

The cosmic energy gravitational genesis of the strongest earthquakes of the earth occurred near the date 2021.1 AD of the local maximal combined planetary and solar integral energy gravitational influence on the Earth

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Abstract. We have presented (on January 27, 2023) to the Advances in Environment and Energies the convincing evidence of the cosmic energy gravitational genesis of the strongest earthquakes of the Earth (especially, the Japanese earthquakes) occurred (on February 10, 2021 AD; February 13, 2021 AD and March 4, 2021 AD) near the previously published (in 2019 AD) date 2021.1 AD (corresponding to February 7, 2021 AD) of the local maximal combined planetary and solar integral energy gravitational influence on the internal rigid core of the Earth (and on the Earth as a whole). The date 2021.1 AD is calculated according to the global prediction thermohydrogravodynamic principles (in the frame of the established thermohydrogravodynamic technology) under the first approximation of the circular orbits of the planets around the Sun. The revealed convincing cosmic energy gravitational genesis of the strongest earthquakes of the Earth (occurred near the date 2021.1 AD) is based on the detailed analysis (in the frame of the thermohydrogravodynamic technology) of the strongest earthquakes (according to the U.S. Geological Survey) of the Earth occurred near the local maximal values of the calculated combined planetary and solar integral energy gravitational influences on the internal rigid core of the Earth.

Keywords. Environment and cosmic energies, non-stationary cosmic gravitation, generalized first law of thermodynamics, global seismotectonic and magnetic processes, thermohydrogravodynamic theory and technology, global prediction thermohydrogravodynamic principles.

1. Introduction

The problem of the long-term predictions of the strong earthquakes [1] is the significant problem of the modern geophysics [2]. It is well known [2] that “the deterministic prediction of the time of origin, hypocentral (or epicentral) location, and magnitude of an impending earthquake is an open scientific problem”. It was conjectured [3] that the recent destructive earthquakes occurred in Sichuan (China, 2008), Italy (2009), Haiti (2010), Chile (2010), New Zealand (2010), and Japan (2011) “have shown that, in present state, scientific researchers have achieved little or almost nothing in the implementation of short- and medium-term earthquake prediction, which would be useful for disaster mitigation measures”.

The strongest Chinese 2008 (occurred in Sichuan) and Japanese 2011 (occurred in the Tohoku region) earthquakes were not unexpected [4-6] for the author. Considering the set of the Chinese earthquakes (Luhuo 1973, Haicheng 1975 and Tang Shan 1976; Bachu 2003, Ruichang 2005 and Yanjin 2006), we predicted [4] the nearest (to the Yanjin 2006 earthquake) Chinese 2008 earthquakes. The occurrence of two large earthquakes in 2008 in the areas surrounding Yutian (Xinjiang) and Wenchuan (Sichuan) confirmed [7] the proposed [4] cosmic energy gravitational genesis of the strong Chinese earthquakes.

In the special issue on “Geophysical Methods for Environmental Studies” of the International Journal of Geophysics, Tinivella et al. [8] confirmed that the article [7] “proposes a possible cosmic energy gravitational genesis of the strong Chinese 2008 and the strong Japanese 2011 earthquakes, based on the established generalized differential formulation of the first law of thermodynamics” [8].

We have demonstrated (on the 11th International Conference on Geology and Geophysics) the first application [9] of the thermohydrogravodynamic technology for evaluation and explanation of the maximal magnitude $M = 7.7$ (according to the U.S. Geological Survey) of the most strongest (during the considered [10] range from December 7, 2019 to April 18, 2020 AD) earthquake of the Earth occurred on January 28, 2020 AD near the calculated [10] date $t^*(\tau_{c,r}, 2020) = 2020.01666\ 6667$ AD (corresponding approximately to January 6, 2020 AD) related with the local maximal combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth. We have shown the established good agreement [9] between the maximal magnitude $M = 7.7$ (according to the U.S. Geological Survey) of the most strongest (during the considered [10] range from December 7, 2019 to April 18, 2020 AD) earthquake of the Earth (occurred on January 28, 2020 AD near the calculated [10] date $t^*(\tau_{c,r}, 2020) = 2020.01666\ 6667$ AD) and the evaluated mean magnitude $M_{up}(2020, \text{loc. max.}) = 7.725$ of the possible strong earthquake (which can occur on January 28, 2020 AD) of the Earth.

We saw [11] that the first most strongest (during the considered range from October 27, 2020 AD to May 17, 2021 AD) related with the calculated [12] date 2021.1 AD earthquake of the Earth (characterized by the magnitude $M = 8.1$ according to the U.S. Geological Survey) occurred on March 4, 2021 AD in Kermadec Islands, New Zealand 25 days after the calculated [12] date 2021.1 AD (corresponding to February 7, 2021 AD) of the local maximal combined

planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth. We have demonstrated the convincing application [11] of the thermohydrogravodynamic technology [9] for evaluation and explanation of the maximal magnitude $M = 8.1$ (according to the U.S. Geological Survey) of the strongest earthquakes of the Earth occurred on March 4, 2021 AD near the calculated [12] date 2021.1 AD. We see now that the second strongest (during the considered range from October 27, 2020 AD to May 17, 2021 AD related with the previously calculated [12] date 2021.1 AD) earthquake of the Earth (characterized by the magnitude $M = 7.7$ according to the U.S. Geological Survey) occurred on February 10, 2021 AD southeast of the Loyalty Islands only 3 days after the calculated [12] date 2021.1 AD corresponding to February 7, 2021 AD.

The first aim of this article is to present the detailed evidence (based on the thermohydrogravodynamic technology [9], [11]) of the cosmic energy gravitational genesis of the strongest earthquakes of the Earth occurred (on March 4, 2021 AD and on February 10, 2021 AD) near the previously calculated [12] date 2021.1 AD (corresponding to February 7, 2021 AD) of the local maximal combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth.

The second aim of this article is to present the detailed evidence of the cosmic energy gravitational genesis of the strongest Japanese earthquake occurred on February 13, 2021 AD near the calculated [12] date 2021.1 AD (corresponding to February 7, 2021 AD) of the local maximal combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth.

In Section 2 we present the fundamentals of the developed thermohydrogravodynamic theory [4-7, 13-15] applied for explanation of the cosmic energy gravitational genesis of the strongest earthquakes of the Earth occurred near the calculated [12] date 2021.1 AD of the local maximal combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth. In Section 2.1 we present the established [4-7, 13-15] general generalized differential formulation (1) of the first law of thermodynamics (for moving rotating deforming compressible heat-conducting stratified individual finite continuum region τ subjected to the non-stationary Newtonian gravitational field) and the applied generalized differential formulation (11) used for the internal rigid core $\tau_{c,r}$ of the Earth. Based on the established [4-7, 13-15] general differential energy gravitational influence dG (given by (7) in the general generalized differential formulation (1)) and the related differential combined planetary and solar energy gravitational influence $dG(\tau_{c,r})$ (given by (12) in the applied generalized differential formulation (11)) on the internal rigid core $\tau_{c,r}$ during the differential time interval dt , in Section 2.2 we present the established [14, 15] global prediction thermohydrogravodynamic principles (15) and (16) (formulated for the local maximal and the local minimal combined planetary and solar integral energy gravitational influences (15) and (16), respectively, on the internal rigid core $\tau_{c,r}$ of the Earth) determining the maximal temporal intensifications of the global seismotectonic, volcanic, climatic and magnetic processes of the Earth near the corresponding time moments $t^*(\tau_{c,r})$ and $t_*(\tau_{c,r})$, respectively. The global prediction thermohydrogravodynamic principle (15) is used for explanation of the cosmic energy gravitational genesis of the strongest earthquakes of the Earth occurred near the calculated [12] date 2021.1 AD of the local maximal combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth. In Section 2.3 we present the general empirical (presented in Tables 1 and 2) and theoretical fundamentals of the thermohydrogravodynamic technology [9, 11, 16] applied for evidence of the cosmic energy gravitational genesis of the strongest earthquakes of the Earth occurred near the previously calculated [12] date 2021.1 AD of the local maximal combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth.

In Section 3 we present the convincing evidence (based on the thermohydrogravodynamic technology [9]) of the cosmic energy gravitational genesis of the strongest earthquakes of the Earth (especially the strongest Japanese earthquakes) occurred (during the considered range from October 27, 2020 to May 17, 2021 AD) near the previously [12] calculated date 2021.1 AD (corresponding approximately to February 7, 2021 AD) related with the local maximal combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth.

In Section 3.1 we present the convincing evidence (based on the thermohydrogravodynamic technology [9, 11]) of the cosmic energy gravitational genesis of the second strongest earthquake of the Earth (characterized by the magnitude $M = 7.7$ during the considered range from October 27, 2020 to May 17, 2021 AD) occurred (according to the U.S. Geological Survey) on February 10, 2021 AD southeast of the Loyalty Islands near the previously calculated [12] date 2021.1 AD corresponding approximately to February 7, 2021 AD.

In Section 3.2 we present the convincing evidence (based on the thermohydrogravodynamic technology [9, 11]) of the cosmic energy gravitational genesis of the most strongest earthquake of the Earth (characterized by the magnitude $M = 8.1$ during the considered range from October 27, 2020 to May 17, 2021 AD) occurred on March 4, 2021 AD in Kermadec Islands, New Zealand near the previously calculated [12] date 2021.1 AD related with the local maximal combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth. To do this, we extend significantly the previous result [11] by inclusion of the significant detailed numerical information obtained based on the thermohydrogravodynamic technology [9, 11].

In Section 3.3 we present the convincing evidence (based on the thermohydrogravodynamic technology [9, 11]) of the cosmic energy gravitational genesis of the strongest Japanese earthquake (characterized by the magnitude $M = 7.1$ according to the U.S. Geological Survey) occurred on February 13, 2021 AD (2021-02-13) 69 km ENE of Namie, Japan 6 days after the previously calculated [12] date 2021.1 AD corresponding to February 7, 2021 AD.

In Section 4 we present the discussion of the main results.

In Section 5 we present the conclusions.

2. Fundamentals of the thermohydrogravodynamic theory applied for explanation of the cosmic energy gravitational genesis of the strongest earthquakes of the Earth occurred near the date 2021.1 AD of the local maximal combined planetary and solar integral energy gravitational influence on the Earth

2.1. The generalized differential formulation of the first law of thermodynamics applied for the internal rigid core of the Earth subjected for the non-stationary gravitational field of the Solar System

Using the postulates of non-equilibrium thermodynamics [17], continuum mechanics [18] and hydrodynamics [19, 20], we derived [4, 13, 21] the generalized differential formulation (for the Galilean frame of reference) of the first law of thermodynamics (for moving rotating deforming heat-conducting stratified individual finite one-component continuum region τ (see Figure 1) subjected to the non-stationary Newtonian gravitational field and to non-potential stress forces characterized by the symmetric stress tensor \mathbf{T}):

$$dU_\tau + dK_\tau + d\pi_\tau = \delta Q + \delta A_{np, \partial\tau} + dG, \quad (1)$$

where,

$$U_\tau = \iiint_\tau u \rho dV \quad (2)$$

is the classical [17] microscopic internal thermal energy of the individual finite continuum region τ , u is the specific (per unit mass) internal thermal energy, ρ is the local density of the mass distribution, t is the time, dV is the differential of the three-dimensional physical volume considered in the finite continuum region τ ;

$$K_\tau = \iiint_\tau \frac{\rho v^2}{2} dV \quad (3)$$

is the established [4, 13, 21] instantaneous macroscopic kinetic energy [20, 22] of the individual finite continuum region τ , \mathbf{v} is the hydrodynamic velocity [19, 20] of the continuum movement in the three-dimensional physical space;

$$\pi_\tau = \iiint_\tau \psi \rho dV \quad (4)$$

is the established [4, 13, 21] macroscopic potential gravitational energy (of the individual finite continuum region τ) related with the non-stationary (depending on the time t) potential ψ of the gravitational field characterized by the local gravity acceleration $\mathbf{g} = -\nabla\psi$ [24];

$$\delta Q = -dt \iint_{\partial\tau} (\mathbf{J}_q \cdot \mathbf{n}) d\Omega_n \quad (5)$$

is the classical [17] differential total heat flux to (or from) the individual finite continuum region τ related with the thermal molecular conductivity of heat across the boundary surface $\partial\tau$ of the individual finite continuum region τ , $d\Omega_n$ is the differential surface element (of the boundary surface $\partial\tau$ of the individual finite continuum region τ) characterized by the external normal unit vector \mathbf{n} , \mathbf{J}_q is the classical [17] density of the heat flux (per unit time and per unit area) across the differential surface element $d\Omega_n$ of the continuum boundary surface $\partial\tau$;

$$\delta A_{np, \partial\tau} = dt \iint_{\partial\tau} (\mathbf{v} \cdot (\mathbf{n} \cdot \mathbf{T})) d\Omega_n \quad (6)$$

is the established [4, 13, 21] generalized differential work done during the differential time interval dt by non-potential stress forces (pressure, compressible and viscous forces for the Newtonian continuum) acting on the boundary surface $\partial\tau$ of the individual finite continuum region τ , \mathbf{T} is the classical [18] symmetric stress tensor of a general form, $\mathbf{t} = \mathbf{n} \cdot \mathbf{T}$ is the classical stress vector [18];

$$dG = dt \iiint_\tau \frac{\partial\psi}{\partial t} \rho dV = -dt \iint_{\partial\tau} (\mathbf{J}_g \cdot \mathbf{n}) d\Omega_n, \quad (7)$$

is the established [4, 7, 13-15, 23] differential energy gravitational influence dG (as the result of the Newtonian non-stationary gravitation) on the individual finite continuum region τ (during the differential time interval dt). Here \mathbf{J}_g is the energy flux (per unit time and per unit area) of the gravitational energy determined by the relation [14, 15]:

$$\rho \frac{\partial\psi}{\partial t} + \text{div} \mathbf{J}_g = 0. \quad (8)$$

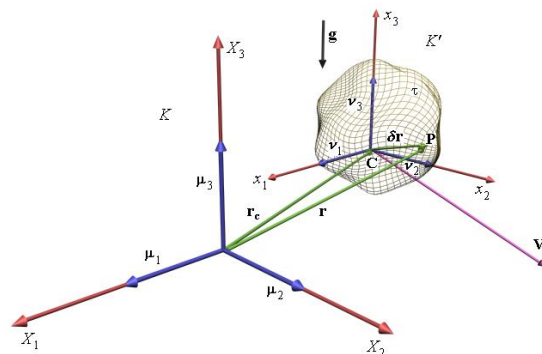


Figure 1. The individual finite continuum region τ (considered in the Cartesian coordinate system K of a Galilean frame of reference) subjected to the non-stationary combined (cosmic and terrestrial) Newtonian non-stationary gravitational field and non-potential terrestrial stress forces acting on the boundary surface $\partial\tau$ of the continuum region τ

The relation (8) is analogous to the famous Lorentz's calibration condition in electrodynamics [24]:

$$\frac{1}{c} \frac{\partial \varphi}{\partial t} + \text{div} \mathbf{A} = 0, \quad (9)$$

where 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.

The generalized differential formulation (1) of the first law of thermodynamics [4, 7, 13, 21] gives the classical [25, 26] identical formulations (taking into account the differential change $dU_\tau \equiv dU$ of the internal thermal energy $U_\tau \equiv U$, the differential change of heat δQ , the pressure p and the differential change $dV \equiv dV_\tau$ of the physical volume V_τ of the considered thermodynamic system)

$$dU = \delta Q - p dV, \quad d\varepsilon \equiv dU, \quad -\delta W = -p dV \quad (10)$$

which can be derived from the generalized differential formulation (1) applied for the continuum region τ of ideal fluid (which gives the partial relation $\delta A_{np, \partial \tau} = -p dV$) considered in the stationary gravitational field (which gives the partial related conditions $\frac{\partial \psi}{\partial t} = 0$ and $dG = 0$).

We use the generalized differential formulation (1) of the first law of thermodynamics for the considered [27, 28] internal rigid core $\tau_{c,r}$ of the Earth (in the considered non-catastrophic thermohydrogravodynamic model [4-6, 14] of the Earth):

$$dU(\tau_{c,r}) + dK(\tau_{c,r}) + d\pi(\tau_{c,r}) = \delta Q(\partial \tau_{c,r}) + \delta A_{np}(\partial \tau_{c,r}) + dG(\tau_{c,r}), \quad (11)$$

where $\delta Q(\tau_{c,r})$ is the considered [27, 28] infinitesimal change of the classical [17, 18, 25, 26] heat across the continuum boundary surface $\partial \tau_{c,r}$ of the internal rigid core $\tau_{c,r}$ of the Earth; $dU(\tau_{c,r})$ is the considered [27, 28] differential change of the classical [17, 18, 25, 26] internal thermal energy $U(\tau_{c,r})$ of the internal rigid core $\tau_{c,r}$ of the Earth; $dK(\tau_{c,r})$ is the considered [27, 28] differential increment of the established [4-7, 12, 14, 15, 29] total macroscopic kinetic energy $K(\tau_{c,r})$ [20-22] of the internal rigid core $\tau_{c,r}$ of the Earth; $d\pi(\tau_{c,r})$ is the considered [27, 28] differential increment of the established [4-7, 12, 14, 15, 29] gravitational potential energy $\pi(\tau_{c,r})$ (determined by the potential ψ of the combined cosmic and terrestrial non-stationary gravitational field) of the internal rigid core $\tau_{c,r}$ of the Earth; $\delta A_{np}(\partial \tau_{c,r})$ is the considered [27, 28] generalized [4-7, 12, 14, 15, 29] differential work done by non-potential terrestrial stress forces (characterized by the symmetric stress tensor \mathbf{T} [18]) acting on the continuum boundary surface $\partial \tau_{c,r}$ of the internal rigid core $\tau_{c,r}$;

$$dG(\tau_{c,r}) = dt \iiint_{\tau_{c,r}} \frac{\partial \psi(\tau_{c,r})}{\partial t} \rho(\tau_{c,r}) dV = -dt \iint_{\partial \tau_{c,r}} (\mathbf{J}_g(\partial \tau_{c,r}) \cdot \mathbf{n}(\partial \tau_{c,r})) d\Omega_{\mathbf{n}}(\partial \tau_{c,r}), \quad (12)$$

is the considered [27, 28] established [4-7, 12, 14, 15, 29] differential combined planetary and solar energy gravitational influence on the internal rigid core $\tau_{c,r}$ during the differential time interval dt . We established [27, 28] that the relation (12) for $dG(\tau_{c,r})$ takes into account the partial derivative $\frac{\partial \psi(\tau_{c,r})}{\partial t}$ of the combined potential $\psi(\tau_{c,r})$ of the combined (planetary, solar and terrestrial) non-stationary gravitational field in the internal rigid core $\tau_{c,r}$ of the Earth, the mass density $\rho(\tau_{c,r})$ in the internal rigid core $\tau_{c,r}$, the flux $\mathbf{J}_g(\partial \tau_{c,r})$ of the gravitational energy (generated by the internal rigid core $\tau_{c,r}$ of the Earth) across the surface element $d\Omega_{\mathbf{n}}(\partial \tau_{c,r})$ (of the continuum boundary surface $\partial \tau_{c,r}$) determined by the external normal unit vector $\mathbf{n}(\partial \tau_{c,r})$. We established [27, 28] that the relation

$$\rho(\tau_{c,r}) \frac{\partial \psi(\tau_{c,r})}{\partial t} + \text{div} \mathbf{J}_g(\partial \tau_{c,r}) = 0, \quad (13)$$

is the basis of the equality (12). The relation (13) is the special variant of the general condition (8) applied for the internal rigid core $\tau_{c,r}$ of the Earth.

We established [15, 28] that the general condition (8) can be rewritten as follows (for the non-stationary gravitational potential ψ)

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

where $\mathbf{v}_{ge} = \frac{\mathbf{J}_g(t, \mathbf{r})}{\rho \psi}$ is the speed [15, 28] of propagation of the gravitational energy, $\rho \psi$ is the macroscopic potential energy per unit volume [15, 28], $s_{ge}(\mathbf{r}, t)$ is the space-time source [15, 28] of distributed production of the gravitational energy per unit volume and per unit time.

The obtained equation (14) for the non-stationary gravitational potential ψ means [15, 28] that the strong density gradients $\nabla \rho \neq 0$ inside of the continuum of the Earth (especially, in the heterogeneous region between the rigid core $\tau_{c,r}$ of the Earth and the fluid core $\tau_{c,f}$ of the Earth) represent the space-time sources $s_{ge}(\mathbf{r}, t) \neq 0$ of the distributed production of the gravitational energy radiated under the oscillatory motion of the rigid core $\tau_{c,r}$ of the Earth relative to the fluid core $\tau_{c,f}$ of the Earth owing to planetary, solar and lunar energy gravitational influences on the Earth [4-7, 12, 14].

We have established [28] that the first direct detection [30] of gravitational waves (occurred on September 14, 2015) and the strongest (in 2015 according to the U.S. Geological Survey) 8.3-magnitude Chilean earthquake (occurred on September 16, 2015) are causally related with the local maximal (in 2015 AD) combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth occurred on the calculated date $t^*(\tau_{c,r}, 2015) = 2015.6833$ AD (corresponding approximately to September 6, 2015 AD).

The calculated (in advance on December 9, 2019 [10]) date $t^*(\tau_{c,r}, 2020) = 2020.016666667$ AD (corresponding approximately to January 6, 2020) is related with the local maximal combined planetary and solar integral energy

gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth. The strong magnetic anomaly (observed on January 6, 2020 in Norway [31] in the perfect agreement with the predicted [10] date $t^*(\tau_{c,r}, 2020) = 2020.016666667$ AD) is the real confirmation [10] that the magnetic processes of the Earth are determined by the combined planetary and solar integral energy gravitational influences on the internal rigid core $\tau_{c,r}$ of the Earth. The established confirmation [10] may be considered as the positive signal that it is possible to develop the unified geophysical theory combining the non-stationary gravitational and electromagnetic fields of the Earth subjected to the non-stationary gravitational field of the Solar System. The analogy between the relation (8) (for the energy flux related with the Newtonian non-stationary gravitational field) and the relation (9) (for the non-stationary electromagnetic field) gives the theoretical physical basis to develop the unified geophysical theory combining the non-stationary gravitational and electromagnetic fields of the Earth.

2.2. The application of the global prediction thermohydrogravidynamic principles for explanation of the cosmic energy gravitational genesis of the strongest earthquakes of the Earth occurred near the date 2021.1 AD of the local maximal combined planetary and solar integral energy gravitational influence on the internal rigid core of the Earth

Based on the generalized differential formulation (11) of the first law of thermodynamics (used for the internal rigid core $\tau_{c,r}$ of the Earth), we formulated [10, 12, 14, 15, 23, 28] the global prediction thermohydrogravidynamic principles determining the maximal temporal intensifications of the established thermohydrogravidynamic processes (in the internal rigid core $\tau_{c,r}$ and in the boundary region $\tau_{r,f}$ between the internal rigid core $\tau_{c,r}$ and the fluid core $\tau_{c,f}$ of the Earth) of the Earth. We concluded [14, 15, 23, 28] (based on the generalized differential formulation (1) of the first law of thermodynamics used for the internal rigid core $\tau_{c,r}$ of the Earth) that the maximal temporal intensifications of the established thermohydrogravidynamic processes are related with the corresponding maximal temporal intensifications of the global natural (seismotectonic, volcanic, climatic and magnetic) processes of the Earth.

The global prediction thermohydrogravidynamic principles are formulated (for the internal rigid core $\tau_{c,r}$ of the Earth) based on the terms (7) and (12) of the generalized differential formulations (1) and (11), respectively, of the first law of thermodynamics [4, 7, 13, 15, 28] as follows [10, 12, 14, 15, 23, 28]:

$$\Delta G(\tau_{c,r}, t^*(\tau_{c,r})) = \max_t \int_{t_0}^t dt' \iiint_{\tau_{c,r}} \frac{\partial \psi_{\text{comb}}}{\partial t'} \rho_{c,r} dV - \text{local maximum for time moment } t^*(\tau_{c,r}), \quad (15)$$

and

$$\Delta G(\tau_{c,r}, t_*(\tau_{c,r})) = \min_t \int_{t_0}^t dt' \iiint_{\tau_{c,r}} \frac{\partial \psi_{\text{comb}}}{\partial t'} \rho_{c,r} dV - \text{local minimum for time moment } t_*(\tau_{c,r}), \quad (16)$$

where $\rho_{c,r}$ is the mass density of the internal rigid core $\tau_{c,r}$, $\psi_{\text{comb}} \equiv \psi_{\text{comb}}(\tau_{c,r}, t)$ is the combined planetary and solar gravitational potential in the internal rigid core $\tau_{c,r}$ of the Earth. The combined planetary and solar gravitational potential $\psi_{\text{comb}}(\tau_{c,r}, t)$ in the internal rigid core $\tau_{c,r}$ of the Earth is approximated as follows [14, 15, 28]:

$$\psi_{\text{comb}}(\tau_{c,r}, t) = \sum_{i=1, i \neq 3}^5 \psi_{3i}(C_3, t) + \sum_{j=5}^8 \psi_{3j}^S(C_3, t), \quad (17)$$

where $\psi_{3i}(C_3, t)$ is the established [4-6, 14] gravitational potential created (at the mass center C_3 of the Earth) by Mercury ($i=1$), Venus ($i=2$), Mars ($i=4$) and Jupiter ($i=5$); $\psi_{3j}^S(C_3, t)$ is the established [12, 14] gravitational potential created (at the mass center C_3 of the Earth) by the Sun due to the gravitational interaction of the Sun with Jupiter ($j=5$), Saturn ($j=6$), Uranus ($j=7$) and Neptune ($j=8$).

We demonstrated previously the convincing evidence [32] that the global prediction thermohydrogravidynamic principles (15) and (16) give the real possibility for prediction (in advance) [27] of the modern regional strongest temporal intensifications of the seismotectonic and climatic processes in California.

2.3. The empirical and thermohydrogravidynamic fundamentals applied for evidence of the cosmic energy gravitational genesis of the strongest earthquakes of the Earth occurred near the date 2021.1 AD of the local maximal combined planetary and solar integral energy gravitational influence on the internal rigid core of the Earth

To evaluate (in the frame of the thermohydrogravidynamic theory) the magnitude of the strongest earthquakes occurred on February 10, 2021 AD and on March 4, 2021 AD (near the local maximal combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth), we consider and analyze the following (presented in Tables 1 and 2) strongest earthquakes (occurred near the local maximal values (15) of the calculated combined planetary and solar integral energy gravitational influences (15) on the internal rigid core $\tau_{c,r}$ of the Earth) characterized by the corresponding magnitudes $M_{\text{up}}(i, \text{loc. max.})$ (according to the U.S. Geological Survey).

We have analyzed additionally the following (presented in Table 2) strongest earthquakes (occurred near the calculated local maximal combined planetary and solar integral energy gravitational influences (15) on the internal rigid

core $\tau_{c,r}$ of the Earth) occurred in the range (of the weakened seismic activity of the Earth) from 1980 AD and before 1994 AD, and on January 28, 2020 AD [9, 10].

Table 1. The first list of the analyzed [9, 11, 16] most strongest earthquakes (according to the U.S. Geological Survey) occurred (in the range from 1900 AD and before 2020 AD) near the calculated local maximal combined planetary and solar integral energy gravitational influences (15) on the internal rigid core $\tau_{c,r}$ of the Earth

Year i, AD	Date $t_e(i, \text{loc. max.})$ of the strongest earthquake	Magnitude $M_{up}(i, \text{loc. max.})$ of the strongest earthquake	Region of the strongest earthquake
1964	1964-03-28	9.2	Southern Alaska
2011	March 11, 2011	9.0	near the east coast of Honshu, Japan
2010	February 27, 2010	8.8	offshore Bio-Bio, Chile
2012	April 11, 2012	8.6	off the west coast of northern Sumatra
1938	1938-02-01	8.5	Banda Sea
1922	1922-11-11	8.5	Atacama, Chile
2001	2001-06-23	8.4	near the coast of southern Peru

Table 2. The second list of the analyzed [9, 11, 16] strongest earthquakes (according to the U.S. Geological Survey) occurred (in the range from 1980 AD and before 1994 AD and in 2020 AD) near the calculated local maximal combined planetary and solar integral energy gravitational influences (15) on the internal rigid core $\tau_{c,r}$ of the Earth

Year i, AD	Date $t_e(i, \text{loc. max.})$ of the strongest earthquake	Magnitude $M_{up}(i, \text{loc. max.})$ of the strongest earthquake	Region of the strongest earthquake
1980	1980-03-28	7.9	Santa Cruz Islands
1981	1981-09-01	7.7	Samoa Islands region
1982	1982-12-19	7.2	south of Tonga
1984	1984-02-07	7.6	Solomon Islands
1985	1985-03-03	8.0	offshore Valparaiso, Chile
1986	1986-05-07	8.0	Andreanof Islands, Aleutian Islands, Alaska
1987	1987-03-05	7.6	Antofagasta, Chile
1988	1988-03-06	7.8	Gulf of Alaska
1989	1989-05-23	8.2	Macquarie Island region
1990	1990-04-18	7.8	Minahasa, Sulawesi, Indonesia
1991	1991-06-20	7.5	Minahasa, Sulawesi, Indonesia
1992	1992-12-12	7.8	Flores region, Indonesia
1993	1993-08-08	7.8	Guam region
1994	1994-10-04	8.3	Kuril Islands
2020	2020-28-01	7.7	123 km NNW of Lucea, Jamaica

We consider (based on the Tables 1 and 2) the strongest earthquakes (occurred near the dates of the local maximal combined planetary and solar integral energy gravitational influences (15) on the internal rigid core $\tau_{c,r}$ of the Earth) as the corresponding two-dimensional vectors (of the two-dimensional plane)

$$(M_{up}(i, \text{loc. max.}), \Delta_{g,S,P}(i) \sin \varphi(i)) \quad (18)$$

determined by the following numerical components: 1) the maximal magnitude $M_{up}(i, \text{loc. max.})$ (for the year i, AD) of the strongest earthquake occurred near the date of the local maximal combined planetary and solar integral energy gravitational influence (15) (for the year i, AD) on the internal rigid core $\tau_{c,r}$ of the Earth, 2) $\sin \varphi(i)$ of the angle $\varphi(i) \equiv \varphi(t_e(i, \text{loc. max.}))$ (related with the strongest earthquake occurred on the date $t_e(i, \text{loc. max.})$ in the year i, AD near the local maximal value $\Delta G(\tau_{c,r}, t^*(\tau_{c,r}, i))$ of the calculated combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth) between the projection $\Omega_{e.p.}$ of the Earth axis Ω (of the Earth's rotation) on the ecliptic plane and the approximate line (in the ecliptic plane) Earth – Sun – Jupiter (characterized by the equal angle deviations of the Earth and Jupiter from the approximate line), and 3) the established [9, 12, 16] normalized dimensionless numerical value (based on the generalized differential formulation (11) of the first law of thermodynamics and on the global prediction thermohydrogravodynamic principles (15) and (16))

$$\Delta_{g,S,P}(i) = \frac{\Delta G(\tau_{c,r}, t^*(\tau_{c,r}, i)) - \Delta G(\tau_{c,r}, t_*(\tau_{c,r}, i))}{\frac{M_{c,r}}{M_3} \Delta_g E_3(\tau_1)} \quad (19)$$

The numerical value (19) is calculated (for the corresponding year i, AD of the occurred strongest earthquake) based on the related local maximal value (given by (15) for the corresponding time $t = t^*(\tau_{c,r}, i)$)

$$\Delta G(\tau_{c,r}, t^*(\tau_{c,r}, i)) = \int_{t_0}^{t^*(\tau_{c,r}, i)} dt' \iiint_{\tau_{c,r}} \frac{\partial \psi_{comb}}{\partial t'} \rho_{c,r} dV \quad (20)$$

and the local minimal value (given by (16) for the corresponding time $t = t_*(\tau_{c,r}, i)$)

$$\Delta G(\tau_{c,r}, t_*(\tau_{c,r}, i)) = \int_{t_0}^{t_*(\tau_{c,r}, i)} dt' \iiint_{\tau_{c,r}} \frac{\partial \psi_{comb}}{\partial t'} \rho_{c,r} dV \quad (21)$$

of the combined planetary and solar integral energy gravitational influences (for the year i , AD) on the internal rigid core $\tau_{c,r}$ of the Earth.

We use in the relation (19) the established [4, 7] value (of the maximal integral energy gravitational influence of the Mercury on the Earth)

$$\Delta_g E_3(\tau_1) = 2\gamma M_3 M_1 \frac{R_{O1} T_3}{(R_{O3}^2 - R_{O1}^2)(T_3 - T_1)}, \quad (22)$$

where γ is the gravitational constant, $M_{c,r}$ is the mass of the internal rigid core $\tau_{c,r}$ of the Earth, M_3 is the mass of the Earth, M_1 is the mass of the Mercury, R_{O3} is the average radius of the Earth's orbit around the Sun, R_{O1} is the average radius of the Mercury's orbit around the Sun, T_3 is the time period of circulation of the Earth around the Sun, T_1 is the time period of circulation of the Mercury around the Sun.

3. The evidence of the cosmic energy gravitational genesis of the strongest earthquakes of the Earth occurred near the date 2021.1 AD of the local maximal combined planetary and solar integral energy gravitational influence on the internal rigid core of the Earth

3.1. The evidence of the cosmic energy gravitational genesis of the second strongest earthquake of the Earth occurred on February 10, 2021 ad near the calculated date 2021.1 AD of the local maximal combined planetary and solar integral energy gravitational influence on the internal rigid core of the Earth

Based on the developed thermohydrogravidynamic technology [9, 11, 16], we present now the explanation of the magnitude $M=7.7$ (according to the U.S. Geological Survey) of the second strongest (during the considered range from October 27, 2020 to May 17, 2021 AD) earthquake of the Earth occurred on February 10, 2021 AD southeast of the Loyalty Islands near the previously calculated [12] date 2021.1 AD

(corresponding to February 7, 2021 AD) related with the maximal combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth. The considered range from October 27, 2020 to May 17, 2021 AD is evaluated based on the calculated [12] date (23) and the calculated adjacent dates 2020.55 AD and 2021.65 AD [9] related with the adjacent local minimal combined planetary and solar integral energy gravitational influences (16) on the internal rigid core $\tau_{c,r}$ of the Earth.

Let us evaluate (based on the thermohydrogravidynamic technology) the magnitude M_{up} (2021.1 AD, loc. max.) of the possible strong earthquake of the Earth near the calculated [12] date (23) corresponding to February 7, 2021 AD. We take into account that this (second in magnitude during the considered range from October 27, 2020 to May 17, 2021 AD near the calculated [12] date 2021.1 AD) strongest earthquake (occurred on February 10, 2021) realized near the calculated [12] date 2021.1 AD (corresponding to February 7, 2021 AD), which corresponds to the following calculated values (based on the thermohydrogravidynamic theory for the planetary configurations under the first approximation of the circular orbits of the planets around the Sun)

$$\Delta_{g,S,P}(2021) = 5273.4914, \quad (24)$$

$$\sin \varphi (2021-02-07) = \sin 45.56^\circ = 0.71398395, \quad (25)$$

$$\Delta_{g,S,P}(2021) \sin \varphi (2021-02-07) = 3765.1882. \quad (26)$$

Considering and analyzing the strongest earthquakes (presented in Tables 1 and 2) on the two-dimensional plane (18), we have established that the dimensionless ranges (containing the value (26) and the magnitude $M = 7.7$ of the earthquakes occurred on February 10, 2021 AD)

$$3500 \leq \Delta_{g,S,P}(i) \sin \varphi (i) \leq 4000, \quad (27)$$

$$7.6 \leq M_{up}(i, \text{loc. max.}) \leq 7.8 \quad (28)$$

include only two realized strongest earthquakes (from the all analyzed strongest earthquakes presented in Tables 1 and 2) occurred on (according to the U.S. Geological Survey) the following dates (accompanied by the corresponding magnitudes and the regions of the strongest earthquakes):

$$1987-03-05 (M_{up}(1987, \text{loc. max.}) = 7.6, \text{Antofagasta, Chile}), \quad (29)$$

$$1988-03-06 (M_{up}(1988, \text{loc. max.}) = 7.8, \text{Gulf of Alaska}). \quad (30)$$

The calculated value (26) is located between the calculated values (calculated under the first approximation of the circular orbits of the planets)

$$\Delta_{g,S,P}(1987) \sin \varphi (1987-03-05) = 3992.6181, \quad (31)$$

$$\Delta_{g,S,P}(1988) \sin \varphi (1988-03-05) = 3540.5336, \quad (32)$$

corresponding to the strongest (according to the U.S. Geological Survey) earthquakes occurred in 1987 AD and in 1988 AD near the local maximal values of the calculated combined planetary and solar integral energy gravitational influences (15) on the internal rigid core $\tau_{c,r}$ of the Earth.

We established previously [29] that the fundamental global seismotectonic, volcanic and climatic periodicity 33 years [29] is close to the empirical time periodicity 35 years [33] of the seismotectonic activity of various regions of the seismic belt around the Pacific Ocean (the Pacific Ring). The time differences (between the dates (29) and (30) of the strongest earthquakes and the date (23)) are equal approximately to 34 years and 35 years, which are in good agreement

with the time periodicity 35 years [33]. This good agreement is the additional argument to consider the combination of the strongest earthquakes occurred on the dates (29) and (30) for evaluation of the magnitude of the strongest earthquake near the date (23).

Using the real values of the maximal magnitudes $M_{up}(1987, \text{loc. max.}) = 7.6$ and $M_{up}(1988, \text{loc. max.}) = 7.8$ together with the above corresponding calculated values (31) and (32) (obtained based on the thermohydrogravodynamic technology [9, 11, 16] applied for the planetary configurations in the first approximation of the circular orbits of the planets), we evaluate (based on the linear extrapolation) the magnitude $M_{up}(2021.1, \text{loc. max.})$ (corresponding to the value (26)) of the possible strong earthquake corresponding to the previously calculated [12] date 2021.1 AD (corresponding to February 7, 2021 AD):

$$\begin{aligned}
 M_{up}(2021.1, \text{loc. max.}) &= M_{up}(1988, \text{loc. max.}) + \\
 &+ \frac{(M_{up}(1987, \text{loc. max.}) - M_{up}(1988, \text{loc. max.}))}{(\Delta_{g,s,p}(1987) \sin \varphi(1987-03-05) - \Delta_{g,s,p}(1988) \sin \varphi(1988-03-06))} \times \\
 &\times (\Delta_{g,s,p}(2021) \sin \varphi(2021-02-07) - \Delta_{g,s,p}(1988) \sin \varphi(1988-03-06)) = \\
 &= 7.8 + \frac{(7.6-7.8)(3765.1882-3540.5336)}{(3992.618-3540.5336)} = 7.8 - \frac{(0.2)(224.6546)}{(452.0844)} = 7.7006, \tag{33}
 \end{aligned}$$

which is very close to the magnitude $M=7.7$ (of the second strongest (during the considered range from October 27, 2020 to May 17, 2021 AD) earthquake occurred (according to the U.S. Geological Survey) on February 10, 2021 AD near the previously calculated [12] date 2021.1 AD related with the local maximal combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth. The possibility to explain (based on the thermohydrogravodynamic technology [9, 11, 16]) the magnitude $M=7.7$ of the second strongest (during the considered range from October 27, 2020 to May 17, 2021 AD) earthquake occurred on February 10, 2021 AD gives the first convincing evidence of the cosmic energy gravitational genesis of the second strongest earthquake of the Earth occurred on February 10, 2021 AD near (and very close to) the previously calculated [12] date 2021.1 AD (corresponding to February 7, 2021 AD) of the local maximal combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth.

3.2. The evidence of the cosmic energy gravitational genesis of the strongest earthquake of the Earth occurred on March 4, 2021 AD near the calculated date 2021.1 AD of the local maximal combined planetary and solar integral energy gravitational influence on the internal rigid core of the Earth

We use the thermohydrogravodynamic technology [9, 11, 16] for evidence of the cosmic energy gravitational genesis of the magnitude $M = 8.1$ (according to the U.S. Geological Survey) of the most strongest (during the considered range from October 27, 2020 to May 17, 2021 AD) earthquake of the Earth occurred on March 4, 2021 AD in Kermadec Islands, New Zealand near the previously calculated [12] date 2021.1 AD (corresponding to February 7, 2021 AD) of the local maximal combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth. To explain the cosmic energy gravitational genesis of the magnitude $M = 8.1$ of the most strongest earthquake (during the considered [11] range from October 27, 2020 to May 17, 2021 AD) of the Earth occurred on March 4, 2021 AD, we present the evaluation (based on the thermohydrogravodynamic technology [9, 11, 16]) of the magnitude $M_{up}(\text{March 4, 2021 AD, loc. max.})$ of the possible strong earthquake of the Earth, which can occur on March 4, 2021 AD corresponding to the following calculated values (calculated under the first approximation of the circular orbits of the planets) [11]:

$$\Delta_{g,s,p}(2021) = 5273.4914, \tag{34}$$

$$\sin \varphi(\text{March 4, 2021 AD}) = \sin 59.709^\circ = 0.86347466, \tag{35}$$

$$\Delta_{g,s,p}(2021) \sin \varphi(\text{March 4, 2021 AD}) = 4553.5262. \tag{36}$$

Considering and analyzing the strongest earthquakes (presented in Tables 1 and 2) on the two-dimensional plane (18), we established [11] that the dimensionless ranges (containing the value (36) and the magnitude $M=8.1$ of the most strongest earthquakes occurred on March 4, 2021 AD)

$$4300 \leq \Delta_{g,s,p}(i) \sin \varphi(i) \leq 4600, \tag{37}$$

$$8.0 \leq M_{up}(i, \text{loc. max.}) \leq 8.2 \tag{38}$$

include only one realized strongest earthquake (from the all analyzed strongest earthquakes given in Tables 1 and 2) occurred on (according to the U.S. Geological Survey) the date (accompanied by the corresponding magnitude and the region of the strongest earthquake):

$$1986-05-07 (M_{up}(1986, \text{loc. max.}) = 8.0, \text{Andreanof and Aleutian Islands, Alaska}). \tag{39}$$

To demonstrate the first evidence of the cosmic energy gravitational genesis of the magnitude $M = 8.1$ of the most strongest (during the considered range from October 27, 2020 to May 17, 2021 AD) earthquake of the Earth occurred on March 4, 2021 AD, we considered [11] the second previous strongest earthquake (from the strongest earthquakes in Tables 1 and 2) occurred on the date (accompanied by the corresponding magnitude and the region of the strongest earthquake)

$$1980-07-17 (M_{up}(1980, \text{loc. max.}) = 7.9, \text{Santa Cruz Islands}) \tag{40}$$

characterized by the difference of 6 years (between the dates (39) and (40) of the occurred strongest earthquakes) in accordance with the established previously [29] fundamental periodicity 6 years [29] of the global seismotectonic, volcanic and climatic activity of the Earth.

Based on the first binary combination of the strongest earthquakes occurred on the dates (39) and (40) characterized by the maximal magnitudes $M_{up}(1986, \text{loc. max.}) = 8.0$ and $M_{up}(1980, \text{loc. max.}) = 7.9$, respectively, and using the following corresponding calculated values (calculated under the first approximation of the circular orbits of the planets):

$$\Delta_{g,s,p}(1986) = 4427.9895, \quad (41)$$

$$\sin \varphi (1986-05-07) = \sin 76.33^\circ = 0.97167295, \quad (42)$$

$$\Delta_{g,s,p}(1986) \sin \varphi (1986-05-07) = 4302.5576, \quad (43)$$

$$\Delta_{g,s,p}(1980) = 5057.1379, \quad (44)$$

$$\sin \varphi (1980-07-17) = \sin 50.47^\circ = 0.77129131, \quad (45)$$

$$\Delta_{g,s,p}(1980) \sin \varphi (1980-07-17) = 3900.5249, \quad (46)$$

we evaluated (based on the linear extrapolation [11]) the first variant of the magnitude $M_{up}(\text{March 4, 2021 AD, loc. max., 1})$ (of the possible strong earthquake of the Earth, which can occur on March 4, 2021 AD for the corresponding value (36)):

$$\begin{aligned} M_{up}(\text{March 4, 2021 AD, loc. max., 1}) &= M_{up}(1980, \text{loc. max.}) + \\ &+ \frac{(M_{up}(1986, \text{loc. max.}) - M_{up}(1980, \text{loc. max.}))}{(\Delta_{g,s,p}(1986) \sin \varphi (1986-05-07) - \Delta_{g,s,p}(1980) \sin \varphi (1980-07-17))} \times \\ &\times (\Delta_{g,s,p}(2021) \sin \varphi (\text{March 4, 2021 AD}) - \Delta_{g,s,p}(1980) \sin \varphi (1980-07-17)) = \\ &= 7.9 + \frac{(8.0-7.9)(4553.5262-3900.5249)}{(4302.5576-3900.5249)} = 7.9 + \frac{0.1 \cdot (653.0013)}{(402.0327)} = 8.0624. \end{aligned} \quad (47)$$

The evaluated magnitude (47) is near the real maximal magnitude $M=8.1$ (according to the U.S. Geological Survey) of the strongest (during the considered range from October 27, 2020 to May 17, 2021 AD) earthquake of the Earth occurred on March 4, 2021 AD. The closeness of the evaluated [11] first magnitude (47) to the real maximal magnitude $M=8.1$ gives the first evidence of the cosmic energy gravitational genesis of the magnitude $M = 8.1$ of the strongest earthquake occurred on March 4, 2021 AD during the considered [11] range from October 27, 2020 to May 17, 2021 AD.

To demonstrate the second evidence of the cosmic energy gravitational genesis of the magnitude $M = 8.1$ of the strongest (during the considered range from October 27, 2020 to May 17, 2021 AD) earthquake of the Earth occurred on March 4, 2021 AD, we considered [11] the previous strongest earthquake (given in Table 2) occurred on the date (accompanied by the corresponding magnitude and the region of the strongest earthquake)

$$1988-03-06 (M_{up}(1988, \text{loc. max.}) = 7.8, \text{ Gulf of Alaska}) \quad (48)$$

characterized by the difference of 33 years (between the dates (48) and (23)) in accordance with the established previously [29] fundamental periodicity 33 years [29] of the global seismotectonic, volcanic and climatic activity of the Earth. We considered [11] (from the strongest earthquakes given in Table 2) the second (to obtain the binary combination with (48)) previous strongest earthquake occurred on the date (accompanied by the corresponding magnitude and the region of the strongest earthquake)

$$1982-12-19 (M_{up}(1982, \text{loc. max.}) = 7.2, \text{ south of Tonga}) \quad (49)$$

characterized by the difference of 6 years (between the dates (48) and (49) of the occurred strongest earthquakes) in accordance with the established previously [29] fundamental time periodicity 6 years [29] of the global seismotectonic, volcanic and climatic activity of the Earth. Based on the second binary combination of the strongest earthquakes occurred on the dates (48) and (49) characterized by the maximal magnitudes $M_{up}(1982, \text{loc. max.}) = 7.2$ and $M_{up}(1988, \text{loc. max.}) = 7.8$, respectively, and using the following corresponding calculated (under the first approximation of the circular orbits of the planets) values:

$$\Delta_{g,s,p}(1988) = 3606.3125, \quad (50)$$

$$\sin \varphi (1988-03-06) = \sin 79.04^\circ = 0.98176008, \quad (51)$$

$$\Delta_{g,s,p}(1988) \sin \varphi (1988-03-06) = 3540.5336, \quad (52)$$

$$\Delta_{g,s,p}(1982) = 5201.404, \quad (53)$$

$$\sin \varphi (1982-12-19) = \sin 16.77^\circ = 0.28853043, \quad (54)$$

$$\Delta_{g,s,p}(1982) \sin \varphi (1982-12-19) = 1500.6039, \quad (55)$$

we evaluated (based on the linear extrapolation [11]) the second variant of the magnitude $M_{up}(\text{March 4, 2021 AD, loc. max., 2})$ (of the possible strong earthquake of the Earth, which can occur on March 4, 2021 AD for the corresponding value (36)):

$$\begin{aligned} M_{up}(\text{March 4, 2021 AD, loc. max., 2}) &= M_{up}(1982, \text{loc. max.}) + \\ &+ \frac{(M_{up}(1988, \text{loc. max.}) - M_{up}(1982, \text{loc. max.}))}{(\Delta_{g,s,p}(1988) \sin \varphi (1988-03-06) - \Delta_{g,s,p}(1982) \sin \varphi (1982-12-19))} \times \\ &\times (\Delta_{g,s,p}(2021) \sin \varphi (\text{March 4, 2021 AD}) - \Delta_{g,s,p}(1982) \sin \varphi (1982-12-19)) = \\ &= 7.2 + \frac{(7.8-7.2)(4553.5262 - 1500.6039)}{(3540.5336 - 1500.6039)} = 7.2 + \frac{0.6 \cdot (3052.9223)}{(2039.9297)} = 8.09795. \end{aligned} \quad (56)$$

The evaluated magnitude (56) is very close to the real maximal magnitude $M=8.1$ (according to the U.S. Geological Survey) of the strongest (during the considered range from October 27, 2020 to May 17, 2021 AD) earthquake of the Earth occurred on March 4, 2021 AD. The closeness of the evaluated [11] second magnitude (56) to the real maximal magnitude $M=8.1$ gives the second evidence of the cosmic energy gravitational genesis of the magnitude $M = 8.1$ of the strongest earthquakes occurred on March 4, 2021 AD during the considered [11] range from October 27, 2020 to May 17, 2021 AD.

To demonstrate the third evidence of the cosmic energy gravitational genesis of the magnitude $M = 8.1$ of the strongest (during the considered range from October 27, 2020 to May 17, 2021 AD) earthquake of the Earth occurred on March 4, 2021 AD, we considered [11] the nearest (to the date (39)) previous strongest earthquake (given in Table 2) occurred on the date (accompanied by the corresponding magnitude and the region of the strongest earthquake) 1985-03-03 ($M_{up}(1985, \text{loc. max.}) = 8.0$, offshore Valparaiso, Chile. (57)

We established [28] the confirmed cosmic energy gravitational genesis of this strongest earthquake (57). The difference (between the dates (57) and (23)) is equal approximately to 36 years, which is close to the empirical time periodicity 35 years [33] of the seismotectonic activity of various regions of the seismic belt around the Pacific Ocean (the Pacific Ring). We considered [11] (from the strongest earthquakes given in Table 2) the second (to obtain the binary combination with (57)) nearest previous strongest earthquake occurred on the date (accompanied by the corresponding magnitude and the region of the strongest earthquake) 1991-06-20 ($M_{up}(1991, \text{loc. max.}) = 7.5$, Minahasa, Sulawesi, Indonesia (58)

characterized by the difference of 6 years (between the dates (57) and (58) of the occurred strongest earthquakes) in accordance with the established previously [29] fundamental time periodicity 6 years [29] of the global seismotectonic, volcanic and climatic activity of the Earth.

Based on the third combination of strongest earthquakes occurred on the dates (57) and (58) characterized by the maximal magnitudes $M_{up}(1985, \text{loc. max.}) = 8.0$ and $M_{up}(1991, \text{loc. max.}) = 7.5$, respectively, and using the following corresponding calculated (under the first approximation of the circular orbits of the planets) values

$$\Delta_{g,s,p}(1985) = 4735.5615, \quad (59)$$

$$\sin \varphi (1985-03-03) = \sin 53.81^\circ = 0.80706328, \quad (60)$$

$$\Delta_{g,s,p}(1985) \sin \varphi (1985-03-03) = 3821.5981, \quad (61)$$

$$\Delta_{g,s,p}(1991) = 3077.1287, \quad (62)$$

$$\sin \varphi (1991-06-20) = \sin 22.75^\circ = 0.3867108, \quad (63)$$

$$\Delta_{g,s,p}(1991) \sin \varphi (1991-06-20) = 1189.9564, \quad (64)$$

we evaluated (based on the linear extrapolation [11]) the third variant of magnitude $M_{up}(\text{March 4, 2021 AD, loc. max., 3})$ (of the possible strong earthquake of the Earth, which can occur on March 4, 2021 AD for the corresponding value (36)):

$$\begin{aligned} M_{up}(\text{March 4, 2021 AD, loc. max., 3}) &= M_{up}(1991, \text{loc. max.}) + \\ &+ \frac{(M_{up}(1985, \text{loc. max.}) - M_{up}(1991, \text{loc. max.}))}{(\Delta_{g,s,p}(1985) \sin \varphi (1985-03-03) - \Delta_{g,s,p}(1991) \sin \varphi (1991-06-20))} \times \\ &\times (\Delta_{g,s,p}(2021) \sin \varphi (\text{March 4, 2021 AD}) - \Delta_{g,s,p}(1991) \sin \varphi (1991-06-20)) = \\ &= 7.5 + \frac{(8.0-7.5)(4553.5262-1189.9564)}{(3821.5981-1189.9564)} = 7.5 + \frac{0.5 \cdot (3363.5698)}{(2631.6417)} = 8.13906. \end{aligned} \quad (65)$$

The evaluated magnitude (65) is very close to the real maximal magnitude $M=8.1$ (according to the U.S. Geological Survey) of the strongest (during the considered range from October 27, 2020 to May 17, 2021 AD) earthquake of the Earth occurred on March 4, 2021 AD. The closeness of the evaluated [11] third magnitude (65) to the real maximal magnitude $M=8.1$ gives the third evidence of the cosmic energy gravitational genesis of the magnitude $M = 8.1$ of the strongest earthquake occurred on March 4, 2021 AD during the considered [11] range from October 27, 2020 to May 17, 2021 AD.

We evaluated [11] the mean value $M_{up}(\text{March 4, 2021 AD, loc. max.})$ for the calculated first, second and third variants ((47), (56) and (65), respectively) of magnitude (of the possible strong earthquake of the Earth, which can occur on March 4, 2021 AD for the corresponding value (36)):

$$\begin{aligned} M_{up}(\text{March 4, 2021 AD, loc. max.}) &= \frac{1}{3} \sum_{i=1}^3 M_{up}(\text{March 4, 2021 AD, loc. max., } i) = \\ &= \frac{8.0624+8.09795+8.13906}{3} = 8.0998, \end{aligned} \quad (66)$$

which is very close to the real maximal magnitude $M=8.1$ (according to the U.S. Geological Survey) of the strongest (during the considered range from October 27, 2020 to May 17, 2021 AD) earthquake of the Earth occurred on March 4, 2021 AD. The possibility to explain (based on the thermohydrogravodynamic technology [9, 11, 16]) the real maximal magnitude $M=8.1$ of the most strongest (during the considered range from October 27, 2020 to May 17, 2021) earthquake occurred on March 4, 2021 AD (according to the U.S. Geological Survey) gives the perfect convincing evidence of the cosmic energy gravitational genesis of the most strongest earthquake of the Earth occurred on March 4, 2021 AD near the previously calculated (under the first approximation of the circular orbits of the planets) [12] date

2021.1 AD (corresponding to February 7, 2021 AD) of the local maximal combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth.

3.3. The evidence of the cosmic energy gravitational genesis of the strongest Japanese earthquake occurred on February 13, 2021 AD near the calculated date 2021.1 AD of the local maximal combined planetary and solar integral energy gravitational influence on the internal rigid core of the Earth

Taking into account the established [4] time periodicity 83 years (of recurrence of the local maximal integral energy gravitational influences of the Jupiter on the Earth), the year 1927 AD of the Jupiter's opposition with the Earth, the established [5, 6] time periodicity 88 years (of recurrences of the local maximal combined planetary and solar integral energy gravitational influences on the Earth) and the year 1923 AD of the last strongest Japanese earthquake in the Tokyo region, we predicted [5, 6] "the time range 2010 ÷ 2011 AD (1927+83 ÷ 1923+88) of the next sufficiently strong Japanese earthquake near the Tokyo region". The established [4-6] cosmic energy gravitational genesis of the strongest Japanese earthquakes was confirmed [7] by the strongest Japanese earthquake occurred on March 11, 2011 AD in the Tohoku region. We confirmed additionally [28, 29] the established [4-7] cosmic energy gravitational genesis of the strongest Japanese earthquakes.

We established the convincing good agreement [16] between the maximal magnitude $M=9.0$ (according to the U.S. Geological Survey) of the most strongest Japanese earthquake (occurred on March 11, 2011 in the Tohoku region) and the evaluated (based on the application of the thermohydrogravodynamic technology [9]) magnitude $M_{up}(\text{March 11, 2011 AD, loc. max.}) = 8.978077$ of the possible strong earthquake (of the Earth), which can occur on March 11, 2011 AD. Based on the good agreement between the real magnitude $M=9.0$ (according to the U.S. Geological Survey) of the most strongest Japanese earthquake occurred on March 11, 2011 in the Tohoku region and the evaluated [16] magnitude $M_{up}(\text{March 11, 2011 AD, loc. max.}) = 8.978077$ of the possible strong earthquake of the Earth (which can occur on March 11, 2011 AD), we concluded [16] that the applied thermohydrogravodynamic theory describes adequately the global energetics of the internal rigid core $\tau_{c,r}$ of the Earth subjected to the non-stationary cosmic gravitation of the Solar System. This good agreement [16] demonstrates the convincing cosmic energy gravitational genesis of the strongest Japanese earthquake (characterized by the maximal magnitude $M=9.0$ according to the U.S. Geological Survey) occurred on March 11, 2011 in the Tohoku region near the calculated [9, 12, 16] date $t^*(\tau_{c,r}, 2011) = 2011.26666666$ AD (corresponding approximately to April 7, 2011) of the local maximum (for 2011 AD) of the combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth.

We concluded (on October 6, 2020 [10] as the main conclusion for the presentation on the 10th International Conference on Geology and Geophysics) that the previously calculated [12] date 2021.1 AD (related with the local maximal combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth) is very important (in the first place) for Japan. We see now that the most strongest (during the considered range from October 27, 2020 AD to May 17, 2021 AD related with the previously calculated [12] date 2021.1 AD of the maximal combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth) Japanese earthquake (characterized by the magnitude $M=7.1$ according to the U.S. Geological Survey) occurred on February 13, 2021 AD (2021-02-13) 69 km ENE of Namie, Japan near 6 days after the previously calculated [12] date 2021.1 AD corresponding to February 7, 2021 AD. This good agreement confirms convincingly the cosmic energy gravitational genesis of the strongest Japanese earthquake occurred on February 13, 2021 AD near 6 days after the previously calculated (under the first approximation of the circular orbits of the planets) [12] date 2021.1 AD.

4. Summary of the main results

We have presented in Section 2 the fundamentals of the thermohydrogravodynamic theory for evidence of the cosmic energy gravitational genesis of the strongest earthquakes (of the maximal magnitudes 8.1, 7.7 and 7.1, respectively, according to the U.S. Geological Survey) of the Earth (during the considered range from October 27, 2020 AD to May 17, 2021 AD) occurred on March 4, 2021 AD, on February 10, 2021 AD and on February 13, 2021 AD, respectively, near the previously calculated [12] date 2021.1 AD (corresponding to February 7, 2021 AD) related with maximal combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth. We have presented in Section 2.1 the established [4, 13, 21] generalized differential formulation (1) of the first law of thermodynamics, which generalizes the classical [25, 26] formulation (10) by taking into account (along with the classical [25, 26] differential change of heat δQ and the classical [25, 26] differential change of the internal thermal energy dU_τ) the established [4, 13] differential energy gravitational influence dG (related with the non-stationary cosmic and terrestrial Newtonian gravitation) on the individual finite continuum region τ during the differential time interval dt . In Section 2.1 we present also the applied generalized differential formulation (11) of the first law of thermodynamics used for the internal rigid core $\tau_{c,r}$ of the Earth subjected to the combined planetary and solar non-stationary energy gravitational influences [4-7, 9-12, 14-16].

Based on the established [4, 13] general differential energy gravitational influence dG (given by (7) in the general generalized differential formulation (1)) and the related differential combined planetary and solar energy gravitational influence $dG(\tau_{c,r})$ (given by (12) in the applied generalized differential formulation (11)) on the internal rigid core $\tau_{c,r}$

[27, 28] during the differential time interval dt , we have presented in Section 2.2 the established [14, 15] global prediction thermohydrogravodynamic principles (15) and (16) determining the maximal temporal intensifications of the global seismotectonic, volcanic, climatic and magnetic processes of the Earth near the corresponding time moments $t^*(\tau_{c,r})$ and $t_*(\tau_{c,r})$, respectively. We have presented in Section 2.3 the general empirical (presented in Tables 1 and 2) and theoretical fundamentals of the thermohydrogravodynamic technology [9, 11, 16] applied for evidence of the cosmic energy gravitational genesis of the strongest earthquakes of the Earth occurred near the previously calculated [12] date 2021.1 AD of the local maximal combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth.

We have presented in Section 3 the convincing evidence of the cosmic energy gravitational genesis of the strongest earthquakes (characterized by the magnitudes 8.1, 7.7 and 7.1 according to the U.S. Geological Survey) of the Earth (during the considered range from October 27, 2020 AD to May 17, 2021 AD) occurred on March 4, 2021 AD, on February 10, 2021 AD and on February 13, 2021 AD, respectively, near the previously calculated [12] date 2021.1 AD (corresponding to February 7, 2021 AD) related with local maximal combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth.

We have presented in Section 3.1 the convincing evidence (based on the thermohydrogravodynamic technology [9, 11, 16]) of the cosmic energy gravitational genesis of the second strongest earthquake of the Earth (characterized by the magnitude $M = 7.7$ according to the U.S. Geological Survey) occurred (during the considered range from October 27, 2020 to May 17, 2021 AD) on February 10, 2021 AD southeast of the Loyalty Islands near the previously calculated [12] date 2021.1 AD (corresponding approximately to February 7, 2021 AD) related with the local maximum (for 2021 AD) of the combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth. To establish this convincing evidence, we have used the well-founded combination of two previous strongest earthquakes (29) and (30) (considered from the all analyzed strongest earthquakes presented in Tables 1 and 2) for evaluation of the magnitude $M_{up}(2021.1, \text{loc. max.}) = 7.7006$ (given by (33)) of the possible earthquake (of the Earth), which can occur on February 10, 2021 AD near the previously calculated [12] date 2021.1 AD (corresponding to February 7, 2021 AD) related with the local maximal combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth. The cosmic energy gravitational genesis of the second strongest earthquake of the Earth (occurred on February 10, 2021 AD) is based on the good agreement between the real magnitude $M=7.7$ of the second strongest earthquake (occurred on February 10, 2021) and the evaluated (based on the thermohydrogravodynamic technology [9, 11, 16]) magnitude $M_{up}(2021.1, \text{loc. max.}) = 7.7006$ (given by (33)) of the possible earthquake (which can occur on February 10, 2021 AD) of the Earth.

We have presented in Section 3.2 the convincing evidence (based on the thermohydrogravodynamic technology [9, 11, 16]) of the cosmic energy gravitational genesis of the most strongest earthquake (during the considered range from October 27, 2020 to May 17, 2021 AD) of the Earth (characterized by the maximal magnitude $M = 8.1$) occurred on March 4, 2021 AD in Kermadec Islands, New Zealand near the previously calculated [12] date 2021.1 AD related with the local maximal combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth. To establish this convincing evidence, we have founded logically the previous application [11] of the thermohydrogravodynamic technology (extended significantly by the detailed numerical information related with the thermohydrogravodynamic technology [9, 11, 16]) for the previously [29] established fundamental time periodicities [29] of the global seismotectonic, volcanic and climatic activity of the Earth. We have used the well-founded combination of two previous strongest earthquakes (39) and (40) (from the all analyzed strongest earthquakes presented in Tables 1 and 2) for evaluation of the first variant of the magnitude $M_{up}(\text{March 4, 2021 AD, loc. max., } 1) = 8.0624$ (given by (47) [11]) of the possible earthquake (of the Earth), which can occur on March 4, 2021 AD near the previously calculated [12] date 2021.1 AD (corresponding to February 7, 2021 AD) related with local maximal combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth. We have used the well-founded combination of two previous strongest earthquakes (48) and (49) (from the all analyzed strongest earthquakes presented in Tables 1 and 2) for evaluation of the second variant of the magnitude $M_{up}(\text{March 4, 2021 AD, loc. max., } 2) = 8.09795$ (given by (56) [11]) of the possible earthquake (of the Earth), which can occur on March 4, 2021 AD near the previously calculated [12] date 2021.1 AD. We have used the well-founded combination of two previous strongest earthquakes (57) and (58) (from the all analyzed strongest earthquakes presented in Tables 1 and 2) for evaluation of the third variant of the magnitude $M_{up}(\text{March 4, 2021 AD, loc. max., } 3) = 8.13906$ (given by (65) [11]) of the possible earthquake (of the Earth), which can occur on March 4, 2021 AD near the previously calculated [12] date 2021.1 AD. The convincing cosmic energy gravitational genesis of the most strongest earthquake of the Earth (occurred on March 4, 2021 AD) is based on the very good agreement [11] between the mean magnitude $M_{up}(\text{March 4, 2021 AD, loc. max.}) = 8.0998$ (given by (66) [11]) and the real maximal magnitude $M=8.1$ (according to the U.S. Geological Survey) of the most strongest (during the considered range from October 27, 2020 to May 17, 2021 AD) earthquake of the Earth occurred on March 4, 2021 AD near the previously calculated [12] date 2021.1 AD of the local maximal combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth.

We have presented in Section 3.3 the convincing evidence (based on the thermohydrogravodynamic technology [9, 11, 16]) of the cosmic energy gravitational genesis of the most strongest (during the considered range from October 27, 2020 to May 17, 2021 AD) Japanese earthquake (characterized by the magnitude $M= 7.1$ according to the U.S. Geological Survey) occurred on February 13, 2021 AD (2021-02-13) 69 km ENE of Namie, Japan near 6 days after

the previously calculated [12] date 2021.1 AD corresponding to February 7, 2021 AD. The convincing cosmic energy gravitational genesis of the most strongest (during the considered range from October 27, 2020 to May 17, 2021 AD) Japanese earthquake (occurred on February 13, 2021 AD) is based on the small difference of near 6 days between the date February 13, 2021 AD (of the most strongest Japanese earthquake occurred during the considered range from October 27, 2020 AD to May 17, 2021 AD) and the previously calculated [12] date (corresponding to February 7, 2021 AD) 2021.1 AD (established previously on October 6, 2020 [10] as the very important date in the first place for Japan) of the local maximal combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth. The small difference of near 6 days between the date February 13, 2021 AD (of the strongest Japanese earthquake occurred during the considered range from October 27, 2020 AD to May 17, 2021 AD) and the previously calculated [12] date 2021.1 AD (corresponding to February 7, 2021 AD) gives the additional convincing evidence of the established [5-7, 28, 29] cosmic energy gravitational genesis of the strongest Japanese earthquakes.

The established convincing evidence of the cosmic energy gravitational genesis of the strongest earthquakes of the Earth occurred near the previously calculated [12] date 2021.1 AD (of the local maximal combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth) is based on the analysis (in the frame of the thermohydrogravodynamic technology [9, 11, 16]) of the strongest earthquakes of the Earth (occurred near the local maximal values of the calculated combined planetary and solar integral energy gravitational influences (15) on the internal rigid core $\tau_{c,r}$ of the Earth) occurred on (according to the U.S. Geological Survey): 1964-03-28 (M=9.2, Southern Alaska), March 11, 2011 (M=9, near the east coast of Honshu, Japan), February 27, 2010 (M=8.8, offshore Bio-Bio, Chile), April 11, 2012 (M=8.6, off the west coast of northern Sumatra), 1938-02-01 (M=8.5, Banda Sea), 1922-11-11 (M=8.5, Atacama, Chile), 2001-06-23 (M=8.4, near the coast of southern Peru), 2020-28-01 (M=7.7, 123 km NNW of Lucea, Jamaica) and during the range from 1980 AD and before 1994 AD.

5. Conclusions

We stated in 2016 AD [23] that the long-term deterministic prediction of the devastating earthquakes of the Earth is the urgent problem of the modern geophysics before the founded [14, 15] increased intensifications of the global natural (sesmotectonic, volcanic, climatic and magnetic) processes of the Earth during the established ranges (2020÷ 2026) AD, (2037.38÷2043.38) AD and (2055÷2064) AD [14, 15]. To solve the problem of the long-term deterministic predictions of the strongest devastating earthquakes, it is needed to understand (as the first step) the physical genesis of the strongest earthquakes of the Earth.

The application of the thermohydrogravodynamic technology [9-11, 16] reveals the convincing cosmic energy gravitational genesis of the strongest (during the considered range from October 27, 2020 to May 17, 2021 AD) earthquakes of the Earth occurred near the previously calculated (based on the first approximation of the circular orbits of the planets around the Sun [12]) date 2021.1 AD of the local maximal combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth subjected to the non-stationary cosmic gravitation of the Solar System.

Taking into account the revealed cosmic energy gravitational genesis of the strongest (during the considered range from October 27, 2020 to May 17, 2021 AD) earthquakes of the Earth (including the most strongest Japanese earthquake) occurred near the previously calculated [12] date 2021.1 AD, we can conclude that the maximal magnitudes of the strongest earthquakes of the Earth (occurred near the local maximal combined planetary and solar integral energy gravitational influences (15) on the internal rigid core $\tau_{c,r}$ of the Earth) can be predicted theoretically (in advance) based on the developed thermohydrogravodynamic technology [9, 11, 16] of evaluation of the maximal magnitudes of the strongest (during the calculated (in advance) time ranges of the temporal intensifications [10] of the global natural processes of the Earth) earthquakes of the Earth near the calculated (in advance) dates $t^*(\tau_{c,r}, i)$ (corresponding to the year i , AD) of the local maximal combined planetary and solar integral energy gravitational influences (15) on the internal rigid core $\tau_{c,r}$ of the Earth.

The revealed cosmic energy gravitational genesis (related with combined planetary and solar integral energy gravitational influences (15) on the internal rigid core $\tau_{c,r}$ of the Earth under the first approximation [12] of the circular orbits of the planets around the Sun) of the strongest (during the considered range from October 27, 2020 to May 17, 2021 AD) earthquakes of the Earth (occurred near the previously calculated [12] date 2021.1 AD) opens the real urgent perspective to incorporate (as a logically well-founded step) into the thermohydrogravodynamic technology [9-11, 16] the previously developed [4-6, 14] thermohydrogravodynamic models (based on the generalized differential formulation (1) of the first law of thermodynamics applied to the real macroscopic Earth consisting of four different interacting 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}) taking into account the planetary, solar and lunar energy gravitational influences [4-7, 12, 14] related with the real elliptical orbits of the planets (of the Solar System) and the real elliptical orbit of the Moon around the Earth.

We have established the well-founded empirical and theoretical physical basis to develop the unified geophysical theory combining the non-stationary gravitational and electromagnetic fields of the Earth. The first empirical-theoretical physical basis is related with the convincing coincidence of the previously calculated [10] date $t^*(\tau_{c,r}, 2020) = 2020.016666667$ AD (corresponding approximately to January 6, 2020 of the local maximal combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth) and the real date (January 6, 2020) of the observed [31] strong magnetic anomaly in Norway. We present the second empirical-

theoretical physical basis (confirming the validity of the made conclusion) related with the fact that established date 2007.3 AD [34] of the “very rapid changes in the trend of the secular variation of the geomagnetic field (geomagnetic jerks)” is in good agreement with the calculated (based on the global prediction thermohydrogravodynamic principle (16) applied for the first approximation of the circular orbits of the planets around the Sun) date $t_*(\tau_{c,r}, 2007) = 2007.4166666666$ AD of the local minimal combined planetary and solar integral energy gravitational influence (16) on the internal rigid core $\tau_{c,r}$ of the Earth. This good agreement (between the empirical date 2007.3 AD [34] and the calculated theoretical date $t_*(\tau_{c,r}, 2007) = 2007.4166666666$ AD) is the convincing argument of the cosmic energy gravitational genesis of the “very rapid changes in the trend of the secular variation of the geomagnetic field (geomagnetic jerks)” occurred near the established date 2007.3 AD [34]. The theoretical physical basis is related with the convincing inherent physical analogy between the relation (8) (for the energy flux J_g related with the scalar potential ψ of the Newtonian non-stationary gravitational field) and the relation (9) for the vector potential A associated with the scalar potential φ of the non-stationary electromagnetic field.

We presented (on the 12th International Conference on Geology and Geophysics, which has been held during May 30 – June 1, 2022 AD in China) the calculated [11] (under the first approximation of the circular orbits of the planets) forthcoming (for May 30 – June 1, 2022 AD) date $t^*(\tau_{c,r}, 2023) = 2023.2666666666$ AD (corresponding to April 7, 2023 AD) related with the maximal combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth. We see now (on February 28, 2023 AD) that the strongest (from December 28, 2022 AD to February 28, 2023 AD) earthquake of the Earth (characterized by the magnitude $M = 7.8$ according to the U.S. Geological Survey) occurred on February 6, 2023 AD in Turkey and Syria 60 days before the previously calculated [11, 16] date $t^*(\tau_{c,r}, 2023) = 2023.2666666666$ AD of the local maximal combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth. The fairly small difference of 60 (28-6+31+7) days between the date February 6, 2023 AD (of the strongest earthquake of the Earth occurred in Turkey and Syria near the calculated [11, 16] date $t^*(\tau_{c,r}, 2023) = 2023.2666666666$ AD) and the previously calculated [11, 16] date $t^*(\tau_{c,r}, 2023) = 2023.2666666666$ AD (corresponding to April 7, 2023 AD) gives the convincing evidence of the cosmic energy gravitational genesis of the strongest (from December 28, 2022 AD to February 28, 2023 AD) earthquake occurred in Turkey on February 6, 2023 AD 60 days before the previously calculated [11, 16] date $t^*(\tau_{c,r}, 2023) = 2023.2666666666$ AD of the local maximal combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth.

Taking into account the empirical fact (see Table 1) that the more strongest (characterized by the magnitudes $M_{up}(i, \text{loc. max.}) \geq 8.6$) earthquakes of the Earth (occurred near the dates $t^*(\tau_{c,r}, i)$ of the local maximal (for year i , AD) combined planetary and solar integral energy gravitational influences (15) on the internal rigid core $\tau_{c,r}$ of the Earth) have the tendency to occur in the end of February (February 27, 2010 AD), in the March (March 28, 1964 AD and March 11, 2011 AD) and in the beginning of April (April 11, 2012), we can assume (on February 28, 2023 AD) that the strongest (from December 28, 2022 AD to February 28, 2023 AD) earthquake occurred on February 6, 2023 AD in Turkey and Syria 60 days before the previously calculated [11, 16] date $t^*(\tau_{c,r}, 2023) = 2023.2666666666$ AD (corresponding to April 7, 2023 AD) is the possible precursor of the more strongest earthquakes, which can occur in March, 2023 AD and in the beginning of April, 2023 AD near the calculated [11, 16] date $t^*(\tau_{c,r}, 2023) = 2023.2666666666$ AD. Taking into account the previously calculated dates $t^*(\tau_{c,r}, 2011) = 2011.2666666666$ AD [9, 12, 16] and $t^*(\tau_{c,r}, 2023) = 2023.2666666666$ AD [11, 16], we obtain the difference $t^*(\tau_{c,r}, 2023) - t^*(\tau_{c,r}, 2011) = 12$ years, which is equal to the established previously [29] fundamental time periodicity 12 years [29] of the global seismotectonic, volcanic and climatic activity of the Earth. Based on the Table 1 of [9], we establish the fact that the condition $t^*(\tau_{c,r}, 2023) - t^*(\tau_{c,r}, i) = 12$ years is satisfied only for $i = 2011$, i.e. for the single strongest earthquake of the Earth (given in Table 1 and given in Table 1 of [9]) occurred on March 11, 2011 AD in the Tohoku region near the calculated [9, 12, 16] date $t^*(\tau_{c,r}, 2011) = 2011.2666666666$ AD (corresponding approximately to April 7, 2011 AD) of the local maximal combined planetary and solar integral energy gravitational influence (15) on the internal rigid core $\tau_{c,r}$ of the Earth. It means that the March, 2023 AD and the beginning of April, 2023 AD can present the possible forthcoming maximal temporal intensification (during the range from December 28, 2022 AD to July 14, 2023 AD) of the global seismotectonic processes of the Earth near the calculated [11, 16] date $t^*(\tau_{c,r}, 2023) = 2023.2666666666$ AD. We have (based on the Table 1 of [9]) the empirical condition $t^*(\tau_{c,r}, i) - t_e(i, \text{loc. max.}) \leq 31.92$ days (for $i = 1964, 2010, 2011, 2012$) for the magnitudes $M_{up}(i, \text{loc. max.})$ of the more strongest earthquakes (characterized by the magnitudes $M_{up}(i, \text{loc. max.}) \geq 8.6$ in Table 1 and in Table 1 of [9]) occurred on the dates $t_e(i, \text{loc. max.})$ (of the realized strongest earthquakes) before the dates $t^*(\tau_{c,r}, i)$ of the calculated local maximal (for year i , AD) combined planetary and solar integral energy gravitational influences (15) on the internal rigid core $\tau_{c,r}$ of the Earth. If the date $t_e(2023, \text{loc. max.})$ of the possible strongest (during the range from December 28, 2022 AD to July 14, 2023 AD) earthquake of the Earth (which can occur near the previously calculated [11, 16] date $t^*(\tau_{c,r}, 2023) = 2023.2666666666$ AD) will satisfy the same condition $t^*(\tau_{c,r}, 2023) - t_e(2023, \text{loc. max.}) \leq 31.92$ days (as for $i = 1964, 2010, 2011, 2012$ [9]), then the strongest (during the range from December 28, 2022 AD to July 14, 2023 AD) earthquake of the Earth can realize (in accordance with Table 1 and Table 1 of [9]) from March 6, 2023 AD to April 7, 2023 AD. If the strongest (during the range from December 28, 2022 AD to July 14, 2023 AD) earthquake of the Earth will realize (in accordance with Table 1 and Table 1 of [9]) from March 6, 2023 AD to April 7, 2023 AD), then

we can assume (on February 28, 2023 AD) the same condition $M_{up}(2023, \text{loc. max.}) \geq 8.6$ for the magnitude $M_{up}(2023, \text{loc. max.})$ of the possible strongest (during the range from December 28, 2022 AD to July 14, 2023 AD) earthquake of the Earth. If the realized strongest (during the range from December 28, 2022 AD to July 14, 2023 AD) earthquake of the Earth will occur outside of the range (March 6, 2023 AD ÷ April 7, 2023 AD), then it is not possible to evaluate (based on Table 1 and Table 1 of [9]) the magnitude $M_{up}(2023, \text{loc. max.})$ of the possible strongest (during the range from December 28, 2022 AD to July 14, 2023 AD) earthquake of the Earth.

Taking into account the great devastating effect of this strongest earthquake occurred in Turkey and Syria on February 6, 2023 AD, we will consider in the first place (despite of the absence of the general solution of the problem of three celestial bodies) the next very urgent, comprehensible and very complex (theoretical, computational and practical) problem: the application of the established [14, 15] general global prediction thermohydrogravodynamic principles (15) and (16) for the real elliptical orbits of the planets (of the Solar System) and for the real elliptical orbit of the Moon around the Earth to calculate (in the more rigorous and more real approximation) the corresponding more precise time moments $t^*(\tau_{c,r})$ and $t_*(\tau_{c,r})$ determining (according to the general global prediction thermohydrogravodynamic principles (15) and (16)) the maximal temporal intensifications of the global seismotectonic, volcanic, climatic and magnetic processes of the Earth.

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