interactions of the Sun with the Jupiter and Saturn. We showed [2] that the revealed [32–34] geomagnetic reversals of the Earth are related to the established [13] synchronic fundamental seismotectonic, volcanic, climatic and magnetic time periodicities $T_{tec, vol, clim, m, sf} = (6321 \pm 3)$ years.

We can conclude that the physical mechanism (and the related cosmic energy gravitational origin) of the strongest geomagnetic anomalies and geomagnetic reversals is the same. This mechanism is related to the periodic recurrences of the local maxima (which can be extremely large) and local minima (which can be extremely small) of the cosmic (planetary and solar) integral energy gravitational influences (given by the Equations (11) and (12) respectively) on the internal rigid core $\tau_{c,r}$ of the Earth. There is no doubt that it is possible to obtain a more good agreement (between the dates of the strong geomagnetic anomalies and the dates $t^*(\tau_{c,r})$ and $t_*(\tau_{c,r})$ corresponding to the local maximal and local minimal cosmic (planetary and solar) integral energy gravitational influences (given by the Equations (11) and (12) respectively) on the internal rigid core $\tau_{c,r}$ of the Earth) by taking into account the established [11,14,27,28] lunar integral energy gravitational influences (under the elliptical orbit of the Moon around the Earth) on the internal rigid core $\tau_{c,r}$ of the Earth and by taking into account the real elliptical orbits [11,14,25,27,28] of the planets (of the Solar System) around the Sun.

Based on the generalized differential formulations (given by the Equations (1) and (9)) of the first law of thermodynamics applied for the internal rigid core $\tau_{c,r}$ of the Earth, we can conclude that the very extreme cosmic (planetary and solar) integral energy gravitational influences (given by the Equations (11) and (12), respectively) are related [13] to the very extreme displacements of the internal rigid core $\tau_{c,r}$ of the Earth relative to the fluid core $\tau_{c,f}$ of the Earth. By taking into account the combined planetary, solar and lunar energy

gravitational influences [11,14,25,27,28] related to the real elliptical orbits of the planets (around the Sun) and the Moon around the Earth, we see the real perspective (as a logically well-founded working step) to use the developed thermohydrogravidynamic models [14,16,27,28] of the Earth (consisting of four different geospheres, including the rigid core $\tau_{c,r}$, the fluid core $\tau_{c,f}$, the mantle τ_m and the Earth's crust τ_{crust}) to calculate the real displacements (in addition to the previous evaluations [13] for the system Earth-Moon) of the internal rigid core $\tau_{c,r}$ of the Earth relative to the fluid core $\tau_{c,f}$ of the Earth.

The established convincing evidence (confirmed by the global prediction thermohydrogravidynamic principles given by the Equations (11) and (12) respectively) of the cosmic energy gravitational origin of the strongest geomagnetic anomalies of the magnetic field of the Earth suggests (as a logically well-founded and urgent step) the development of the general unified geophysical theory describing the possible geomagnetic reversal [2,3] of the Earth's magnetic field during the evaluated [2,3] range (2007 ÷ 2216) AD. This range (2007 ÷ 2216) AD (according to the Equation (15)) is related to the recurrence (characterized by the synchronic fundamental seismotectonic, volcanic, climatic and magnetic time periodicities $T_{tec, vol, clim, m, sf} = (6321 \pm 3)$ years [2,13]) of the very extreme (extremely large and extremely small) cosmic (planetary and solar) integral energy gravitational influences (given by the Equations (11) and (12) respectively) on the internal rigid core $\tau_{c,r}$ of the Earth.

Taking into account the relativistic nature (according to Maxwell's relativistic equations) of the non-stationary electromagnetic field [23], there is an exceptional need of the relativistic theory (consistent with Einstein's Special Theory of Relativity) of the non-stationary gravitation. The established physical analogy between the Equation (8) (for the energy flux $\mathbf{J}_g$ related to the scalar potential Ψ of the non-stationary gravitational field) and the Lorentz's calibration Equation (10) (for the vector potential $\mathbf{A}$ of the non-stationary electromagnetic field related to the scalar potential φ of the non-stationary electromagnetic field) gives the theoretical basis to solve the unsolved problem (initiated by Einstein during the time range 1908–1914 AD [35] and then considered by McVittie [36]) of the foundation of the relativistic theory of the non-stationary gravitation consistent with the Lorentz's transformation [23]. We can conclude that the foundation of the relativistic theory (consistent with the Lorentz's transformation) of the non-stationary gravitation is the next needed step to develop the unified relativistic geophysical theory (describing the geomagnetic reversals of the Earth's magnetic field) as the synthesis of the relativistic electrodynamics [23], the Einstein's Special Theory of Relativity, the established non-equilibrium statistical thermohydrodynamic theory of the three-dimensional dissipative turbulence [17,37] (needed for modelling of the established [13] thermohydrogravidynamic processes in the turbulent boundary region τ_{rf} between the internal rigid core $\tau_{c,r}$ and the fluid core $\tau_{c,f}$ of the Earth), the established [2,3,6,11,15–17] generalized differential Equations (1) and (9) representing the first laws of thermodynamics (related to the established [13,14,20,24–26] global prediction thermohydrogravidynamic principles given by the Equations (11) and (12)), and the relativistic theory of the non-stationary gravitation. We will present the foundation of the relativistic theory (of the non-stationary gravitation) in the next publication.

Conflicts of Interest

The author declares no conflict of interest.

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