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Geological Specimens, Minerals, and Actions Affecting Polar Shift and Earth's Magnetic Field

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Abstract

This study will touch upon Earth's magnetic field, the four spheres, and their relationship with polar shift influenced by the magnetization of the interior and surface areas. It will outline how certain aspects within the spheres are influenced by magnetization of minerals and localized rock, how such can be contained deep within Earth's mantle areas, as well as how mining deposits of iron ore can affect other spheres and systems. It will also entail a brief explanation of geological research concerning the Pacific Ocean floor, as well as a discussion on the magnetization of minerals retaining their properties at extremely high temperatures within Earth's interior. There will be explanations of how various spheres interact with each other, but it should be noted that while some findings here might seem unsubstantiated, any analysis of Earth's interior and exterior, the magnetic field, polar shift, and its contagion effect upon living organisms, is still, somewhat, in its initial research stages, and is, at times, left to hypotheses concerning anomalous indications. This study is not conclusive. It has, at best, pieced together areas of relevance. Concluded here is that each event affects polar shift. How this has been affected by magnetization is not completely, at this time, understood. Furthermore, this report in no way promotes the "doomsday scenario", prolific, fairly recently, within some of the scientific literature on this subject, particularly in Europe. This paper closely adheres to the most modern theories, and will try, at best, to leave speculation to science fiction writers.

Keywords

Polar Shift, Magnetic Field, Atmosphere, Lithosphere, Hydrosphere, Biosphere, Iron Ore, Hematite, Magnetite

1. Introduction

This paper discusses our planet's dynamics, starting with a brief discussion of the Earth's innermost areas and how these interact with, and affect, the four spheres that modern geological scientists use to evaluate planetary changes. It will also focus on the Earth's magnetic field and how this is a direct result of the convection of liquid iron within our Earth's inner and outer core. The purpose of this evaluation is to determine any magnetic paradoxes occurring within our planet, how these react with the four spheres, and in doing so, will include a discussion dealing with our planet's magnetic field and the main iron oxides affecting it, *i.e.*, geological specimens like hematite and magnetite. Additionally, I will discuss the newest revelation that iron oxides actually have a very high critical temperature, and maintain it within the planet's deepest regions.

2. Factors Affecting Polar Shift and Magnetic Field

Hematite is a heavy oxide mineral and is Earth's most prolific iron ore. It contains a high iron content of 70% and preserves its magnetic properties even when it is both inside and outside our planet's mantle. This is important to mention since Earth's mantle was previously thought to be without magnetic properties, since Earth's inner high pressures and temperatures would eradicate them [1]. This new finding has also impacted our present knowledge of other planetary systems. For example, we now know that Mars, a planet without a core magnetic field, is still magnetized due to its mantle. While our own planet's core contains liquid iron alloys causing electric flows, the rocks within our Earth's crust also send signals, and these iron oxides play key roles in our mantle's magnetization. Hematite, for example, which retains its magnetic properties down to Earth's mantle, can be located in tectonic plates, and we now know from studying it that Earth's magnetic field is quickly and erratically changing. Furthermore, Earth's inside core, crust, and mantle are all affecting these fast changes. We now know there are magnetically ordered materials contained within our mantle, and from studying their effects on our Earth's magnetic field, we can better see any future impacts this might have on our planetary poles [2] [3].

Looking at our magnetic field is extremely important when considering one naturally occurring phenomenon: future polar shifts. Right now, satellites are being used to study the phenomenon, and we now know that Earth's geomagnetic poles were never stagnant, and in more recent geological history, our poles seem to have flipped every 200,000 - 300,000 years. It has been estimated that our planet's last polar shift happened around 780,000 years ago, so we are long overdue for another one, and right now, geological scientists are seeing erratic and fast changes in the movement of our magnetic poles. This is of great note since a polar shift would eradicate our current biosphere as we know it [4].

2.1. Lithosphere

Concerning our lithosphere, we know it comprises the planet's crust, mantle, and core. Deep inside Earth's core and crust there are clear indicators of our planet's magnetic field. Long thought to be de-magnetized, we now know that our mantle is comprised of iron oxides that actually retain their magnetic properties deep inside the mantle. But from studying our mantle alone, the lowest part appears to be vastly different than all other sections [1] [4]. We know this from analyzing basalts, a type of volcanic rock formed from fast cooling lava. Basalts contain some of the most complex chemicals on our planet, and from studying them, we can see just how plumes and other components within the Earth's mantle interact, as well as how these lead to a very complex chemistry [3].

Mantle convection is something we need to take into account whenever discussing polar shift theory, since it is a main cause behind continental drift. Mantle convection triggers earthquakes and volcanoes on the Earth's surface, and from it, material from the lowermost part of Earth's mantle is carried upward, giving scientists opportunities to study the composition of Earth's deepest areas. Rocks, at the planet's mantle, become heated to about 4000 K, causing them to expand and have a lower density. Then, now buoyant rocks, called mantle plumes, float upward to the surface. Fully understanding this process is important since interactions occurring within our Earth's interior must adhere to the same state of physics that we know to be correct everywhere else on our planet, namely conservation of mass, momentum, and energy. Moreover, our Earth's mantle has some very different compositional reservoirs, including extremely ancient, more-primitive ones existing at its lowermost point, *i.e.*, recycled oceanic crusts, and depleted background mantle, and surface lava's complex geochemistry evidences this, since its components are made up of various deep-mantle reservoirs [2] [5]. Lava is carried to the surface by mantle plumes, and thus contains both young and old oceanic crust amalgamated together with Earth's depleted mantle. All this is an important finding, since the cycling of oceanic crust through mantle reservoirs explains the different recycled oceanic crustal ages of our planet. Furthermore, as liquid metal within Earth's outer core moves, it generates electric currents, and this causes a magnetic field. The constant movement of liquid metal through our magnetic field creates even stronger electrical currents and thus has a more powerful effect on our planet. This is called the geomagnetic dynamo, and once great enough, it can eventually lead to polar shift [6].

The magnetic field surrounding our planet protects us from radiation and other charged particles coming from outer space. Each day we wreak havoc on it, thus causing more instability. One such potential hazard comes from the mining of iron ores, like hematite, which pollutes the air when it forms nitrous oxide, carbon dioxide, carbon monoxide, and sulfur dioxide by the equipment used to extract it, thus affecting not just the Earth's energy and electromagnetic field, but all plant and animal life. With the known carcinogenic effects iron ore mining has on animals, causing potential DNA damage and disease, alternative extraction methods need to be sought out, or else these prospects should be abandoned altogether for the good of the environment. Not only does the mining of iron ore cause pollution of heavy metals and acid that drains from mines, but radioactive dust is blown from iron ore mining sites to populous areas, where surface land

and water can then become contaminated, and it must be noted here that many extraction sites also cause considerable groundwater contamination as well [7] [8].

One major question asked is just how much of an impact does the iron ore mining industry and heavy metal displacement have on Earth's magnetic field [6]. While mining operations are relatively small compared to the size of the Earth, our planet's magnetic field remains highly variable locally, and this is even how we prospect for iron ore deposits in the first place. We do not yet know what effect these localized, heavier deposits have on Earth's magnetic field, and the result of extracting from these more heavily magnetized areas, and unfortunately, without knowing this information or the potential dangers, we continue to do it anyway.

2.2. Biosphere

Concerning the biosphere, it has long been known that many animals navigate using Earth's magnetic field. Moreover, our magnetic field is used by various species to migrate to other locations. We even know that certain species of both plants and animals can either see or sense the magnetic field through a type of protein naturally produces within the organism or their bodies, and the term for that is magnetoreception. It has also been determined that the protein being produced by birds, for example, to detect Earth's magnetic field is much higher during their migration seasons. Interestingly, it has recently been discovered that the beaks of avians, the bones within the nasal areas of many mammals like humans, and the brains of all living creatures contains the iron oxide magnetite. This highly magnetized mineral then acts as a sort of navigation system, signaling information relative to the animal's location within our planet's poles.

Since we know that animals utilize the magnetic field for orientation purposes, the effects of these constant changes within our erratically changing lithosphere are not yet knows. This is perhaps why we are now seeing anomalous events, like a displaced Stellar's sea eagle in Maine unable to return to Siberia, or the premature deaths of bees at various locations throughout our planet within recent news stories. Unfortunately, the magnetic field utilized for orientation purposes is constantly changing, and this is why geoscientists are keeping it constantly under surveillance [8] [9] [10].

2.3. Hydrosphere

We actually know about the Earth's past magnetic fields by studying the igneous rocks in our lithosphere, but concerning our hydrosphere, we actually know about past reversals of our magnetic field by studying our mid-ocean ridges. Deep within the Pacific Ocean, scientists have discovered valuable information pertaining to the polar shift anomaly. One of the previous polar shift routes that has been analyzed lies in the western part of the Pacific Ocean (the Murray and

Marquesas fracture zones on the Pacific plate) and corresponds to electromagnetic sources discovered within the Earth's mantle. Interestingly, the geological research being done in the Pacific Ocean pertaining the past polar shift does not coincide with the same known route measured on Earth's land surfaces. Instead, the routes of past polar shift evidenced in the Pacific Ocean seem to have originated from an unknown source of hematite underneath the ocean floor, as well as deep below within the Earth's mantle itself. Magnetic anomalies can be detected within our mid-ocean ridges [11]. The ocean floor spreads, magma comes up from the mantle, cools, then forms basaltic crust along the ridges, then it is carried away. As it cools, however, it records the direction of the Earth's magnetic field at that point in our planet's history.

Our Earth's ancient, paleomagnetic poles are believed to lie somewhere in our oceans. Scientists now believe that the locations for our ancient poles denote that the Earth's spin axis changed well over 44 million years ago, and while many researchers are not in agreement about when this shift occurred, studying these locations within our oceans provides a plethora of suggestions for the migration of Earth's spin axis, but it also indicated how little we actually know about plate tectonics and their dynamics. One theory even suggests that polar wander has nothing to do with observable tectonics, but instead suggests that the Earth's lowest mantle areas may be the reason [12] [13].

2.4. Atmosphere

It goes without saying that our Earth's magnetic field pertains to our atmosphere, since it extends from our planet's interior then out into space. In space, the electromagnetic field protects our planet from the Sun's dangerous solar winds, but it also interacts with particles emanating from our Sun. The electromagnetic field would not exist without Earth's electrical currents and the planet's motion. Earth's motion is due to something called "convection currents" which are caused by the heat, as well as the magnetized minerals, leaving Earth's core. The magnetosphere is the outermost area of the Earth's magnetic field within space and then extends outward tens of thousands of kilometers into space and protects our planet from events that could potentially harm our atmosphere, such as cosmic rays [14] [15] [16].

In conclusion, further study is needed to determine the Earth's magnetic field and its relevance on the four biospheres. In order to determine when our next polar shift might occur, we still need to better understand the multiple clues detecting our planet's past dramatic shifts. Moreover, we still remain somewhat lost on the erratic behavior of our planet's magnetic components, plus how these minerals interact with Earth's four spheres.

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Conflicts of Interest

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

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