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Earth's Magnetic Field—The Key to Global Warming

Bjarne Lorenzen

Kolding, Denmark
Email: bjarne.lorenzen@yahoo.com

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Abstract

It is commonly known that the climate debate suffers due to a lack of knowledge about the cause and effect relationship between a number of climatic temperature variations that have occurred in history without being able to blame human emission of greenhouse gas in any way. Only when we are willing to give up the idea that there is a geodynamo deep inside of the Earth being responsible for the Earth's magnetic field and when we get back to the idea that the origin of the magnetic field is simply ferromagnetic, will it be possible to establish two different cause and effect connections that are suitable to explain why there is an acknowledged coincidence between climatic temperature variations and an intensive, proportional variation in the strength of the Earth's magnetic field. Such insight may easily prove to be decisive at a time when many people can no longer differentiate between politics, mass hysteria, presumptions and actual knowledge. When there are requirements that a solution to climatic temperature variations must contain the solution to the coincidence mentioned, two possible scenarios exist. The one possibility (although not very likely) that is suitable to solve the mysterious coincidence is that mainly the northern part of the Atlantic Ocean is heated from within (from the interior of the Earth) and that variations in the Earth's emission of heat cause primarily all of Europe to have witnessed warm winters for decades. The one possible cause and effect connection may (in theory) be that inner heat in the Earth's crust can loosen frozen, ferromagnetic structures, thereby drive the Earth's ferromagnetic, magnetic field to restructure and be reorganised from periodically being a chaotic, magnetic field to periodically being a well-structured, ferromagnetic field. The connection between magnetism and thermal impact is already commonly known. The other and somewhat more likely cause and effect connection is building on Henrik Svensmark's (and teams) theory that says that variations in the cosmic radiation reaching the Earth depend on the strength of the Sun's magnetic field and that this radiation contributes to creating aerosols, thereby varia-

tions in the cloud formation. Solar storms contribute to temporarily strengthening the Earth's magnetic field. The question is whether these contributions could also periodically have a long-term effect on the Earth's magnetic field. In that case, this may explain the reason for the above-mentioned coincidence.

Keywords

Earth's Magnetic Field, Geodynamo, Global Warming

1. Introduction

The prevailing accepted (Geodynamo Theory) of the Earth has major problems explaining several aspects related to Earth's Magnetic Field as listed below:

- Fluctuations (instability) of the strength of the Earth's magnetic field.
- The South Atlantic Anomaly.
- Many of the crust anomalies (for instance the Central African crust anomaly).
- The reversal of the Magnetic Poles every 200,000 years.
- The coinciding periods (of thousands of years) of correlation between the Earth's global temperature and the strength of the Earth's global magnetic field.
- The correlation between Magnetic Crust Anomalies & Thermal Activities.
- The periodic emergence of 2 (or possibly 4) different Magnetic South and North poles.

Why the Earth's Magnetic Field (hereafter MF) periodically is reversing its poles (Geomagnetic Reversal) and why it sometimes operates at a fraction of its average strength are both huge mysteries. The so-called "inner dynamo" should produce a very stable MF due to the stable spin of the Earth.

Therefore many of the unsolved mysteries connected to the MF of the Earth are so strange that they could be compared to the Earth suddenly reversing its spinor significantly reducing its rotational speed.

However, all these mysterious magnetic phenomena can easily be understood as cause-effect in light of a new theory presented here. The MF of the Earth is simply a ferromagnetic field, solely generated in the Earth's crust. This realization opens the door for also understanding the cause of the coinciding periods (of thousands of years) of correlation between the Earth's global temperature and the strength of the Earth's global magnetic field. As a side effect, it solved the (main causes) of so-called Global Heating.

The following points have been underestimated or not fully understood:

- The magnetic material in the Earth's crust is enough to create a global MF.
- The importance of the "frozen" and "non-frozen" magnetic flux in the Earth's crust.
- Why the ferromagnetic field of the Earth periodically disintegrates and inte-

grates.

- Variation of inner heat flow in the crust of the Earth.

2. The Magnetic Basic State of the Earth

Before the "inner geodynamo theory" took over, the scientific community accepted that the MF of the Earth was a ferromagnetic field created by magnetic materiel in the crust. The new geodynamo theory is in fact only a thesis (speculation). No hard cause-effect evidence really exists. Indeed, the new thesis rather created a lot more problems than it "solved"—and instead prevented us from understanding the true nature of the cause of the MF of the Earth for the last decades.

Today, it is known that the MF of the Earth periodically goes through periods that are dominated by "magnetic chaos". During these periods of fragmented magnetic activity, two (or even four) Magnetic North and South Poles exist, and the magnetic strength of the global field is very weak. The periods of "magnetic chaos" reveal "the key" to unlock several mysteries connected to Earth's MF, and even the key to unlock the main reason to the global heating that we are facing these years.

During periods of weak magnetic activity, it makes no sense believing or claiming that an inner electromagnetic dynamo does in fact exist inside the Earth. During these periods, a global magnetic field simply does not exist.

Periods characterized by a chaotic magnetic state are in reality the basic state of the Earth's Ferro-Magnetic Field (hereafter FMF). It is well-known that during periods characterized by chaotic and weak magnetism and the global FMF of Earth is less than 10% of the normal (average) strength. The remaining 90% of the maximum strength is simply created when the fragmented magnetic "alliances" (again) gather to form a global FMF. The new theory calls this phenomenon: "ferro-magnetic integration". What we see is nothing more than the simple ferromagnetic (continental) alliances, which eventually integrate into a global MF again. Hence, the "basic ferro-magnetic state" is a very simple phenomenon that is simple to understand.

Periods of a weak and chaotic MF are always followed by periods when, once again, a global FMF is created. There is simply no use at all for an inner dynamo theory at any time. All we need to understand is how a chaotic and disintegrated ferromagnetic crust field is reintegrated into a global FMF and also why this field turns back to a period of weakness and disruption.

3. The Two Ferromagnetic Crust Fields

It is a well-known fact that the MF of the Earth has integrating and self-perpetuating properties. For instance, an iron bar placed vertically on the northern hemisphere would immediately create a magnetic north at the top of the bar. As a result, such a bar would (on the one hand) become a (more or less) integrated part of the Earth's global MF and contribute to its total strength. On the other

hand, any "frozen magnetic flux" of the iron bar would point in random directions, preventing fully magnetic integration and therefore also (relative to the possible, full potential) at the same time causing both disruptive and weakening effects.

If the vertical iron bar were to be heated to the Curie temperature and after that cool down again, the iron bar would be perfectly integrated with the MF of the Earth, hence contributing much stronger to the Global FMF of the earth. The integrating of an FMF is a self-perpetuating property that is able to first unite relatively small magnetic areas and thereby finally unite FMF's of continents to eventually unite a global FMF of the planet.

Deep inside the crust of the Earth (where the temperature is higher than on the surface but still below the Curie point), there are optimal conditions for the process of magnetic integration. The "magnetic resistance" is lower in these warmer areas due to disruptive, "frozen" magnetic structures and is significantly reduced.

The thickness of the continents is much larger than the crust beneath the oceans. Magnetic strength is therefore also stronger above the two northern continents. In contrast, the southern hemisphere does not have such large land masses and therefore contributes much less to the global field.

Figure 1 shows a magnetic map and that the 2 great northern continents have 2 strong magnetic areas: one above northern Siberia and the other one above North America. During periods when continental FMF strength is strong, a strong, integrated global crust field easily stretches to the southern hemisphere. The opposite happens during weak magnetic periods. Disintegration of the global FMF of the Earth will first reduce the range. Finally, Eurasia and South/North America will have their own north and south pole.

During periods of magnetic disintegration, Eurasian FMF will draw back its share of the magnetic common magnetic north and south pole in the direction of its own continent, and the same thing will occur to the combined field of the North and South American continents. This is what is happening right now to

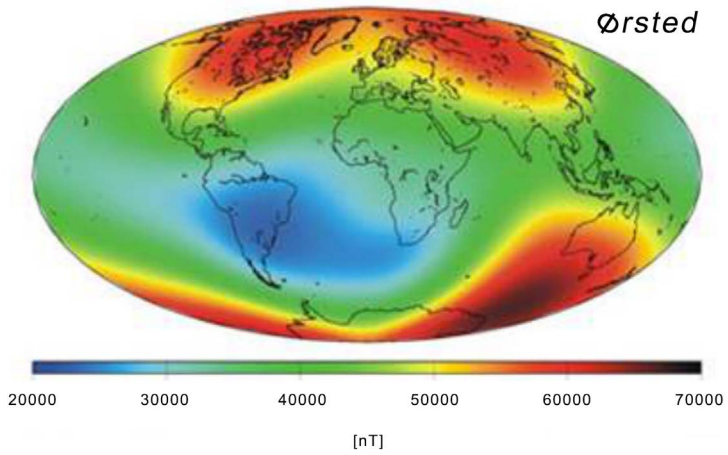

Figure 1. Continental ferromagnetism credit DTU.

South/North America, which also explains the so-called South Atlantic Anomaly. Continued global disintegration (that started 3000 years ago) will gradually weaken the Earth's magnetic extent (Figure 2).

The main cause for this is magnetic entanglement, especially in the northern regions near the Nord Magnetic Pole (NMP). North Canada has been affected the most, and therefore, the combined North and South American MF is weakening dramatically.

The magnetic weakness that we currently see in the Atlantic Ocean (called "*The South Atlantic anomaly*") is in reality the first serious sign of a period when the global MF has begun the process of a separation into two parts. The scientific mainstream community believes that the global weakening of the MF will continue and that a magnetic poles reversal is about to happen. This is most likely not true.

4. Magnetic Integration & Disintegration

The Arctic Ocean is an area of special strategic interest. In the Arctic Ocean, we find one of the biggest and strongest magnetic anomalies on Earth (Figure 3). Therefore, this strong magnetic area is the most obvious area to bring to our attention.

The Arctic Ocean is the natural place where the two big continental ferromagnetic fields are gathered into one global field. The Magnetic North Pole (hereafter MNP) is the entrance to the ferromagnetic field of the Earth. It is especially important to notice that the thermal heat that we find in the Arctic ocean can most certainly cause frozen magnetic flux in that area to release and hence—in the long run—make that area very flexible (easy to adapt to the global FMF) (Figure 4).

Figure 5 shows frozen permanent magnetic flux in the upper surface of the Earth's crust. In the Earth's "lower crust" (orange color), it is increasingly easier to change the magnetic directions until reaching the Curie point.

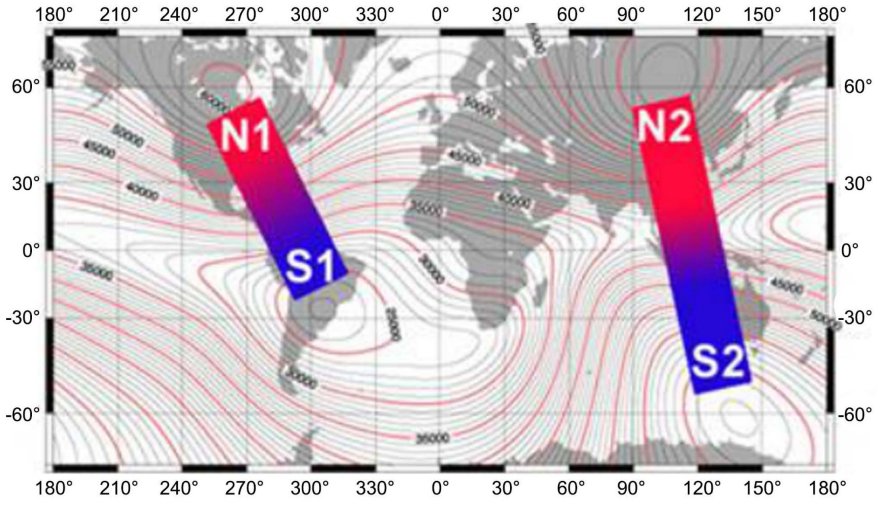

Figure 2. Continental ferromagnetism.

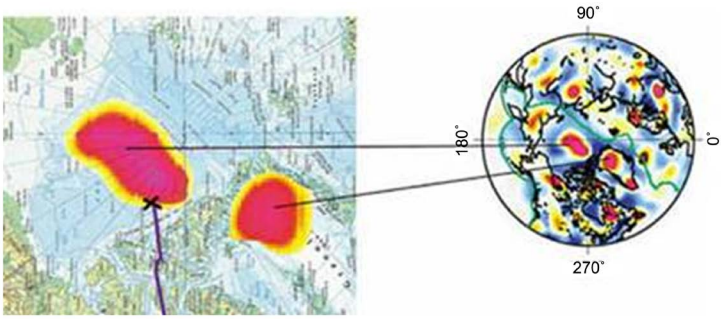

Figure 3. Arctic magnetic anomaly.

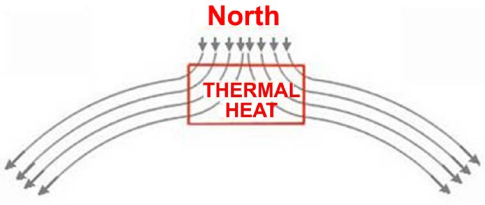

Figure 4. Magnetic "entrance" of the Earth.

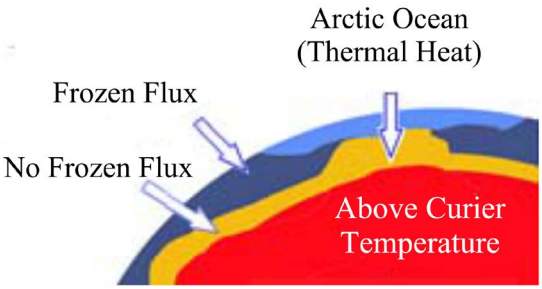

Figure 5. Ferromagnetic crust flux.

Figure 6 shows a green "number 8" in the image. This roughly illustrates the "path" the MNP has been travelling over the past 3000 years. While the MNP travels through the cold underground (and areas with bad ferromagnetic conductivity or frozen flux and hence poor magnetic flexibility), it has a decreasing effect on the global FMF. The MNP movement around such magnetic areas "pulls" new magnetic power lines in its "wake".

Many of these new directions of the magnetic power lines freeze in different chaotic directions. After hundreds of years, these magnetic power lines no longer point exactly to the MNP but instead to the direction where MNP once was. As a result, the movement of MNP in frozen magnetic areas contributes to a disrupted and a decreasing global FMF in its "wake". This is exactly what has happened during the last 3000 years, and that is one of several reasons why the global MF has been decreasing so much through time.

The faster the MNP is moving around in cold chaotic areas, the more it entangles the FMF of these areas. During such periods, the MNP is entangling many of the Earth's magnetic power lines by pointing them into increasingly chaotic magnetic directions. This naturally noticeably weakens the global FMF.

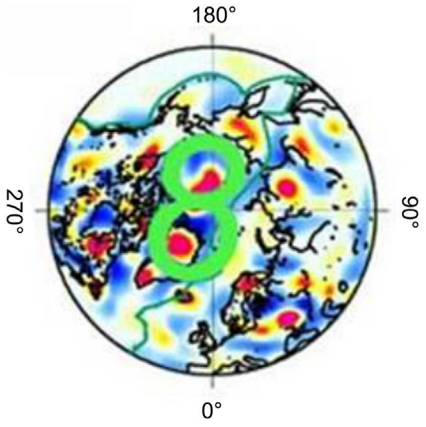

Figure 6. The path of MNP.

The conclusion is simple: the faster and wider the MNP travels over "cool", chaotic magnetic areas of the crust, the faster and wider it entangles the magnetic lines on its way, causing reduction of the strength of the global MF.

Whether the Earth's magnetic strength is increasing or decreasing especially depends on the Earth's magnetic susceptibility at different periods which in turn depends on (as mentioned earlier) the favorable placement of the MNP, simply because MNP is the entrance to the FMF of the earth (Figure 7).

Paleomagnetic data seems to confirm that the MNP is (periodically in the past) situated above the great magnetic anomaly in the Arctic Ocean where strong thermal activity is going on to a depth of up to 5000 meters.

This apparent "triviality" seems to be decisive in regards to whether or not our two big continents (over long periods) are able to magnetically integrate with each other (and therefore grow in magnetic strength).

It has to be noted that during periods of increasing magnetic integration, it is not sufficient that the MNP or the magnetic South Pole (MSP) is situated above the big thermal magnetic anomaly. That is just one of several prerequisite conditions required for strengthening the field.

It is known that the Earth's MF is temporarily "raised" with the contribution of solar storms. However, the susceptibility for permanently absorbing magnetic contribution from solar storms is different from time to time. The favorable placement of MNP makes it possible for the Earth's FMF to maintain these regularly received solar "magnetic contributions". This can very well have a self-perpetuating effect.

5. Continental Magnetic Anomalies

The strength and size of the continental magnetic anomalies are partly caused by materials that can be magnetized in the continental mass. Furthermore, thermal heat in the crust of the Earth often plays a major part, simply because warmer magnetic material of the crust can change the magnetic direction easier and hence adapt to the continuing change of magnetic direction due to the motion of MNP (and SMP) (Figure 8 & Figure 9).

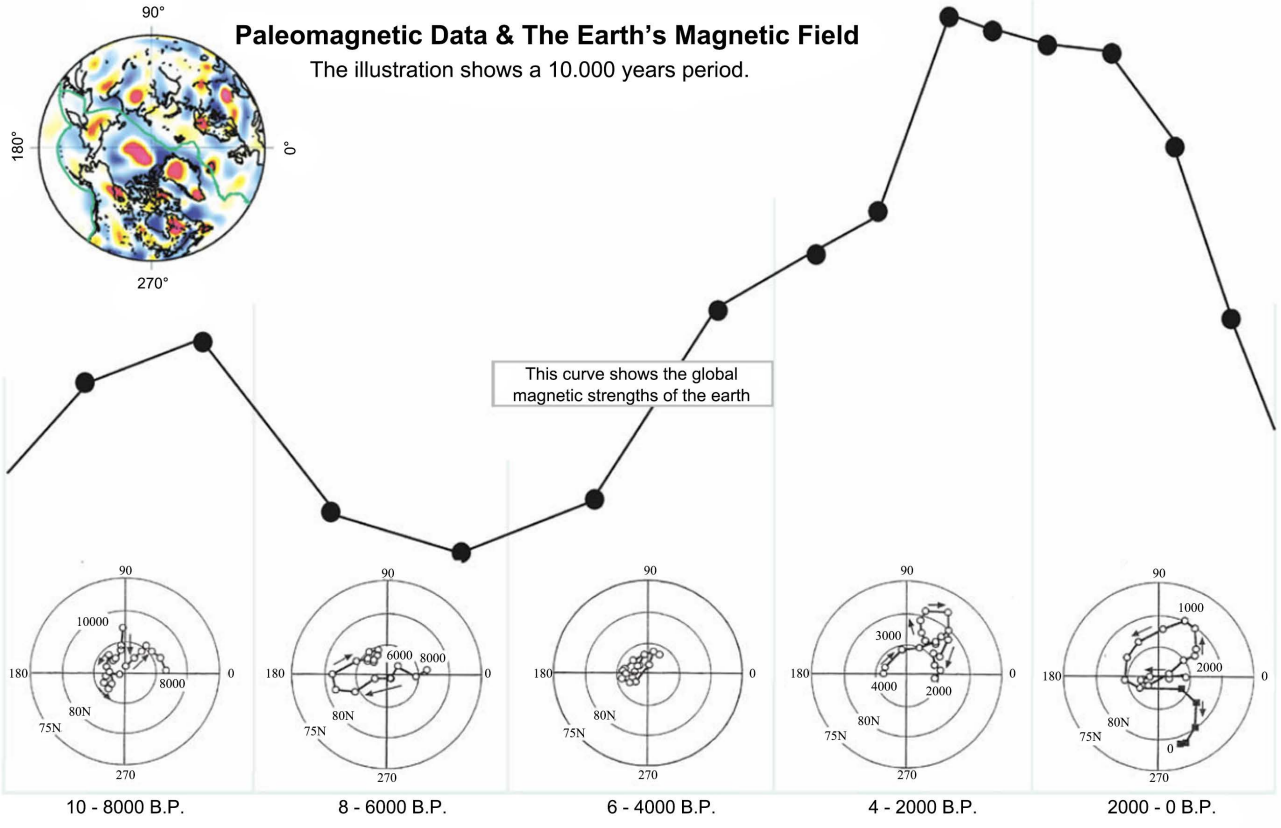

Figure 7. Paleomagnetic data earth magnetic field 0 - 10,000 years B.P.

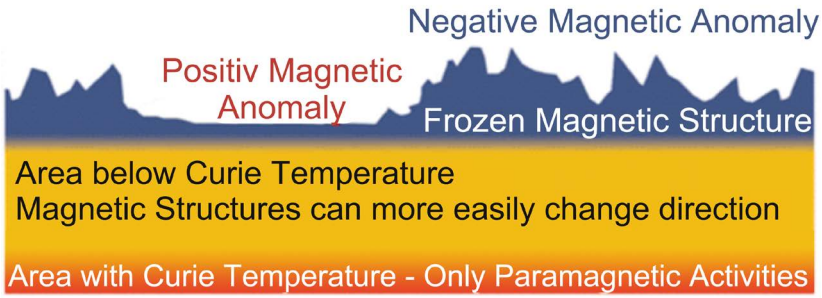

Figure 8. Ferromagnetic structures of the crust of the earth.

6. The Earth's Basic Magnetic State Compared to Mars

It is known that "the basic magnetic state" has a magnetic strength that is only 10% of the normal strength of the MF of the Earth which is around 60,000 nT. The question is whether the magnetic alliances that characterize the magnetic basic state can be divided even further to create smaller magnetic alliances. There is no doubt that further magnetic fragmentation (in periods of the basic magnetic state) will cause the MFs of the Earth to become even weaker. It is easy to conclude that further magnetic fragmentation (in the periods of basic state) will cause the local magnetic strength to decrease further-down to values we can currently observe on Mars (where the local remnants of the global MF show magnetic density of only 1500 nT) (Mars compared to Earth).

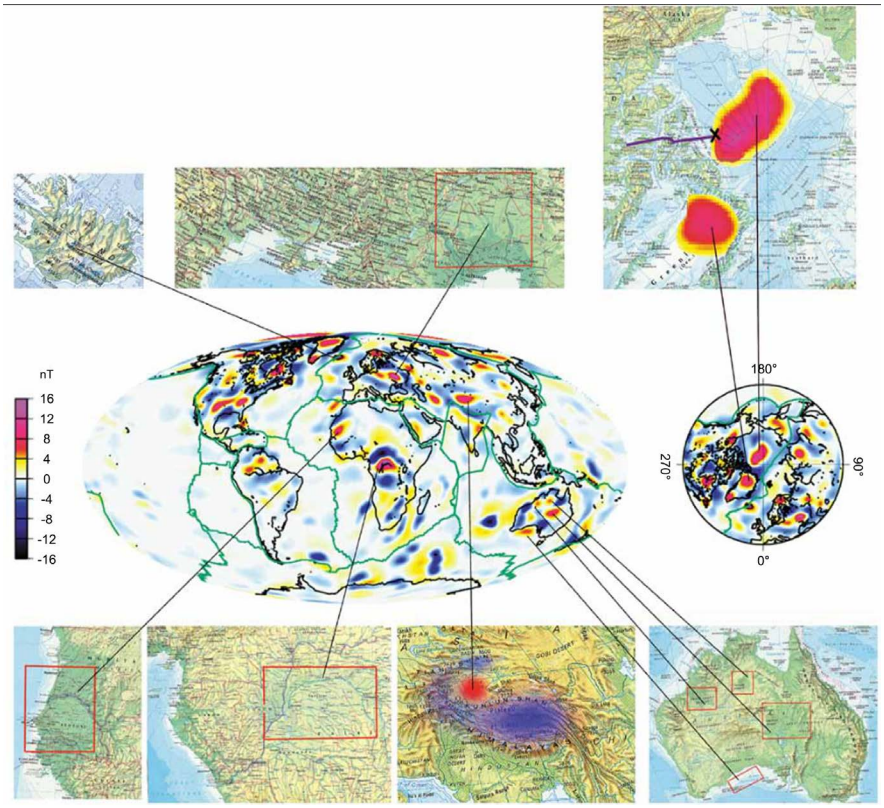

Figure 9. Most of the positive continental magnetic anomalies are positioned either in thermal areas or in great continental hollows where it is known that the thermal heat run-through is greater than in areas that are positioned at relatively higher altitudes. Thermal heated areas can easier adapt to the Global FMF of the Earth. The African (Congo) magnetic crust anomaly and many more are therefore no longer mysteries.

It is very likely that the magnetic field of Mars once was a much stronger magnetic field. The loss of thermal heat in the crust of Mars caused the magnetic structures to freeze in chaotic directions as the crust of the planet was cooling off. With that, Mars lost its chance to start a new process of magnetic integration. What is seen on Mars is that some magnetic alliances (in the crust) remain, but these are very small and probably completely "frozen" and unable to gain any significant size and strength, even locally.

7. The Cause of Disintegration of the Magnetic Field

1) The favorable placement of the Earth's MNP is very important for the magnetic susceptibility of the Earth's FMF and is therefore also important for a possible magnetic contribution from the Solar wind/storms. In addition to the favorable placement of MNP, one or two prerequisites are important.

2) Where in the crust that large (periodical) heat flows take place through the crust of the Earth, how widely spread these are as well as how strong the periodical activity is. Especially important is the crust of the Earth under the oceans. (Only few years ago, scientists begun to map the thermal activity taking place in the arctic ocean.)

3) Regardless of whether variations of heat flow (point 2 above) in the Earth's crust is of minor importance or not, the solar activity is a very important factor for maintaining the Earth's FMF. Periods of favourable placement of MNP combined with large solar magnetic contributions from the Sun must in any case be expected to reinforce the Earth's FMF for long-term periods. Periods of large magnetics susceptibility does have are organising impact of the Earth's FMF.

8. Correlation between the Temperature of the Earth and Earth's Global Magnetic Field

Long-term coincidence between climatic temperatures of the Earth on the one hand and the global strength of the MF of the Earth on the other is a well-known and accepted fact.

Figure 10 and Figure 11 show the temperature and magnetic data sets. In Figure 12 these data are combined. After the last Ice Age, it took our planet 4000 years to reach the climatic temperature we have today. Periods with greater thermal heat releases from the interior of the Earth, especially in the Arctic Ocean, can cause a diminishing ability of the Arctic Ocean to properly participate in the process of cooling down the warm water masses of the Gulf Stream as well as to release frozen magnetic flux.

The coinciding data clearly indicate that the cause of ice ages is almost completely misunderstood and that Milankovitch cycles are far from enough to fully understand the cause-effect process (Milankovitch Cycles). Figure 12 shows the red graph (Earth's magnetic field) intensely following the temperature graph (black graph). As can be seen, the magnetic field does not coincide with the much faster variations in the temperature graph, meaning the ones varying from a couple of hundred years to a couple of thousand years.

The reason is that the strength of the magnetic field is determined by two factors:

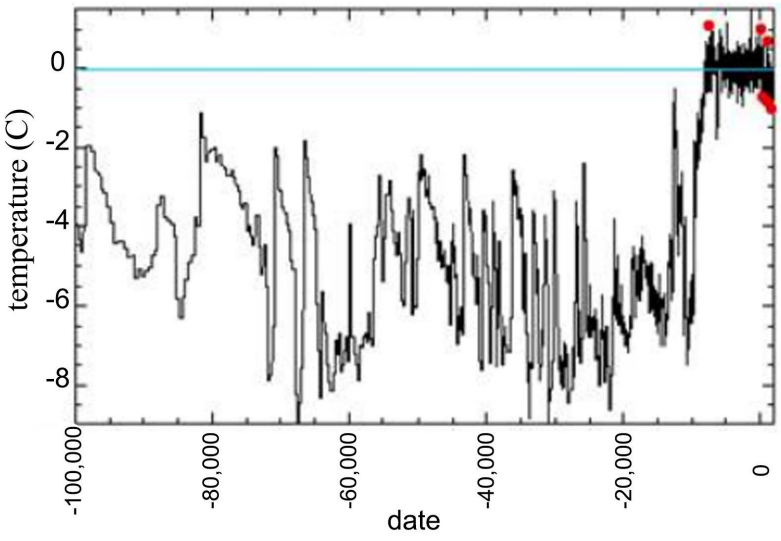

Figure 10. Temperature variation 100,000 years.

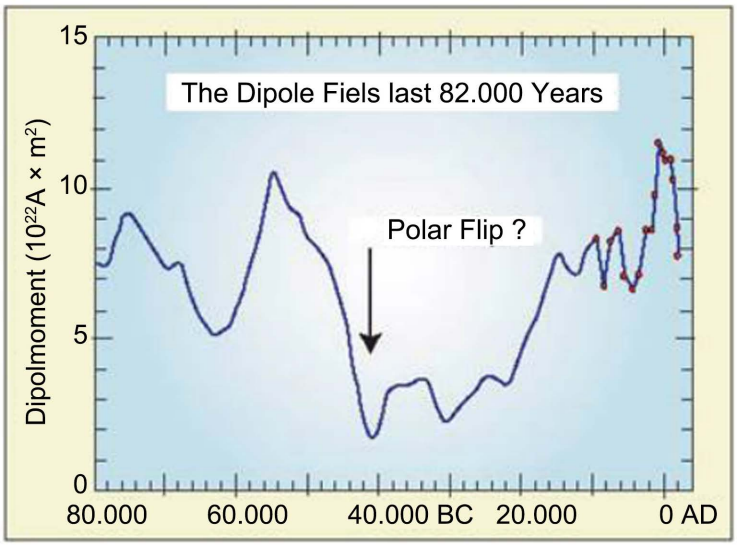

Figure 11. The dipole field for the past 82,000 years.

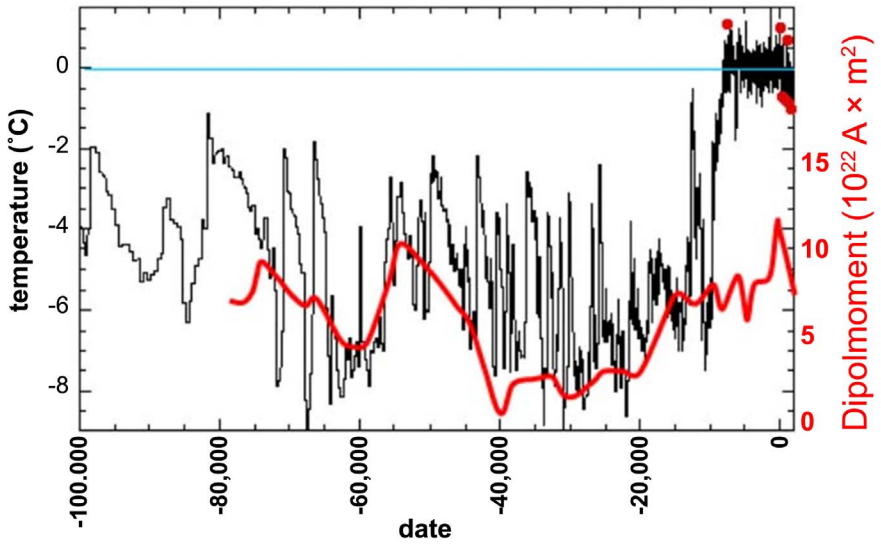

Figure 12. Atmospheric temperature and magnetic magnitude 0 - 80,000 years B.P.

- partly determined by either the heat flow and/or solar activity variations shown by (Henrik Svenmark);
- and partly determined by MNP in an area with various magnetic susceptibility. The fast, stray MNP causes the quick variation of the magnetic field.

9. The Long-Term Movement of the Poles

Currently, the MNP is situated in northern Canada. Since 1831, we have seen that the MNP has begun to move towards Eurasia. This shows that during the past 150 years, the Eurasian field has lost strength faster than the combined (North and South) American MF or (more likely) that large magnetic entanglement in Northern Canada has dislocated the North/South American Field (Figure 13).

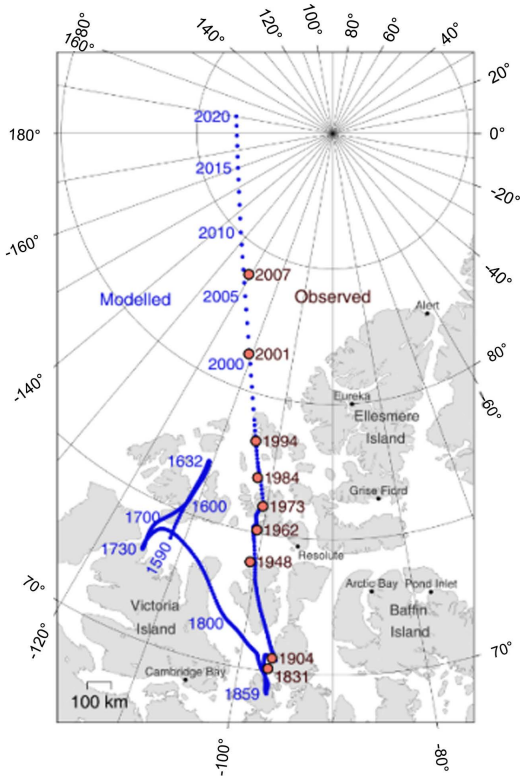

Figure 13. The path of MNP from 0 to 400 years B.P. (Credit Wikipedia).

The direction and speed of the MNP during periods of disintegration can generally be understood as an indicator of which part of the Earth is losing/changing its magnetic strength (or magnetic position) and how quickly it happens (**Figure 14**).

10. The Reversal of the Magnetic Field ... (The Magnetic Pole Reversal)

Why does the MF of the Earth reverse during periods of 200,000 years that are characterized by the basic magnetic state?

The main reason is magnetic entanglement.

In addition to that;—if the thermal heat flow in the Arctic Ocean periodically (during the Ice Ages) more or less disappears, that will have a significant dramatical impact on the MF of Earth.

The thermal areas (in the Arctic) is a strategic important entrance for the MF of the Earth,—If frozen flux, especially in the Arctic Ocean begin to dominate,—that area will lose its ability to magnetically integrate with the global MF. This will cause accelerating magnetic disintegration of the global MF.

The global MF can no longer stay as one and splits into two huge parts (and later, possibly into four parts): magnetic chaos begins to rule, and repeated magnetic pole reversals can easily take place.

5 million years ago, the duration of an ice age was a little less than 15,000 years—after that a gradual increase to 100,000 years. The temperature variations

are also far less.

If perturbation (Milankovitch cycles) were in fact the true explanation of the ice age cycles, a symmetrical sine curve is to be expected rather than the very sudden endings of the ice ages (and the interglacial periods). As indicated by Figure 15, the ending of an ice age (and interglacial period) only takes a couple of hundred years (and not tens of thousands of years as could be expected), emphasizing that something far more drastic (than a relatively slow perturbation) causes the Earth's climatic temperature variations.

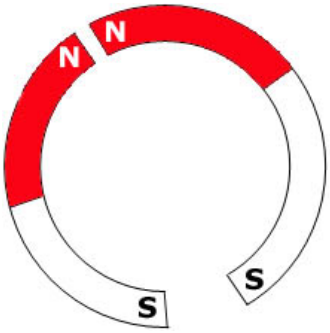

Figure 14. Continental ferromagnetism.

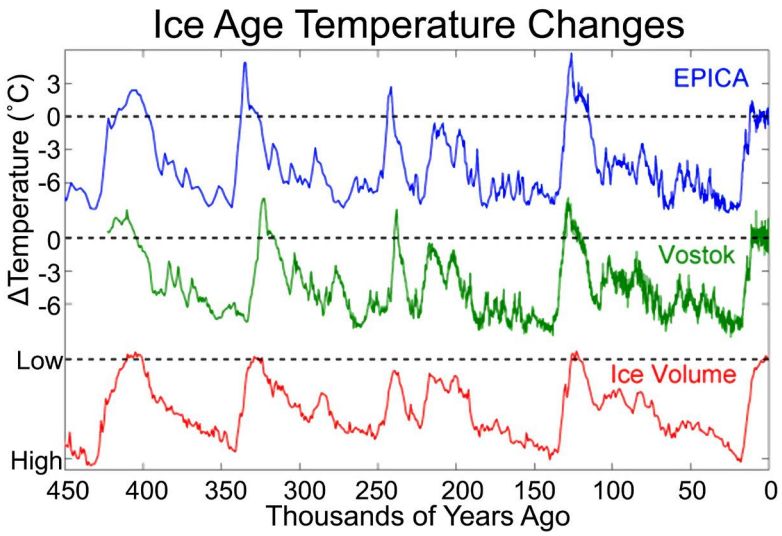

Figure 15. Shows the pattern of temperature and ice volume changes associated with recent glacials and interglacials (Credit Wikipedia).

11. Conclusion

In conclusion, there is no need for an electromagnetic inner dynamo theory to explain:

- the periods of the basic magnetic state,
- the integration process,
- the magnetic pole reversal,
- the magnetic anomalies,
- the movement of the magnetic poles,

- anything else...

We are dealing with a simple and completely natural ferromagnetic process in the Earth's crust busted by the solar wind (and nothing more than that). Much points in one direction: areas containing thermal heat play a role in shaping the FMF of our planet (because these areas hold very great integrating forces on the local level as well as in relation to the global field). An unknown contribution to the cause of ice ages could very well be less emission of inner heat.

The largest contribution to climatic change (also these days) is most likely the correlation between solar activity and cosmic radiation reaching the Earth resulting in cloud formations as shown by Henrik Svensmark and his team (Henrik Svenmark; The Sun Allergy of Climate Researchers; Henrik Svensmark's Research). As the ocean accumulates heat, a delay in the cause-effect must be expected.

A consequence must be that periods of solar activity are not always brief (which means not only periods of 11 years or periods of a few hundred or thousand years) but also periodic solar activity cycles that last 100,000 years—before that 41,000 years and before that 15,000 years. This is required in order to be able to link the coincidence between climatic temperature and the Earth's magnetic field.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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