

The impact of the weak magnetic field on the change of the Earth's climate (an attempt to explain climate changes from a new perspective)

إعداد

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Abstract:

The research aims to measure the extent of the weakness of the magnetic field and its implications for changing the climate of the planet. At the end of the nineteenth century, when the field density decreased by more than (5%), and over the past twenty years, the percentage of decrease increased by about (1.5%), and the field has explored during the period (2020-1900) a distance of up to 900 km), in addition to an increase in the speed of the field from 10) km/year) to 55 km/year) during the past few years and it is now moving towards Siberia, and the field density is decreasing annually by (0.2%) every year according to equations formulated by the researcher and it is expected that this percentage will increase with the increase the speed of the field, and this caused an increase in the temperature of the planet due to allowing the entry of larger quantities of cosmic waves and solar storms, as the entry of solar storm waves causes an increase in the percentage of ultraviolet rays and this raises the temperatures as well as an increase in the entry of cosmic waves coming from outside the solar system NS The formation of thermal clouds that absorb these rays and reflect them towards the earth and at the same time did not allow them to be reflected back into space, which raises the temperatures on the surface of the earth and causes the emergence of many incurable diseases that gradually appear with the increase in the position of the magnetic field.

Key words: magnetic reversal, weak magnetic field, climate change, cosmic waves, solar storms.



Introduction

Climate changes represent the most important event for humans because of their direct impact on their industrial, agricultural and even biological activities. Many theories have emerged that explain these changes, but they are theoretically based mainly on the human influence through factories, but this factor is considered insufficient because the effect is not comparable to the tremendous heat that the sun emits. Or cosmic waves (rays coming from outside the solar system), as well as theories that favored the movement of continents or volcanic eruptions, but they are also weak and unconvincing for many scientists, and it was also confirmed that the Earth is currently going through a state of reversal of the magnetic poles, and it is known that every coup is accompanied by weakness This field, which provides us with a protective shield from solar storms and cosmic rays, has a weakness today that may develop greatly in the coming decades, increasing the temperature of the Earth's surface and authorizing many diseases and epidemics.

Research problem

The research problem is represented by the following question: What is the role of the weak magnetic field in changing the Earth's climate and what are the future expectations for it?

Research hypothesis

The hypothesis of the research is the following answer: If the magnetic field weakens a lot of ultraviolet rays resulting from solar storms and cosmic waves will leak out, which will gradually



raise the surface temperature of the Earth with the weakening of the magnetic field.

Research methodology

The researcher decided to divide his research into two demands preceded by an introduction. The first requirement represented the concept of the magnetic field and the ways of its formation, where the purpose of this field, how it works and the factors affecting it, starting from the inner core of the Earth all the way to the rays coming from outside the solar system, while the second topic dealt with the weakness of the magnetic field. The talk and its relationship to climatic changes has been divided into three parts. The first was explained through the previous stages of magnetic field weakness, and the second was mathematical equations devised by the researcher to clarify the annual rate of magnetic field weakness and predict the term of the field ending completely in the event of stability of the influencing factors. As for the third part, it focused on a weak relationship the modern magnetic field with the climatic changes that the Earth is experiencing today and the global warming.



The first requirement: the concept of the magnetic field and methods of its formation

Physicists define the magnet as a substance that emits invisible lines of force between its poles. But when talking about the definition of the Earth in a general physical way, this definition applies to it greatly, as it is considered a large magnet that emits its own magnetic field called the magnetosphere 1996 Jankowski and J. Sucksdorff, P12, and this field extends for more than 36000 miles) in space starting from the inner center of the Earth (the Earth's core) until its meeting with the solar winds (solar storms) and cosmic waves in outer space (Oster.H.U, 2008, P77-76), but this distance is limited to the side far from the sun perpendicular, as the side facing the sun is much less than this extension, especially during the collision of the solar wind with the field. It cannot be said that geomagnetism is understood in all its aspects, as it still contains many ambiguous issues, and many theories have appeared that have tried to explain the magnetic field, some of which have disappeared and have not been proven correct, and some of them were considered acceptable. It is also known as the Field Magnetic Theory, which was introduced by Bullard and Elsasser, who assumed that the dynamics required to generate the bulk of the Earth's magnetic field (approximately %94) is found in the outer shell of the core region, which consists mainly of iron and nickel alloys. With small amounts of light elements such as sulfur, silicon and some radioactive elements, the materials of this region are found in a fluid and electrically conductive form (Lanza.R and Meloni, 2006, p34), and the dynamic theory assumes that the movement of



the Earth's rotation is in a counterclockwise direction with the presence of convective currents (currents). Convection Thermal) in the outer liquid core envelope and the presence of a solid inner core that leads to the generation of light electric currents (Hamblin.w.k aan Chr istiansen.E.H, p739), meaning that this field is caused by a magnetic dynamo (*) in the liquid core of the Earth (the main field), which is the most widespread field through convective flow from the molten metal that forms the outer core of the Earth(obaïd&et,2023), where it generates the movement of liquid iron and the presence of charges Free electric currents with the Earth's rotation that drive the magnetic field (Edda Line Gunnarsdottir, 1979) Note that the field axis does not coincide with the Earth's rotation axis, as it tilts at an angle of °11.30) (Sanders. Robert, 2009, p32), and the first layer (in the inner core) consists of heavy metal materials in a very hard state, the thickness of which reaches to (1220 km) (Sabahiyeh Younis, 2013, p. 23), photo (1), and its temperature reaches (°6000 C) and pressure reaches (360 kPa/ Pa) (Alfie.D. Gilan and Other, 2007, p17). Given that most of the Earth's heat originates from the solar range, most scientists expect that at the beginning of the Earth's geological history, the Earth's temperature was much higher than now, and about 3 billion years ago, calculations and measurements indicated that the rate of internal heat generation of the Earth was twice the high rate of heat generation now, and that was It is believed that it was twice its rate now. It is believed that this high rate in the distant past is the reason for the increase in convection shown in picture (1) near the mantle layer and the movement of tectonic plates to allow the formation of igneous rocks such as comities, and convection



currents also contribute In generating a magnetic field caused by induced currents in the crust And the mantle and oceans that add to the total geomagnetic field (Turcott GL, 2002, p137-136) It was mentioned above that the Earth's interior generates the magnetic field (%94) of the magnetic field, and with respect to the rest it arises from the ionosphere layer (the ionosphere layer It is one of the layers of the atmosphere and extends from (-1000 70) km from the sea surface and its thickness ranges between 685-910 km) This layer is exposed to the incoming X-rays and ultraviolet rays present in the sun's rays, as these rays remove the electrons of these atoms and leave them in an ionized state, due to the strong ionization of the atoms of the gases of this layer, we always find that the ionosphere is charged with electricity, which leads to a significant rise in its temperature in Its upper parts, and the temperature is at an altitude of 160 km (about 343 °C), then it rises with the increase in altitude to about 1000 km), but when we begin to approach the top of the ionosphere, the temperature begins to decrease. The degree of ionization in the ionosphere varies from one altitude to another, from day to day, and from month to month, and from season to season, and the reason for this difference is the link between layer formations. The ionosphere of the sun and the irritations and calmness that occur in it, this change in the conditions of the sun is also the reason for the disturbance or sometimes interruption in the transmission or reception of radio and radio waves on the surface of the earth.

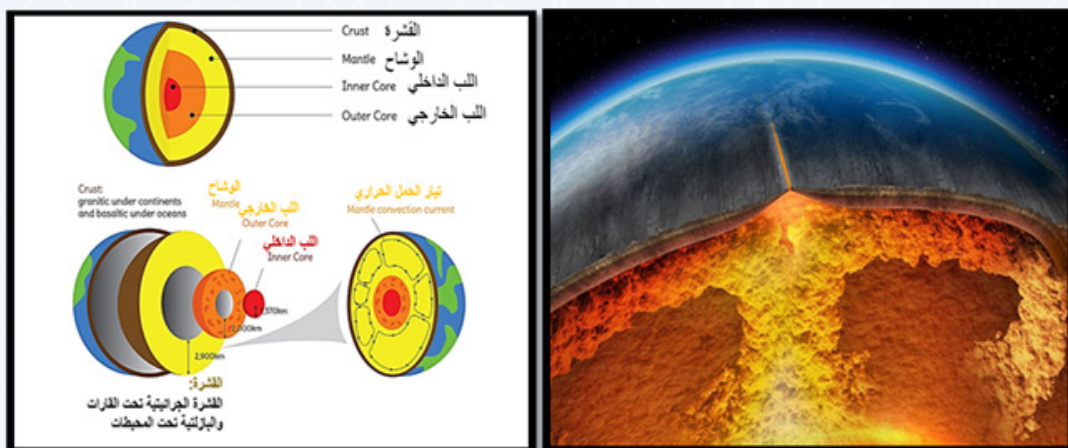
1. **Layer (D)** and it is located in the lower part of the ionosphere at an altitude of (50-90 km) and has a light concentration of

free electrons and thus it reflects long waves, and this layer has a low temperature of (70-(

2. Layer (E), located at an altitude of 90-150 km), is more ionic than layer D and reflects waves of medium lengths.

3. Layer (F) located at an altitude of 150-1000 km), which is more ionized than the previous layers and is useful in radio communications. Which makes it disappear at night, it must also be mentioned that the layers (E) and (F) are greatly affected by solar activity and solar eruptions associated with the activity cycle.

Picture (1) Earth's geological layers and convection currents

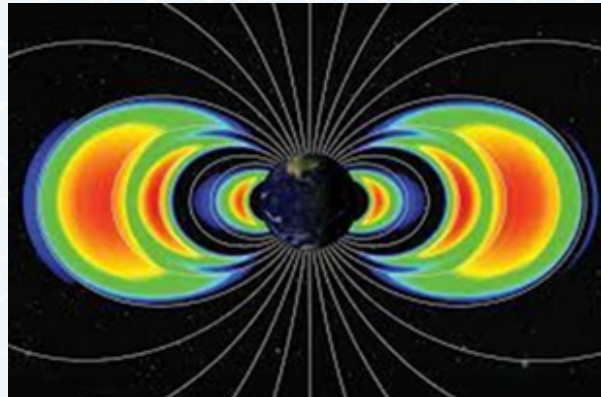


Source: <http://wasse3sadrak.com/25%D25%2587%9D>

In the solar system, in which the number of sunspots and solar flares increases, and this cycle occurs every 11 years (Alfe.D, Gilan, 2017, pp21), and the Van Allen belt is formed in this layer, which is due to the reasons for the formation of To the interaction between the charged particles (present in the ionosphere) and the magnetic field, and this belt approaches the earth at the poles, as shown in the picture (2), and this beams are known as a material that holds ions and electrons by means of magnetic

fields, as the local magnetic field, which is represented by field lines, affects In fast charged particles, it causes them to draw a spiral path around these lines, and they can also move from one line to another when these fields change. M.hudson, 2019, p124)

Picture (2) Van Allen belt



Source: <https://qatar-com/van-allen-probes-spot-radiation-barrier-in-space>

The second requirement: The weakness of the modern magnetic field and its relationship to climate changes

First: The weakness of the modern magnetic field of the Earth

A historical view of the reversal of the magnetic poles previously It is known that the Earth's magnetic field reverses its direction with a somewhat complex regularity, as the magnetic north turns to the south and vice versa, and it follows the historical record of poles changing (76 million years ago), where the poles changed more than 171 times) (Cande.S.C, Kent.D.V, 2009). , p6518), and once the rate of fluctuations in the Earth's magnetic field widely over time, as 72 million years ago the field fluctuated 5 times in a million years and before 54 million years ago, 10 fluctuations



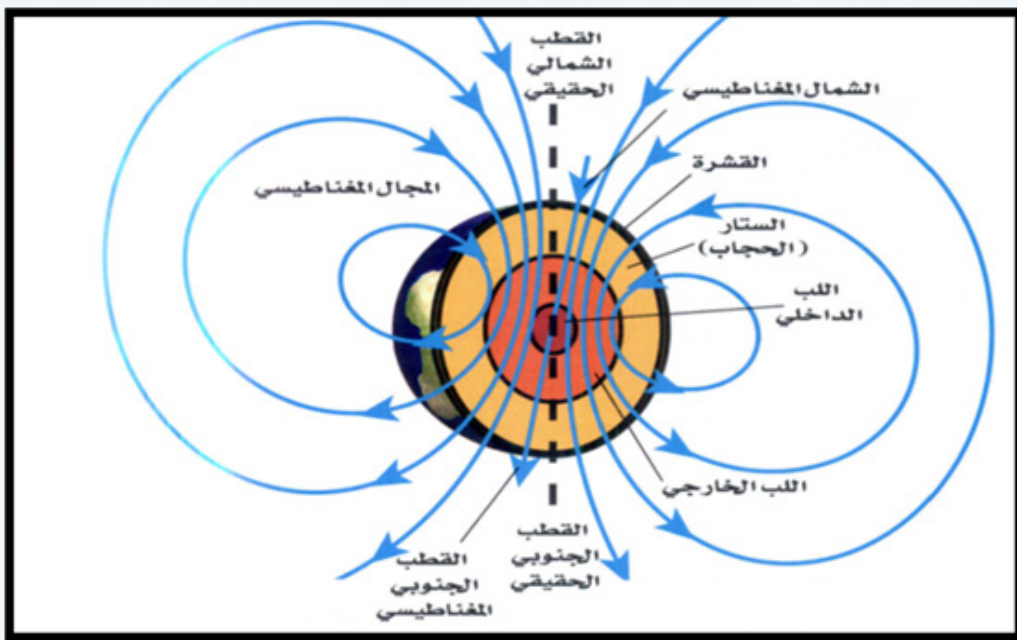
occurred within 4 million years and before 42 million years, 17 fluctuations occurred within 3 million years ago and 24 million years ago 13 fluctuations occurred within 3 million years and before 15 million years there were 51 fluctuations within 12 million years and two fluctuations occurred within 50 thousand years (Cande.S.C, Kent.D.V, 2009, p6515)

As for the processes that drive this change, they are not clearly understood because this requires knowledge and full awareness of what exactly happens inside the Earth's core to bring about this change. The density of the field will decrease significantly and we will need a long period of rotation at different speeds between the layers of the earth and accordingly the poles will change as the north pole field appears in the place of the south or vice versa and it is not necessary that they be in the same direction, and some research indicates that the North Pole was once In South Africa, in the Indian Ocean, in Japan, and in Alaska, it is certain that change, whatever its causes, requires a very long time, as researcher Brad Singer and his colleagues estimated in a study on magnetic field inversion and its effects on humanity's future bug and published In the journal Science Advance, the last magnetic reversal took 22 thousand years, and the average period of pole shift requires between 4000-9000 years), and the results of the study indicate that the magnetic dipole field of the Earth began It collapsed about 795 thousand years ago) and witnessed what is known as the deflection event, as the magnetic field loses a large part of its original strength. A thousand years) the magnetic field collapsed again and eventually reversed directions after (11,000 years) with the last polar reversal process continuing for (4,100 years) says (Singer) What the lava flow records clearly show is

a few attempts by the dynamo to reverse Polarity before the final reversal (Scientific American)(The direction of the Earth's magnetic field is determined by measuring two angles, which are the magnetic inclination angle and the magnetic declination angle, where the angle of inclination is between $^{\circ}90-0$) and the $^{\circ}90$ represents the poles and ($^{\circ}0$) the surface, while the magnetic declination angle It is the angle between the magnetic meridian and the geographical axis and its amount is between $^{\circ}180-0$), and the magnetic field is characterized by two advantages:

1. dipole (where the angle of inclination at the pole is 90)
2. Regular change of magnetic field strength and intensity of lines of force between the poles (North and South) (Montgomery.C.W, 1997, p411), picture (3)

Picture (3) shows the angles of inclination and deflection of the magnetic field



Source: <http://www.chtoukaphysique.com>



The recent reversal of the poles and the weakness of the current magnetic field

When talking about the current magnetic reversal, scientists noticed in the early part of the eighteenth century a slight weakening of the Earth's magnetic field, and since the end of the nineteenth century, the field density has decreased by more than (%5) and over the past 20 years, the density has decreased by about %1.5. The field is a distance of (900 km) between the period 1900-2020) (Pavlov.V, Gallet.Y, 2005, p78), and the speed of the field in recent decades has reached (10 km / h), but in recent years this speed has increased to 55) km/h) the field has moved from Canada west towards the Arctic Ocean on its way to Siberia, (Merrill Ronaald.T and other, 1998, p231) At this rate the magnetic field may disappear over the next few centuries to its lowest levels and then there will be no shield A shield that prevents the entry of cosmic rays and solar storms, and then the impact of those rays on human life will increase, and this reversal may be the worst in the history of the earth due to the presence of man and the spread of his human activities, as it was the last reversal of the poles since (78 thousand years) that is, thousands of years before the creation of man. Our human race has never encountered such a phenomenon before, which is obvious the new reversal may occur relatively soon.

Statistical measurements of the annual rate of weakness in the magnetic field

After clarifying the magnitude of the weakness in the current magnetic field, the annual rate of magnetic field weakening will

be explained here in a mathematical manner, as three equations were organized that were formulated by the researcher to find out the annual rate of magnetic field weakening, the first main one and two sub-equations to know the value of some elements Within the main equation, the following is an explanation of these equations:

$$W_{mf} = \frac{(\frac{S}{T})^2}{\sqrt{6000}} \sqrt{C}$$

Since:

S = average rotational speed of the Earth (km/h)

T = mean temperature of the ionosphere.

6000 = Earth's core temperature

C = speed of field movement (km/year)

This equation is organized according to the following considerations and controls:

Choosing an element (the average speed of the Earth's rotation) and the symbol (S) was chosen to represent it in the equation, and the Earth's rotation is the main driver of the movement of the components of the Earth's geological layers and then generation of the field by the influence of the magnetic dynamo that is clarified during the first requirement.

To get the value of S, we follow the following equation:

$$S = (VE/VP)^2$$

Since:

S= Earth's rotation speed (km/h)

VE= Earth's velocity about the equator (km/h)

VP= Earth's velocity at the poles (km/h)



And the speed of the Earth at the equator is 1644.4 (km/h) while at the poles it is equal to 289.95(km/h)

$$(32.2 \ 5.7)^2 = S = (1644.4/289.95)^2$$

Choosing the ionosphere element due to the direct relationship with the magnetic field, and the symbol T) was chosen to represent its value in the equation.

To get the values of (T), follow the following equation:

$$T = \sqrt{\left(\frac{F}{D}\right)^2}$$

Since:

T = mean temperature of the ionized core

F = the highest layer of the ionized core

D = the lowest layer of the ionized conglomerate

It was mentioned previously that the value of (F) is equal to (1500)° and the value of (D) is equal to 70-°), as shown below:

$$T = \sqrt{\left(\frac{1500}{-70}\right)^2} = \sqrt{(-21.4)^2} = \sqrt{459.2} = 21.4$$

As for choosing the temperature of the Earth's core, which is 6000 (° C), it is also closely related to the generation of the magnetic field, as due to this high temperature it produces (%94) of the magnetic field that was explained in the first requirement. As for the speed of the magnetic field, it is the largest determinant of the annual rate of measuring the period of reversal between the poles, and the current speed has reached (55 km) as explained previously, and it is symbolized by the symbol (c) to represent it in the main equation.

$$W_{mf} = \frac{\left(\frac{S}{T}\right)^2}{\sqrt{6000}} \sqrt{C} = \frac{\left(\frac{32.2}{21.4}\right)^2}{\sqrt{6000}} \sqrt{55} = \frac{2.3}{77.5} (7.4) = 0.2$$

In the end, it can be said that the Earth's magnetic field weakens by an annual rate of (0.2) if the basics of the equation are



stable in terms of the speed of the field, the temperature of the Earth's core, the temperature of the ionosphere and the rest of the basics of the equation. Human life, unless this weakness recedes and its activity is restored before it is too late, and the weakness or disappearance of the magnetic field does not mean the warming of the planet only, but the spread of many diseases that the human body cannot resist. It should be noted that these diseases do not appear at once but spread gradually with each degree of weakness. The magnetic field is witnessing so that these diseases will not adhere to certain climatic conditions or a specific geographical area, but rather their spread will be global because the earth contains billions of viruses when they interact with cosmic waves, they will become advanced viruses that are not affected by climatic characteristics because they originated in very high thermal conditions and will only be dissipated by degrees Heat is greater than that of radiation, and even if we provide that heat to eliminate diseases, humans will be killed from that heat before diseases.

Second: The reflection of the weakness of the modern magnetic field on the change of the Earth's climate

After clarifying the magnitude of the weakness of the magnetic field, this allowed the entry of large quantities of solar storms, which were repelling more than (%99) of them and thus raising the temperatures, as solar storms have the ability to cause a sudden change in the level of ionization of the ionosphere from During the transfer of enormous charged particles that exceed the capacity of the Earth's magnetic field, and these particles consist of billions of tons of gas and other materials emitted

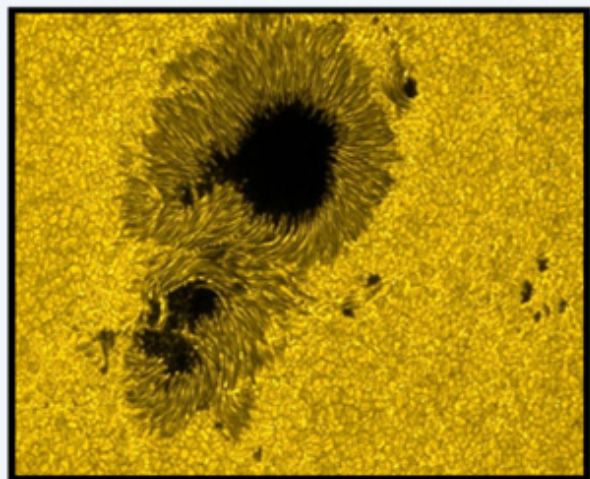


from the sun at a high speed of up to several million kilometers per hour, which is emitted in the form of a cloud resulting from solar explosions (NatGopalswamy, 2007, p2) called glow The solar flare that arises accompanying a phenomenon that occurs on the surface of the sun is called black spots (** ()*), and as shown in the pictures (4) and (5), and the solar glow occurs in a spectrum of exponential quantities that suffice an energy of 1020 joules), while the large events It can release energy up to (1025 atmospheres) (Menzel Whipple and de Yaucouleurs, 2012), and one of the benign effects of these solar storms is the phenomenon of the aurora borealis, which is the northern and southern lights resulting from the collision of the components of the atmosphere with the components of the solar storm which appear It has many colors that give a beautiful view at the poles, as for their bad effects, solar storms have a role in increasing the amount of ultraviolet rays

Picture (4) Solar fla



Picture (5) Sunspots



Source: <https://www.albaladnews.net/more16-217032->

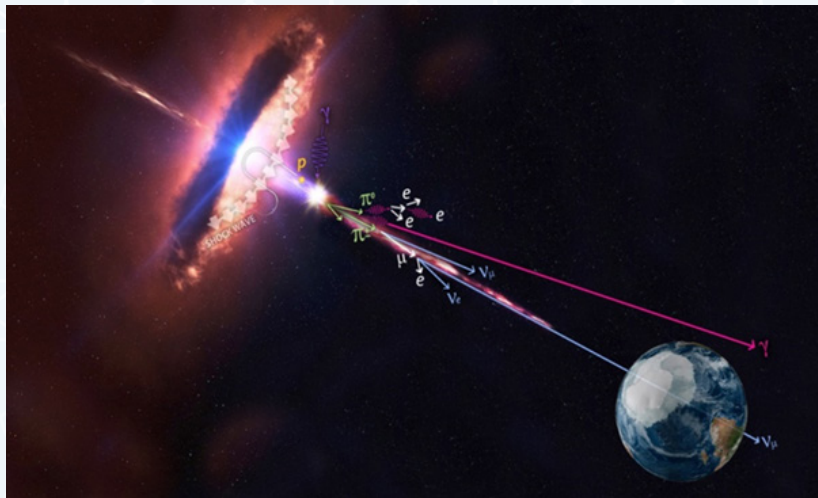


The other effect of the weak magnetic field is evident through cosmic rays, which are known as fragments of particles that affect the planet from outside the solar system, and the effects of these rays magnify at the speed of light and are responsible for electronic faults in satellites and other machines (Sharma, 2008, p478). The source of these rays was mysterious and unknown until the date of 2017/12/7, when an international team of scientists announced that they had tracked the source of cosmic rays when they used multiple types of signals, as they observed gravitational waves and light emitted by a pair of merging neutron stars. The scientist (Regina) said «Today we're really excited to report that we now know something about the source of cosmic rays in the co-discovery of neutrons and gamma rays,» Caputo of NASA's Fermi Space Telescope said during a press conference. Showers of high-energy particles arise when energetic cosmic rays strike the top of the gaseous atmosphere of the Earth, as shown in the picture (6). These rays coming from galaxies are atomic fragments such as protons (positively charged particles), electrons (negatively charged particles) and the nuclei of atoms. Most of these rays consist of atomic nuclei (most of them are hydrogen nuclei, some of them are helium, and the rest are heavier elements). 2007, p14) as for the rest of the components, they are present in very weak proportions. Cosmic rays fall constantly on the Earth, and while high-energy (primary) cosmic rays collide with atoms in the upper atmosphere of the Earth, a few of them reach the Earth after these (secondary) particles leave the collision area (the upper atmosphere) and reach us in the Earth and after those The rays will collide with the clouds scattered in parts of the troposphere, which will turn



those clouds into a radiation-absorbing mass, and then their temperature will rise, which will be reflected on the trapping of heat inside that layer. The high temperature radiation coming from outer space is absorbed, which creates a kind of global warming inside the troposphere.

Picture (6) the effect of cosmic rays on Earth



Source: <https://www.space.com/-41156cosmic-ray-source-multimessenger-astronomy.html>

Results

1. It became clear through the course of the research that the Earth is currently going through a magnetic reversal phase that may last for a long time until it takes place, but the impact on human life is the weakness of the magnetic field during the coup because every reversal of the magnetic field is accompanied by a weakness in the density of this field.
2. It turns out that the Earth is undergoing a change of magnetic poles, where since the end of the nineteenth century the field density has decreased by more than (5%) and over the past 20 years) the density has decreased by (1.5%
3. The magnetic field has moved during the period (2020-1900) a distance of up to 900 km, in addition to an increase in the speed of the magnetic field from 10 km/year to 55 km/year during the past few years and is now moving towards Siberia.
4. It turns out that the size of the field double annually is (0.2) according to several mathematical equations, and it is expected that this percentage will increase with the increase in the speed of movement or with the increase in temperature.
5. The weakness in the density of the magnetic field caused the entry of larger quantities of cosmic waves and solar storms, as the entry of the waves of solar storms causes an increase in temperatures, as well as an increase in the entry of cosmic waves coming from outside the solar system by forming heat clouds that absorb these rays and reflect them towards the Earth at the same time It did not allow it to reflect into space, which raises the temperatures on the surface of the earth and causes the emergence of many incurable diseases



that gradually appear with the increase in the position of the magnetic field.



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- <https://www.albaladnews.net/more16-217032->

Margins

(*)Magnetic dynamo // It seems clear that the generation of the field is related to the speed of the Earth's rotation, as Venus has a core similar to the Earth's, but it takes a much longer time to complete a full rotation, which makes its magnetic field immeasurable, and it seems certain that the Earth's core The component of molten iron has a role in the emergence of this field, as the model based on the rotation of the molten core of the earth eventually leads us to the so-called dynamo effect, or the geographical dynamo, which is similar to the generator of electricity where the load rotates the molten outer core and rotates relative to the earth and that It means the presence of conductive materials that rotate relative to the Earth's magnetic field, and if they can produce any charges between the layers



due to factors such as friction, it will produce a rotational current that can be the newly generated ring to maintain the Earth's magnetic field, for more review the source:

Blackwood, OH, Kelly, WC, and Bell, RM, General Physics, 4th edition, Wiley, 1973.p67

(*) The Van Allen radiation belts are two bands of electrically charged particles that surround the upper surface of the Earth. They are also called (radiation belts) and the belts are named after their discoverer James Alfred Van Allen, the American physicist who discovered them in 1958, for more see the source: <https://www.maref.org>

(*) Solar flare, and this glow is usually associated with sunspots, which are defined as a temporary phenomenon on the photosphere of the sun, appearing in the form of spots darker than the surrounding areas, and they are areas with a low surface temperature of 4000 (C) which is a difference of 2000 (° C) from the surface temperature of the Sun of 6000 (° C) and is caused by concentrations of magnetic field flux. These spots usually appear in pairs of opposite magnetic polarity, their number varies according to the solar cycle of about 11 years. Sunspots expand and contract as they move across the surface of the Sun in diameters. Ranging from (16-160 thousand km) and indicates intense magnetic activity that accompanies secondary phenomena such as coronal rings and outcrops. Most solar flares and coronal mass emissions originate in magnetically active regions around visible sunspot gatherings.

Sami K. Solanki, Sunspots: An overview, The Astronomy and astrophysics review, Katlenburg-Lindau, Germany, 2003, p154.



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