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RESEARCH ARTICLE

Earthquake and Weather Forecasts are Like Mirages in the Desert?

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ABSTRACT

In an attempt to minimize human and financial losses to address the issue of forecasting climate and seismic threats, advanced countries are spending enormous economic resources, which tend to increase annually. For example, in 2025, the National Oceanic and Atmospheric Administration alone received 6.1 billion dollars for weather forecasting. Against this background, some scientific organizations, groups of scientists, and businessmen took advantage of the current economic environment and made forecasting weather and earthquakes their profitable business. Demand creates supply, and a commercial approach in this direction is quite logical and dictated by economic axioms. Nevertheless, we believe that before paying taxpayers' money to private companies to pay for weather and earthquake forecasts, we need to make sure that such orders can be scientifically implemented in order to exclude payment for dubious forecasts made not on the basis of fundamental and applied sciences, but on Tarot cards or fortune-telling on coffee grounds. The importance of a clear answer to the scientific reality of forecasting these events cannot be overestimated, because the quality of life of a huge number of people around the world depends on the possibility or impossibility of weather forecasts and earthquakes. And it depends on an honest answer, free from any commercial verbiage, whether we will remain the playthings of all kinds of natural processes, and by what criteria we will choose a rational direction for investing financial and scientific tools in the fight against unexpected weather disasters and catastrophic earthquakes. This article examines the possibilities to confirm or refute the reality of weather and earthquake forecasting based on the level of scientific development achieved so far in fundamental and applied exact sciences, meteorology, and seismology.

Keywords: weather and earthquake precursors, earthquake, weather, forecast.

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1. Introduction

1.1. Weather forecast

The death of the passenger ship Royal Charter and more than 450 lives off the coast of England during a severe storm in 1859 led to the first warning service for possible stormy weather, and on August 1, 1861, the first ever weather forecast appeared in the Times newspaper. Its author was Robert Fitzroy, who eventually became the first victim of an inaccurate weather forecast. He committed suicide because his weather forecasts were not always accurate. A weather forecast is an assumption about the future state of the weather

at a certain point or region during a certain period of time. It is compiled by meteorological services that collect meteorological, climatological, hydrological, and oceanographic data from several dozen satellites, hundreds of installed buoys, thousands of ships, aircraft, and a huge number of weather stations. With the help of this data, daily weather forecasts are developed, and early warnings of natural disasters are issued. In order to predict the weather, you need to know what the weather conditions are at the moment, and this is one of the most difficult tasks. In the United States, data is sent to ten National Environmental Forecasting Centers, which are part of the National Weather Service. Every day, the NMS receives reports on 192,000 observations from weather stations, 2,700 from ships, 18,000 from meteorological buoys, 250,000 from weather balloons, 115,000 from aircraft, and 140 million from satellites. Weather data is also received from weather services in other countries. But this is not enough, because computer models greatly simplify the real state of affairs in the atmosphere. Most of them track the weather at points located 10-20 km from each other, while weather conditions can vary within just a few kilometers. Weather parameters are entered into a computer, and based on them, a short-term forecast is obtained, which may not come true, and it, in turn, is used to make a medium-term forecast. This is how small errors in the short-term forecast turn into errors in the medium-term forecast, which in turn into significant errors. This is the so-called running error, which gradually increases step by step and reduces the chance of an accurate forecast. That's why meteorologists inevitably make significant mistakes in weather forecasts. Today, scientists process huge packages of meteorological data, but admit that their forecasts cannot be absolutely accurate. Modern short-term forecasts have an accuracy of ~ 94%, which, nevertheless, leads to sad consequences. For example, inaccuracies in weather reports in Russia cost the federal budget 60 billion rubles per year [1], and the annual losses of the United States Freight Forwarders Association are ~ $ 3.5 billion dollars. From 1970 to 2012, 8,835 disasters, 1.94 million deaths, and $2.4 trillion dollars in economic losses related to meteorological disasters were recorded worldwide. Over the past 20 years, the number of climate disaster reports has increased fivefold, and economic losses have increased from 156 billion to 864 billion $$ [2]. Weather is the influence of the elements on a global scale, which can spread over thousands or more kilometers. Thanks to improved monitoring devices, meteorologists are able to make more and more long-term forecasts. So, today in the USA, the temperature for 5 days is predicted with an accuracy of three degrees, which is one degree more accurate than thirty years ago. In 1987, flash flood warnings were received 7 minutes before they began, and in 2004, 47 minutes before. Every year, powerful hurricanes hit the Gulf Coast and Florida. Thirty years ago, meteorologists, predicting where a hurricane would reach land in three days, allowed an error of ~ 800 km. Today, the estimated error is ~500 km. Nevertheless, it is almost impossible to get a perfectly accurate weather forecast, because even the smallest changes in the atmosphere can lead to fundamental changes in the weather. "Meteorology has not yet become an exact science," says Charles McGill, an employee of the Burlington branch of the National Weather Service of the National Oceanic and Atmospheric Administration. —Maybe someday forecasting methods will be so good that they will allow us to determine exactly where and when a thunderstorm will occur, but it seems to me that this day will not come soon." What is the future of weather forecasting? “The quality of such forecasts will steadily improve," says Richard Antes, president of the Interuniversity Association for the Study of Atmospheric Phenomena, "but despite all the technical achievements of recent years, the day when a meteorologist will be able to forget about intuition and rely only on technology will not come very soon.” Here, we want to support Mr. McGill and Mr. Antes, and we add that, following the latest scientific achievements, we can confidently say that it will never be possible to make an accurate weather forecast, and this is exactly the state of affairs in meteorology that this article is dedicated to.

1.2. Earthquake forecast

In terms of devastating consequences and the number of human casualties, one of the first places among natural disasters is occupied by earthquakes, which, in addition to their destructive power, can cause so-called cascade events: tsunamis, gas pipeline breaks, gas explosions and fires, power outages and disruption of transport communications, landslides, dam bursts or any other disasters caused by movement the Earth's crust. Catastrophic earthquakes over the past 50 years have claimed the lives of tens of thousands of people, as well as economic damage amounting to one trillion dollars. Recent examples show that the 11/03/2011 underground points of M 9.1 in Japan caused $360 billion in damage, which was a record in the history of mankind. According to the Turkish Confederation of Entrepreneurs (TURKONFED), the economic damage caused by the earthquake on August 17, 1999, in the Gelcuk region in northwestern Turkey amounted to 17.1 billion dollars, and the victims of the tremors were ~ 18 thousand people. And the economic damage from the two earthquakes on February 6, 2023, with the epicenter inKahramanmaraş, has already amounted to $ 84.1 billion. After this devastating earthquake in Turkey, the representative of the United Nations Development Program, Louise Vinton, said: “The calculations carried out to date clearly indicate that the amount of damage, according to the authorities, confirmed by international partners, will exceed $ 100 billion, and it will take even more to rebuild.” 50 years ago, the M7.3 Haicheng earthquake occurred in China. Most geophysicists recognized this event as an important milestone in the history of seismology, and from that moment on they thought they could predict earthquakes and finally, for the first time in the history of seismology, they managed to make the most accurate earthquake forecast! It should be noted that this is indeed the only major earthquake that was “officially predicted” before it occurred, which made it a landmark case in the study of earthquake precursors and their prediction. It's not for nothing that we put the words “officially predicted” in quotation marks, because in fact, no geophysical miracle happened in Haicheng. The decisive factor for the evacuation of a million local residents was the sequence of earthquakes around the city, which began two weeks in advance and intensified two days before the main tremor, with the largest earthquake, M 5.1, occurring ~ 12 hours before it. When the walls of your house have been shaking for two weeks, and the shaking is getting worse by the minute, only short-sighted, blind, and deaf residents of the city could stay under the roof of their house and wait for it to fall on their heads or not. With this development, Chinese scientists decided to play it safe, announced the evacuation of residents, and did not lose. This episode allowed Chinese scientists to announce their victory in earthquake forecasting to the whole world. But all sensible scientists realized that, unfortunately, the geophysical event of the century did not take place, because it was predicted two days after its beginning, that is, retroactively. As for naive geophysicists who believe in miracles, they still talk about the Haicheng forecast as the greatest miracle and firmly believe in the possibility of predicting earthquakes. Over the past five decades, seismic monitoring capabilities have expanded significantly, and our understanding of the physical processes underlying earthquakes has advanced significantly thanks to field observations, experiments, and advances in computer modeling. Nevertheless, earthquake prediction and predictability remain one of the most challenging tasks in Earth science. Earthquake prediction is the assumption that an earthquake of a certain magnitude will occur in a certain place at a certain time interval. Despite the considerable efforts of seismologists in research, it is not yet possible to make such a forecast accurate to the day or month and ensure that the damage caused by false alarms does not cause financial and moral losses. In the seventies of the last century, after solving the strategic issue of obtaining atomic energy, people decided to solve another global problem and put a barrier in the way of catastrophic earthquakes. In many advanced countries, the development of new directions and techniques in earthquake forecasting has begun. At that time, scientists decided to follow the simplest scheme – to track earthquake precursors and, based on their analysis, develop a universal algorithm for predicting aftershocks. The task of finding patterns in earthquake-related phenomena was brought to the fore

in order to predict the behavior of the subsurface using the so-called earthquake precursors. Many schemes were proposed that took into account even living "predictors" of earthquakes in the form of animal reactions to processes occurring underground, which manifested themselves in anxiety and panic before the movements of the earth's crust. Geophysicists put the finishing touches to observations of the precursors of aftershocks, adjusted them depending on geological conditions, swapped them, and shuffled them like a deck of cards, but it all turned out to be in vain! After spending countless amounts of money and time, geophysicists realized that the matter was much more serious than they thought, and moved on to solving the task through fundamental research of the seismic process and its manifestations. For example, in the USA, Japan, Mexico, and China, geophysicists decided to follow the path of super-expensive geodetic monitoring of the surface of seismically dangerous areas through artificial Earth satellites. Scientists tracked millimeter deviations from the relief of huge areas of seismically dangerous zones. But it was all in vain: high-precision equipment missed a number of major earthquakes, showing its complete uselessness! Numerous other forecasting methods were invented, but as time passed, there were no reliable and accurate earthquake forecasts. In 1999, well-known geophysicists announced in the journal Nature: - “Deterministic predictions of individual earthquakes with sufficient accuracy to plan evacuation programs are unrealistic” [3]. It would seem that the issue is closed, but it turned out to be not quite so. Despite the contradictions of earthquake forecasting with the fundamental laws of science, there are still scientists who believe in the possibility of earthquake forecasting. In their work, they proceed from the main provisions of Mr. Reid's theory about the long-term accumulation of energy of rock deformation by the earthquake source. In fact, Mr. Reid's theory [4,5], on which the entire base of seismology is built, is false, and no energy accumulation occurs. All earthquake energy is manifested and realized in a short period of time, measured in seconds. It was shown in [6,7] that Reid's theory contradicts the second law of thermodynamics, in particular, the principle of Minimum energy of a system, because any system tends to the lowest energy state available to the system. This means that absolutely all the studies based on the Reid theory initially had a fundamental error that puts a fat cross on all the efforts of geophysicists, both in the research of the earthquake process itself and the methods of forecasting this phenomenon. The cost of this mistake is enormous: wasted significant financial resources and years of research.

2. Thermodynamics of seismic and weather phenomena

Anticipating readers' question why we compare events occurring in different physical environments that are different in nature: some in the atmosphere, others in the earth's crust and mantle, we answer that it is quite appropriate to compare weather and earthquakes, because they are similar self-organizing systems that exist in nature in a huge range and quantity. Research practice shows that studying any event is most effective when comparing phenomena with obvious similarities. This technique, widely known in science, allows researchers to obtain a clear and complete picture of phenomena, trace the difference in events that occur when scaling processes, more confidently determine the amount of energy expended or realized by physical processes, and correctly set reference points in the research procedure, which in most cases serves as a guarantee of the correct result. In the study, we tried to show that earthquakes and weather are similar systems, and if so, then these phenomena have the same properties. For example, weather is a self–organized system, one of the properties of which is the inability to forecast the development of an event for a certain period of time. Based on the similarity of earthquake processes and weather, it can be confidently stated that earthquake processes are also self-organized systems, and they, like the weather, cannot be predicted, which is confirmed by the world experience in observing seismic events. Self-organizing systems are the universe itself and the stars, the evolution of life and living cells, the climatic features of the planet, and earthquakes. It should be noted that such systems appear in the case of the formation of an influx of energy in them, which

can occur for various reasons with the formation of eventually non-equilibrium zones, which, in order to maintain stability and viability, must become, and become self-organizing systems. Nature, in accordance with the fundamental principle of Minimum energy of any system, will try to return the system to its previous equilibrium state by utilizing "extra" energy through a Supernova explosion, cell division, earthquake, hurricane, thunderstorm, heavy rain, etc. The energy expended on these processes will be the energy of seismicity, vortices, thunderstorms, and other climatic phenomena. That is, a change in the thermodynamic state of the system leads to the formation of "extra" energy in the rocks of the rock massif and the atmosphere. In other words, in order for a tectonic earthquake to occur, for example, it is necessary that there is not an elastic rebound of the plate due to the accumulation of energy of elastic deformations, as stated by the theory of Elastic recoil, but the appearance in the rock massif of at least one of the temperature or pressure gradients or other thermodynamic parameter. Even more clearly, this is evidenced by the change in these parameters in the atmosphere. And only after these thermodynamic events, as a result of the appearance of charges and the induction of a changing electromagnetic field, inductance and electrical conductivity of the medium, the energy of the event will be generated. But how Nature will spend the generated energy, for a subsequent earthquake or the appearance of a hurricane, it will be unknown to us until the very last moment. The problem of understanding the thermodynamic conditions of earthquake energy generation and weather excesses rests on the problem of subjectivity and inertial thinking of the scientific community. The thing is that to this day, there is a deeply ingrained stereotype in the geometric environment (and not only) that accompanies the Second Law of Thermodynamics from the first day it was introduced into the world of science by R. Clausius [8]. Some scientists still believe that the Second Law of thermodynamics applies strictly to isolated equilibrium systems, when the mass, energy, and configuration of the system do not change, and the time of system change does not matter. Until now, it was believed that seismic and weather processes are not equilibrium systems, and it is on this basis that the Second Law of Thermodynamics supposedly does not concern them in any way, which allows the earthquake source and the epicenter of the weather cataclysm to accumulate energy in the system in order to eventually erupt into a seismic or weather cataclysm. And although the principle of operation of this generator has not yet been explained in any way by modern geophysics (except for the process of formation of static electricity charges), it is this misconception that has successfully led the scientific problem to a dead end. Being at a dead end, the idea of extra energy formation in the rocks of the rock massif and in the atmosphere of the planet is "multiplying" for many years now, in the form of a huge number of different theoretical works that directly and unequivocally contradict the fundamental laws of thermodynamics and simplify the problem to the level of a (hill of beans) eaten egg. By the way, it is precisely this misconception in the foundations of the Second Law of Thermodynamics that has led some scientists in the past and even in the present to predict the heat death of the universe. To be fair, it should be noted that the seemingly simple Second Law of Thermodynamics is actually not as obvious as it seems at first glance, and more than one great scientist has "broken his teeth on it." The same great Planck, the same great Vernadsky... Currently, this long-standing mistake has finally emerged from the shadow of misunderstanding and has become apparent thanks to the modern development of the theory of nonequilibrium systems.

3. Theoretical modeling of Sandpile-SOC type events in the field of earthquake forecasting

The development of thermodynamic systems that are not in equilibrium in the middle of the 20th century allowed us to look at the energy of various systems and their behavior during the transition to a nonequilibrium state in a different way than our patriarchs of thermodynamics. The pioneer in this direction was the Nobel laureate Lars Onsager and his work in the field of nonequilibrium thermodynamics [9,10]. It

was the Reciprocity Ratio he discovered that changed the idea of equilibrium in the world of science, which unequivocally states that, despite the fact that the molecules of absolutely any system under consideration can behave as randomly as possible (chaos), nevertheless, the whole system as a whole can be in an ordered state! Later, another Nobel laureate, Ilya I. Prigozhin, made a significant contribution to the development of nonequilibrium thermodynamics [11], which developed the concept of spontaneous and non-equilibrium transition from chaos to the order of open systems far from thermodynamic equilibrium. Finally, in 1988, based on the work of Lars Onsager and Ilya Prigozhin, Per Bak and Chao Tang described a model of transition from chaos to order [12] called the Sandpile, which well-illustrated and described the process of self-organization of thermodynamic systems. They are called SOC – Self-Organized Criticality, or dissipative systems. More than 6,000+ articles have already been written based on this work, which has made it one of the most cited in physics. Moreover, none of the 6,000+ articles refuted the SOC's conclusions, which, along with the "Lorenz Butterfly", served as the most significant blows to the positions of supporters of the possibility of predicting earthquakes and weather. In the Sandpile model, a stream of sand is poured onto a horizontal plane and when a critical slope angle is reached, the process switches to self-organization mode: "avalanches" slide off the sand slide, and a new portion of sand compensates for sand losses caused by "avalanches", while the shape of the slide remains constant, i.e. chaos spontaneously turns into order. Based on the laws of thermodynamics, we can confidently conclude that in the event of an earthquake or a climatic apocalypse, the rock mass and weather epicenter of critical events behaves like a Sandpile – SOC system capable of self-organization, in which chaos spontaneously turns into order. In other words, any geological body, through seismic events, releases excess energy that has arisen in the system, just as the atmospheric center of bad weather does, which further ensures the stability of the entire system. Currently, the SOC system has become one of its main contenders for explaining the mechanism of earthquakes, because tremors demonstrate the results of a power-law distribution of earthquakes according to the Gutenberg-Richter earthquake distribution law, which corresponds to the power-law distribution of SOC systems. Compare:

$$N(s) \propto S^{-\alpha} \quad (1)$$

Where, N is the number of avalanches, S is the number of grains of sand, and α is a constant.

In mathematical form, the Gutenberg-Richter law:

$$\mathrm{Log}_{10}N = a - bM, \quad (2)$$

$$\text{Or } N = 10^{a - bM} \quad (3)$$

Where, N is the number of earthquakes, M is the magnitude, and a and b are constants specific to each region. If we express the Gutenberg-Richter law in terms of earthquake energy:

$$E(N) \propto N^{-\beta} \quad (4)$$

Where β is a constant, and N is the number of earthquakes with energy E, then we get a mathematical similarity:

$$\text{« } E(N) \propto N^{-\beta} \sim N(s) \propto S^{-\alpha} \text{ »} \quad (5)$$

The $N(s) \propto S^{-\alpha}$ algorithm of the proposed SOC model is easily implemented by computer modeling, which made it possible to widely adopt it for various systems, because the idea of SOC is simple, and most of the models used in its modeling do not pose difficulties for specialists, and "games" in a children's sandbox do not require financial costs. At the end of the 20th century, with the boom in SOC development, there was hope that within a short time, an earthquake prediction model would be developed based on the

Gutenberg-Richter law, and the coveted earthquake algorithm would finally be developed. But it was all in vain. It turned out that it is not possible to create a computer program for a spontaneously organized system, because the SOC model is focused on non-integrated systems. Such systems do not allow the decomposition of the entire system into subsystems, which excludes self-organization. Consequently, the distribution of energy released during earthquakes according to the Gutenberg-Richter power law can be explained by the self-organization of the critical state of the earth's crust, but it is unrealistic to build a computer program for determining the forecast and strength of earthquakes. Therefore, the Gutenberg-Richter law is a law about the number of earthquakes of different magnitudes, and not the basis for predicting where and when a particular earthquake will occur. At the end of the 20th century, large-scale SOC system modeling projects were carried out, such as the Limits to Growth project, which aimed to create forecasts of global population growth and its impact on natural resource reserves. The project failed. Another project, Global Warming, also "successfully" failed. And this is despite the fact that we have hundreds of weather satellites in Earth orbit, we have a good understanding of weather physics, the aerodynamics of air currents, and we have serious financial support for the implementation of meta-projects. But the project could not be completed, because the result was critically dependent on unpredictable factors. Earthquake forecasts belong to the same category of unpredictable phenomena, despite the fact that we have a good understanding of solid state physics, geology, the law of Elasticity, calculations of mechanical stresses, and the kinematics of plate movement. And all this is because we are dealing with forecasts in a complex system, because even simple mechanical systems, such as pendulums, can behave unpredictably and we do not know where the pendulum will end up after a long time, no matter how easily we solve the equations of its motion and starting position. And then what about the movement of tectonic plates and the reaction of the earth's crust to this process, when one part of the system from the distant past can today affect thousands of other subsystems on the domino principle? On the other hand, the fact that catastrophic earthquakes follow the same laws as weak ones indicates that these events do not have specificity and, despite the fact that earthquakes occur with a well-defined probability according to the Gutenberg-Richter law, this does not mean that such phenomena are periodic. The fact that there has not been an earthquake for a long time does not mean that it should happen in the near future. To think like that is to make a grave mistake, which is clearly demonstrated by the casino and our life experience. For example, after ten consecutive drops of red, there is a 50% chance that black will fall for the eleventh time. The same applies to earthquakes. The fact that events occur at an average interval does not mean that they are cyclical. The recent catastrophic earthquake of 30.07.2025 M8.8 in the Kuril Islands occurred 70 years earlier than predicted by earthquake statistics in this area, and claimed by seismologists misled by these statistics. Then why does the topic of earthquake forecasting never leave the pages of scientific journals? It's all about our underestimation of the complexity of the system. We hope and think that the earthquake forecast will comply with our knowledge. We say that we know the geological structure of the planet, the complexity of the dynamic interaction of the rocks of the earth's crust, the approximate structure of the mantle and core, the hydrodynamics of underground hydrocarbon fluids, gases, aqueous solutions, etc. In fact, we are not even close to understanding the complexity of the forecasting problem, and we do not understand that when making forecasts of events, we have chosen the wrong path for us, because it is basically impossible to predict an earthquake and weather conditions.

4. Self-organizing systems and the Sandpile model (SOC-Self-Organized Criticality)

Self-organized systems evolve to a complex critical state without the intervention of any external agent. The process of self-organization occurs during the transition period. The complexity of the behavior of systems, whether in seismology or a plant cell, is always created as a result of the process of evolution. But

by studying the development of three generations of chimpanzees, it is impossible to understand the evolution of animal life. Studying five to ten models of the development of weather conditions at some point on the planet is not enough to make an accurate weather forecast. A couple of hundred models won't give the right result. Here is a good example in our support: when Hurricane Katrina formed in 2005, meteorologists predicted its landfall in the Panama City area. Then the models pointed to Florida, but in reality, as we now know, Mr. Lorenz's Butterfly flapped its wings somewhere, and Hurricane landed in New Orleans, causing numerous casualties (1,392 fatalities, 652 missing, $125 billion in damage). The laws of seismicity are also impossible to understand by studying earthquakes that occur only in our foreseeable history, because it is necessary to take into account the geophysical processes that took place over hundreds of millions of years in the past and created conditions for earthquakes in our time. But we don't even know the past of the mountain range, and until recently, we didn't realize that without this knowledge, the idea of predicting earthquakes is utopian. This was proved by Edward Lorenz, a meteorology teacher and instructor at the U.S. Air Force Engineering Weather Service. In the course of his research, he discovered that the slightest changes in the initial conditions of self-organizing systems cause large changes in the final result. The discovery was given the name Lorenz, and it proved that meteorology, studied before the “holes”, cannot accurately predict the weather even today. As it turned out, self-organizing systems are subject to the “Lorenz butterfly” effect, Fig. 2 and are extremely dependent on initial conditions: small changes in the environment can lead to various consequences, which makes predicting their behavior extremely difficult, and most often impossible. Sensitivity to initial conditions in such a system means that there exists a number $\upsilon > 0$ such that for any point X and any neighborhood UX there is a point $Y \in UX$ and numbers $n \in \mathbb{N}$ such that / |fn(x) - fn(y) / | | υ. Consequently, a minuscule change in the current trajectory can lead to a significant change in its future location and behavior, where the only movement of a butterfly's wing represents a negligible change in the initial state of the system, and causes a chain of events leading to large-scale changes in the distant future.



Figure 1. File:Katrina 2005-08-28 1700Z.jpg NASA - https://worldview.earthdata.nasa.gov/

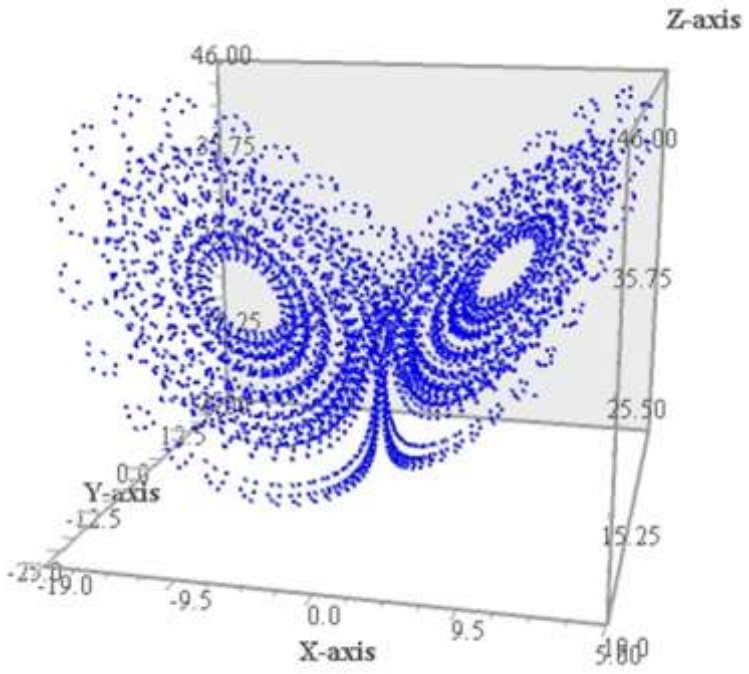


Figure 2. Vogel (Tsiberkin K.B). "The Lorenz Butterfly". The x, y, and z axes display weather components, and the graph displays possible weather conditions. The graph is a function of time, which theoretically means that tracing a curve in one direction reveals past weather conditions, while tracing a curve in the other direction predicts future weather conditions. However, practically indistinguishable points may correspond to completely different weather epochs, indicated by two separate "wings".

5. An example of the behavior of an avalanche and the "Lorenz Butterfly" effect superimposed on it

The canonical example of the SOC model and the "Lorenz Butterfly" effect superimposed on it is not only a sand slide, weather, earthquake, but also an avalanche. Snow on the mountainside exhibits intermittent equilibrium behavior, where periods of rest are interrupted by periodic avalanches. Avalanches are caused by the domino effect, in which one snowflake pushes another or several other snowflakes and cause them to move other snowflakes. In turn, these snowflakes can interact with other snowflakes in a type of chain reaction (thermodynamics of chain processes). Here, strangely enough, we must realize that the forecast of avalanches currently depends on specific minor events that occurred in the very distant past. Namely, when the landscape of a mountain valley was formed millions of years ago, when a steep slope was formed, when this slope was formed by rocks with a low coefficient of friction, when the slope smoothly turned into a valley, when wind, weather, rains and snow caused rock erosion, when over many millions of years the water of melting snow broke through its paths in the valley and polished the surface of the rocks. These initial conditions of an avalanche are enough to make it unpredictable, not to mention other events in the mountains. For example, changes in weather parameters: humidity and air temperature, freezing of ice on the slope of a slope wet from rain before a snowfall, the presence of weak soil brought by water into the valley before a snowfall, etc. These parameters alone are more than enough to make an avalanche forecast impossible. It may happen today, it may happen tomorrow, or it may never happen at all, and the snow will melt safely in the spring. The same picture is emerging for earthquake forecasting. Did seismologists have the opportunity to make a forecast of the Kuril earthquake on 07/30/2025 M8.8? No, because the foundation of this

earthquake, according to SOC theory, was laid by nature many millions of years ago with the beginning of the formation of the Kuril Ridge and the Kamchatka Peninsula. Are we aware of the formation features and the geological structure of this region? No! Do we know the volume of circulating magma inside the rock massif, its temperature and pressure? How should we take into account the mass of the Pacific Ocean surge on the day of the earthquake, the presence of magnetic storms or solar flares last week, because these and other numerous Space weather factors could well trigger an earthquake? A similar pattern is emerging for weather forecasts. Did meteorologists have the opportunity to accurately predict the time and place of Hurricane Katrina's landfall? No, because the change in atmospheric parameters at many points over a vast area of several thousand square kilometers were rapid, and these points were separated by only a few kilometers. The conclusion is obvious.

6. Conclusion

SOC systems, in interaction with the “Lorenz Butterfly” effect, evolve to a critical state without the intervention of any external agent, which means that an earthquake can occur at any time for no reason, and the weather can change dramatically in any unexpected direction for meteorologists. In fact, there is always a reason. During seismic processes, it is hidden from us by events that occurred millions of years ago, which we do not know about and will never find out. When forecasting weather conditions, the reason for the inability to make an accurate forecast is hidden from us by changes in numerous parameters of the atmosphere and Space weather in accordance with the “frequency of flapping of butterfly wings” By Lorenz. Unfortunately, it is not possible to create a computer or mathematical model of such systems with probable forecast points, since SOC is focused on non-integrable systems, and such systems do not allow the decomposition of the entire system into subsystems, which excludes self-organization and the transition of chaos into order. Based on this, we can conclude that it is fundamentally impossible to make an earthquake forecast, and the proof of our words is that the conclusions of the theorists of nonequilibrium systems Lars Onsager, Ilya Prigozhin, Per Bak, Chao Tang and Mr. Lorenz have not yet been refuted, either by theoretical modeling or practical. But such attempts are constantly being made, and this is easily understandable, because the “pie” of financing weather forecasts and earthquakes attracts adventurous people to profit from taxpayers' finances. Attacks are constantly carried out through the editorial offices of scientific and near-scientific journals, which publish articles about the possibility of forecasting weather and earthquakes. An example for you is the academic journal Bulletin of the Seismological Society of America, which announced the release of a special issue on earthquake forecasting - Special Issue on Earthquake Physics, Earthquake Forecasting, and Beyond – 50 Years After the 1975 Ms 7.3 Haicheng Earthquake. And all this is being done despite the fact that back in 1999, well-known geophysicists announced through the journal Nature: “Deterministic predictions of individual earthquakes with sufficient accuracy to plan evacuation programs are unrealistic.” Has anything changed since then? Have you proved that SOC systems allow decomposition of the whole into subsystems? No! Or has someone refuted Mr. Lorenz's conclusions? Again, no! But the financial pie smells so wonderful and beckons so enticingly.… We hope that modern researchers of seismic and weather processes will finally admit that they have no chance of inventing a method for predicting earthquakes and accurate weather forecasting, because this contradicts the fundamental laws of science. There was a similar situation in the scientific world when they tried to invent a Perpetual motion machine. Based on the material presented, we simply have to think about the redistribution of funds intended to combat these elements in the direction of realistic projects.

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