

ORIGIN OF TERRESTRIAL MAGNETIC FIELD

Abstract

The objective of the article is to show the entire amount of geomagnetic field arises from rotating thermoelectric charges caused by thermal gradient of Earth's crust and core. Although there is almost same amount of positively and negatively charged volumes of Earth's globe, they are split and therefore their velocities are not equal, and this particular inequality creates terrestrial magnetic field.

The origin of terrestrial magnetic field seems to be settled in thermal gradient of Earth's crust and core and coldness of poles altogether with Earth's rotation.

Thermal gradient causes thermoelectric effect which aggregates negative charges in colder areas. Electric field generated by temperature gradient is given by the following Peltier¹–Seebeck² formula:

$$\vec{E} = \alpha \cdot \vec{\nabla}T \quad (1)$$

According above formula altogether with homogenous approximation of globe's cooling we have:

$$V = \int_0^{r_{\text{Earth}}} \alpha \cdot (\vec{\nabla}T) \cdot d\vec{r} = \alpha \cdot (T_{\text{atmospheric}} - T_{\text{core}}) \quad (2)$$

Furthermore, there is a real thermoelectric couple on the boundary between core's layers of iron and nickel, which could be an additional charge pump.

Tesla³ firstly noticed that Sun should be positively and planets should be negatively charged. The concept is simple: electronic gas is consisted of conductive electrons that are trying to obtain equal pressure on whole volume. Therefore, hot areas have lower concentration of conductive electrons just like concentration of hot air molecules in balloon is lower then in surrounding cold air. Rotation of unequally charged globe generates terrestrial magnetic field due to this thermo-electric effect.

The augmentation of magnetic field during glacial periods could be caused simply by extra accumulation of charges in regions near poles. Furthermore, declination of magnetic fields from the Earth's rotation's axe [1] might be caused by North Pole warming which is not followed by Greenland too.

So, the core is positively charged and the rest of globe is less or more negatively charged, and total sum of charges is nearly equal to zero. Actually,

¹ Jean Charles Athanase Peltier, 1785 – 1845.

² Thomas Johann Seebeck, 1770 – 1831.

³ Nikola Tesla, 1856 – 1943.

there might be slightly more negative than positive charge electrified by Sun and therefore the increase of Sun activity brings more negative charges to planets and cosmic bodies making Sun more positive at the same time.

But, the peripheral regions of the planet have higher peripheral velocities due to difference in peripheral velocities across radius which causes generation of the magnetic field from the same amount of negative and positive charges. Therefore resultant magnetic field appears just because peripheral velocity of negative charges in crust is higher than the velocity of the same amount of positive charges in core. It seems that the heat of the core has origin in fission nuclear reaction [4] and then it should be reignited by adjacent supernova blasts. If it is so, then the key event that started global warming was supernova blast at 1987 that perturbed and reignited the nuclear processes in the Earth's core. We may notice that there was a worm period in Europe after supernova blast at 1047 A. D. according Chinese chronics, which led us into renaissance. We should also notice that global sea-level was much higher in classic times than it is today, especially in Mediterranean⁴ basin which is clearly notable on the debris of Pompeii and Herculaneum, and in North Africa implying that this period was much warmer.

There is almost permanent unidirectional wind across Atlantic that makes difference in duration of flights between America and Europe and vice versa implying that there must be certain current induction. This wind has permanent movements in regards to terrestrial magnetic field which must generates electric current according Lorentz⁵ law:

$$\vec{E} = \vec{v} \times \vec{B} \quad (3)$$

This also should produce terrestrial currents, or, it is also possible that these terrestrial currents produce this wind, which implies that the atmosphere is a giant MHD fan. There is also a chance that magnetic field has relative velocity in regards to earth's surface, which is possible within M hypothesis as it is experimentally proven by Radović motor on [5] on pp. 134 fig. 4 which is rechecked by Stewart [6].

This friction and precession produce weak DC telluric electric currents [3], with source on equator and sinks on poles creating Aurora-Borealis and Aurora-Australis. This current runs through air in one direction and trough Earth's crust in opposite one. The current also prevents landfalls and any fluctuation of this current creates occurrences of instantly frequent and massive landfalls⁶.

This current is probably also responsible for certain amount of free oxygen in our atmosphere and for creation of some petroleum seats: electrolysis of water and calcium-carbonates creates oxygen, hydro-carbonates and calcium-hydroxide. It seems that Biosphere 1 and 2 projects [7] proved that closed system cannot produce enough oxygen and furthermore this is only available explanation for permanent influx of calcium-hydroxide in world's oceans. According this scenario some of free oxygen had

⁴ Mediterranean = middle terrain, i.e. middle land, which lexically implies that this region was land once upon a time, just it is described in ancient legends.

⁵ Hendrik Antoon Lorentz, 1853-1928.

⁶ At least one patent is Serbian patent office is dedicated to landfall prevention by weak DC current and the one is awarded by gold medal on Belgium's fair of innovations.

appeared by electrolytic decomposition of water into oxygen and hydrogen: oxygen was released into atmosphere and hydrogen partially staid captured in hydro-carbonates and partially escaped from atmosphere as lightest gas.

The fact is that oil and natural gas may appear in inorganic electrolytic process which implies that there would be new and unexpected locations of oil and gas seats. This telluric current could be used for earthquakes predictions while instant variation of pressure in Earth's crust changes conductivity and speed of electric current, which then should produces electromagnetic emissions on long waves' band. This is also a good test for the theory. Instant and violent shaking of conductor in magnetic field induces electromagnetic radiation that should happen during earthquakes.

This telluric current has to have great influence to weather facilitating creation of clouds: a cloud is consisted of great numbers of small drops and they all are denying to be mutually joined into bigger ones, and, only explanation for that is existence of electrical charges in all of these small drops. Tesla also firstly noticed that is unlikely for rain to start without lighting. This lighting actually is a discharging of these initial small drops, and that discharging facilitates drops joining into bigger ones, causing rains. These charges are captured inside every single small drop and huge permittivity constant and huge electrical resistance of water both have a great role in drops absorption of these charges. Such captured charges cannot be easily detected without creation of appropriate circumstances, just like rainfall initiated with lightning is. If it is so, then it means that electrostatic filters on coal power plants are significant cause of global heating, and it might be significant even in regards to carbon-dioxide increase. This artificial charging of air by industrial electrostatic filters decreases atmospheric ability to release moisture by prevention of big drops creation. Carbon-dioxide and water creates carbonic acid, and water with dissolved carbon-dioxide has significantly reduced resistance which prevents charging of small drops and therefore atmospheric ability of moisture absorption is significantly reduced. So, it seems that electrostatic filters amplify destructiveness of carbon-dioxide increase.

Good thing is that we could also affect climate by proper artificial air charging which would produce instant rains in deserts making them suitable for bio-diesel production by cultivation of genetically modified plants resistant to salt in soil. Artificial discharging of atmosphere could annul effect of global warming which might be global warming problem solution for humankind.

These drops' charges have origin in the telluric current induced by already mentioned thermo-electrical and Coriolis effects, and partially in Solar winds whose are mainly consisted of charged particles. All these charged particles then remain captured in microscopic drops in atmosphere preventing drops merging. It is also unlikely that pressure does not affect Curie⁷ point and thus it might be possible that core is magnetized in the manner of permanent magnet by the thermo-electrical effect described in this article. If the pressure can affect melting point it should also be able to affect Curie point because both phenomena are caused by thermal vibrations.

Superficial identification of Earth's magnetic field with rotating punctual charge is:

⁷ Pierre Curie, 1859 – 1906.

$$\vec{B} = \frac{\mu_r \cdot \epsilon_r}{c^2} \cdot \vec{E} \times \vec{v} = \frac{\mu_r \cdot \epsilon_r}{c^2} \cdot \vec{E} \times (\vec{\omega} \times \vec{r}) = \frac{\mu_r \cdot \epsilon_r}{c^2} \cdot ((\vec{E} \cdot \vec{r}) \cdot \vec{\omega} - (\vec{E} \cdot \vec{\omega}) \cdot \vec{r}) \quad (4)$$

i.e.:

$$d\vec{B} = \mu_r \cdot \epsilon_r \cdot \frac{(\vec{E} \cdot d\vec{r}) \cdot \vec{\omega} - (\vec{E} \cdot \vec{\omega}) \cdot d\vec{r}}{c^2} \quad (5)$$

⇒

$$\vec{B} = V \cdot \mu_r \cdot \epsilon_r \cdot \frac{\vec{\omega} - (\hat{r} \cdot \vec{\omega}) \cdot \hat{r}}{c^2} \quad (6)$$

Finally:

$$\vec{B} = \alpha \cdot (T_{\text{atmospheric}} - T_{\text{core}}) \cdot \mu_r \cdot \epsilon_r \cdot \frac{\vec{\omega} - (\hat{r} \cdot \vec{\omega}) \cdot \hat{r}}{c^2} \quad (7)$$

Above equation describes magnetic field of rotating punctual charge, whereas B is magnetic field, V is electric potential of the charge, ω is angular velocity of charge's rotation, i.e. globe's rotation, r is coordinate of a spectator feeling B field generated by the rotating charge, α is Seebeck constant, c is speed of light and T is temperature.

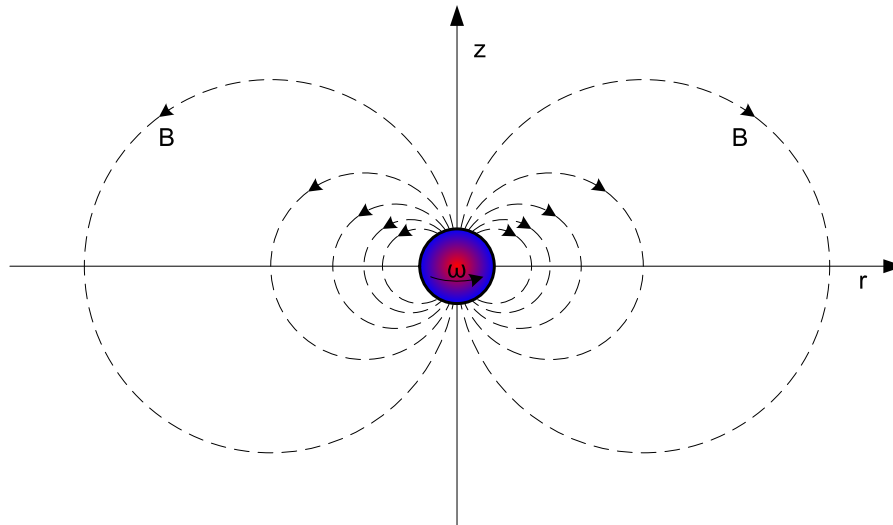
According above equation the equipotent lines of magnetic field of rotating spherical charge in cylindrical coordinates [r, ϕ , z] with angular velocity [0, 0, ω_z] are described by following equation:

$$\left(r \pm \frac{1}{2} \cdot \frac{\mu \cdot Q \cdot \omega_z}{4 \cdot \pi \cdot B} \right)^2 + z^2 = \left(\frac{\mu \cdot Q \cdot \omega_z}{4 \cdot \pi \cdot B} \right)^2 \quad (8)$$

Coriolis⁸ effect is caused by both Earth's rotation and precession. Accumulations of negative charges in cold and positive ones in hot zones bend the magnetic axe and detaching it from the direction of globe's rotation axe.

Lines of equipotent magnitudes of magnetic field of rotated punctual spherical charge are given on the following graphic:

Fig. 1



⁸ Gaspard-Gustave Coriolis, 1792–1843.

Real terrestrial magnetic lines are not circular and they are deformed by Sun's charged particles winds.

Equation (7) yields a value for terrestrial magnetic field which magnitude is far below the real one. This implies that there are significant amount of substances with huge permittivity constant in globe, just like fresh water (~80), silicon-dioxide (~3.7), diamonds (~8), graphite (~15) or pure silicon (~11.5) are. These substances are able to collect and bound substantial amount of charges which facilitates creation of terrestrial magnetic field:

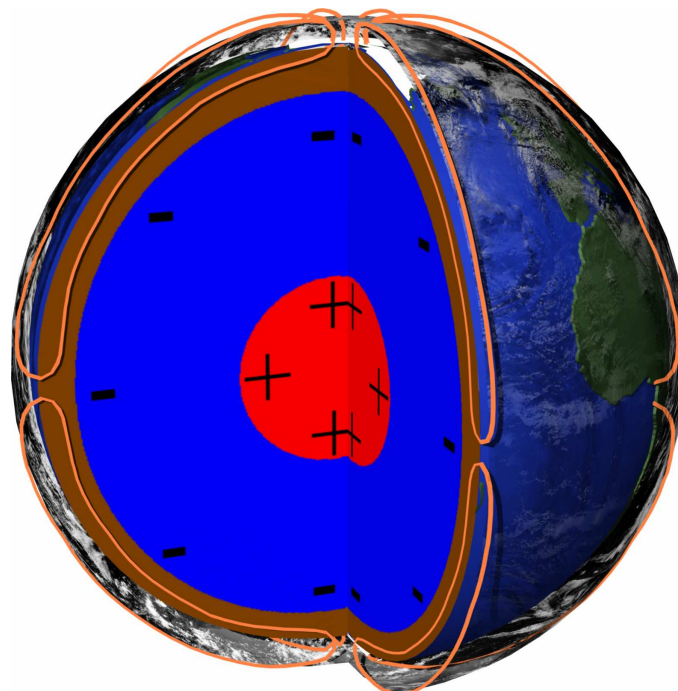
$$B \approx \frac{\mu_0 \cdot \mu_r \cdot C \cdot V}{2 \cdot t_{\text{Day}} \cdot R} \quad (9)$$

Whereas μ_0 is permeability of vacuum, μ_r is relative permeability, C is capacitance of globe, V is potential generated by Seebeck thermoelectric effect, t_{Day} is duration of one single rotation of globe and $t_{\text{Day}} = 86400\text{s}$, and R is radius of globe.

Geomagnetic axe will continue to decline with melting of North Pole's ice from axe of Earth's rotation by attraction of still cold Greenland and hot spots just like Yellowstone is. If the bending of geomagnetic axe does not vary seasonally then it means that there must be a hot spot on opposite side of the North Pole reaches with positive charges which bend the geomagnetic axe. Telluric currents also induce an additional magnetic field perpendicular to one induced by thermal charging, and collinear to Earth's crust. This additional field also bends the compass needle creating the discrepancy between axe of rotation and magnetic axe, the discrepancy which is shaped by cold and hot regions.

Following figure shows the path of telluric currents that runs trough Earth's crust and atmosphere:

Fig. 2



According to the fact that telluric currents generate a magnetic field that is significantly weaker than the main one and that this field added to the main field bends the magnetic field, we may expect that an increase of saturation of oceans' water with carbonic acid will increase its conductivity and therefore increase this additional telluric magnetic field, which will continue to bend the main magnetic axis elongating the angular distance between magnetic and rotational axes of the globe.

EXPERIMENTAL VERIFICATION

Experimental evidences for the theory are numerous, but major experimental evidence is the one that the polarization of the terrestrial magnetic field matches polarization proposed by this thermo-voltaic model in both directions, then concentration of calcium-hydroxide in oceans follows the magnitude of the terrestrial magnetic field, the magnitude of the magnetic field follows glacial periods and concentration of carbon-dioxide, and there is also a localized opposite magnetic field which occasionally occurs especially in hot volcanic regions and finally there is certain matching between deviations in the terrestrial magnetic field and positions of oil wells. Solar wind reduces the resistance of the air by ionization, increasing the magnitude of the telluric electric current that also runs through the atmosphere, which magnifies the intensity of polar lights. It is also geologically proven that a periodical increase of terrestrial magnetic fields has been followed by the appearance of glacial periods.

CONCLUSIONS

Proposed thermo-electric explanation of the terrestrial magnetic field explains also the basic climate process of precipitations. We may expect that a significant amount of atmospheric free oxygen has its origin rather in water electrolyzed by telluric currents than in the biogenic process of photosynthesis.

Global warming might be significantly provoked by the usage of industrial electrostatic filters too and not by carbon-dioxide emission only. And finally, we could affect and control weather by artificial ionization and to significantly improve weather forecast by tracking air's ionization as an additional meteorological parameter. Even more, maybe we could improve volcanic eruption prediction by tracing of air ionization and variation in the local geomagnetic field.

We should be also able to induce precipitations in Australia and Sahara much easier than we think now, making these regions suitable for bio-diesel and ethanol productions. And, by measurement of telluric currents' variation we could be able to predict earthquakes or to discover unanticipated positions of new natural gas and oil seats.

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