ISSN: 2639-7455

Research Article

Earth & Environmental Science Research & Reviews

Climate Change and Catastrophes

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Submitted: 2023 Dec 02; **Accepted**: 2024 Jan 04; **Published**: 2024 Jan 15

Citation: Ospanova, N.K. (2024). Climate Change and Catastrophes. *Earth Envi Scie Res & Rev, 7*(1), 01-10.

Abstract
We live in a period of expansion of the Earth, which is associated with intensified degassing of hydrogen, carbon dioxide, and methane from the bowels. An analysis of the development of the ice cover in Tajikistan indicates that warming has been continuing for at least 200 thousand years. A number of facts indicate steady heating of the planet's core over the long period of time. Climatic changes get character of catastrophic events more and more. Establishing by us of properties of a catastrophe as a natural phenomenon helps us to more fully understand the essence of the processes taking place. At the international level, the issue of climate adaptation is being discussed, but it is impossible to adapt to catastrophes. The anthropogenic factor has little influence on the creation of the greenhouse effect, but anthropogenic pollution of the ocean increases the negativity of the processes taking place. No single country can resist climate change; the combined efforts of all humanity are required.

Keywords: Earth's Core, Solar System, Geodynamics, Ozone Layer, Catastrophes, Climate, Cyclicity, Degassing, Glaciation

1.Introduction
The main blame for climate change is placed on anthropogenic activities: excessive use of freons, which destroy the Earth's ozone layer, and the burning of hydrocarbon fuels. But now we live during an epoch of expansion of the Earth, and expansion is always interfaced to formation of cracks, breaks and active degassing. Hydrogen degassing is a powerful climate-forming factor. The intensity of climatic changes sharply increases, but all observed processes cannot be explained only by internal reasons, because synchronous jumps in natural processes occur not only on Earth, but also on other planets of the solar system. At the international level, the issue of adaptation to climatic changes is widely discussed, but climatic changes even more often get character of catastrophic events. The properties of natural disasters we have established reject the possibility of adaptation to climate, but support a data set, testifying to steady heating of the planet's core. The purpose of this article is to present a point of view on climate events occurring on Earth, taking into account our own data on studying of properties of natural catastrophes.

2. Methodological Justification
When establishing the properties of a natural catastrophe, the author took into account the mathematical approach to explaining catastrophic phenomena, as well as the traditional approach to understanding disasters as large-scale events entailing negative consequences. In this case, a formalization method was used, which consisted in abstracting from the qualitative or quantitative characteristics of individual disasters and identifying their common features. The logical-analytical method was used in the synthesis and analysis of numerous data – both our own and that of other researchers. Dealing with the evolution of the world and the evolution of Paleozoic corals in particular, the author has extensive experience in the development of theoretical and fundamental problems.

3. About the Influence of Freons
10 years after the signing (in 1987) of the Montreal Protocol, in which freons were declared the main destroyers of the ozone layer, they were removed from almost everywhere. According to calculations, the emission of ozone-depleting substances should have stopped the destruction of the layer by 2005 due to the removal of freons from industry. But at present the situation is far from expected. For example, ozone losses over the Northern Hemisphere through the huge ozone hole in the center with Siberia range from 35 to 52% per month [1].

Thus, the removal of freons from industry could not stop the destruction of the ozone layer. Other destroyers have been identified, such as hydrogen and methane; the latter is three times more aggressive than carbon dioxide. [1] points out that any hydrogen-containing hydroxide entering the stratosphere triggers a cycle of about 40 reactions, which ends with the formation of water in the system – as a result of the binding of ozone and hydrogen. This leads to a thinning of the ozone layer. The main degassers of the subsoil (hydrogen, methane and other gases) are rift zones; this explains why areas of ozone depletion coincide with tectonic structures [1].

4. "Anthropogenicity" of CO_2

Huge amounts of money (hundreds of billions of dollars) are allocated to combat carbon dioxide, the main source of which is considered to be the burning of hydrocarbon fuels. However, the events of recent decades are forcing scientists to reconsider this point of view.

The following sources of CO_2 emissions can be listed.

1. Oceans. 95% CO_2 is dissolved in the ocean. In a normal "working" state, the ocean absorbs carbon dioxide and releases oxygen. When heated, carbon dioxide is released into the atmosphere, which is currently happening. Over the past 30 years, ocean heating has increased by 450% [2]. Also, methane, which is found in large quantities at the bottom of the oceans in a solid state, when heated, turns into the gaseous state and is released into the air.
2. Glaciers. When ice melts and water freezes in the body of glaciers, the content of carbon dioxide in newly emerging air bubbles can exceed its content in the atmosphere by 10-100 times [3, 4]. Therefore, active melting of glaciers can contribute to the supply of carbon dioxide to the atmosphere.
3. Permafrost. The ice content in permafrost can reach up to 90%. When ice melts, carbon and methane are released. In addition, studies carried out in 2015 by American specialists from Florida State University, the University of Colorado and the National Research Program of the US Geological Survey in Colorado showed that organic carbon very quickly moves from permafrost into the atmosphere due to the activity of microorganisms that convert carbon in the process of life into carbon dioxide [5]. Permafrost covers 60% of Russia's territory, and it is currently actively melting.
4. Reduction of forest cover and increasing warming lead to massively emit carbon dioxide by trees.
5. Volcanoes. Recently, there has been an increase in volcanic activity; accordingly, the release of gases from craters, cracks, lava flows and pyroclastic rocks is increasing. Among emitted gases, carbon dioxide ranks second in concentration after water vapor.
6. Large-scale forest fires and peat burning.

Data from high-precision satellite observations indicate the small role of the greenhouse effect against the background of significant changes in the global energy balance of the climate system over the past 20 years [6]. Mathematical calculations carried out by scientists show that "the current ideas about the significant impact of anthropogenic carbon dioxide emissions on climate warming are a myth, but in reality these emissions do not affect the thermal regime of the Earth in any way" [7]. Anthropogenic CO_2 accounts for no more than 1% of the total amount of gas entering the atmosphere.

5. Degassing and Expansion of The Earth

Thus, the anthropogenic factor is not dominant in climate change on Earth; therefore, some scientists [6] directly call the anthropogenic factor far-fetched. It is also unlikely that the point of view about methane pollution of the atmosphere as a result of the life of cattle can be taken seriously. We currently live in an era of Earth expansion, and expansion is always associated with the formation of cracks, faults and active degassing. The release of hydrogen and methane from the bowels of the Earth is recorded using instruments. Hydrogen degassing is considered as a powerful climate-forming factor [8]. In addition, no one can deny the fact of the anomalously increased seismic activity currently observed, but it is known that hydrogen can also be released onto the surface during earthquakes [8].

Scientists write [8] that over the past 200 million years, a grandiose process of expansion of the Earth has unfolded, and since the Paleozoic, the radius of the planet has more than doubled, and its volume and mass have accordingly increased by approximately an order of magnitude. Calculations by other scientists [9] are consistent with these data: over the past 150 million years, the total surface area of the planet has increased from approximately 250 to 500 million square kilometers, that is, twice. Expansion can be indicated by geodetic measurements. According to them, the distances between all stations, without exception, located on opposite sides of the shores of the Atlantic and Pacific oceans, are currently increasing. Only one conclusion can be drawn: the distance from each other of the continents of Eurasia, Africa and North America reflects the process of expansion of the Earth [8]. This is confirmed by recording with gravity increasing devices. The behavior of the level of the World Ocean, which has been rising at greater or lesser rates for many decades, also indicates an increase in the volume of the Earth due to degassing of the core and the increase in the mass of the mantle and crust. At the same time, according to the results of precise repeated measurements of the heights of the foundation of the VLBI and GPS stations, the surface of the continents is rising. [8] points out that the process of Earth's expansion is sometimes interrupted by short-term compression. According to another point of view (the Concept of an expanding and pulsating Earth), epochs of stable expansion of the Earth are replaced by epochs of stable compression [10]. Describing a trajectory around the center of the Galaxy, our Earth and our Solar system successively pass through different times of the galactic year. Taking into account astronomical data, the duration of the galactic year is approximately 214-220 million years. Apogalacty (or "summer") is about 70 million years; perigalacty ("winter") covers approximately 35 million years. The two transition periods ("autumn" and "spring") are taken to be approximately equal to 56 million years. We are currently going through the galactic "winter" and entering a period of maximum planetary expansion (Figure 1).

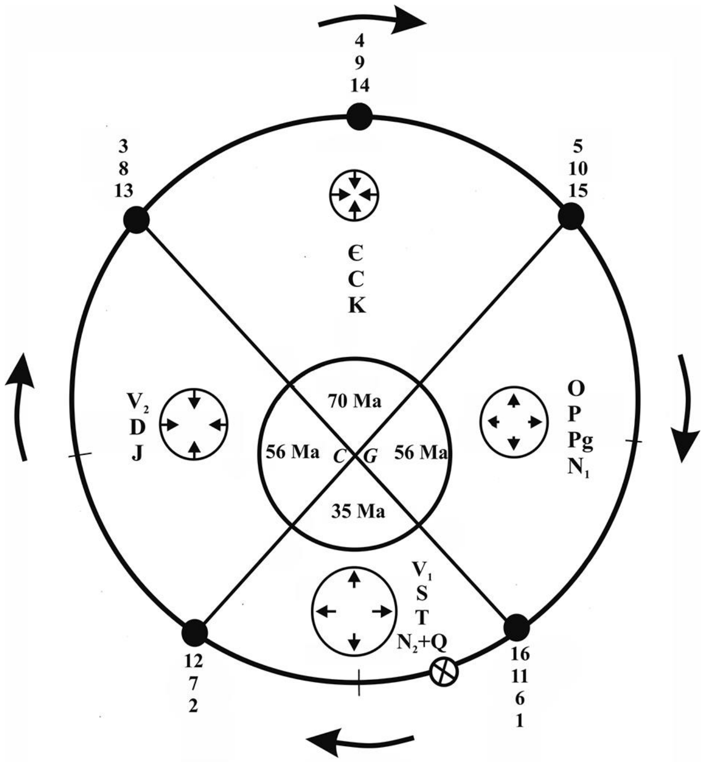

Figure 1: Cycles of expansion and contraction of the Earth in the late Proterozoic and Phanerozoic in accordance with the concept of the Galactic year [10]. CG – Galactic Center; x – current position of the Solar system on Galactic orbit.

V1, 2 – early and late Vendian; Є – Cambrian; O – Ordovician; S – Silurian; D – Devonian; C – Carboniferous; P – Permian; T – Triassic; J – Jurassic; K – Cretaceous; Pg – Paleogene; N1,2 – early and late Neogene; Q – Quaternary. 1–16 – tectonic epochs: 1 – Baikalian; 2, 4 – unnamed; 3 – Late Baikalian; 5 – Salairian; 6 – Takonian; 7 – Late Caledonian; 8 – Bretonian; 9 – Sudetian; 10 – Uralian; 11 – Late Hercynian; 12 – Early Cimmerian; 13 – Late Cimmerian; 14 – Austrian; 15 – Laramian; 16 – Late Alpine.

The authors note [10] that pulsations in the size of the Earth are secondary phenomena in relation to its general expansion. From the above it is clear that both instrumental measurements and geological data indicate a long-term expansion of the Earth. Expansion and degassing are two parallel interrelated processes. Without knowledge of the geological evolution of the Earth and taking into account the influence of cosmic factors, discussions about the causes of climate change hang in the air.

6.Modern Climate Change

Recently, the intensity of climate change has increased sharply. New centers of heating of magma approaching the surface of the Earth have appeared, fires and floods destroy everything in their path, wind speeds and the strength of storms have increased, etc. Let's give just a few examples.

Scientists point to an increase in mantle plumes and subglacial volcanism beneath West Antarctica [11, 12]. A large geothermal anomaly has been identified in the watershed near the South Pole and East Antarctica [13]. A rapid rise of magma was recorded during the eruption of the Fagradalsfjall volcano in Iceland. Due to the rapid change in melt composition (from shallow to deep mantle), scientists consider this eruption to be unique [14]. It was also concluded that humans have nothing to do with most forest fires [15]. According to Doctor of Geological and Mineralogical Sciences Syvorotkin, powerful ultraviolet light, penetrating through ozone holes resulting from the destruction of ozone by hydrogen and methane, breaks down oxygen molecules, which is why ozone appears in large quantities at the Earth's surface. As a result, a strong flammable mixture is formed, which itself is prone to spontaneous combustion: hydrogen, methane, ozone and high temperature at the surface of the Earth. There is a connection between fires and ozone holes and at the same time with degassing structures.

Abrupt changes in a number of natural processes have been recorded since the end of the last century [6]:
- the drift speed of the north magnetic pole, which increased by more than 500% from 1980 to 2010, means the beginning of a significant increase in the geodynamic activity of the Earth;
- the sharp increase in the number of strong earthquakes and the number of deaths during strong earthquakes according to the exponential law;
- abrupt change in solar radiation in 1998;
- abrupt anomalous increase in global tropospheric temperature in

1998;
- a “jump” in annual tsunami numbers since 1998, described by exponential trends;
- the sharp increase in the number of tornadoes, North Atlantic tropical storms, and the total number of hurricanes in the Atlantic basin;
- steady increase in the number of floods;
- the sudden increase in the number of forest fires in 1998, and the number of other events.

It should be noted that the intensity of the processes tends to increase over time; that is, the jumps are not anomalous one-time phenomena, but only marked the beginning of some long-term (?) global changes.

It is impossible to explain all observed processes only by internal reasons. A significant increase in the level of evolutionary trends after leaps can only occur by adding energy to the planet or the Solar system as a whole [6]. Synchronous jumps in natural processes occur not only on Earth, but also on the Sun, Moon, Mars and other bodies of the Solar System. Therefore, many believe that the cause of sudden climate changes is 12 thousand years and 24 thousand year cyclicities.

7. On adaptation to climate change

The issue of adaptation to climate change is widely discussed at the international level. However, as [16] notes, none of the Central Asian countries have specific recommendations that would allow them to take measures in advance to adapt to sudden changes in weather conditions, especially throughout the year. In particular, he writes: “Unfortunately, international project work on climate change by various donors in the region is more focused on socio-economic issues that have little to do with climate change, and are certainly far from scientific research. Most of all, the issues of raising public awareness, increasing the level of knowledge and training are considered. The gender issue is very fashionable in all projects, including climate change projects. These issues are undoubtedly important if, as a result of their consideration, the main issue can be resolved – mitigating the negative impact of climate change” [16].

Adaptability means that we can prepare for future climate changes in advance. But the events of recent years show that countries are not even able to cope with the consequences of climate impacts, let alone somehow prevent them.

8. Disasters and catastrophic changes

Currently, the character itself of climate variation has changed: rains can be of a burst character; during floods, water levels can rise several meters in a few minutes; storms can change their intensity on the fly, that is, intensify as water and air masses move; snow may suddenly fall where there has never been snow before, etc. Thus, climate changes are increasingly taking on the character of catastrophic events. But, as follows from the properties of disasters as a natural phenomenon that we have established, it is impossible to adapt to disasters; there is only one way to deal with them: try to avoid them, if such a possibility exists.

Traditionally, the concept of disaster was associated with large-scale phenomena of a destructive character, entailing negative consequences (volcanic eruptions, landslides, earthquakes, tsunamis, etc.). A catastrophe is an event with unfortunate, tragic consequences [17]. The scale of the manifestation also relates to the catastrophism of Cuvier, who in 1812 put forward the hypothesis of revolutions (from the Greek katastrophe – revolution), during which the destruction of the organic world occurred. The mathematical theory of catastrophes, in contrast to the Newtonian theory of differential and integral calculus, which studies smooth, continuous processes, justifies a universal method for studying abrupt transitions, discontinuities, and sudden qualitative changes [18]. Diagrams resulting from solving functions may look like a “fold”, “dovetail”, “butterfly”, etc. Mathematical curves describe the behavior of an object at the moment of a change in its state, but they do not reveal the essence of catastrophe as a natural phenomenon, because the curves on a plane cannot give an idea of the visible destruction that causes disasters on the terrain, as well as the consequences of this destruction. For those who are directly confronted with disasters in everyday life, this approach gives nothing.

Despite the impressive amount of data on natural disasters, the properties of disasters had not been studied before our work. The main attention was paid to the scale of the disasters and the destruction they caused, while the essence of the catastrophe as a natural phenomenon was obscured. This approach does not contribute to understanding the role and place of catastrophes in the overall system of our world.

The definition given by Ozhegov is not scientific, so let’s turn to the Stewart’s formulation [19]: *a catastrophe is understood as both a sudden change in the behavior of a system and the general type of systems in which such changes occur*. By type of systems researchers mean those that are described using the above-mentioned universal models - “fold”, “dovetail”, etc. Simply put, the catastrophe is the sudden change in the behavior of the system. An infinite number of phenomena fall under the definition of the catastrophe – a sudden overturning or falling of an object, evaporation of water, refraction of light, rainbows, mood changes, differentiation of biological cells, etc. [19].

According to Stewart [19], a catastrophe has the following constituent elements: control parameter space, space of variable state, and response surface. Graphically this can be depicted as follows (Figure 2).

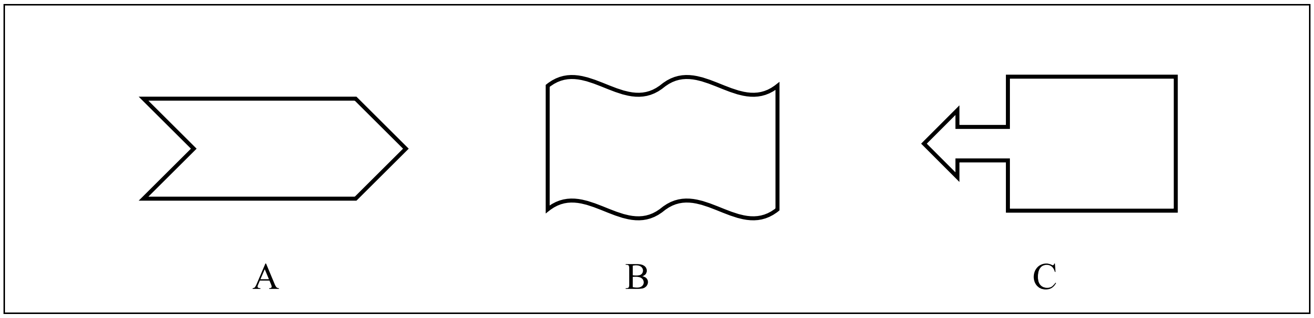

Figure 2: Elements of a catastrophe: A – space of control parameters; B – space of variable states; C – response surface

In addition to the suddenness of the manifestation, which follows from the definition, a disaster has the following properties: **relative short duration, irreversibility of consequences, unpredictability and spontaneity** [20, 21, 22].

The relative short duration is due to a sharp disruption of the equilibrium that existed before the catastrophe; because of this, the release of energy associated with the catastrophe is of an impulsive character. For a disaster to happen, it is necessary to achieve the certain critical level of energy required to trigger the catastrophe and overcome the resistance of the external environment, the balance of which it disrupts. Pulse discharge causes a high speed of the catastrophe, which explains its short duration.

The irreversibility of the consequences stems not only from the fact that the disaster does not fit into the surrounding course of development and disrupts its order, but also from the relative short duration of the disaster, as well as the composition of its elements (Figure 2). The presence of a region of variable states between the control space and the response surface determines the qualitative difference between the beginning and the end of what we understand as a catastrophe.

Unpredictability follows from the suddenness of the manifestation and can relate both to the time of the beginning or end of the disaster, the location of the manifestation, and to its intensity, the scale of the impact and the assessment of the consequences. No one can know in advance the energy potential of a catastrophe, as well as the resistance of the environment that it overcomes, which is different in each specific case. Therefore, it is difficult to foresee both the time of its onset and the entire range of consequences it causes. It follows from this that there *will always be a greater or lesser area of uncertainty in predicting disasters.*

Spontaneity is associated with the impossibility of preventing an ongoing catastrophe, because there is a gap between the space of control parameters and the response surface (Figure 2). Intervention in the course of a disaster is possible only in the space of variable states, where counter factors can be involved that can weaken the final effect, but due to the transience of the process, such intervention is very difficult. Spontaneity can also manifest itself in the fact that one disaster can provoke a series, a cascade of disasters [20].

A cascade of disasters *is a series of catastrophic events that determine each other and follow each other* [21]. The duration of the intervals between them depends on the specific conditions in which the disaster occurred, and can range from the first seconds and minutes to several days and months. As an example of the cascade, we can cite the following series of events that are relevant today: sharp heating of the inner core of the planet – heating and liquefaction of the outer core – acceleration of the flow of molten iron of the outer core – seepage of the melt into the mantle – cavitation explosions (at the boundary of hot and cold magma) – occurrence of a shock wave – generation of deep-focus earthquakes – increased seismic and volcanic activity. This series can be continued (formation of cracks and faults on the surface; destruction of infrastructure, etc.).

In addition to the indicated properties, disasters are characterized by the property of **long-range action**: *the remote consequences of the disaster are more long-term in character than the disaster itself* [21]. Observations show that the consequences caused by a catastrophe last much longer than the duration of the disaster. This paradox occurs due to the difference in the speed of implementation of different processes. The speed of the catastrophe itself is enormous, so the quantity inversely proportional to it – time – turns out to be small. The consequences caused by the catastrophe are less energetically saturated (if there is no replenishment with additional portions of energy) and occur at the slower speed; accordingly, the time for their implementation increases. For example, aftershocks after the shock of the main earthquake can span quite the long time. After the earthquake in Turkey and Syria on February 6, 2023, aftershocks continued for at least a month, numbering 11,020 at the beginning of March.

Since the imbalance caused by a catastrophe is associated with a whole series of events, which we call a "cascade", when some changes provoke others, and since between the space of control parameters and the disaster response zone lies the space of variable states (Figure 2), a return to the original state and restoration of the previous equilibrium is impossible. A disaster creates a new state of the environment, different from the previous one, leads to the emergence of a new quality and completely changes the direction of further development, from which it follows, that **the disaster leaves its mark forever.** The fact that 12-thousand-year cycles determine, according to researchers, complete geodynamic and tectonic restructuring, can serve as one confirmation.

Thus, as stated above and as follows from the study of the properties of catastrophes, *there will always be a greater or lesser area of uncertainty in predicting disasters*. This should be taken into account when we talk about modern climate changes, and this once again confirms the impossibility of adapting to them. For example, an increase in humidity can provoke the increase in the amount of precipitation, but it is not always possible to predict the location of precipitation, the area where storms will appear, as well as the behavior and duration that is currently observed. Suffice it to recall Typhoon Freddy with its unpredictable trajectory and unexpected duration.

Knowledge of the properties of a catastrophe helps to more fully understand the essence of currently occurring climate changes, their unpredictability, spontaneity, suddenness and irreversibility: it is impossible to stop the catastrophe that has already begun; there is only the single way of struggle with disasters – to try to avoid them, if such a possibility exists.

9. Discussion

Not all scientists recognize the existence of a 12-thousand-year cyclicity or simply do not know about it. But our Solar system, moving in a closed spiral in the galaxy, takes not only a large step equal to 200–220 million years (= galactic year), but also a small step equal to 26 thousand years (half cycle – 13 thousand years) [23]. Making one own revolution (small step), the Solar system twice, every 12-13 thousand years, falls under a certain stream of hard galactic radiation, the nature of which remains unclear (Figure 3).

Periodically, it turns out to be either closer or a little further in relation to this flow of energy; accordingly, 12- and 24-thousand-year cycles are distinguished. Other scientists also write about 12- and 24-thousand-year fluctuations in the climate system with catastrophic consequences. [24], based on an analysis of geophysical, heliogeophysical, geological, seismological, astrophysical scientific data and his own works, established the following cause-and-effect chain of extreme changes in the climate system. The Earth, rotating along with the Solar System within the Galaxy, periodically passes through the spiral arms and experiences the interaction of galactic shock waves, which impact the planet in the form of cosmic radiation. The passage of the Solar System through the galactic arms (the far and near points of interaction) is accompanied by variations in the intensity of galactic cosmic rays. High-frequency components of interaction oscillations with periods of 12,000 and 24,000 years correspond to abrupt climate changes and catastrophic events on Earth during the solar system's crossing of near and far regions of galactic shock waves in the Orion arms. The author came to the conclusion that explaining of global warming by anthropogenic atmospheric pollution with carbon dioxide is not just a mistake, but a scientific crime.

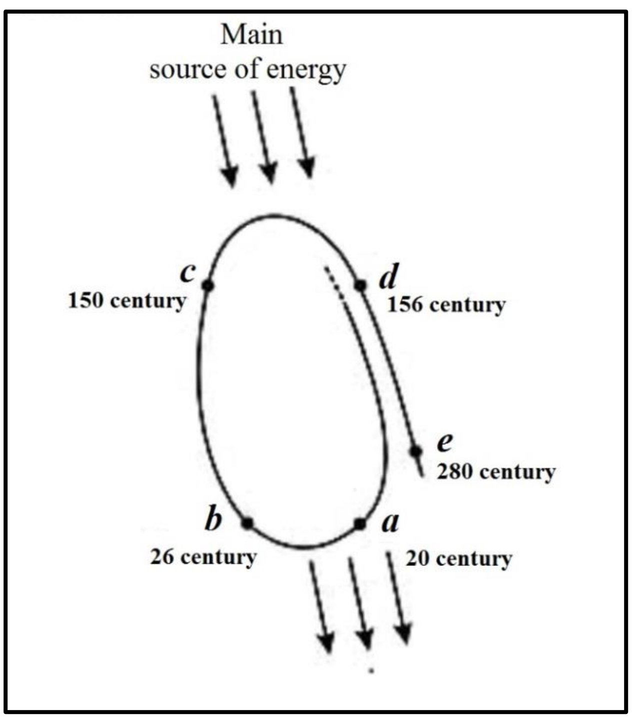

Figure 3: The position of the small turn of the spiral in relation to the direction of the main energy flow [23].

Geological data do not indicate a strict cyclicity, but rather a certain extension of the destruction processes over time. For example, the period of deglaciation of the Fennoscandian (Baltic) crystalline shield was accompanied by pronounced tectonic activity: a wide manifestation of various faults of different ranks and an increased level of seismicity. Based on the study of seismites of the Kola Peninsula, it was established [25] that increased seismic activity (magnitude ≥6) was observed not only in the Kola region, but also throughout Fennoscandia in the interval 12900-11500 years ago (end of the Younger Dryas – beginning of the Preboreal) and then in the interval 11500-9900 years (Preboreal – beginning of the Boreal period). The extension of events in time is associated not only with the fact that it takes the certain time to pass through the zone of action of hard radiation, but also with inertial and compensatory processes (they are not considered here).

With the passage of geological time, there is an increase in the intensity of tectonic processes. The Precambrian seas were relatively shallow, turbid, with a narrow photic zone, and there were extensive multi-kilometer ebbs and flows [26, 27, 28]. Since the Cambrian, upwellings have developed widely due to the differentiation of the sea bottom by depth [29]. The height of the photic zone column increased, and anoxic conditions (hydrogen sulfide contamination) could be created in sediment traps. The establishment of rifts and the beginning of the formation of oceans are associated with the end of the Permian – the beginning of the Triassic [4]. Since the Mesozoic, the intensity of tectonic processes has increased even more, and a powerful tectonic stage has appeared (Cimmerian, or Pacific). The differentiation between deep-sea depressions and mountain elevations has reached its maximum over the entire period of the Earth's existence. Neotectonic movements associated with the Alpine folding phase (late Paleogene-Anthropocene) are characterized by even greater intensity. Compared to the previous stage, their intensity increased almost threefold [4].

The increase in tectonic (and geodynamic in general) activity over time indicates that the earth's core is subject to destabilization due to heating not only at the moments of the cycles, but experiences stable heating over a long period of time. Scientists believe [30] that the mechanism of forced oscillations of the planet's core and mantle under the influence of gravity of surrounding celestial bodies is capable of providing energy for all observed planetary phenomena (tectonic activity, the formation of cracks and faults, the rise of plumes, degassing, sharp surges in the activity of the polar regions, etc.). The constant displacement of the Earth's center of mass relative to its geometric center is 1.1 km. The mechanism of forced oscillations of the planet's core and mantle is capable of providing energy for all observed planetary phenomena. This point of view represents an alternative to the established ideas that the main sources of income of heat are the gravitational differentiation of terrestrial matter by density, the decay of radioactive elements and the tidal interaction of the Earth with the Moon. It was calculated, for example, that the contribution of lunisolar tides to the endogenous activity of the planet and to planetary natural processes is no more than 1%.

The mechanism proposed by Barkin explains the cause of geodynamic processes, but the energy generated during this process is not enough to heat the core. In the best case, this energy, coupled with the energy generated by a continuous stream of neutrinos (heavy neutrinos can destabilize atomic nuclei: [31]) may be sufficient to maintain the temperature of the core at a relatively constant level.

As stated above, "a catastrophe leaves its mark forever," so additional portions of heat received by the Solar System during cycles can have a cumulative effect and, over time, shift the equilibrium towards gradual heating of the cores. It is known, for example, that Mercury should have already cooled down, and distant planets, being far from the Sun, exhibit anomalous activity [32]. Neptune's endogenous activity is higher than that of Uranus, although it is approximately twice as far from the Sun. Barkin points out that the list of paradoxes in our solar system can be continued.

Another evidence of prolonged heating of the core can be a change in the intensity of the magnetic field, which in the Precambrian was approximately 6-8 times higher than the modern value [33]. It is known that when core is heated, the magnetic field weakens, which is clearly observed during periods of cyclic exposure. A general decrease in the intensity of the magnetic field may also indicate that the process of heating of the earth's core lasts quite a long time.

Data on the development of the ice cover of Tajikistan in the Quaternary indicate that warming has been ongoing for at least 200 thousand years.

The most ancient is the Tupchak glaciation, which occurred in the second half of the Early Quaternary time (more than 200 thousand years ago). It was especially strongly developed in the Eastern Pamirs, exceeding the modern one by eight times. The second, the so-called Lyakhsh Ice Age, dates back to the second half of the Middle Quaternary. This glaciation occurred 100 thousand years ago and covered the entire mountainous territory of Tajikistan. At the very end of the Quaternary period – in the Holocene, which lasted approximately 12 thousand years, there was a gradual warming of the climate of Tajikistan. The average air temperature was 13-14°C lower than now [34]. We are currently living in the hottest time of the Holocene. Generally speaking for the Earth, the end of the 20th century is considered the warmest in the entire history of civilization [23].

For clarity, we have summarized data on the development of the ice cover of Tajikistan during the Quaternary period in a table. The area of modern glaciation is taken as one.

Table. Development of the ice cover of Tajikistan in Quaternary time
(based on the work «Glaciers of Tajikistan, 2003")[34].

Glacier (interglacier)	Age	Glaciation area, km^2	Area ratio
Tupchak glaciation	More than 200,000 years ago (Pleistocene)	29570	More than 3.5 times higher than modern
Lyakhsh Ice Age	100,000 years ago (Pleistocene)	24860	More than 2.9 times higher than modern
Interglacial	Modern era (Holocene)	8476,2	1 (unit)

From the table you can see how the area of the ice sheet changed during the Quaternary glaciations and the interglacial period that followed. Thus, we actually have little natural monitoring by which we can judge the direction of climate change over the past two hundred thousand years.

Let us recall that we live in the period of galactic winter (Figure 1), and it is characterized by sea regressions and cooling [10]. However, data on the development of the ice cover in Tajikistan clearly indicate a process of long-term warming.

If we equate the lifetime of the Earth (4.8 billion years) to one Earth day (24 hours) and accept that the periodicity of the cycles is 12 thousand years, then it is easy to calculate that hard radiation will act (for a conventional day) every 0.216 seconds. With this simple calculation, we want to show that if a body with a sufficiently high thermal conductivity (and this is exactly what the earth's core is) is exposed to sufficiently strong thermal pulses (analogues of high-energy radiation) every 0.216 seconds for 24 hours, then it should heat up. On the scale of the Earth's existence, a time of 12 thousand years is very insignificant, and we can talk about the almost constant receipt of additional portions of energy by the Earth's core.

10. Conclusions

Thus, analysis of a variety of data indicates the influence of cosmic factors on events occurring on Earth. It should also be taken into account that we live in a period of expansion of the Earth, which is associated with increased degassing of hydrogen, methane and other gases from the depths. Without knowledge of the geological evolution of the Earth and taking into account the influence of cosmic factors, discussions about the causes of climate change hang in the air.

Climate change is becoming increasingly catastrophic, and its increasing intensity threatens the death of humanity and the planet as a whole. Anthropogenic pollution of the ocean increases the negativity of the ongoing processes, since it can no longer cope with the cooling function and emits carbon dioxide instead of oxygen. Knowledge of the properties of natural disasters is intended to contribute to a more objective approach to assessing ongoing events. A catastrophe is the sudden change in the behavior of a system, and relying on climate adaptation is nothing more than a fallacy, since we are not talking about gradual long-term changes. Suffice it to recall some events: earthquakes in Turkey, Syria or Morocco; floods in China, Italy or Libya; fires in Hawaii; a hurricane in Acapulco... How can you adapt to something that falls under the definition of "suddenly", how quickly the consequences of these events were eliminated and were they eliminated at all? Predictions can only be made in line with the direction of development, that is, processes strengthen or weaken over time. At the moment, there is an exponential growth in destruction processes. It should be borne in mind that in the case of a cascade of disasters and the global nature of the processes, subsequent events are superimposed on an already changed environment, which further increases uncertainty. For example, scientists are surprised by the fact that earthquakes of smaller magnitude are currently producing the same severe destruction as earthquakes of greater magnitude previously produced. This clearly indicates the change in the stability of the environment as the whole.

Patterned thinking makes people think that the main thing is to go through the cycle. But if we take into account the long-term nature of core heating then we should expect an increase in the intensity of catastrophic events in the future. As the core heats up, the instability of the core will increase, and each subsequent cycle will produce more and more significant destruction. This cycle has only accelerated events that would have happened anyway sooner or later.

An analysis of the currently observed climate events and the destruction they cause shows that no single country can resist them; the combined efforts of all mankind are required. Taking into account the stable nature of the core heating that we have established, this combination cannot be a one-time target (passing through a cycle); a more serious and objective approach to assessing of the situation must take place.

11. Declaration of interest

No additional external funding or grants were received for this research. The study was conducted within the framework of the project "Distribution and biotic crises in the development of Phanerozoic fauna and flora and their stratigraphic potential". This project was approved by the laboratory of paleontology and stratigraphy at the Institute of Geology, Earthquake Engineering and Seismology of the National Academy of Sciences of Tajikistan.

Acknowledgment

I express my gratitude to my daughter Trishina Maria A. for her help in selection of the necessary literature.

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