The Confirmed Validity of the Explanatory Aspect of the Thermohydrogravidynamic Theory Concerning the Evaluated Maximal Magnitude of the Strongest Earthquake during the Considered Intensification of the Global Natural Processes from December 7, 2019 to April 18, 2020 AD

Sergey V. Simonenko

V.I. Il'ichev Pacific Oceanological Institute, Far Eastern Branch of Russian Academy of Sciences, Vladivostok, Russia
Email: sergeysimonenko@mail.ru

Abstract

We present the confirmed validity of the significant explanatory aspect of the thermohydrogravidynamic theory (Simonenko, 2007, 2009, 2012-2020) concerning the evaluated (on April 7, 2021, especially for the presentation on the 11th International Conference on Geology and Geophysics) maximal magnitude 7.725 of the possible most strongest earthquake during the considered (Simonenko, 2020) intensification of the global natural processes of the Earth from December 7, 2019 to April 18, 2020 AD. To obtain the satisfactory explanation of the maximal magnitude M = 7.7 (according to the U.S. Geological Survey) of the strongest earthquake occurred on January 28, 2020 AD (123 km NNW of Lucea, Jamaica) near the calculated (Simonenko, 2020) mean date (February 5, 2020 AD) of the probable most strongest earthquake during the considered (Simonenko, 2020) range from December 7, 2019 to April 18, 2020 AD, we have analyzed the strongest earthquakes of the Earth occurred near the calculated local maximal combined (planetary and solar) integral energy gravitational influences on the internal rigid core of the Earth.

Keywords

Thermohydrogravidynamic Theory, Non-Stationary Cosmic Gravitation, Generalized First Law of Thermodynamics, Cosmic Geology, Cosmic

Geophysics, Cosmic Seismology, Global Seismotectonic, Volcanic, Climatic and Magnetic Processes

1. Introduction

The problem of the long-term predictions of the strong earthquakes (Richter, 1958) is the significant problem of the modern geophysics (Sgrigna & Conti, 2012). It was confirmed (Tinivella et al., 2013) in the special issue on "Geophysical Methods for Environmental Studies" of the International Journal of Geophysics that the article (Simonenko, 2013) "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" (Tinivella et al., 2013).

Using the evaluated probabilities $\mathrm{Pr}_{\mathrm{cor,i}}$ (given by (37) in (Simonenko, 2020) for i from i = 9 to i = 22), we calculated (on October 6, 2020, especially for the presentation on the 10th International Conference on Geology and Geophysics) the mean (defined statistically) theoretical date
$\overline{t}(2019, 2020) = 2020.0995139 =$ February 5, 2020 AD of the probable most strongest earthquake during the considered (Simonenko, 2019b, 2020) range from December 7, 2019 to April 18, 2020. We obtained (Simonenko, 2020) the reasonably small difference of 8 days between the calculated theoretical date (February 5, 2020 AD) and the real date (January 28, 2020 AD) of the most strongest (from December 7, 2019 to April 18, 2020) earthquake (characterized by the maximal magnitude M = 7.7) of the Earth occurred 123 km NNW of Lucea, Jamaica (according to the U.S. Geological Survey) during the considered (Simonenko, 2019b, 2020) range from December 7, 2019 to April 18, 2020 AD. The main aim of this article is to present (in accordance with the author's presentation on the 11th International Conference on Geology and Geophysics) the reasonable explanation (in the frame of the thermohydrogravidynamic theory (Simonenko, 2007, 2009, 2012-2020)) of the maximal magnitude M = 7.7 of the most strongest (from December 7, 2019 to April 18, 2020 AD) earthquake of the Earth occurred on January 28, 2020 AD (according to the U.S. Geological Survey) during the considered (Simonenko, 2019b, 2020) range from December 7, 2019 to April 18, 2020 AD.

In Section 2 we present the fundamentals of the thermohydrogravidynamic technology for evaluation of the maximal magnitude of the strongest earthquake of the Earth during the considered (Simonenko, 2019b, 2020) intensification of the global natural processes of the Earth from December 7, 2019 to April 18, 2020 AD. In Section 2.1 we present the established (Simonenko, 2006, 2007a, 2007b) generalized differential formulation (1) of the first law of thermodynamics. In Section 2.2 we present the established (Simonenko, 2012, 2014) global prediction thermohydrogravidynamic principles (6) and (7) determining the maximal temporal intensifications of the global and regional natural (seismo-

tectonic, volcanic, climatic and magnetic) processes of the Earth.

In Section 3 we present the explanation of the maximal magnitude M = 7.7 (according to the U.S. Geological Survey) of the strongest earthquake of the Earth occurred on January 28, 2020 AD during the considered (Simonenko, 2019b, 2020) range from December 7, 2019 to April 18, 2020 AD.

In Section 4 we present the main results and conclusions.

2. Fundamentals of the Thermohydrogravidynamic Technology for Evaluation of the Maximal Magnitude of the Strongest Earthquake of the Earth during the Considered Intensification of the Global Natural Processes of the Earth

2.1. The Generalized Differential Formulation of the First Law of Thermodynamics for Non-Stationary Newtonian Gravitation

The thermohydrogravidynamic technology of evaluation of the maximal magnitude of the strongest earthquake of the Earth (during the considered (Simonenko, 2019b, 2020) intensification of the global natural processes from December 7, 2019 to April 18, 2020 AD) is based on the established (Simonenko, 2006, 2007a, 2007b) generalized differential formulation of the first law of thermodynamics (for an individual finite continuum region τ subjected to the non-stationary Newtonian gravitation and to non-potential terrestrial stress forces characterized by the symmetric stress tensor $\mathbf{T}$):

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

where dU_τ is the differential change of the classical (De Groot and Mazur, 1962) microscopic internal thermal energy, dK_τ is the differential change of the established (Simonenko, 2004, 2006, 2007a, 2007b) instantaneous macroscopic kinetic energy, $d\pi_\tau$ is the established (Simonenko, 2006, 2007a, 2007b) differential change of the macroscopic potential gravitational energy related with the non-stationary total potential ψ of the gravitational field characterized by the local gravity acceleration $\mathbf{g} = -\nabla\psi$, δQ is the classical (De Groot and Mazur, 1962) differential change of heat related with the thermal molecular conductivity of heat across the boundary surface $\partial\tau$ of the individual finite continuum region τ, $\delta A_{np,\partial\tau}$ is the established (Simonenko, 2006, 2007a, 2007b) generalized differential work done by non-potential stress forces acting on the boundary surface $\partial\tau$ of the individual finite continuum region τ. We established (Simonenko, 2007a, 2007b) the significant differential energy gravitational influence

$$dG = dt \iiint_\tau \frac{\partial\psi}{\partial t}\rho dV \tag{2}$$

on the individual finite continuum region τ during the infinitesimal time interval dt, where ρ is the local mass density, dV is the differential of physical volume, $\dfrac{\partial\psi}{\partial t}$ is the partial time derivative of the gravitational potential ψ. The

generalized differential formulation (1) (Simonenko, 2006, 2007a) generalizes the classical (Gibbs, 1873; Landau and Lifshitz, 1976) formulations

$$dU = \delta Q - pdV, \quad d\varepsilon \equiv dU, \quad -\delta W = -pdV \tag{3}$$

by taking into account the established (Simonenko, 2006, 2007a, 2007b) infinitesimal increment dK_τ of the macroscopic kinetic energy K_τ, the established (Simonenko, 2006, 2007a, 2007b) infinitesimal increment $d\pi_\tau$ of the gravitational potential energy π_τ, the established (Simonenko, 2006, 2007a, 2007b) generalized infinitesimal work $\delta A_{np,\partial\tau}$ done on the individual finite continuum region τ by the surroundings of τ, and the established (Simonenko, 2007a, 2007b, 2012, 2014) differential energy gravitational influence dG on the individual finite continuum region τ as the result of the Newtonian non-stationary gravitation.

Introducing the energy flux $\mathbf{J}_g$ of the gravitational energy (per unit time and per unit area) across the differential surface element $d\Omega_{\mathbf{n}}$ characterized by the external normal unit vector $\mathbf{n}$, the relation for dG can be rewritten as follows (Simonenko, 2012, 2014)

$$dG = dt \iiint_\tau \frac{\partial \psi}{\partial t} \rho dV = -dt \iint_{\partial\tau} \left(\mathbf{J}_g \cdot \mathbf{n} \right) d\Omega_{\mathbf{n}}, \tag{4}$$

where the flux $\mathbf{J}_g$ of the gravitational energy is determined by the relation (Simonenko, 2012, 2014):

$$\rho \frac{\partial \psi}{\partial t} = -\text{div} \, \mathbf{J}_g. \tag{5}$$

2.2. The Global Prediction Thermohydrogravidynamic Principles Determining the Maximal Temporal Intensifications of the Global Natural Processes of the Earth

The rigorous global prediction thermohydrogravidynamic principles are formulated (for the internal rigid core $\tau_{c,r}$ of the Earth) based on the term (2) of the generalized differential formulation (1) of the first law of thermodynamics (Simonenko, 2007a, 2007b) as follows (Simonenko, 2012, 2014, 2016, 2018, 2019a, 2020):

$$\begin{aligned} &\Delta G(\tau_{c,r}, t^*(\tau_{c,r})) \\ &= \max_t \int_{t_0}^t dt' \iiint_{\tau_{c,r}} \frac{\partial \psi_{comb}}{\partial t'} \rho_{c,r} dV \quad -\text{local maximum for time moment } t^*(\tau_{c,r}), \end{aligned} \tag{6}$$

and

$$\begin{aligned} &\Delta G(\tau_{c,r}, t_*(\tau_{c,r})) \\ &= \min_t \int_{t_0}^t dt' \iiint_{\tau_{c,r}} \frac{\partial \psi_{comb}}{\partial t'} \rho_{c,r} dV \quad -\text{local minimum for time moment } t_*(\tau_{c,r}), \end{aligned} \tag{7}$$

where $\rho_{c,r}$ is the mass density of the internal rigid core $\tau_{c,r}$, $\psi_{comb} \equiv \psi_{comb}(\tau_{c,r}, t)$ is the combined cosmic (planetary and solar) gravitational potential in the internal rigid core $\tau_{c,r}$ of the Earth, $\partial\psi_{comb}/\partial t \equiv \partial\psi_{comb}(\tau_{c,r}, t)/\partial t$ is the partial

time derivative of the combined cosmic gravitational potential $\psi_{comb}(\tau_{c,r}, t)$. The partial time derivative (of the combined cosmic gravitational potential $\psi_{comb}(\tau_{c,r}, t)$) is approximated as follows

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

where $\partial \psi_{3i}(C_3, t)/\partial t$ is the established partial time derivative (Simonenko, 2007, 2009, 2012, 2013) of the gravitational potential $\psi_{3i}(C_3, t)$ created (at the mass center C_3 of the Earth) by the significant planet τ_i (i = 1 corresponds to Mercury, i = 2 corresponds to Venus, i = 4 corresponds to Mars and i = 5 corresponds to Jupiter); $\partial \psi_{3j}^{S}(C_3, t)/\partial t$ is the established (Simonenko, 2012, 2019a) partial time derivative of the gravitational potential $\psi_{3j}^{S}(C_3, t)$ created (at the mass center C_3 of the Earth) by the Sun due to the gravitational interaction of the Sun with the outer large planet τ_j (j = 5 corresponds to Jupiter, j = 6 corresponds to Saturn, j = 7 corresponds to Uranus) and j = 8 corresponds to Neptune).

3. Results and Discussions

We present in this Section 3 the thermohydrogravidynamic explanation of the maximal magnitude M = 7.7 (according to the U.S. Geological Survey) of the strongest earthquake of the Earth occurred on January 28, 2020 AD near the calculated (Simonenko, 2020) mean date (February 5, 2020 AD) of the probable most strongest earthquake during the considered (Simonenko, 2019b, 2020) range

$$\text{from December 7, 2019 to April 18, 2020 AD} \tag{9}$$

near the calculated (Simonenko, 2019b, 2020) date (corresponding approximately to January 6, 2020):

$$t^{*}(\tau_{c,r}, 2020) = 2020.01666\ 6667\ \text{AD} \tag{10}$$

related with the maximal combined planetary and solar integral energy gravitational influence (6) on the internal rigid core $\tau_{c,r}$ of the Earth. This thermohydrogravidynamic explanation is made by means of evaluation of the range

$$7.6593 \div 7.7908 \tag{11}$$

of the maximal magnitude of the possible most strongest earthquake of the Earth during the considered (Simonenko, 2019b, 2020) range (9) of intensification of the global natural processes of the Earth. Based on the thermohydrogravidynamic theory, we consider the Earth subjected to the combined planetary (Simonenko, 2007b, 2009, 2010, 2012, 2013, 2014, 2015, 2016, 2019a, 2019b, 2019c) and solar (Simonenko, 2012, 2014, 2015, 2016, 2019a, 2019b, 2019c, 2020) non-stationary cosmic energy gravitational influences owing to the gravitational interaction of the Sun with Jupiter, Saturn, Uranus and Neptune. We have analyzed the strongest earthquakes (presented in **Table 1**) of the Earth occurred near the dates $t^{*}(\tau_{c,r}, i)$ (corresponding to the years i = 1964 AD, 2011 AD,

Table 1. The analysis of the previous strongest earthquakes (according to the U.S. Geological Survey) of the Earth occurred on dates $t_e(i)$ near the calculated dates $t^*(\tau_{c,r}, i)$ (corresponding to the years i = 1964 AD, 2011 AD, 2010 AD, 2012 AD, 1938 AD, 1922 AD and 2001 AD) of the local maximal values of the calculated combined planetary and solar integral energy gravitational influences (6) on the internal rigid core $\tau_{c,r}$ of the Earth.

Year i	Date $t_e(i)$ of strongest earthquake	Magnitude $M_{up}(i, \text{loc. max.})$ of strongest earthquake	Region of strongest earthquake	$\Delta(i) = \lvert t_e(i) - t^*(\tau_{c,r}, i) \rvert$, in days
1964 AD	1964-03-28	9.2	Southern Alaska	15.48 days before the date $t^*(\tau_{c,r}, 1964) = 1964.283333333$ AD
2011AD	March 11, 2011	9.0	near the east coast of Honshu, Japan	27.39 days before the date $t^*(\tau_{c,r}, 2011) = 2011.2666666666$ AD
2010 AD	February 27, 2010	8.8	offshore Bio-Bio, Chile	2.87 days before the date $t^*(\tau_{c,r}, 2010) = 2010.1666666666$ AD
2012 AD	April 11, 2012	8.6	off the west coast of northern Sumatra	31.92 days before the date $t^*(\tau_{c,r}, 2012) = 2012.366666666$ AD
1938 AD	1938-02-01	8.5	Banda Sea	16.69 days before the date $t^*(\tau_{c,r}, 1938) = 1938.133333333$ AD
1922 AD	1922-11-11	8.5	Atacama, Chile	22.8 days after the date $t^*(\tau_{c,r}, 1922) = 1922.8$ AD
2001 AD	2001-06-23	8.4	near the coast of southern Peru	15.72 days after the date $t^*(\tau_{c,r}, 2001) = 2001.433333333$ AD

2010 AD, 2012 AD, 1938 AD, 1922 AD and 2001 AD) of the local maximal values of the calculated combined planetary and solar integral energy gravitational influences (6) on the internal rigid core $\tau_{c,r}$ of the Earth. These strongest earthquakes (presented in **Table 1**) occurred on the presented (in **Table 1**) dates $t_e(i)$ (according to the U.S. Geological Survey) are characterized by the corresponding (presented in **Table 1**) magnitudes $M_{up}(i, \text{loc. max.})$ and the corresponding (presented in **Table 1**) regions of earthquakes. We see the unquestionable fact that the strongest earthquakes (characterized by the magnitudes $M_{up}(i, \text{loc. max.}) \geq 8.4$) of the Earth are characterized by the sufficiently small differences $\Delta(i)$ between the dates $t_e(i)$ (of the strongest earthquakes occurred in years i) and the dates $t^*(\tau_{c,r}, i)$ (corresponding to the years i) of the local maximal values of the calculated combined planetary and solar integral energy gravitational influences (6) on the internal rigid core $\tau_{c,r}$ of the Earth. This unquestionable fact shows that we can use the global prediction thermohydrogravidynamic principle (6) for the reliable predictions of the strongest earthquakes (characterized by the large magnitudes $M_{up}(i, \text{loc. max.}) \geq 8.4$) of the Earth near the evaluated dates $t^*(\tau_{c,r}, i)$.

The strongest earthquakes (of the Earth occurred near the local maximal values of the calculated combined planetary and solar integral energy gravitational influences (6) on the internal rigid core $\tau_{c,r}$ of the Earth) occurred in the range from 1980 AD and before 1994 AD (of the weakened seismic activity of the Earth) are analyzed additionally.

The strongest earthquakes (occurred near the local maximal combined planetary and solar integral energy gravitational influences (6) on the internal rigid core $\tau_{c,r}$ of the Earth) are considered and analyzed on the two-dimensional plane

$$(M_{up}(i, \text{loc. max.}), \Delta_{g,S,P}(i)\sin\varphi(i)), \tag{12}$$

where $M_{up}(i, \text{loc. max.})$ is the maximal (for the year i) magnitude of the strongest earthquake occurred on the date $t_e(i)$ near the local maximal combined planetary and solar integral energy gravitational influence (6) (for the year i) on the internal rigid core $\tau_{c,r}$ of the Earth,

$$\Delta_{g,S,P}(i) = \frac{\Delta G(\tau_{c,r}, t^*(\tau_{c,r}, i)) - \Delta G(\tau_{c,r}, t_*(\tau_{c,r}, i))}{\Delta_g E(\tau_{c,r}, \tau_1)}, \tag{13}$$

is the normalized dimensionless numerical function (based on the global prediction thermohydrogravidynamic principles (6) and (7)) calculated (for the corresponding year i related with the date $t_e(i)$ of the occurred strongest earthquake) based on the local maximal value

$$\Delta G(\tau_{c,r}, t^*(\tau_{c,r}, i)) = \int_{t_0}^{t^*(\tau_{c,r}, i)} dt' \iiint_{\tau_{c,r}} \frac{\partial \psi_{comb}}{\partial t'} \rho_{c,r} dV \tag{14}$$

and based on the local minimal value

$$\Delta G(\tau_{c,r}, t_*(\tau_{c,r}, i)) = \int_{t_0}^{t_*(\tau_{c,r}, i)} dt' \iiint_{\tau_{c,r}} \frac{\partial \psi_{comb}}{\partial t'} \rho_{c,r} dV \tag{15}$$

of the combined planetary and solar integral energy gravitational influences (for the year i) on the internal rigid core $\tau_{c,r}$ of the Earth. The angles (characterizing the displacement of the internal rigid core $\tau_{c,r}$ relative to the Earth's axis Ω of rotation) $\varphi(i)$ (related with the strongest earthquake occurred on the date $t_e(i)$) are calculated (for application in (12)) based on the condition of the equal angle deviations of the Earth and Jupiter from the straight line Earth – Sun – Jupiter.

The expression $\Delta_g E(\tau_{c,r}, \tau_1)$ of the maximal integral energy gravitational influence of the Mercury on the internal rigid core $\tau_{c,r}$ of the Earth:

$$\Delta_g E(\tau_{c,r}, \tau_1) = 2\gamma M_{c,r} M_1 \frac{R_{O1} T_3}{(R_{O3}^2 - R_{O1}^2)(T_3 - T_1)} \tag{16}$$

is used in relation (13) for $\Delta_{g,S,P}(i)$ as a measuring unit for normalization of the combined planetary and solar integral energy gravitational influence (for the year i) on the internal rigid core $\tau_{c,r}$ of the Earth. Here γ is the gravitational constant, $M_{c,r}$ is the mass of the internal rigid core $\tau_{c,r}$ of the Earth, M_1 is the mass of 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 Mercury around the Sun.

We have established that the dimensionless determinant range (defined by

(13))

$$\Delta_{g,S,P}(i)\sin\varphi(i) = 2000 \div 2600, \tag{17}$$

includes only 3 (from the all analyzed strongest earthquakes) strongest earthquakes (occurred near the local maximal combined planetary and solar integral energy gravitational influences (6) on the internal rigid core $\tau_{c,r}$ of the Earth) occurred on the following dates (characterized by the indicated maximal magnitudes and regions of the strongest earthquakes):

1) $t_e(1994) = 1994\text{-}10\text{-}04$ ($M_{up}(1994, \text{loc. max.}) = 8.3$, Kuril Islands), (18)

2) $t_e(1984) = 1984\text{-}02\text{-}07$ ($M_{up}(1984, \text{loc. max.}) = 7.6$, Solomon Islands), (19)

3) $t_e(1992) = 1992\text{-}12\text{-}12$

   ($M_{up}(1992, \text{loc. max.}) = 7.8$, Flores region, Indonesia). (20)

We take into account that the strongest earthquake (during the considered (Simonenko, 2019b, 2020) range (9)) occurred (according to the U.S. Geological Survey) on

$$t_e(2020) = \text{January } 28, 2020 \text{ AD}. \tag{21}$$

This date (21) corresponds to the calculated determinant value

$$\Delta_{g,S,P}(2020)\sin\varphi(\text{January } 28, 2020) = 2220.3855, \tag{22}$$

based on the corresponding calculated values

$$\Delta_{g,S,P}(2020) = 5097.9445, \tag{23}$$

$$\sin\varphi(\text{January } 28, 2020) = \sin 25.82° = 0.43554526. \tag{24}$$

The calculated determinant value (22) belongs to the range of the determinant values (17), which contains only three corresponding calculated determinant values (corresponding to the considered above three strongest earthquakes):

$$\Delta_{g,S,P}(1994)\sin\varphi(1994\text{-}10\text{-}04) = 2506.1754 \text{ for } t_e(1994), \tag{25}$$

$$\Delta_{g,S,P}(1984)\sin\varphi(1984\text{-}02\text{-}07) = 2113.2566 \text{ for } t_e(1984), \tag{26}$$

$$\Delta_{g,S,P}(1992)\sin\varphi(1992\text{-}12\text{-}12) = 2474.3391 \text{ for } t_e(1992). \tag{27}$$

Based on the first combination of strongest (second and third) earthquakes and using the real maximal magnitudes of these strongest earthquakes:

$$M_{up}(1984, \text{loc. max.}) = 7.6, M_{up}(1992, \text{loc. max.}) = 7.8, \tag{28}$$

and the corresponding calculated (in the first approximation of the circular orbits of the planets) determinant values (26) and (27) based on the corresponding calculated values:

$$\Delta_{g,S,P}(1984) = 5094.6407, \tag{29}$$

$$\sin\varphi(1984\text{-}02\text{-}07) = \sin 24.51° = 0.41485199, \tag{30}$$

$$\Delta_{g,S,P}(1992) = 3296.0997, \tag{31}$$

$$\sin\varphi(1992\text{-}12\text{-}12) = \sin 48.65° = 0.7506877, \tag{32}$$

we have evaluated (based on the linear interpolation) the first maximal magnitude $M_{up}(2020, loc.\ max., 1)$ corresponding to the calculated determinant value (22):

$$M_{up}(2020, loc.\ max., 1) = M_{up}(1984, loc.\ max.)$$
$$+ \frac{\left(M_{up}(1992, loc.\ max.) - M_{up}(1984, loc.\ max.)\right)}{\left(\Delta_{g,S,P}(1992)\sin\varphi(1992\text{-}12\text{-}12) - \Delta_{g,S,P}(1984)\sin\varphi(1984\text{-}02\text{-}07)\right)}$$
$$\times \left(\Delta_{g,S,P}(2020)\sin\varphi(2020\text{-}01\text{-}28) - \Delta_{g,S,P}(1984)\sin\varphi(1984\text{-}02\text{-}07)\right) \quad (33)$$
$$= 7.6 + \frac{(7.8 - 7.6)(2220.3855 - 2113.2566)}{(2474.3391 - 2113.2566)} = 7.6593$$

of the probable most strongest earthquake during the considered (Simonenko, 2019b, 2020) range (9).

Based on the second combination of strongest (second and first) earthquakes and using the real maximal magnitudes of these strongest earthquakes

$$M_{up}(1984, loc.\ max.) = 7.6, \quad M_{up}(1994, loc.\ max.) = 8.3, \quad (34)$$

the calculated determinant value (26) and the corresponding calculated (in the first approximation of the circular orbits of the planets) determinant value (25) based on the corresponding calculated values:

$$\Delta_{g,S,P}(1994) = 3882.7923, \quad (35)$$

$$\sin\varphi(1994\text{-}10\text{-}04) = \sin 40.2° = 0.645457, \quad (36)$$

we have evaluated (based on the linear interpolation) the second maximal magnitude $M_{up}(2020, loc.\ max., 2)$ corresponding to the calculated determinant value (22):

$$M_{up}(2020, loc.\ max., 2) = M_{up}(1984, loc.\ max.)$$
$$+ \frac{\left(M_{up}(1994, loc.\ max.) - M_{up}(1984, loc.\ max.)\right)}{\left(\Delta_{g,S,P}(1994)\sin\varphi(1994\text{-}10\text{-}04) - \Delta_{g,S,P}(1984)\sin\varphi(1984\text{-}02\text{-}07)\right)}$$
$$\times \left(\Delta_{g,S,P}(2020)\sin\varphi(2020\text{-}01\text{-}28) - \Delta_{g,S,P}(1984)\sin\varphi(1984\text{-}02\text{-}07)\right) \quad (37)$$
$$= 7.6 + \frac{(8.3 - 7.6)(2220.3855 - 2113.2566)}{(2506.1754 - 2113.2566)} = 7.7908$$

of the probable most strongest earthquake of the Earth during the considered (Simonenko, 2019b, 2020) range (9).

The explained evaluated narrow range (11) of the maximal magnitudes of the probable most strongest earthquake during the considered (Simonenko, 2019b, 2020) range (9):

$$M_{up}(2020, loc.\ max., 1) \div M_{up}(2020, loc.\ max., 2) = 7.6593 \div 7.7908 \quad (38)$$

includes the maximal magnitude M = 7.7 (according to the U.S. Geological Survey) of the strongest earthquake of the Earth occurred on January 28, 2020 AD near the calculated (Simonenko, 2020) mean date (February 5, 2020 AD) of the probable most strongest earthquake occurred during the considered (Simonenko, 2019b, 2020) range (9). The mean maximal magnitude

M_{up} (2020, loc. max.) = 7.725 (of the obtained first and second maximal magnitudes 7.6593 and 7.7908) is in good agreement with the maximal magnitude M = 7.7 (according to the U.S. Geological Survey) of the strongest earthquake of the Earth occurred on January 28, 2020 AD near the calculated (Simonenko, 2020) mean date (February 5, 2020 AD) of the probable most strongest earthquake occurred during the considered (Simonenko, 2019b, 2020) range (9).

It is evident that this good agreement between the real magnitude M = 7.7 (of the strongest earthquake occurred on January 28, 2020 AD during the considered (Simonenko, 2019b, 2020) range (9)) and evaluated mean maximal magnitude (39) (of the probable most strongest earthquake during the considered (Simonenko, 2019b, 2020) range (9)) means that the applied thermohydrogravidynamic theory describes reasonably the global energetics the internal rigid core $\tau_{c,r}$ of the Earth related with the established (Simonenko, 2012, 2014) flux $\mathbf{J}_g$ (determined by the relation (5)) of the combined (planetary and solar) radiated gravitational energy.

4. Conclusion

We concluded (on April 30, 2021) that this good agreement between the real magnitude M = 7.7 (of the strongest earthquake occurred on January 28, 2020 AD during the considered (Simonenko, 2019b, 2020) range (9)) and evaluated mean maximal magnitude (39) (of the probable most strongest earthquake during the considered (Simonenko, 2019b, 2020) range (9)) means that the magnitudes of the strongest earthquake of the Earth (occurred near the calculated maximal combined planetary and solar integral energy gravitational influences (6) on the internal rigid core $\tau_{c,r}$ of the Earth) are theoretically explainable and consequently are predictable (in advance) based on the presented thermohydrogravidynamic technology.

Based on the presented theoretical thermohydrogravidynamic theory, it is possible to expand the developed thermohydrogravidynamic technology (of evaluation of the maximal magnitudes of the strongest earthquakes occurred near the maximal combined planetary and solar integral energy gravitational influences (6) on the internal rigid core $\tau_{c,r}$ of the Earth) for evaluation of the maximal magnitude of the strongest earthquake of the Earth occurred near the calculated (Simonenko, 2019a) forthcoming date $t_*(\tau_{c,r}, 2021) = 2021.65$ AD (corresponding to July 26, 2021 AD, which belongs to the forthcoming range from July 23, 2021 AD to August 8, 2021 AD of the forthcoming Olympic games in Japan) of the minimal combined planetary and solar integral energy gravitational influence (7) on the internal rigid core $\tau_{c,r}$ of the Earth.

The developed thermohydrogravidynamic technology can be used for evaluation of the maximal magnitude of the strongest earthquake of the Earth near the calculated (on April 30, 2021) forthcoming date $t^*(\tau_{c,r}, 2022) = 2022.18333333$ AD (given in the author's presentation on the 11th International Conference on Geology and Geophysics) related with the maximal combined planetary and solar integral energy gravitational influence (6) on the internal rigid core $\tau_{c,r}$ of the

Earth.

The developed thermohydrogravidynamic technology can be used (by the participants of the 11th International Conference on Geology and Geophysics) for evaluation of the maximal magnitudes of the strongest earthquakes near the calculated (on April 30, 2021) forthcoming date $t^*(\tau_{c,r}, 2022) = 2022.18333333$ AD for Japan, Italy, Greece, China, Chile and USA (especially, for California (Simonenko, 2019c)), for which we have established previously (Simonenko, 2018, 2019c) the confirmed cosmic energy gravitational genesis of the strongest earthquakes.

Based on the analysis (presented in **Table 1**) of the previous strongest earthquakes (according to the U.S. Geological Survey), we conclude that if the magnitude $M_{up}(2022, \text{loc. max.})$ of the strongest earthquake of the Earth (which will occur on date $t_e(2022)$ near the calculated forthcoming date $t^*(\tau_{c,r}, 2022) = 2022.18333333$ AD) will be larger than 8.4, then this strongest earthquake of the Earth will occur (according to **Table 1**) during the sufficiently small range $\left| t_e(2022) - t^*(\tau_{c,r}, 2022) \right| \leq 31.92$ days .

Acknowledgements

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

References

De Groot, S. R., & Mazur, P. (1962). *Non-Equilibrium Thermodynamics* (1st ed.). Amsterdam, Holland: North-Holland Publishing Company.

Gibbs, J. W. (1873). Graphical Methods in the Thermodynamics of Fluids. *Transactions of the Connecticut Academy*, *2*, 309-342.

Landau, L. D., & Lifshitz, E. M. (1976). *Theoretical Physics* (Vol. 5). *Statistical Physics* (3rd ed.). Moscow, Russia: Nauka. (In Russian)

Richter, C. F. (1958). *Elementary Seismology*. San Francisco, USA: W.H. Freeman.

Sgrigna, V., & Conti, L. (2012). A Deterministic Approach to Earthquake Prediction. *International Journal of Geophysics*, *406278*, 1-20. https://doi.org/10.1155/2012/406278

Simonenko, S. V. (2004). The Macroscopic Non-Equilibrium Kinetic Energies of a Small Fluid Particle. *Journal of Non-Equilibrium Thermodynamics*, *29*, 107-123. https://doi.org/10.1515/JNETDY.2004.007

Simonenko, S. V. (2006). *Non-Equilibrium Statistical Thermohydrodynamics of Turbulence* (1st ed.). Moscow, Russia: Nauka.

Simonenko, S. V. (2007a). Statistical Thermohydrodynamics of Irreversible Strike-Slip-Rotational Processes. In E.E. Milanovsky and A.V. Vikulin (Eds.), *Rotational Processes*

*in Geology and Physics (*pp. 225-251). Moscow, Russia: KomKniga. (In Russian)

Simonenko, S. V. (2007b). *Thermohydrogravidynamics of the Solar System* (1st ed.). Nakhodka, Russia: Institute of Technology and Business Press.

Simonenko, S. V. (2009). *Fundamentals of the Thermohydrogravidynamic Theory of Cosmic Genesis of the Planetary Cataclysms* (1st ed.). Nakhodka, Russia: Institute of Technology and Business Press.

Simonenko, S. V. (2010). *Fundamentals of the Thermohydrogravidynamic Theory of Cosmic Genesis of the Planetary Cataclysms* (2nd ed.). Nakhodka, Russia: Institute of Technology and Business Press.

Simonenko, S. V. (2012). *The Cosmic Energy Gravitational Genesis of the Increase of the Seismic and Volcanic Activity of the Earth in the Beginning of the 21st Century AD* (1st ed.). Nakhodka, Russia: Institute of Technology and Business Press.

Simonenko, S. V. (2013). Fundamentals of the Thermohydrogravidynamic Theory of the Global Seismotectonic activity of the Earth. *International Journal of Geophysics*, 1-39. https://doi.org/10.1155/2013/519829

Simonenko, S. V. (2014). The Prognosticating Aspects of the Developed Cosmic Geophysics Concerning the Subsequent Forthcoming Intensifications of the Global Seismicity, Volcanic and Climatic Activity of the Earth in the 21st Century. *British Journal of Applied Science & Technology*, *4*, 3563-3630. https://doi.org/10.9734/BJAST/2014/10766

Simonenko, S. V. (2015). The Cosmic Energy Gravitational Genesis of the Forthcoming Intensifications of the Global Seismotectonic, Volcanic, Climatic and Magnetic Activities Since 2016 AD. *American Journal of Earth Sciences*, *2*, 211-229.

Simonenko, S. V. (2016). The Confirmed Validity of the Thermohydrogravidynamic Theory Concerning the Strongest Intensifications of the Global Natural Processes of the Earth in 2016 since 1 September, 2016. *British Journal of Applied Science & Technology*, *18*, 1-20. http://www.sciencedomain.org/abstract/17601 https://doi.org/10.9734/BJAST/2016/30049

Simonenko, S. V. (2018). The Confirmed Cosmic Energy Gravitational Genesis of the Strongest Japanese, Italian, Greek, Chinese and Chilean Earthquakes. *Energy Research*, *2*, 1-32. https://doi.org/10.31058/j.er.2018.22006

Simonenko, S. V. (2019a). The Thermohydrogravidynamic Theory Concerning the First Forthcoming Subrange 2020 ÷ 2026 AD of the Increased Intensification of the Earth. *New Horizons in Mathematical Physics*, *3*, 13-52. https://doi.org/10.22606/nhmp.2019.32001

Simonenko, S. V. (2019b). The Thermohydrogravidynamic Theory Concerning the Forthcoming Intensification of the Global Natural Processes from December 7, 2019 to April 18, 2020 AD. The Unpublished Article Submitted to *Energy Research* on December 9, 2019. https://www.researchgate.net/publication/345359738_SVSimonenko_to_ER_in_ITS_Manuscript_Template https://doi.org/10.4236/gep.2020.810022

Simonenko, S. V. (2019c). An Update of the Global Prediction of Thermohydrogravidynamic Principle Concerning the Strongest Intensifications of the Seismotectonic Processes: Special Reference to California. *Ambient Science*, *6*, 50-54. https://caves.res.in/journal/articles/Amb_Sci_06(1)_Aa02.pdf https://doi.org/10.21276/ambi.2019.06.1.aa02

Simonenko, S. V. (2020). The Confirmed Validity of the Thermohydrogravidynamic Theory Concerning the Forthcoming Intensification of the Global Natural Processes from December 7, 2019 to April 18, 2020 AD. *Journal of Geoscience and Environment Protec-*

tion, 8, 351-367. https://doi.org/10.4236/gep.2020.810022

Tinivella, U., Giustiniani, M., & Cassiani, G. (2013). Geophysical Methods for Environmental Studies. *International Journal of Geophysics, 2013*, Article ID: 950353, 2 pages. https://doi.org/10.1155/2013/950353