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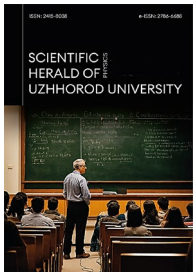

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The Planetary Life Support Mechanism on the Earth: Problems and Prospects

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Abstract

Relevance. The study's relevance is conditioned by identifying a previously unknown planetary life support mechanism, including the creation and preservation of conditions and life itself on Earth.

Purpose. The purpose of the study was to reveal the planetary life support mechanism and to understand the regularities of the origin and continuous action of terrestrial processes, which are the conditions necessary for life on Earth.

Methodology. The main research method is experimental modelling of electromagnetic interactions in the Sun-atmosphere-Earth system.

Results. It has been established that part of the solar energy that comes to the Earth without penetrating its surface ionises the atmosphere, sequentially transforming, creates and preserves the terrestrial processes necessary for life and turns into geoelectricity that creates the Earth's electromagnetic field – a constantly operating source of energy in the Earth's crust. The solar energy penetrating to the surface of the Earth, which has a periodic effect on it, is supposed to preserve the thermal regime of the planet, together with the additional heat of the induction current and the rotation of the Earth and the atmosphere, created by the flow of solar energy that does not penetrate to its surface.

Conclusions. It is shown that all the electromagnetic energy of solar radiation continuously flowing to the Earth is intended and used by the planetary life support mechanism. The findings have practical implications for monitoring the operation of the planetary life support system, understanding how solar energy sustains living organisms, studying the evolution and variability of weather patterns, and exploring the potential for managing these processes.

Keywords: rotation of the Earth; solar energy; thermal regime; electromagnetic field; induction current; terrestrial processes; geoelectricity; meteorological conditions.

Introduction

The main problem of life on the Earth, according to the author of this study, is the creation and preservation of living conditions. Previous civilisations were destroyed and ceased to exist as a result of fleeting global spontaneous destructive phenomena. However, the given components of the current planetary life support mechanism are not given due attention in modern science. This state of a vital problem, according to the author, is conditioned by the fact that the well-known postulate: "The sun is the only source for all forms of energy observed in the life of nature", recognised by the scientific community, while at the same time it is present in science practically [1]. This is due to the lack of understanding of the permanent mechanism of SE supply to terrestrial processes. In this study, the task of identifying and analysing the existing mechanism of SE inflow was set and solved. $1.74*10^{17}$ W of solar radiation energy enters the Earth. After the primary reflection (~30%), a part of the energy, approximately $8.2*10^{16}$ W, penetrates to the Earth's surface, exerting a periodic effect on it, which is necessary mainly to maintain the given thermal regime of the planet. The other part of the energy, which is $4*10^{16}$ W,

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is absorbed by the atmosphere and is practically not used in the planetary life support mechanism [2].

In the nature of the Earth, all bodies are built from a known set of electrically charged particles. The presence of charges in particles implies well-defined laws of force interactions between them, which are carried out by means of an electromagnetic field; therefore, these forces are called electromagnetic. At the same time, the forces of magnetic interaction under normal conditions are much weaker than the Coulomb field [3]. As a result, nature, in most cases, "prefers" electrical forces to magnetic ones. It was noted above that approximately $8.2*10^{16}$ W of solar energy is intended for the surface of the Earth. The periodic action of this energy is investigated by modern science. This study is devoted to identifying the purpose of approximately $4*10^{16}$ W of solar cells that do not penetrate to the surface. These values indicate that SE on the Earth has the highest power, which can only be controlled by the Sun. According to M. Deinega [4], the process of interaction between human and nature occurs based on certain patterns. Indeed, humanity cannot exist without nature, since natural benefits ensure their vital activity. However, when humans intervene in natural processes, they must consider the laws of development, both of individual natural resources, and, in general, the laws of the functioning of life on the Earth.

As Z.V. Lavryniuk states [5], the currently ongoing systemic-synergetic stage in the development of ecology orients ecological research towards the study of the specific characteristics of complex objects, the versatility of relationships between elements, their subordination, and interdependence. According to E.M. Yemelyanov [6], in addition to the reserve of resources, the Earth has another very important property: it produces heat exchange between the absorbed solar energy and its atmosphere. This indicates that the water and land of the Earth, absorbing solar radiation, raise the temperature and return heat to space in the form of infrared radiation. T. Agazade et al. note [7] that the goal of a planetary civilisation (its main course of long-term purposeful, rapid, efficient and reliable development) should be to provide a decent standard of living, optimally differentiated for all states on the planet based on progressive state institutions of interconnected interstate relations and market democratic relations in the economies and politics of all states. "What is electricity, and what is magnetism? These questions are asked over and over again. The most powerful minds are constantly struggling to solve this problem; and yet, there is still no definitive answer. It would be very important to know what the capacity of the Earth is. And what a charge it contains when electrified! In any case, it is important to understand how much electricity the Earth contains. It is difficult to say whether we will ever gain such knowledge, but I hope that we will, and precisely with the help of electrical resonance" [8]. Such problems were asked a hundred years ago by the world-famous prominent scientist and inventor in the field of electricity, N. Tesla. The issues raised are only currently being addressed in this paper.

The purpose of the study was to reveal the planetary life support mechanism and to understand the regularities of the origin and continuous action of terrestrial processes, which are the conditions necessary for life on the Earth.

Materials and Methods

The solution of pressing issues in research was carried out in the field of phenomena and processes caused by electromagnetic interaction, the most common on the Earth (except for the Earth's gravity and tides). With all the variety of interactions of bodies with each other, all of them ultimately come down to the interaction of elementary particles through the electromagnetic field. However, the electromagnetic field and the movement of elementary particles are not a mechanical system, and therefore, cannot be described by mechanics. All classical mechanics, and with it the concept of force, is not applicable to such systems. The energy description becomes the only possible one. If in classical mechanics the origin of force is not essential, then the state of the energy source of terrestrial processes determines the mechanism of their origin and action. Energy is a universal quantitative characteristic of the motion and interaction of any bodies. The conventionally used term "force" has no quantitative meaning, and implies interactions of a certain kind [9]. Thus, to get an idea about electromagnetic interactions in the Sun-ionosphere-Earth system, a unique experimental device was created that models this system based on empirical similarity [10]. The essence of the experimental device is illustrated by the diagram shown in Figure 1.

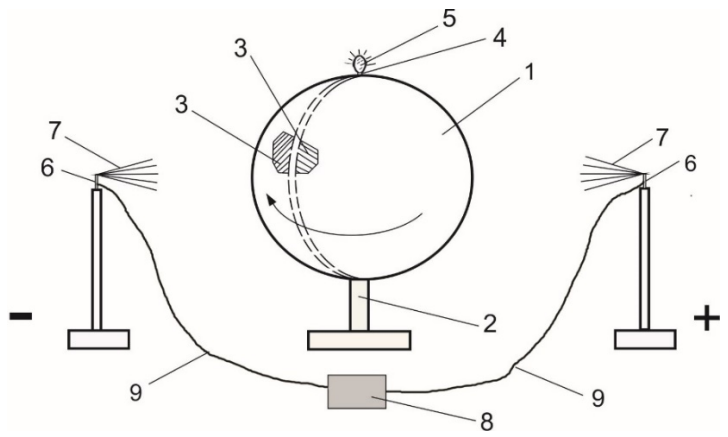

Figure 1. Experimental device simulating electromagnetic interactions in the Sun-ionosphere-Earth system

The device is a hollow sphere made of a dielectric material (1) that can rotate around its axis (2). The inner surface of the sphere is covered with two conductive hemispheres, which are interconnected by the leads of a neon lamp. A neon lamp (5) is a gas discharge lamp containing neon gas that glows when an electric current is applied. Conductive hemispheres (3) on the inner surface of the sphere can serve as electrodes connected to the lamp leads (4). Electrodes (6) are installed on opposite sides of the sphere, connected by a conductor (9) to the clamps of the electrophore machine (8), on which positive and negative charges are accumulated.

Charged particles flowing down from the cathode ionise the air between the electrodes, forming an electrostatic field. A flow of moving charged particles of positive and negative signs occurs between the electrodes. In this case, electrons and negatively charged ions move to the anode (positive electrode), and positively charged ions move to the cathode (negatively charged electrode). When the air is ionised, the high voltage on the electrodes of the device releases electrons from the air molecules, creating positively charged ions and negatively charged ions and electrons. The resulting circular motion of charged particles around the sphere under the influence of an electric field involves neutral molecules of atmospheric gas and the sphere itself in its movement. The impact of an electric field on charged particles creates interaction forces between charged and neutral particles, causing them to move along the lines of the electric field. Free charges in conductive hemispheres move under the action of an electric field and the rotation of the sphere, flowing from one hemisphere to another. The burning of the lamp fixes the excitation of electric current in accordance with electrodynamic induction.

The rotation of the sphere is conditioned by the rotational moment of the ion current and the transfer current – the movement of individual point charges deposited on the surface of the sphere. Moreover, they give the sphere not only an electric charge, but also a mechanical impulse, and momentum transfer occurs. As a result of this effect, the sphere receives additional acceleration relative to the action of the main flow of moving charged particles, which, as the experiment shows, has a mechanical effect. This can explain the established direction of the inductive current opposite to the direction of rotation of the sphere. To investigate the effect of the surface condition on the rotation speed, the coating of the spheres was varied using a dielectric matter – a polymer flock, which creates a rough surface, and a conductive matter – carbon grease, which creates a smooth surface. The voltage applied to the electrodes was 20-30 kV. The summarised results are presented in Table 1.

Table 1. Influence of surface condition of the spheres, the diameter and distance of the electrodes from the surface on the speed of rotation of the bodies

Diameter, mm	Distance of electrodes from the body surface, mm	Coating type	Rotation speed, rpm
160	60	Flock	65
	40		130
160	60	Flock+carbon	38
	40		75
110	60	Flock	100
	80		75

To investigate the influence of the gas medium, the electrodes, and the sphere were placed in a sealed chamber. After voltage was applied to the electrodes and a steady state of rotation was reached, air was removed from the chamber and the rate of rotation was recorded. As the pressure decreased, the rotation speed decreased significantly. Changes in the concentration of neutral molecules and atoms, as well as the concentration of ions and electrons in the gas microenvironment, affect the interaction of charges with the surface of the sphere and electrodes, which changes the speed of rotation of the sphere. Figure 2 shows a series of experiments carried out with objects of various shapes [11].

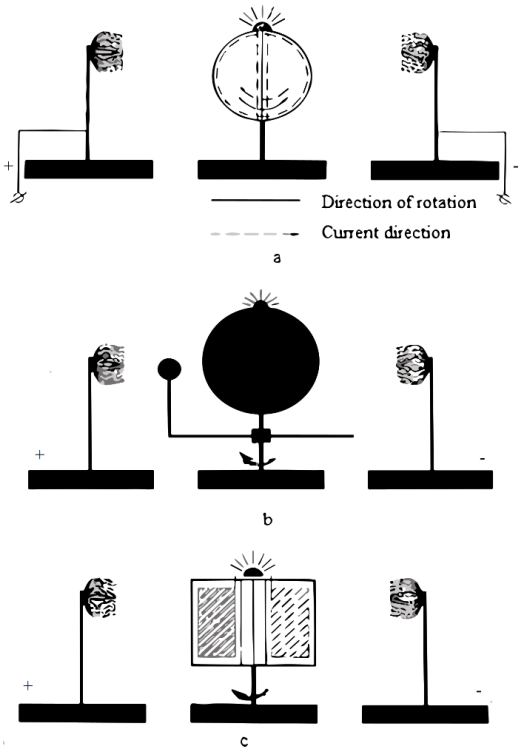

Figure 2. Schemes of experimental studies

Note: a – rotation of the sphere with conductive spheres connected by the leads of a neon light bulb; b – rotation of two spheres of different diameters with a common axis of rotation; c – rotation of plates with conductive coatings connected by the leads of a neon light bulb.

With an increase in the voltage applied to the electrodes, the potential difference between the electrodes increases, and the flow of electricity from the tips of the electrodes increases, more efficient ionisation occurs. This ultimately causes an increase in the electric field strength, moving charges around the object and, accordingly, acceleration of the sphere rotation. The foregoing indicates that moving charges, ordered by an electric field, have a mechanical effect [12].

Results

The rotating sphere moves in the electrostatic field of moving charges, while stationary currents have the same Coulomb field (electrostatic field) as stationary charges due to the fact that new charges arrive at each point in place of outgoing charges [3]. Summarising the results of the experimental studies, the main position is formulated: a previously unknown phenomenon of rotation of bodies in the electric field of moving charges has been experimentally established. It consists in the fact that under the action of the electric field of moving charges, rotation of spherical, flat, conical and other shapes of bodies occurs at a speed depending on changes in the flow of tension in the state of the gas shell around the body and the state of its surface [12].

The phenomenon of rotation of bodies in the electric field of moving charges is a scientific discovery of a new property of the electric field. The next stage of transformations – the mechanical energy of the Earth's rotation is converted into electrical energy of the induction current. The phenomenon of the appearance of an electric current when a conductor moves in an electrostatic field was established by the author of this study when searching for clean energy for industry. In M. Faraday's electromagnetic induction, the conductor rotates (moves) in a magnetic field. The electric, Coulomb field is much more powerful than the magnetic field under normal conditions. I.E. Irodov compares the forces of magnetic (F_m) and electric (F_e) interaction of moving charges (q) in parallel and with the same velocity (v) [3]. The ratio $F_m/F_e=(v/c)^2$. Even for sufficiently high speeds (as an example, v=300 km/s) this dependence is equal to 10^{-6}, i.e., the magnetic part of the force is many times smaller than the electric part. However, the magnetic interaction in technology plays a major role (the production of electricity).

Experiment No. 1

Figure 3 shows a general view of the device.

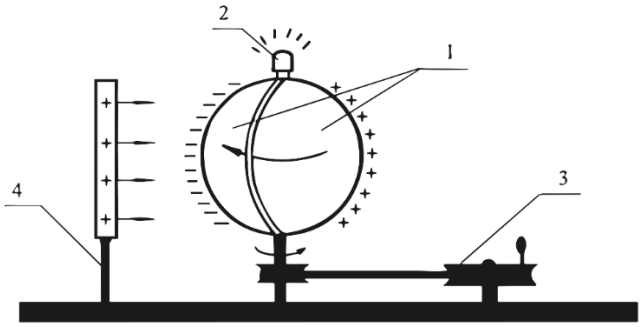

Figure 3. Experimental model of induction current excitation in a conductive sphere

This device contains a sphere with a diameter of 150 mm, made of a dielectric composition (1). Its surface is covered with a thin conductive coating in the form of two different hemispheres, interconnected by the terminals of a neon signal lamp (2), type MN-5 with an ignition threshold of 100 V. The spherical object is connected, for example, with a manual drive (3), which creates a rotation of about 80-100 rpm for the sphere. The stand (4) is needed for the introduction of a plate with an electrostatic field (plexiglass can be used). An electromagnet is installed on this rack. The device works as follows: initially, a magnet is attached to the stand (4), after which the stand with the magnet is placed on the surface of the spherical object at a distance of 10-20 mm, and the spherical object is rotated. A current (stray) is excited in a spherical object. The lamp does not emit light. Then an electrified plexiglas plate 150*150 mm in size is attached to the stand (4) and the spherical object is rotated. The light bulb turns on. The mechanical energy of rotation of a spherical object in an electric field is converted into electrical energy. During the rotation of a spherical object in an electric field, a process occurs for the movement of charges in the conductor, due to the electromotive force and mechanical energy of rotation. The electromotive force of induction under these conditions is calculated by equation (1):

$$\mathrm{E}_{ind} = -\frac{1}{\mathrm{c}}\frac{dN}{dt}, \qquad (1)$$

where: dN – electric field strength flux; dt – time; c – speed of light coefficient.

The experiment confirms that this feature is preserved when the source moves (rotates) around a stationary conductor, when its field turns from electrostatic into the electric field of a moving source [15].

Experiment No. 2

The installation shown in Figure 4 was specially developed to determine the quantitative characteristics of the induction current in conductors moving in a potential electrostatic field.

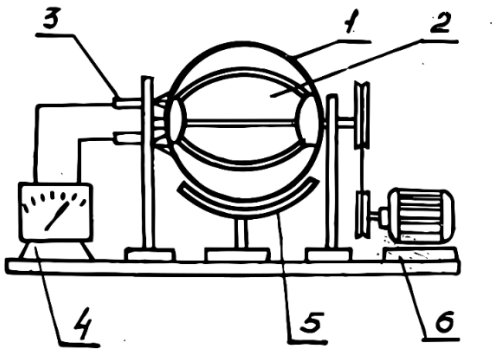

Figure 4. Experimental model of electric current induction depending on the speed of the conductor and the strength of the electrostatic field

Figure 4 shows a sphere with a diameter of 250 mm made of a dielectric (1). In order to register the electric current, the surface of the sphere is glued with segments (2) made of aluminium foil. All segments (there are eight of them) are separated from each other by a gap of 3 mm. At the end of the sphere, on the insulators, there are two current-collecting brushes (3) that connect the two near segments with a galvanometer (4). At the bottom of the sphere at a distance of 10 mm, on a certain stand, a sector (5) is built, made of an insulator, the outer side of which has a conductive layer. The sphere is rotated by a motor (6). A charge is applied to the conductive layer of the sector from an external source to create a Coulomb field with the properties of positive or negative charges. When the sphere rotates, the charges induced by the Coulomb field on the segments (2) sequentially move along a closed loop through the galvanometer, which measures the direct current. The experiments were carried out at electrostatic field strength of 20 and 100 V/cm [11]. Graphs built according to the readings of the galvanometer reflect the dependence of the excited current on the speed of rotation

of the sphere and the value of the electrostatic field strength (Figure 5).

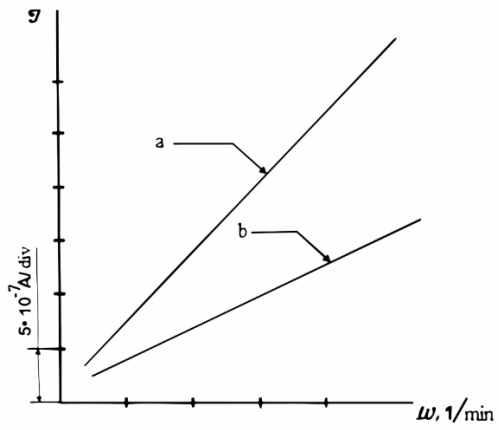

Figure 5. Graph of the dependence of the value of the induction current on the rate of movement of the conductor and the strength of the electrostatic field

Note: a – 100 V/cm; b – 20 V/cm.

Based on the results presented in Figure 5, it can be concluded that the amount of electric current created in the conductor is directly proportional to the frequency of rotation of the conductor and increases with increasing external electric field strength. These characteristics are satisfied by *dN*/*dt*, i.e., rate of change of flux vector $\bar{E}$ penetrating the plane of the conductor (fixed segment). In this case, (2):

$$N = \iint_{(Sc)} (E \cos \alpha)\ dS, \qquad (2)$$

where: *Sc* – area of the segment plane, α – angle between the course of the vector $\bar{E}$ and the normal to the plane under study. Valid (3):

$$\frac{dN}{dt} = \frac{d}{dt} \iint_{(Sc)} E_n\, dS = \iint_{(Sc)} \frac{\partial E_n}{\partial t} dS + \iint_{(Sc)} \left(\vec{v} \nabla \vec{E}_n\right)\ dS, \qquad (3)$$

where: $E_n = E\cos\alpha$.

For a stationary Coulomb field (4):

$$\frac{\partial E_n}{\partial t} = 0, \qquad (4)$$

therefore (5):

$$\frac{dN}{dt} = \iint_{(Sc)} \left(\vec{v} \nabla \vec{E}_n\right)\ dS. \qquad (5)$$

If the spherical conductor rotates at a constant frequency, then its rotations will create an alternating magnetic field around itself. This alternating magnetic field, in turn, will create an electric current in the conductor, which will be proportional to the frequency of rotations and the intensity of the external field. The magnitude of the current will depend on many factors, such as the diameter and shape of the conductor, the intensity of the external field, and the properties of the environment (6):

$$\frac{dN}{dt} = 2\pi R\omega \iint_{(Sc)} \left(\left[\vec{\Omega}_0 \vec{r}_0\right] \nabla \vec{E}_n\right)\ d, \qquad (6)$$

where: ω – frequency of rotations of the segment (conductor); *R* – radius of the sphere; Ω_0 – unit vector of the angular velocity of rotations; r_0 – unit radius vector of the points of the sphere surface; *E* – magnitude gradient.

Accordingly, (7):

$$\text{E.D.S.} \sim I \sim \frac{dN}{dt}. \qquad (7)$$

Equations (5) and (6) suggest that the given components of the ratio increase with the growth of |v| are the velocity modulus of the relative displacement of the conductor and the source of the Coulomb field. The excitation of the current occurs due to the electrical interaction of the free charges of the conductor and the source of the Coulomb field in the dynamics of their relative displacement. The direction of the emerging current in the reference frame, which is closely connected with the conductor, coincides with the direction of movement of the source of the Coulomb field, i.e., against the direction of rotation of the sphere. A new type of current induction in a conductor, which has an electrodynamic nature, in contrast to electromagnetic induction, was classified by the author as electrodynamic induction [11]. Equation (2) is similar in form to the equation for E.D.S. electromagnetic induction occurring at a non-zero value: *dF*/*dt*, where *F* – magnetic flux penetrating the plane, which rests on the conductor contour [13]. This results in (8):

$$F = \iint B\cos\alpha \, dS, \quad (8)$$

where: B – magnetic field induction.

The phenomenon under study is by its nature (mechanism and current direction rule) different from electromagnetic induction. Its differential (element, small part) can be characterised as a phenomenon of electrostatic induction. The essence of the originality of the phenomenon lies in the ability of the electric field of the source to retain free charges during their relative movement. This phenomenon can be innovative, as it can lead to new ways to control and use the electric current in the conductor, based on the features of interaction with an external electric field. To describe the phenomenon of excitation of an electric current in a conductor moving relative to a source of an electrostatic field, the following equations can be used that describe the relationship between the quantities characterising this phenomenon (9-11):

$$\vec{j} = (\rho - \rho_0)\vec{v}, \quad (9)$$

$$\frac{\partial \rho}{\mathrm{dt}} + (\vec{v}, \nabla \vec{p}) = 0, \quad (10)$$

$$div\vec{E}' = 4\pi\rho. \quad (11)$$

Considering the experimental studies carried out, the main position is formulated: The previously unknown phenomenon of excitation of an electric current in a conductor moving in an electrostatic field has been experimentally established, which consists in the fact that under the influence of an electric Coulomb field (electrostatic field) with the relative movement of its source and conductor, which has an ionic, electronic, or mixed conductivity, an electric current arises in the conductor, the magnitude of which depends on the rate of change in the flux of the Coulomb field strength [11].

Summarising in general the results of studies performed on the created experimental device, it should be noted that after applying sufficient voltage to the electrodes for effective air ionisation, a self-developing process of step-by-step formation of the conditions necessary for converting and flowing the desired energy to the final result is established – the creation of electric and magnetic fields. In a direct study of electrical interactions in an experimental device, new, previously unknown regularities and properties of the electric field were revealed – the rotation of bodies in the electric field of moving charges and the excitation of current when the conductor moves in an electrostatic field, which are the main components of a self-developing process and open up ways to identify the planetary life support mechanism.

The essence of the planetary life support mechanism

Life on the Earth is supported by a constantly operating mechanism that creates and preserves the conditions of life on the Earth. However, there is still no idea in science about the mechanism of creation of the main terrestrial processes, the development and preservation of their parameters. For a reliable understanding of the processes occurring in a living organism and serving to maintain life in it, it is necessary to know what a continuously acting external energy is for the origin and operation of the processes of living organisms. To solve the problems of weather and climate change and the possibility of managing them, it is necessary to know the permanent source and mechanism of action of the energy underlying the origin and occurrence of certain processes. According to observational data for the period from 2000 to 2004, the main energy inflow into the atmosphere-Earth system, averaged over time and over the surface, amounts to 341 W/m^2 or 1.74*10^{17} W [2]. The primary reflection from the Earth's surface is 23 W/m^2 and clouds – 79 W/m^2 (total 102 W/m^2, albedo ~30%). Subsequently, 161 W/m^2 (8.2*10^{16} W) are absorbed by the Earth's surface, and 78 W/m^2 (4*10^{16} W) are absorbed by the atmosphere. Below is data from the International Earth Rotation Service (IERS), including the designated period from 2000 to 2004.

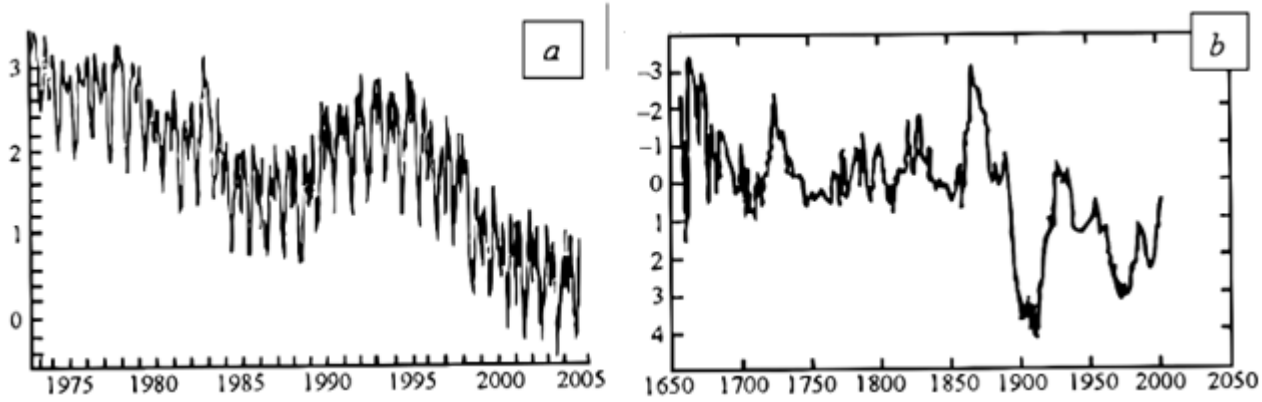

Figure 6. Variations in the rotation mode of the Earth

Notes: a, b – deviations ΔP of the length of the day from the reference ones.

In the given data, the Earth's rotation speed is characterised by the deviation ΔP of the duration of the Earth's day from the reference equal to 86,400 seconds. The shorter the Earth's day, the faster the Earth rotates. Studies note irregular fluctuations in the angular velocity of rotation. The Earth rotated most strongly in 1870, when the duration of the day was 0.003 seconds less than the standard. The slowest time was in 1903, when the length of the day was 0.004 seconds longer. The rest of the time, the changes did not exceed 1-2 ms. The noted changes are only ascertained, without explanation, since the mechanism of the Earth's rotation is still unknown. The above value of the main energy inflow of $1.74*10^{17}$ W differs little from the calculated share falling on the Earth – $1.75*10^{17}$ W, if the total light power of the Sun is $L=3.83*10^{26}$ W [16]. Only half a billionth of all solar radiation reaches the Earth. Nevertheless, the Sun, one might say, pays close attention to the Earth. Science has long considered only the periodic action of the Sun on the Earth's surface. If all the energy (P) indicated above is absorbed, including the albedo P (1-A), then, in this case, the calculated temperature of the Earth is 257 K or -16°C. The actual temperature of the Earth's surface is $T_{surf.av.}$=15°C [2].

It is also important to note that the Sun emits light energy in a wide range of the spectrums. Moreover, the Sun also emits visible light with maximum intensity, but in a very narrow interval of short waves. On the scale of electromagnetic waves, visible light denotes a narrow strip between ultraviolet and infrared radiation, wavelength from $4*10^{-5}$ cm to $8*10^{-5}$ cm. It is characteristic that the Earth's atmosphere is transparent only for the same wavelength range. The human eye and the eyes of animals are especially sensitive to such a certain narrow range of wavelengths [9]. Other waves do not cause visual sensations. The given data together means that the Sun "purposefully" emits visible light for the Earth, which penetrates through the optical window of the atmosphere to the Earth's surface. Light waves not only warm up 1.5-2 meters of the land surface and hundreds of meters of water in the oceans, but also awaken chemical activity in the substance, and also provide energy for the processes of photosynthesis. The visible light emitted by the Sun retains a characteristic feature of modern civilisation – members of the community see each other and can look into each other's eyes. It is difficult to imagine a civilisation without visible light.

Now it is necessary to consider the main problem – the creation and preservation of life conditions on the Earth. Experimental modelling of the SE flux that does not penetrate to the Earth's surface has shown that high-energy particles with an equivalent power of $4*10^{16}$ W ionise atmospheric gas. In this case, the kinetic energy of motion is converted into the potential energy of the electrostatic field of the ionosphere. The reason for the circular movements of charges in the ionosphere is considered to be the "diurnal variations of the winds" that create S_q current system [17, 18]. However, such explanations, according to the author of this study, are incorrect since they contradict the logic of causal relationships of electromagnetic interactions. The determining factor is the significantly different concentration of charged particles on the day and night sides of the planet. The concentration of charged particles drops, for example, for the E layer by a factor of 80-100 [16].

Different charge densities are nothing more than a potential difference that causes an electromotive force of an ordered movement of charges. In this case, positive carriers (ions) move from a region with a higher potential to a region with a lower potential, while negative carriers move vice versa [3]. The movement of charges ordered by the electrostatic field creates circular currents in the ionosphere. New geophysical regularities have been established based on direct experimental and additional studies on the rotation of bodies in the electric field of moving charges and the excitation of electric current when a conductor moves in an electrostatic field:

- mechanism of axial rotation of the Earth and atmosphere;
- mechanism of induction of intraplanetary currents that create the electric and magnetic fields of the Earth.

The above indicates that the rotation of the Earth and the atmosphere is carried out by a single source – solar energy, namely, the circular motion of charged particles of the ionospheric current, which have a mechanical action [10]. Until now, according to modern concepts, it was believed that the energies of the rotation of the Earth and the atmosphere are very high and exceed all known geophysical processes in power, respectively 10^{15} and 10^{14}-10^{15} W [19]. The given values were obtained by separately studying these motions. The implementation of rotation by a single source with a power equivalent to $4*10^{16}$ W fundamentally changes the idea of the mechanism of rotation and the interactions of these movements. The next stage is the rotation of the electrically conductive planet in the electrostatic field of the ionosphere, considering reasonable geophysical laws. Notably, the Earth and the ionosphere currently do not rotate synchronously. Calculations show that the relative movement between them can be about 0.1 cm/s, which is determined by the drift of the non-dipole part of the magnetic field 0.2˚ per year towards west. It follows from this that in 2000 years the Earth makes one rotation more than the ionosphere. This is sufficient for the induction of an electric current and the formation of magnetic poles of modern orientation.

The free charges of the conductor are the electricity of the Earth. The carriers of the circular current of the ionosphere are converted into solar energy. When the Earth rotates in the electrostatic field of the ionosphere, the carriers of the ionospheric current interact with the free charges of the conductor. In this case, not only an electric charge is given, but also a mechanical impulse. There is a transfer of momentum. As a result of this effect, the Earth receives additional acceleration relative to the action of the main flow of moving charged particles, which, as shown, have a mechanical effect. From the upper layers of the atmosphere (ionosphere), an electric current constantly flows to the Earth [6]. The current strength is approximately 1,800 A, the power is ~$7*10^{8}$ W. Consequently, a scientific discovery and, accordingly, a new geophysical mechanism for the induction of an intraplanetary system of electric currents open up ways for understanding the conversion of solar energy into geoelectricity. This means that the induced current is the carrier of the SE. Electric and magnetic fields are created

according to the Earth's laws of electrodynamics. These fields are not something isolated, they are a single electromagnetic field, the carrier of SE in the Earth's crust, and therefore, a permanent source of energy for biological systems, meteorological factors, physical and chemical transformations in the Earth's crust. Solar energy, sequentially transforming, sets the mechanism of origin and action of step-by-step processes and moves towards the transformation of the electromagnetic field of the Earth (Figure 7).

It is important to note that the induced interplanetary system of geoelectricity currents, as shown above, creates the Earth's electromagnetic field which is the carrier of SE in the Earth's crust. In fact, it is the environment surrounding living organisms and giving them energy for life, as well as creating meteorological conditions for their existence.

N.Tesla [8], in his time, demonstrated obtaining light energy from the environment, considering this energy to be inexhaustible. Our work shows that the energy of the Sun continuously coming to the Earth is intended and used by the planetary mechanism. Only the excess energy of solar activity remains.

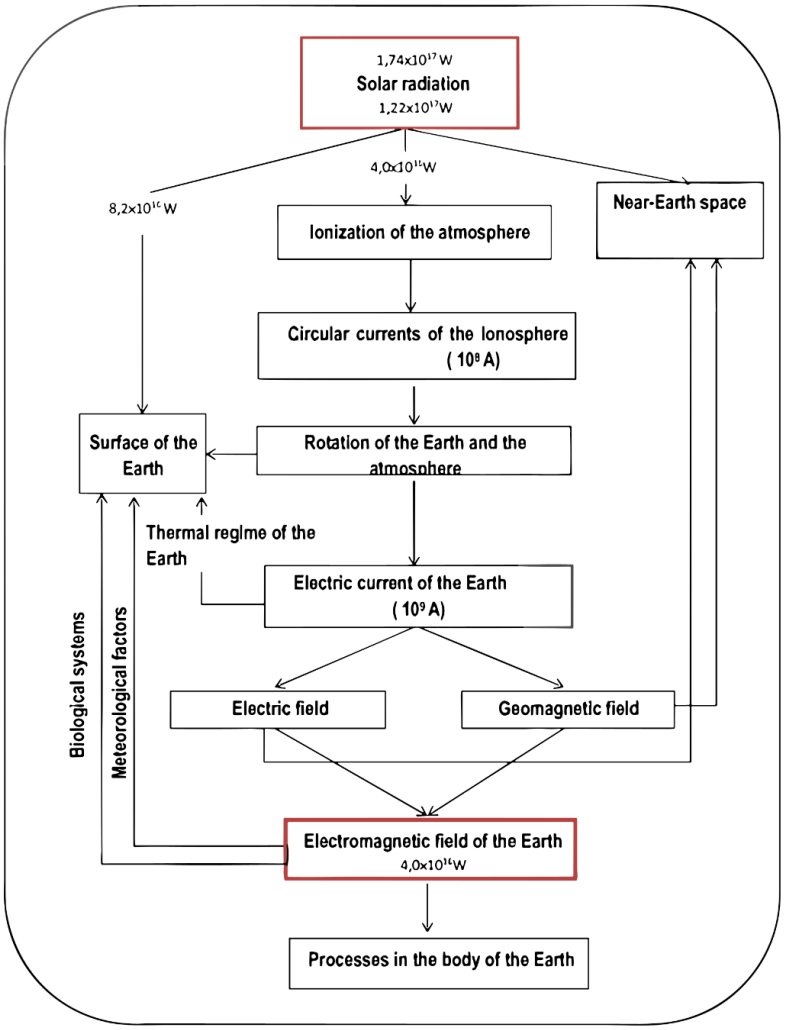

Figure 7. Activity of the Sun on the Earth (scheme of electromagnetic interactions in the planetary life support mechanism)

First, during the ionisation of the atmosphere, the kinetic energy of motion is converted into the potential energy of the electrostatic field – the ionosphere. The next stage is the conversion of SE into the energy of moving particles – the electric energy of circular currents of the ionosphere ($I \approx 10^8$ A) [16]. Next, electrical energy is transformed into mechanical energy of the rotation of the Earth and the atmosphere, which is again converted into electrical, but already of the intraplanetary system of currents ($I \approx 10^9$ A) [21]. Consequently, SE turns into geoelectricity. The final form of SE transformation is the Earth's electromagnetic field, the SE carrier in the Earth's crust with an equivalent power of $\approx 4*10^{16}$ W. The foregoing indicates that the planetary life support mechanism covers almost all processes involved in the creation and maintenance of conditions and life itself on the Earth. The single power of the energy source sets the energy-related basic parameters of these processes and commensurate energy intensity. Irregular in time and power, the energy of solar activity (SA) does not participate in creative activity, is not controlled and regulated. This is excess energy that causes temporary disturbances of the Earth processes and, ultimately, turns into potential energy of accumulation. In connection with

the knowledge obtained for the first time about the location of a constantly operating source of solar energy in the Earth's crust, its physicochemical heterogeneity becomes an important factor. Due to the heterogeneity of the medium, electrical forces can take on various forms and types that change the properties and manifestations of these forces.

In modern studies, horizontal stratification of the Earth's crust is accepted with a significant difference in the composition of rocks in the process of its layer-by-layer formation [20]. In this case, the layers can be electrically isolated with their own potential. In general, the results of studying the physical properties of samples and large areas of the Earth's crust showed their significant difference. Moreover, changes in the electrical resistivity (ER) of the rocks of the Earth's crust are characterised not by percentages, but by orders of magnitude. The resistivity of the main rock-forming materials (quartz, feldspars) is 10^7-10^9 Ohm*m. Sulphides and graphites are about 10^{-4} Ohm*m. The resistivity of monolithic silicate rocks is 10^6-10^2 Ohm*m. However, the main factor in the changes in resistivity is porosity, moisture saturation, and the degree of mineralisation, which determine the electrical conductivity. The heterogeneity of the Earth's crust determines the heterogeneity of the electromagnetic field of the Earth. When inducing and flowing an induction current under conditions of a diversely expressed inhomogeneity of the medium, a transformation and segregation of electrical forces can occur, which can be felt on energy consumers. This is especially relevant for meteorological conditions, where weather processes are very energy intensive.

The scientific literature considers possible electrical intraterrestrial states and processes leading to the accumulation of free electric charges and high electric fields [22, 23]. Based on the new knowledge obtained, it can be imagined that in one case these are local fields of high intensity, affecting the intensity of evaporation, humidity, thunderstorms, causing heavy precipitation, floods, tornadoes, hail [24]. In the other, it is the accumulation of charges, their polarisation, a growing potential difference, leading to electric discharges ("underground lightning") in a closed space with an explosive release of accumulated energy, leading, depending on the properties of the host rocks, to earthquakes, volcanic eruptions, tornadoes [14]. Characteristically, 80% of earthquakes are shallow-focus, with a source depth of up to 8 km [25]. In addition, regional electrical transformations occur, with properties that exclude precipitation and cause fires in vegetation over vast areas. The regional state of meteorological processes, which largely determine the weather and climate on the mainland, is closely related to the regional state of the electromagnetic field [15]. The magnetic field of the planet is one of the main properties of the planet, which determines the conditions of life [25]. At the same time, there is still no model of the planet's magnetic field that would explain the mechanism of field reversal and be supported by a constantly operating energy source [26]. Between the ionosphere and the Earth, at the present stage of evolution, there is always a relative movement. The mechanical energy of the Earth's rotation in the potential field of forces of electrostatic origin is converted into an electric current, the strategic direction of which along the equator generates a magnetic field with a predominant dipole structure (Figure 8).

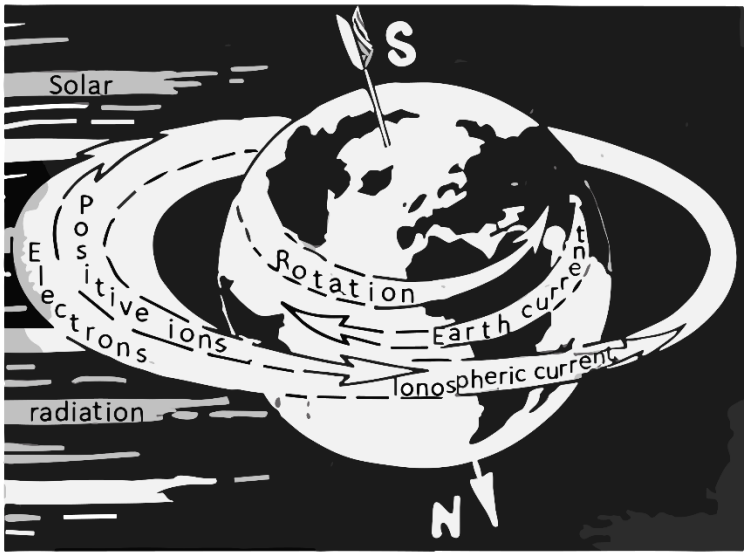

Figure 8. New mechanism of the Earth's magnetic field

Thus, the identified mechanism of the origin of the geomagnetic field corresponds to Ampère's classical assumption that the Earth's magnetism is caused by currents flowing around the Earth from west to east. In this case, the magnetic properties of the body are determined by closed currents inside it. The new concept of geomagnetism explains the mechanism of magnetic pole reversal [11].

Discussion

Until now, in modern science, there are no ideas about the planetary life support mechanism. This may be

conditioned by the lack of a designated science of the preservation of life on the Earth. In geology, in phenomena connected with life, particulars are studied. The investigation of the mechanism that responds to them is not posed as a task of scientific research, as V.I. Vernadskyi wrote [28]. An important discovery is the identification of the creative activity of the Sun in creating and maintaining the thermal regime of the planet and terrestrial processes – the components of the planetary life support mechanism. The power of solar energy flows on the Earth exceeds the power of all known geophysical processes. Only the Sun can control this energy, so the author speaks about the activity of the Sun on the Earth. The planetary life support mechanism is a set of processes created by the Sun, closely connected by the internal logic of its place in the overall chain of the operating mechanism. In this case, there is a consistent transformation of the SE and, accordingly, the origin and action of terrestrial processes that perform their functions and create conditions for the phased movement of the SE from the ionosphere to the electromagnetic field of the Earth – a constantly operating source for providing energy to living organisms, metrological factors, physical and chemical transformations in the Earth's crust. Over the past 5-10 years, the scientific community has become increasingly active in addressing the problems of climate change, global warming and the potential of geothermal energy. The Intergovernmental Panel on Weather and Climate Change, the Union of Concerned Scientists, and the Environmental Defence Fund are actively expressing their views on these problems. However, all numerous publications are similar in one thing – they do not and cannot have a final character. This is mainly due to the lack of knowledge so far about the existence, location, and form of a permanent energy source of powerful weather processes. This source sets the mechanism of origin and action of these processes.

There are still no reliable ideas about the origin of anomalous phenomena. This is evidenced by the lack of ways to predict them and the unexpectedness of the events. The annual energy of earthquakes alone is already 10^{26} J [27]. The planetary life support mechanism, as shown, is created and maintained by a solar cell with a power of $4*10^{16}$ W (approximately 10^{24} J). Single earthquakes – the total power already exceeds 10^{22} J [15]. In this paper, it is established that all the electromagnetic energy coming to the Earth, constantly radiated by the Sun, is intended and used by the planetary life support mechanism. For anomalous phenomena, only the energy of solar activity (SA) remains, which is confirmed by the correlation of catastrophic events with SA. Unpredictable in terms of time and power, excess energy on the Earth, as noted, is not controlled, not regulated, and does not participate in creative activity, causes short-term disturbances of the Earth processes and is converted into potential energy of accumulation in local volumes of the Earth's crust. The centres of accumulation of negative energy are scattered over the Earth's crust with an unpredictable degree of readiness for their manifestation. The possibility of their simultaneous manifestation with corresponding consequences is not excluded. To save life on the Earth, it is necessary, based on the new knowledge about the planetary life support mechanism, to specifically identify the centres of accumulation and remove excess energy to use it as environmentally friendly energy.

Regarding the reversal of magnetic poles based on research, the following should be noted. In accordance with the concept presented in this paper, the magnetic field of the planet Earth is created by an intraplanetary current induced during the rotation of the Earth in the electrostatic field of the ionosphere. The location of the magnetic poles is determined by the course of the electric current, which depends on the ratio of the speed of rotation of the Earth and the ionosphere. At present, the Earth is ahead of the ionosphere, the electric current is directed against the rotation of the Earth – to the west, which determines the current position of the magnetic poles. When the magnetic field is inverted, the Earth lags behind the ionosphere, the current is directed to the east, and the magnetic poles change their position by 180˚ [11]. When the magnetic poles change, a period of synchronous rotation of the Earth and the atmosphere inevitably begins. Currents are not induced. The intensity of the planet's magnetic field decreases to the level of the non-dipole part. The temperature of the Earth's surface drops sharply. The subsequent decrease in the Earth's rotation speed leads to the excitation of currents in the opposite direction. Thus, the inversion mechanism has been sufficiently revealed in this study, and now the task is reduced to finding a mechanism for changing the rotation rates of the Earth and/or the ionosphere.

Currently, the efforts of the scientific community are aimed at studying and solving the following problems related to life on the Earth. Z. Ali et al. [29] give a rationale that the availability of electricity in the state characterises the level of quality of life and development of society. The analysis shows that about one in five people on the planet has a limited ability to use electricity. Most of these people live in 12 countries in Asia and Africa. Solving the problem of obtaining affordable, environmentally friendly electrical energy is an urgent problem of our time. Recently, increased attention has been paid to geothermal energy. This problem, as shown in this study, is being actively discussed. According to X. Zhang et al. [30] geothermal energy is a constant and stable source of energy due to the continuous generation of heat from the Earth's interior and long-term availability. This energy is a reliable source of electricity and heat. Geothermal energy can be used where it is available, reducing dependence on energy imports and strengthening energy independence. According to V. Gonzales [31], geothermal systems are renewable energy sources and can provide significant economic and environmental benefits.

Geothermal power plants can operate continuously, provided their fuel source is constant. This quality makes geothermal energy a valuable base source of renewable energy. Base power supply loads are a source that can generate a certain amount of electricity at any given time, rather than producing varying amounts of electricity depending on external factors such as the presence of wind and sun. Moreover, geothermal power plants offer more flexibility than some other types of baseload power sources, since it is relatively easy to increase and decrease their electricity production depending on the need [31]. As shown in this paper, the thermal regime of the planet at the level of $T_{surf.av.}$=15°C is supported by a quite certain

amount of solar energy incoming to the Earth's surface and additional heat of the induction current, considering the rotation of the Earth and the atmosphere. Obviously, the internal heat of radioactive decay is also involved in maintaining the thermal regime. Therefore, the uncontrolled removal of geothermal energy can lead to a violation of the thermal balance and to new problems of climate change on the planet.

This paper shows that the continuous flow of solar radiation to the Earth is fully used by the planetary life support mechanism, and the energy of solar activity is excessive and creates pockets of accumulation of negative energy. This energy is to be discovered and used for the needs of mankind as renewable clean energy, which would eliminate natural disasters and maintain the heat balance of the planet.

Conclusions

Interpretation based on theoretical analogies and experimental evidence of the obtained new knowledge on reality led to the identification of a self-developing process of successive transformations of the SE in connection with the creation of terrestrial processes. It has been established that part of the solar energy that comes to the Earth without penetrating its surface ionises the atmosphere, sequentially transforming, creates and preserves the Earth's processes necessary for life and turns into geoelectricity, which creates the Earth's electromagnetic field – a constantly operating source of energy in the Earth's crust.

The solar energy penetrating to the surface of the Earth, which has a periodic effect on it, is intended to preserve the thermal regime of the planet, together with the additional heat of the induction current and the rotation of the Earth and the atmosphere, created by the flow of solar energy that does not penetrate to its surface.

Notably, the Earth has been proven to rotate due to the conversion of the energy of moving charges into mechanical energy. The Earth moves in the electrostatic field of the ionosphere, which is accompanied by the electrical interaction of the current carriers of the ionosphere (transformed SE) with the free charges of the Earth (geoelectricity), which, in accordance with electrodynamic induction, opens up a new pattern – the transformation of the SE into geoelectricity – the carrier of the SE into the Earth's crust.

New knowledge opens up ways to understand the mechanism of interaction of an energy source with living organisms through the environment and with processes during the development of meteorological conditions in a heterogeneous environment. It is already obvious that the single energy basis of terrestrial processes, which determines the mechanism of their origin and action, is the electrical forces of the transformed SE. The single power of the energy source sets the energetically interconnected parameters of the processes and their commensurate energy intensity.

Identification of the planetary life support mechanism became possible through the knowledge of new properties of the electric field – "The phenomenon of rotation of bodies in the electric field of moving charges" and "The phenomenon of excitation of electric current in a conductor moving in an electrostatic (electric) field", as well as "The pattern of converting solar energy into geoelectricity". These fundamental scientific discoveries of the main components of the continuous process are connected by the internal logic of their place in the overall chain of activity of the planetary life support mechanism.

Fundamental changes in existing ideas about the mechanism of origin and action of terrestrial processes are introduced by the identified continuously operating source of SE – its location in the Earth's crust and shape. The obtained ideas about the origin of the geomagnetic field open up a previously unknown extreme mechanism of magnetic pole reversal and the creation of a monitoring of its state.

The knowledge gained about the creative activity of the Sun (solar energy) in creating and maintaining the planetary life support mechanism on the Earth opens up ways to solve pressing problems. The totality of new knowledge, theoretical and experimental studies, forms the basis for the emergence of a new science of the preservation of life on the Earth.

The practical significance of this study lies in the possibility of using the results obtained to create a monitoring of the state of the planetary life support mechanism, to understand the mode of continuous inflow of solar cells to living organisms, the development and variability of meteorological conditions, and the prospects for managing these processes, monitoring the state, and eliminating problems that threaten the planetary life support mechanism, while generating environmentally friendly renewable energy.

Acknowledgements

None.

Conflict of Interest

None.

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Планетарний механізм життєзабезпечення на Землі: проблеми та перспективи

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Анотація

Актуальність. Актуальність дослідження полягає у виявленні раніше невідомого планетарного механізму життєзабезпечення, що включає створення та збереження умов і самого життя на Землі.

Мета. Метою дослідження було виявити планетарний механізм життєзабезпечення та зрозуміти закономірності виникнення та постійну дію земних процесів, які є необхідними умовами для життя на Землі.

Методологія. Основним методом дослідження є експериментальне моделювання електромагнітних взаємодій в системі Сонце-атмосфера-Земля.

Результати. Встановлено, що частина сонячної енергії, яка надходить на Землю, не проникаючи на її поверхню, іонізує атмосферу, послідовно трансформуючись, створює і зберігає необхідні для життя земні процеси та перетворюється на геоелектрику, яка створює електромагнітне поле Землі – постійно діюче джерело енергії в земній корі. Сонячна енергія, що проникає на поверхню Землі і періодично впливає на неї, повинна підтримувати тепловий режим планети разом з додатковим теплом індукційного струму і обертання Землі й атмосфери, створених потоком сонячної енергії, яка не проникає на її поверхню.

Висновки. Виявлено, що вся електромагнітна енергія сонячного випромінювання, що безперервно надходить до Землі, призначена і використовується планетарним механізмом життєзабезпечення. Отримані результати мають практичне значення для моніторингу роботи планетарної системи життєзабезпечення, розуміння того, як сонячна енергія підтримує живі організми, вивчення еволюції та мінливості погодних умов, а також вивчення потенціалу управління цими процесами.

Ключові слова: обертання Землі; сонячна енергія; тепловий режим; електромагнітне поле; індукційний струм; земні процеси; геоелектрика; метеорологічні умови.