The Cosmic Energy Gravitational Genesis of the Strongest Temporal Intensifications of the Global and Chinese Seismotectonic Processes

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Abstract

We present (on the 14th International Conference on Geology and Geophysics) the convincing evidence that the strongest earthquakes (according to the U.S. Geological Survey) of the Earth (during the range 1900 ÷ 2024 AD) and the strongest Chinese earthquakes (during the range 1900 ÷ 2024 AD) occurred near the calculated (based on the established (Simonenko, 2012, 2014) global prediction thermohydrogravidynamic principles determining the maximal temporal intensifications of the global seismotectonic, volcanic, climatic and magnetic processes of the Earth) dates corresponding to the local maximal and to the local minimal, respectively, combined planetary and solar integral energy gravitational influences on the internal rigid core of the Earth. We present the convincing evidence of the discovered cosmic-terrestrial energy gravitational genesis of the strongest earthquakes (during the range 1900 ÷ 2024 AD) of the Earth (and the strongest Chinese earthquakes) confirming the established first strong cosmic-terrestrial tendency (characterized by the necessary conditions 1.1 and 1.2) and the established second strong cosmic-terrestrial tendency (characterized by the necessary conditions 2.1 and 2.2).

Keywords

Thermohydrogravidynamic Theory, Non-Stationary Cosmic Gravitation, Generalized First Law of Thermodynamics, Cosmic Geology, Cosmic Geophysics, Cosmic Seismology, Global Seismotectonic Processes, Global Prediction Thermohydrogravidynamic Principles, Thermohydrogravidynamic Technology

1. Introduction

The problem of the long-term and short-term predictions of the strong earth-

quakes is the significant problem (Richter, 1958) of the modern geophysics (Simonenko, 2012, 2024) related with the founded (Simonenko, 2012, 2014) increased intensifications of the global natural (seismotectonic, volcanic, climatic and magnetic) processes of the Earth during the established range 2020 ÷ 2026 AD. The evaluation (in advance based on the global prediction thermohydrogravidynamic principles (Simonenko, 2012, 2014)) of the forthcoming ranges of the maximal temporal intensifications of the global seismotectonic processes of the Earth is the significant first step to solve the problem of the long-term deterministic predictions of the strongest earthquakes of the Earth.

We presented (on the 13th International Conference on Geology and Geophysics) the convincing evidence (Simonenko, 2023) that the strongest earthquakes (according to the U.S. Geological Survey) of the Earth (during the range 2020 ÷ 2023 AD) occurred near the predicted (calculated in advance based on the global prediction thermohydrogravidynamic principles (1) and (2)) dates $t^*(\tau_{c,r}, i)$ (for i = 2020, 2021, 2022 and 2023) and $t_*(\tau_{c,r}, i)$ (for i = 2020, 2021 and 2022).

The first general aim of this article (prepared based on the made presentation on the 14th International Conference on Geology and Geophysics) is to present the convincing evidence of the cosmic energy gravitational genesis of the strongest temporal intensifications of the global and Chinese seismotectonic processes during the range 1900 ÷ 2024 AD. The second general aim of this article is to present the convincing evidence of the discovered cosmic-terrestrial energy gravitational genesis of the strongest earthquakes (according to the U.S. Geological Survey) of the Earth (and the strongest Chinese earthquakes occurred in China) during the range 1900 ÷ 2024 AD.

In Section 2 we present the development of the thermohydrogravidynamic theory and technology (Simonenko, 2006, 2012, 2021, 2023, 2024). In Section 2.1 we present the established (Simonenko, 2012, 2014) global prediction thermohydrogravidynamic principles (1) and (2) determining the maximal temporal intensifications of the global seismotectonic, volcanic, climatic and magnetic processes of the Earth near the corresponding time moments (dates) $t^*(\tau_{c,r}, i)$ and $t_*(\tau_{c,r}, i)$. In Section 2.2 we present the derived new generalized differential formulation (4) of the first law of thermodynamics (for the Galilean frame of reference) for the whole material continuum of the Earth τ_3 subjected to the non-stationary potential cosmic and potential terrestrial Newtonian gravitational forces and non-potential terrestrial stress forces characterized by the symmetric stress tensor $\mathbf{T}$. In Section 2.3 we present the derived generalized reduced (first and second) global prediction thermohydrogravidynamic principles (7) and (8) determining the maximal temporal intensifications of the global seismotectonic, volcanic, climatic and magnetic processes of the Earth near the corresponding dates $t^*(\tau_3, i)$ and $t_*(\tau_3, i)$. In Section 2.4 we derive (based on the generalized reduced first global prediction thermohydrogravidynamic principle (7)) the necessary conditions 1.1 (given by the conditions (9) and (10)) and 1.2 (given by the conditions (11) and (12)), which are necessary (but not sufficient)

for creation of the strongest earthquakes of the Earth. In Section 2.5 we derive (based on the generalized reduced second global prediction thermohydrogravidynamic principle (8)) the necessary conditions 2.1 (given by the conditions (13) and (14)) and 2.2 (given by the conditions (15) and (16)), which are necessary (but not sufficient) for creation of the strongest earthquakes of the Earth.

In Section 3 we present the convincing evidence of the cosmic energy gravitational genesis of the strongest temporal intensifications of the global and Chinese seismotectonic processes during the range $1900 \div 2024$ AD. In Section 3 we present also the convincing evidence of the cosmic-terrestrial energy gravitational genesis of the strongest (during the range $1900 \div 2024$ AD) earthquakes of the Earth and the strongest Chinese earthquakes.

In Section 4 we present conclusions.

2. Development of the Thermohydrogravidynamic Theory

2.1. The Established Global Prediction Thermohydrogravidynamic Principles

The first and the second global prediction thermohydrogravidynamic principles (determining the maximal temporal intensifications of the global seismotectonic, volcanic, climatic and magnetic processes of the Earth near the corresponding dates $t^*(\tau_{c,r},i)$ and $t_*(\tau_{c,r},i)$) are formulated (based on the term (2) of the generalized differential formulation (1) of the first law of thermodynamics) for the internal rigid core $\tau_{c,r}$ of the Earth (Simonenko, 2012, 2014):

$$\Delta G(\tau_{c,r},t^*(\tau_{c,r},i)) =$$

$$= \max_t \int_{t_0}^{t} dt' \iiint_{\tau_{c,r}} \frac{\partial \psi_{comb}}{\partial t'} \rho_{c,r} dV - \text{local maximum for time moment } t^*(\tau_{c,r},i), \quad (1)$$

$$\Delta G(\tau_{c,r},t_*(\tau_{c,r},i)) =$$

$$= \min_t \int_{t_0}^{t} dt' \iiint_{\tau_{c,r}} \frac{\partial \psi_{comb}}{\partial t'} \rho_{c,r} dV - \text{local minimum for time moment } t_*(\tau_{c,r},i), \quad (2)$$

where $\rho_{c,r} = 12800 \, \text{kg} \cdot \text{m}^{-3}$ (Alboussière et al., 2010) is the mass density of the internal rigid core $\tau_{c,r}$, $\psi_{comb} \equiv \psi_{comb}(\tau_{c,r},t)$ is the combined planetary and solar gravitational potential (Simonenko, 2012, 2013, 2014) in the internal rigid core $\tau_{c,r}$.

2.2. The New Generalized Differential Formulation of the First Law of Thermodynamics for the Cosmic Geophysics and Geology

We use the general equation (Gyarmati, 1970) for the hydrodynamic velocity $\mathbf{v}$ of the material continuum movement in the Earth τ_3:

$$\frac{d\mathbf{v}}{dt} = \frac{1}{\rho} \text{div } \mathbf{T} + \mathbf{g} = \frac{1}{\rho} \text{div } \mathbf{T} + \mathbf{g}_{int} + \mathbf{g}_{cos} = \frac{1}{\rho} \text{div } \mathbf{T} - \nabla \psi_{int} - \nabla \psi_{cos}, \quad (3)$$

for the deformed continuum (characterized by the local density ρ of mass dis-

tribution of the material continuum of the Earth τ_3) characterized by the symmetric stress tensor $\mathbf{T}$ (Gyarmati, 1970) of a general form and taking into account the time variations of the general non-stationary potential $\psi = \psi_{int} + \psi_{cos}$ represented as the sum of the non-stationary terrestrial potential ψ_{int} (related with the whole deforming material continuum of the Earth τ_3) and the cosmic (solar, planetary and lunar) potential ψ_{cos} (Simonenko, 2012, 2013, 2014). The operator $d/dt = \partial/\partial t + \mathbf{v} \cdot \nabla$ denotes the total time derivative (Gyarmati, 1970) following the continuum substance. The general non-stationary gravitational field is characterized by the general local gravity acceleration vector $\mathbf{g} = -\nabla\psi$ inside the material continuum of the Earth. Based on the general Equation (3) of the continuum movement (Gyarmati, 1970) and taking into account the previously used (Simonenko, 2006, 2012, 2013, 2014) classical postulates of hydrodynamics, continuum mechanics and non-equilibrium thermodynamics, we derive the new generalized differential formulation (for the Galilean frame of reference) of the first law of thermodynamics (for the whole material continuum of the Earth τ_3 subjected to the non-stationary potential cosmic and potential terrestrial Newtonian gravitational forces and non-potential terrestrial stress forces characterized by the symmetric stress tensor $\mathbf{T}$):

$$dU(\tau_3) + dK(\tau_3) + d\boldsymbol{\pi}_{cos}(\tau_3) + d\boldsymbol{\pi}_{int}(\tau_3) =$$
$$= \delta Q(\partial\tau_3) + \delta A_{np}(\partial\tau_3) + \delta A_{g,int}(\tau_3) + dG_{cos}(\tau_3) + dG_{int}(\tau_3), \tag{4}$$

where $U(\tau_3,t)$ is the classical (Gibbs, 1873; De Groot & Mazur, 1962; Landau and Lifshitz, 1976) internal thermal energy of the Earth τ_3;

$K(\tau_3,t) = K_t(\tau_3,t) + K_{int}(\tau_3,t)$ is the macroscopic kinetic energy of the Earth τ_3, $K_t(\tau_3,t)$ is the macroscopic translational kinetic energy of the orbital movement of the Earth τ_3 in the ecliptic plane, $K_{int}(\tau_3,t)$ is the macroscopic internal kinetic energy (Simonenko, 2004, 2012, 2013) of the Earth τ_3; $\boldsymbol{\pi}_{cos}(\tau_3,t)$ is the cosmic (Simonenko, 2012, 2013, 2014) potential gravitational energy (of the Earth τ_3) related with the non-stationary potential ψ_{cos} of the cosmic (solar, planetary and lunar) gravitational field;

$$\boldsymbol{\pi}_{int}(\tau_3,t) = \frac{1}{2} \iiint_{\tau_3} \psi_{int} \rho dV \tag{5}$$

is the new terrestrial potential gravitational energy (of the Earth τ_3) related with the Newtonian potential ψ_{int} of the terrestrial gravitational field; $\delta Q(\partial\tau_3,t)$ is the classical (Gibbs, 1873; De Groot & Mazur, 1962; Landau and Lifshitz, 1976) differential (during the differential time interval dt) total heat flux across the boundary surface $\partial\tau_3$ of the Earth τ_3; $\delta A_{np}(\partial\tau_3,t)$ is the established (Simonenko, 2006, 2012, 2013, 2014) generalized differential work done by non-potential terrestrial stress forces acting on the boundary surface $\partial\tau_3$; $\delta A_{g,int}(\tau_3,t)$ is the new differential work done by the potential terrestrial gravitational forces acting on the deforming material continuum of the Earth τ_3;

$$dG_{cos}(\tau_3,t) = dt \iiint_{\tau_3} \frac{\partial\psi_{cos}}{\partial t} \rho dV, \tag{6}$$

is the established (Simonenko, 2012, 2013, 2014) differential (during the differential time interval dt) cosmic energy gravitational influence (as the result of the non-stationary cosmic gravitation) on the material continuum of the Earth τ_3; $dG_{int}(\tau_3, t)$ is the new differential terrestrial energy gravitational influence (as the result of the non-stationary potential terrestrial gravitation) on the deforming continuum of the Earth τ_3.

2.3. The Generalized Reduced First and Second Global Prediction Thermohydrogravidynamic Principles

By considering the very restrictive conditions $\Delta A_{g,int}(\tau_3, t, t_0) = 0$, $\Delta G_{int}(\tau_3, t, t_0) = 0$, and neglecting the cosmic planetary and lunar potential gravitational energy of the Earth τ_3 ($\boldsymbol{\pi}_{cos,P}(\tau_3, t) = 0$, $\boldsymbol{\pi}_{cos,M}(\tau_3, t) = 0$), we obtain from (4) the generalized reduced first global prediction thermohydrogravidynamic principle (determining the maximal temporal intensifications of the global seismotectonic, volcanic, climatic and magnetic processes of the Earth near the corresponding date $t^*(\tau_3, i)$):

$$\max_t \left\{ U(\tau_3, t) + K_{int}(\tau_3, t) \right\} = \left\{ U(\tau_3, t^*(\tau_3, i)) + K_{int}(\tau_3, t^*(\tau_3, i)) \right\} \Leftrightarrow$$

$$\Leftrightarrow \max_t \left\{ \Delta G_{cos}(\tau_3, t, t_0) - \boldsymbol{\pi}_{int}(\tau_3, t) \right\} = \max_t \left\{ \int_{t_0}^t dt' \iiint_{\tau_3} \frac{\partial \psi_{cos}(t')}{\partial t'} \rho dV - \frac{1}{2} \iiint_{\tau_3} \psi_{int} \, \rho dV \right\}, \quad (7)$$

which means the local maximum of the function $\left\{ \Delta G_{cos}(\tau_3, t, t_0) - \boldsymbol{\pi}_{int}(\tau_3, t) \right\}$ for the time moment $t^*(\tau_3, i)$.

We obtain from (4) the generalized reduced second global prediction thermohydrogravidynamic principle (determining the maximal temporal intensifications of the global seismotectonic, volcanic, climatic and magnetic processes of the Earth near the corresponding date $t_*(\tau_3, i)$):

$$\min_t \left\{ U(\tau_3, t) + K_{int}(\tau_3, t) \right\} = \left\{ U(\tau_3, t_*(\tau_{c,r}, i)) + K_{int}(\tau_3, t_*(\tau_{c,r}, i)) \right\} \Leftrightarrow$$

$$\Leftrightarrow \min_t \left\{ \Delta G_{cos}(\tau_3, t, t_0) - \boldsymbol{\pi}_{int}(\tau_3, t) \right\} = \min_t \left\{ \int_{t_0}^t dt' \iiint_{\tau_3} \frac{\partial \psi_{cos}(t')}{\partial t'} \rho dV - \frac{1}{2} \iiint_{\tau_3} \psi_{int} \, \rho dV \right\}, \quad (8)$$

which means the local minimum of the function $\left\{ \Delta G_{cos}(\tau_3, t, t_0) - \boldsymbol{\pi}_{int}(\tau_3, t) \right\}$ for the time moment $t_*(\tau_3, i)$. Here ρ is the local density of mass distribution of the material continuum of the Earth τ_3, ψ_{cos} is the combined cosmic (solar and planetary) gravitational potential (Simonenko, 2012, 2013, 2014) in the material continuum of the Earth τ_3.

2.4. The First Strong Cosmic-Terrestrial Tendency for Creation of the Strongest Earthquakes of the Earth

According to the generalized reduced first global prediction thermohydrogravidynamic principle (7), we derive the necessary condition 1.1 defined by the necessary combined simultaneous conditions

$$0.1 \le \theta_i = t_e(i, \text{loc. max.}) - i \le 0.3, \text{for year } i \text{ AD}, \quad (9)$$

$$0.1 \leq \beta(i) = t^*(\tau_{c,r}, i) - i \leq 0.3, \text{ for year i AD}, \tag{10}$$

which are necessary (but not sufficient) for realization (according to the first variant of the first strong cosmic-terrestrial tendency) of the strongest earthquakes of the Earth during the year i AD. According to the generalized reduced first global prediction thermohydrogravidynamic principle (7), we derive the necessary condition 1.2 defined by the necessary combined simultaneous conditions

$$0.7 \leq \theta_i = t_e(i, \text{loc. max.}) - i \leq 0.9, \text{ for year i AD}, \tag{11}$$

$$0.7 \leq \beta(i) = t^*(\tau_{c,r}, i) - i \leq 0.9, \text{ for year i AD}, \tag{12}$$

which are necessary (but not sufficient) for realization (according to the second variant of the first strong cosmic-terrestrial tendency) of the strongest earthquakes of the Earth during the year i AD. The first strong cosmic-terrestrial tendency is related with the local maximal combined planetary and solar integral energy gravitational influences on the Earth and the local minimal terrestrial potential gravitational energies of the Earth.

2.5. The Second Strong Cosmic-Terrestrial Tendency for Creation of the Strongest Earthquakes of the Earth

According to the generalized reduced second global prediction thermohydrogravidynamic principle (8), we derive the necessary condition 2.1 defined by the necessary combined simultaneous conditions

$$0.35 \leq \theta_i = t_e(i, \text{loc. min.}) - i \leq 0.65, \text{ for year i AD} \tag{13}$$

$$0.35 \leq \alpha(i) = t_*(\tau_{c,r}, i) - i \leq 0.65, \text{ for year i AD}, \tag{14}$$

which are necessary (but not sufficient) for realization (according to the first variant of the second strong cosmic-terrestrial tendency) of the strongest earthquakes of the Earth during the year i AD. According to the generalized reduced second global prediction thermohydrogravidynamic principle (8), we derive the necessary condition 2.2 defined by the necessary combined simultaneous conditions

$$\begin{cases} 0.8 \leq \theta_i = t_e(i, \text{loc. min.}) - i \leq 1, \text{ for year i AD}, \\ 0 \leq \theta_{i+1} = t_e(i+1, \text{loc. min.}) - (i+1) \leq 0.25, \text{ for year i+1 AD}, \end{cases} \tag{15}$$

$$\begin{cases} 0.8 \leq \alpha(i) = t_*(\tau_{c,r}, i) - i \leq 1, \text{ for year i AD}, \\ 0 \leq \alpha(i+1) = t_*(\tau_{c,r}, i+1) - (i+1) \leq 0.25, \text{ for year i+1 AD}. \end{cases} \tag{16}$$

which are necessary (but not sufficient) for realization (according to the second variant of the second strong cosmic-terrestrial tendency) of the strongest earthquakes of the Earth during the year i AD. The second strong cosmic-terrestrial tendency is related with the local minimal combined planetary and solar integral energy gravitational influences and the local maximal terrestrial potential gravitational energies.

3. Results and Discussions

3.1. The Application of the Established Global Prediction Thermohydrogravidynamic Principles for Evidence of the Cosmic Energy Gravitational Genesis of the Strongest Earthquakes of the Earth Occurred in China during the Range 1900 ÷ 2024 AD

To confirm the cosmic energy gravitational genesis of the strongest (according to the U.S. Geological Survey) global and Chinese earthquakes of the Earth (during the range 1900 ÷ 2024 AD), we present **Table 1** of the previous strongest earthquakes of the Earth occurred in China near the calculated (based on the global prediction thermohydrogravidynamic principle (1) used for the first approximation of the circular orbits of the planets around the Sun) dates $t^*(\tau_{c,r},i)$.

Table 1. The analysis of the previous strongest earthquakes of the Earth (characterized by the magnitudes $M_{up}(i, \text{loc. max.})$ according to the U.S. Geological Survey) occurred in China on the dates $t_e(i, \text{loc. max.})$ (i = 1908, 1920, 1927, 1931, 1934, 1937, 1976 and 2024) near the calculated dates $t^*(\tau_{c,r},i)$ (i = 1908, 1920, 1927, 1931, 1934, 1937, 1976 and 2024) of the local maximal combined planetary and solar integral energy gravitational influences (1) 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	The realized necessary condition 1.1 or 1.2	$\Delta^*(i) = \left\| t_e(i, \text{loc. max.}) - t^*(\tau_{c,r},i) \right\|$, in days
1908 AD	August 20, 1908 AD = 1908.63791923 AD	6.9	western Xizang, China	-	19.93 days after the calculated date $t^*(\tau_{c,r},1908) = 1908.583333333\,\text{AD}$
1920 AD	June 5, 1920 AD = 1920.42984257 AD	**8.2**	Taiwan region, China	-	74.32 days before the calculated date $t^*(\tau_{c,r},1920) = 1920.633333333\,\text{AD}$
1927 AD	May 22, 1927 AD = 1927.38877481 AD	7.7	Gansu-Qinghai border region, China	-	93.3 days after the calculated date $t^*(\tau_{c,r},1927) = 1927.133333333\,\text{AD}$
1931 AD	August 10, 1931 AD = 1931.6078028 AD	7.9	northern Xinjiang, China	-	27.2 days after the calculated date $t^*(\tau_{c,r},1931) = 1931.533333333\,\text{AD}$
1934 AD	December 15, 1934 AD = 1934.95550992 AD	7.2	western Xizang, China	1.2 partly	38.53 days after the calculated date $t^*(\tau_{c,r},1934) = 1934.85\,\text{AD}$
1937 AD	January 7, 1937 AD = 1937.01916495 AD	7.8	southern Qinghai, China	-	5.17 days before the calculated date $t^*(\tau_{c,r},1937) = 1937.033333333\,\text{AD}$
1976 AD	July 27, 1976 AD = 1976.57221081 AD	7.5	Tianjin-Hebei border region, China	-	81.16 days after the calculated date $t^*(\tau_{c,r},1976) = 1976.35\,\text{AD}$
2024 AD	April 2, 2024 AD = 2024.25462012 AD	7.4	18 km SSW of Hualien City, Taiwan region, China	1.1 partly	34.83 days before the calculated date $t^*(\tau_{c,r},2024) = 2024.35\,\text{AD}$

The closeness (as it is evident from the column for the difference $\Delta^*(i)$ in **Table 1**) of the dates $t_e(i, \text{loc. max.})$ and $t^*(\tau_{c,r}, i)$ (for i = 1908, 1920, 1927, 1931, 1934, 1937, 1976 and 2024) gives the convincing evidence of the cosmic energy gravitational genesis of the strongest (according to the U.S. Geological Survey) earthquakes of the Earth (during the range 1900 ÷ 2024 AD) occurred in China near the calculated dates $t^*(\tau_{c,r}, i)$ (i = 1908, 1920, 1927, 1931, 1934, 1937, 1976 and 2024) corresponding to the local maximal combined planetary and solar integral energy gravitational influences (1) on the internal rigid core $\tau_{c,r}$ of the Earth. We see (based on **Table 1**) that the calculated non-dimensional numerical dates $t_*(\tau_{c,r}, i)$ and the non-dimensional numerical dates $t_e(i, \text{loc. max.})$ are not consistent with the necessary conditions 1.1 (defined by (9) and (10)) and 1.2 (defined by (11) and (12)).

To confirm the cosmic energy gravitational genesis of the strongest (according to the U.S. Geological Survey) global and Chinese earthquakes of the Earth (during the range 1900 ÷ 2024 AD), we present **Table 2** of the previous strongest earthquakes of the Earth occurred in China on the dates $t_e(i, \text{loc. min.})$ near the calculated dates $t_*(\tau_{c,r}, i)$.

The closeness (as it is evident from the column for the difference $\Delta_*(i)$ in **Table 2**) of the dates $t_e(i, \text{loc. min.})$ and $t_*(\tau_{c,r}, i)$ gives the convincing evidence of the cosmic energy gravitational genesis of the strongest (according to the U.S. Geological Survey) earthquakes of the Earth (during the range 1900 ÷ 2024 AD) occurred in China near the calculated dates $t_*(\tau_{c,r}, i)$ corresponding to the local minimal combined planetary and solar integral energy gravitational influences (2) on the internal rigid core $\tau_{c,r}$ of the Earth. **Table 2** presents the evidence that the first strongest (during the range 1900 ÷ 2024 AD) Chinese earthquake was occurred on August 15, 1950 AD in eastern Xizang-India border region exactly 4.32 days before the calculated date $t_*(\tau_{c,r}, 1950)$. We see that the first strongest Chinese earthquake (characterized by the maximal magnitude $M_{up}(1950, \text{loc. min.}) = 8.6$) satisfy to the necessary condition 2.1. We see that the second strongest Chinese earthquake (characterized by the magnitude $M_{up}(1920, \text{loc. min.}) = 8.3$) satisfy to the necessary condition 2.2. Thus, we obtain the convincing evidence (based on **Table 2**) of the cosmic-terrestrial energy gravitational genesis of the strongest Chinese earthquakes (characterized by the magnitudes $M_{up}(1950, \text{loc. min.}) = 8.6$ and $M_{up}(1920, \text{loc. min.}) = 8.3$).

3.2. The Convincing Evidence of the Cosmic-Terrestrial Energy Gravitational Genesis of the Strongest Earthquakes of the Earth Occurred during the Range 1900 ÷ 2024 AD

Table 3 presents the analysis of the previous strongest earthquakes of the Earth (characterized by the magnitudes $8.8 \leq M_{up}(i, \text{loc. max.}) \leq 9.2$ according to the U.S. Geological Survey) occurred on the dates $t_e(i, \text{loc. max.})$ (i = 1964, 2010 and 2011) near the calculated dates $t^*(\tau_{c,r}, i)$ (i = 1964, 2010 and 2011).

We see (based on **Table 3**) that the calculated non-dimensional numerical dates $t^*(\tau_{c,r}, i)$ (i = 1964, 2010 and 2011) and the non-dimensional numerical

Table 2. The analysis of the previous strongest earthquakes of the Earth (characterized by the magnitudes $M_{up}(i, loc. min.)$ according to the U.S. Geological Survey) occurred in China on the dates $t_e(i, loc. min.)$ (i = 1910, 1918, 1920, 1932, 1950, 1951, 1988, 1999, 2001 and 2008) near the calculated dates $t_*(\tau_{c,r}, i)$ (i = 1910, 1918, 1920, 1932, 1950, 1951, 1988, 1999, 2001 and 2008) of the local minimal combined planetary and solar integral energy gravitational influences (2) on the internal rigid core $\tau_{c,r}$ of the Earth.

Year i AD	Date $t_e(i, loc. min.)$ of the strongest earthquake	Magnitude $M_{up}(i, loc. min.)$ of the strongest earthquake	Region of the strongest earthquake	The realized necessary condition 2.1 or 2.2	$\Delta_*(i) = \|t_e(i, loc. min.) - t_*(\tau_{c,r}, i)\|$, in days
1910 AD	April 12, 1910 AD = 1910.27926078 AD	8.1	northeast of Taiwan region	2.2 partly	22.86 days after the calculated date $t_*(\tau_{c,r}, 1910) = 1910.21666666$ AD
1918 AD	February 13, 1918 AD = 1918.12046543 AD	7.3	near the coast of Fujian, China	2.2 perfectly	68.35 days after the calculated date $t_*(\tau_{c,r}, 1917) = 1917.93333333$ AD
1920 AD	December 16, 1920 AD = 1920.96098562 AD	**8.3**	Gansu-Ningxia border region, China	2.2 perfectly	81.21 days before the calculated date $t_*(\tau_{c,r}, 1921) = 1921.183333333$ AD
1932 AD	December 25, 1932 AD = 1932.98288843 AD	7.9	Gansu, China	2.2 perfectly	79.3 days before the calculated date $t_*(\tau_{c,r}, 1933) = 1933.2$ AD
1950 AD	August 15, 1950 AD = 1950.62149212 AD	**8.6**	eastern Xizang-India border region	2.1 perfectly	4.32 days before the calculated date $t_*(\tau_{c,r}, 1950) = 1950.63333333$ AD
1951 AD	November 24, 1951 AD = 1951.89801505 AD	7.8	Taiwan region, China	2.2 partly	54.06 days after the calculated date $t_*(\tau_{c,r}, 1951) = 1951.75$ AD
1988 AD	November 6, 1988 AD = 1988.85747159 AD	7.7	Myanmar-China border region	2.2 perfectly	6.62 days after the calculated date $t_*(\tau_{c,r}, 1988) = 1988.83333333$ AD
1999 AD	September 20, 1999 AD = 1999.72005475 AD	7.7	Taiwan region, China	2.2 partly	29.2 days before the calculated date $t_*(\tau_{c,r}, 1999) = 1999.8$ AD
2001 AD	November 14, 2001 AD = 2001.87063655 AD	7.8	southern Qinghai, China	2.2 perfectly	35.07 days before the calculated date $t_*(\tau_{c,r}, 2001) = 2001.96666666$ AD
2008 AD	May 12, 2008 AD = 2008.36413415 AD	7.9	eastern Sichuan, China	2.1 perfectly	55.71 days before the calculated date $t_*(\tau_{c,r}, 2008) = 2008.51666666$ AD

dates $t_e(i, loc. max.)$ (i = 1964, 2010 and 2011) satisfy the necessary condition 1.1 (defined by (9) and (10)). The satisfaction of the established necessary condition 1.1 explains the maximal magnitudes $M_{up}(i, loc. max.)$ (corresponding to i = 1964, 2010 and 2011) of the strongest earthquakes of the Earth presented in **Table 3**. **Table 3** presents the convincing evidence of the cosmic-terrestrial energy gravitational genesis of the strongest earthquakes of the Earth occurred during the range 1900 ÷ 2024 AD near the calculated non-dimensional numerical dates $t^*(\tau_{c,r}, i)$ (i = 1964, 2010 and 2011).

Table 4 presents the analysis of the all previous strongest earthquakes of the Earth occurred on the dates $t_e(i, loc. min.)$ near the calculated dates $t_*(\tau_{c,r}, i)$

Table 3. The analysis of the previous strongest earthquakes (characterized by the magnitudes $8.8 \le M_{up}(i, \text{loc. max.}) \le 9.2$ according to the U.S. Geological Survey) of the Earth occurred on the dates $t_e(i, \text{loc. max.})$ (i = 1964, 2010 and 2011) near the calculated (Simonenko, 2021) dates $t^*(\tau_{c,r}, i)$ (i = 1964, 2010 and 2011) of the local maximal combined planetary and solar integral energy gravitational influences (1) 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	The realized necessary condition 1.1 or 1.2	$\Delta^*(i) = \left\| t_e(i, \text{loc. max.}) - t^*(\tau_{c,r}, i) \right\|$, in days
1964 AD	March 28, 1964 AD = 1964.24093086 AD	**9.2**	Southern Alaska	1.1 perfectly	15.48 days before the calculated date $t^*(\tau_{c,r}, 1964) = 1964.283333333$ AD
2010 AD	February 27, 2010 AD = 2010.15879534 AD	8.8	offshore Bio-Bio, Chile	1.1 perfectly	2.87 days before the calculated date $t^*(\tau_{c,r}, 2010) = 2010.1666666666$ AD
2011 AD	March 11, 2011 AD = 2011.19164955 AD	9.0	near the east coast of Honshu, Japan	1.1 perfectly	27.39 days before the calculated date $t^*(\tau_{c,r}, 2010) = 2010.1666666666$ AD

Table 4. The analysis of the all previous strongest earthquakes of the Earth (characterized by the magnitudes $9.0 \le M_{up}(i, \text{loc. min.}) \le 9.5$ according to the U.S. Geological Survey) occurred on the dates $t_e(i, \text{loc. min.})$ (i = 1952, 1960 and 2004) near the calculated dates $t_*(\tau_{c,r}, i)$ (i = 1952, 1960 and 2004) of the local minimal combined planetary and solar integral energy gravitational influences (given by the relation (2)) on the internal rigid core $\tau_{c,r}$ of the Earth.

Year i AD	Date $t_e(i, \text{loc. min.})$ of the strongest earthquake	Magnitude $M_{up}(i, \text{loc. min.})$ of the strongest earthquake	Region of the strongest earthquake	The realized necessary condition 2.1 or 2.2	$\Delta_*(i) = \left\| t_e(i, \text{loc. min.}) - t_*(\tau_{c,r}, i) \right\|$, in days
1952 AD	November 4, 1952 AD = 1952.84599589 AD	9.0	off the east coast of the Kamchatka Peninsula, Russia	2.2 perfectly	7.55 days before the calculated date $t_*(\tau_{c,r}, 1952) = 1952.86666666$ AD
1960 AD	May 22, 1960 AD = 1960.39151266 AD	**9.5**	Bio-Bio, Chile	2.1 perfectly	33.53 days before the calculated date $t_*(\tau_{c,r}, 1960) = 1960.48333333$ AD
2004 AD	December 26, 2004 AD = 2004.98836413 AD	9.1	off the west coast of northern Sumatra	2.2 perfectly	89.47 days before the calculated date $t_*(\tau_{c,r}, 2005) = 2005.23333333$ AD

of the local minimal combined planetary and solar integral energy gravitational influences (2) on the internal rigid core $\tau_{c,r}$ of the Earth.

Table 4 shows the convincing evidence of the first (related with the necessary conditions 2.1 defined by (13) and (14)) and the second (related with the necessary conditions 2.2 defined by (15) and (16)) variants of the second strong cosmic-terrestrial tendency related with creation of the strongest earthquakes of the Earth. We see (based on **Table 4**) that the satisfaction of the necessary conditions 2.1 and 2.2 is the real necessary (but not sufficient) condition for realization of the strongest earthquakes (characterized by the magnitudes $9.0 \le M_{up}(i, \text{loc. min.}) \le 9.5$) of the Earth.

3.3. The Evidence of the Cosmic-Terrestrial Energy Gravitational Genesis of the Strongest Chinese Earthquakes Occurred near the Calculated Dates 1975.26666666 AD and 1999. 26666666 AD

Table 5 presents the analysis of the previous strongest Chinese earthquakes occurred on the dates $t_e(i, \text{loc. max.})$ (i = 1975, 1999 and 2023) near the calculated dates $t^*(\tau_{c,r}, i)$ (i = 1975, 1999 and 2023) characterized by the condition $\beta(i) = t^*(\tau_{c,r}, i) - i = 0.266666666$ for i = 1975, 1999 and 2023.

We see (based on **Table 5**) that the maximal magnitude $M_{up}(i, \text{loc. max.}) = 7.1$ (of the strongest Chinese earthquake occurred on April 8, 1999 AD in Jilin-Heilongjiang border region) corresponds to the minimal (for i = 1975, 1999 and 2023) time difference $\Delta^*(1999) = 0.6 \text{ days}$. We see (based on **Table 5**) for the strongest Chinese earthquake (occurred on April 8, 1999 AD) that the calculated non-dimensional numerical date $t_e(1999, \text{loc. max.})$ and the condition $\beta(1999) = 0.266666666$ (for 1999 AD) satisfy the necessary condition 1.1 (defined by (9) and (10)). We see that the calculated non-dimensional numerical date $t_e(2023, \text{loc. max.})$ (of the strongest earthquake of the Earth occurred on February 6, 2023 AD) and the calculated date $t^*(\tau_{c,r}, 2023)$ satisfy the necessary condition 1.1.

Table 5. The analysis of the previous strongest Chinese earthquakes (characterized by the magnitudes $M_{up}(i, \text{loc. max.})$ according to the U.S. Geological Survey) occurred on the dates $t_e(i, \text{loc. max.})$ (i = 1975, 1999 and 2023) near the calculated dates $t^*(\tau_{c,r}, 1975) = 1975.266666666 \text{ AD}$, $t^*(\tau_{c,r}, 1999) = 1999.266666666 \text{ AD}$ and $t^*(\tau_{c,r}, 2023) = 2023.266666666 \text{ AD}$ of the local maximal combined planetary and solar integral energy gravitational influences (1) on the internal rigid core $\tau_{c,r}$.

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	The realized necessary condition 1.1 or 1.2	$\Delta^*(i) = \left\| t_e(i, \text{loc. max.}) - t^*(\tau_{c,r}, i) \right\|$, in days
1975 AD	February 4, 1975 AD = 1975.09582477 AD	7.0	Liaoning, China	1.1 nearly	62.4 days before the calculated date $t^*(\tau_{c,r}, 1975) = 1975.26666666 \text{ AD}$
1975 AD	March 23, 1975 AD = 1975.22450376 AD	6.6	Taiwan region	1.1 perfectly	15.4 days before the calculated date $t^*(\tau_{c,r}, 1975) = 1975.26666666 \text{ AD}$
1975 AD	April 28, 1975 AD = 1975.32306639	6.3	Kashmir-Xinjiang border region	1.1 nearly	20.6 days after the calculated date $t^*(\tau_{c,r}, 1975) = 1975.26666666 \text{ AD}$
1999 AD	April 8, 1999 AD = 1999.26830937 AD	7.1	Jilin-Heilongjiang border region, China	1.1 perfectly	0.6 days after the calculated date $t^*(\tau_{c,r}, 1999) = 1999.26666666 \text{ AD}$
2023 AD	January 25, 2023 AD = 2023.06844626 AD	5.4	Western Sichuan, China	1.1 nearly	72.4 days before the calculated date $t^*(\tau_{c,r}, 2023) = 2023.26666666 \text{ AD}$
2023 AD	February 6, 2023 AD = 2023.10130047 AD	7.8	Pazarcik earthquake, Kahramanmaras earthquake sequence	1.1 perfectly	60.39 days before the calculated date $t^*(\tau_{c,r}, 2023) = 2023.26666666 \text{ AD}$

3.4. The Evidence of the Cosmic Energy Gravitational Genesis of the Global and Chinese Strongest Earthquakes Occurred near the Calculated Dates 1976.35 AD, 2000.35 AD and 2024.35 AD

Table 6 presents the analysis of the previous strongest earthquakes of the Earth (characterized by the magnitudes $M_{up}(i, \text{loc. max.})$ according to the U.S. Geological Survey) occurred on the dates $t_e(i, \text{loc. max.})$ (i = 1976, 2000 and 2024) near the calculated dates $t^*(\tau_{c,r}, i)$ (i = 1976, 2000 and 2024).

We see that the numerical condition $\beta(i) = t^*(\tau_{c,r}, i) - i = 0.35$ (for i = 1976, 2000 and 2024) is not in agreement with the conditions (10) and (12) related with the established necessary conditions 1.1 and 1.2. This disagreement explains the empirical fact that the maximal magnitude $M_{up}(2000, \text{loc. max.}) = 7.9$ in **Table 6** is smaller than the maximal magnitudes $8.8 \leq M_{up}(i, \text{loc. max.}) \leq 9.2$ in **Table 3**.

Taking into account the time distributions of the strongest earthquakes of the Earth near the calculated dates $t^*(\tau_{c,r}, 1976) = 1976.35 \text{ AD}$ and $t^*(\tau_{c,r}, 2000) = 2000.35 \text{ AD}$, we concluded (on May 20, 2024 AD as it was pointed out in the presentation on the 14th International Conference on Geology and Geophysics) that the previous 7.4-magnitude significant Chinese earthquake (occurred on April 2, 2024 in Taiwan region exactly 34.83 days before the calculated (Simonenko, 2023) date $t^*(\tau_{c,r}, 2024) = 2024.35 \text{ AD}$) can be considered (under the same tendency as for 1976 AD and 2000 AD) as the precursor of the

Table 6. The analysis of the previous strongest earthquakes of the Earth (characterized by the magnitudes $M_{up}(i, \text{loc. max.})$ according to the U.S. Geological Survey) occurred on the dates $t_e(i, \text{loc. max.})$ (i = 1976, 2000 and 2024) near the calculated dates $t^*(\tau_{c,r}, 1976) = 1976.35 \text{ AD}$, $t^*(\tau_{c,r}, 2000) = 2000.35 \text{ AD}$ and $t^*(\tau_{c,r}, 2024) = 2024.35 \text{ AD}$ (characterized by the condition $\beta(i) = t^*(\tau_{c,r}, i) - i = 0.35$ for i = 1976, 2000 and 2024) of the local maximal combined planetary and solar integral energy gravitational influences (1) on the internal rigid core $\tau_{c,r}$ of the Earth.

Year i AD	Calculated date $t^*(\tau_{c,r}, i)$	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	$\Delta^*(i)$, in days
1976 AD	$t^*(\tau_{c,r}, 1976) = 1976.35 \text{ AD}$	July 27, 1976 AD	7.5	Tianjin-Hebei border region, China	81.16 days after the calculated date $t^*(\tau_{c,r}, 1976)$
1976 AD	$t^*(\tau_{c,r}, 1976) = 1976.35 \text{ AD}$	February 4, 1976 AD	7.5	Guatemala	92.83 days before the calculated date $t^*(\tau_{c,r}, 1976)$
2000 AD	$t^*(\tau_{c,r}, 2000) = 2000.35 \text{ AD}$	June 4, 2000 AD	7.9	southern Sumatra, Indonesia	28.16 days after the calculated date $t^*(\tau_{c,r}, 2000)$
2000 AD	$t^*(\tau_{c,r}, 2000) = 2000.35 \text{ AD}$	June 18, 2000 AD	7.9	South Indian Ocean	42.16 days after the calculated date $t^*(\tau_{c,r}, 2000)$
2024 AD	$t^*(\tau_{c,r}, 2024) = 2024.35 \text{ AD}$	April 2, 2024 AD	7.4	18 km SSW of Hualien City, Taiwan region, China	34.83 days before the calculated date $t^*(\tau_{c,r}, 2024)$

possible (but not necessary) more strongest earthquake of the Earth during the time range from January 27, 2024 AD to August 12, 2024 AD (corresponding exactly to the mean date of the calculated dates $t^*(\tau_{c,r}, 2024) = 2024.35$ AD and $t_*(\tau_{c,r}, 2024) = 2024.88333333$ AD).

4. Conclusion

We have established in Section 2.3 the new generalized differential formulation (4) of the first law of thermodynamics for the whole material continuum of the Earth τ_3 subjected to the non-stationary potential cosmic and potential terrestrial Newtonian gravitational forces and non-potential terrestrial stress forces characterized by the symmetric stress tensor $\mathbf{T}$. We have established in Section 2.3 the derived generalized reduced (first and second) global prediction thermohydrogravidynamic principles (7) and (8) determining the maximal temporal intensifications of the global seismotectonic, volcanic, climatic and magnetic processes of the Earth near the corresponding dates $t^*(\tau_3, i)$ and $t_*(\tau_3, i)$. We have established in Section 2.4 (based on the established principle (7)) the first strong cosmic-terrestrial tendency (characterized by the necessary conditions 1.1 (defined by the conditions (9) and (10)) and 1.2 (defined by the conditions (11) and (12))) related with creation of the strongest earthquakes of the Earth. We have established in Section 2.5 (based on the established principle (8)) the second strong cosmic-terrestrial tendency (characterized by the necessary conditions 2.1 (defined by the conditions (13) and (14)) and 2.2 (defined by the conditions (15) and (16))) related with creation of the strongest earthquakes of the Earth. The necessary conditions 1.1, 1.2, 2.1 and 2.2 are necessary (but not sufficient) conditions for creation of the strongest earthquakes.

We have presented in Section 3 the convincing evidence of the cosmic energy gravitational genesis of the strongest temporal intensifications of the global and Chinese seismotectonic processes during the range 1900 ÷ 2024 AD. We have presented in Section 3 the convincing evidence that the strongest earthquakes (according to the U.S. Geological Survey) of the Earth and the strongest Chinese earthquakes (during the range 1900 ÷ 2024 AD) were occurred near the calculated (based on the global prediction thermohydrogravidynamic principles (1) and (2) used for the first approximation of the circular orbits of the planets around the Sun) dates $t^*(\tau_{c,r}, i)$ and $t_*(\tau_{c,r}, i)$ corresponding (for year i AD) to the local maximum and the local minimum, respectively, of the combined planetary and solar integral energy gravitational influences (1) and (2), respectively, on the internal rigid core $\tau_{c,r}$ of the Earth and on the Earth as a whole. We have presented in Section 3 the convincing evidence of the cosmic-terrestrial energy gravitational genesis of the strongest (during the range 1900 ÷ 2024 AD) earthquakes of the Earth and the strongest Chinese earthquakes (according to the U.S. Geological Survey) occurred in agreement with the established first strong cosmic-terrestrial tendency (characterized by the necessary conditions 1.1 and 1.2) and in agreement with the second strong cosmic-terrestrial tendency (characte-

rized by the necessary conditions 2.1 and 2.2).

Taking into account the calculated forthcoming date

$t_*(\tau_{c,r}, 2024) = 2024.88333333$ AD corresponding to the local minimum of the combined planetary and solar integral energy gravitational influences (2) on the internal rigid core $\tau_{c,r}$ of the Earth (and on the Earth as a whole), we concluded (as the conclusion No. 3 of the made presentation on the 14th International Conference on Geology and Geophysics) that the necessary condition 2.2 will be perfectly satisfied in 2024 AD for the range (from October 18, 2024 AD to December 31, 2024 AD) of the dates $t_e(2024, \text{loc. min.})$ of the possible (but not obligatory) strongest earthquakes of the Earth. The necessary condition 2.2 will be perfectly satisfied in 2025 AD for the range (from January 1, 2025 AD to April 1, 2025 AD) of the dates $t_e(2025, \text{loc. min.})$ of the possible (but not obligatory) strongest earthquakes of the Earth.

To obtain the more good agreement between the dates $t_e(i, \text{loc. max.})$ and $t_e(i, \text{loc. min.})$ (of the strongest earthquakes of the Earth) and the calculated dates $t^*(\tau_{c,r}, i)$ and $t_*(\tau_{c,r}, i)$ (of the local maximal and the local minimal, respectively, combined planetary and solar integral energy gravitational influences (1) and (2), respectively, on the internal rigid core $\tau_{c,r}$ of the Earth) and to develop the short-term thermohydrogravidynamic technology (Simonenko, 2023), we projected the first real perspective (as the conclusion No. 4.1 of the made presentation on the 14th International Conference on Geology and Geophysics) to take into account (for calculations of the dates $t^*(\tau_{c,r}, i)$ and $t_*(\tau_{c,r}, i)$ according to the global prediction thermohydrogravidynamic principles (1) and (2)) the developed thermohydrogravidynamic models (Simonenko, 2012, 2013, 2014) for the real elliptical orbits of the planets (of the Solar System) around the Sun. We projected the second real perspective (as the conclusion No. 4.2) to take into account (for calculations of the dates $t^*(\tau_{c,r}, i)$ and $t_*(\tau_{c,r}, i)$) the established (Simonenko, 2012, 2013) lunar integral energy gravitational influences on the internal rigid core $\tau_{c,r}$ of the Earth.

We stated (as the conclusion No. 4.3 of the presentation made on the 14th International Conference on Geology and Geophysics) about the real possibility to realize the first and second projected perspectives for improvements of the established necessary (but not sufficient) conditions 1.1, 1.2, 2.1 and 2.2 to obtain the necessary and sufficient conditions (needed for the possible prediction of the strongest earthquakes of the Earth).

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Conflicts of Interest

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