A SHORT MONOGRAPH ON
LIGHTNING AND THE EARTH'S CHANGING MAGNETIC FIELD

By

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The current train of thought in earth physics[1] seems to be that the earth's magnetic field is going to reverse its poles at some point, which evidence from hardened lava suggests happens every few hundred thousand years. Apparently, the earth's magnetic field fades slowly and then reappears with its poles reversed. The main question for this paper is how slowly does the magnetic field fade? The current view is that when the earth's magnetic field disappears, this aegis will no longer protect us from charged radiation from the sun, as well as from charged cosmic rays. Such protection is evidenced from the existence of the Van Allen Belts.

However, before this complete fading out occurs, there is another possibility, which could suggest itself; namely, the magnetic field could very slowly contract as part of its disappearance. As this field contracts, there is a distinct possibility that it could drag the Van Allen Belts much closer to the earth and to the earth's atmosphere, thereby interacting with the earth's atmosphere. What would happen if a large source of free charged particles is brought into contact with the earth's atmosphere?

The current view is that lightning in thunderstorms is caused by ice particles interacting with each other through friction, thus causing charge separation. Of course there are other causes of lightning, caused by frictional charge separation, such as is found around erupting volcanoes and near tornadoes. This paper wishes to point out that the interaction of the atmosphere with this hypothetical large source of free plasma could result in larger and more devastating storms with lightning bolts many times more powerful than those we now experience. That is why the question was asked earlier as to how slowly the magnetic field would fade. If it fades over a very long time, such as decades or hundreds of years, while the contraction stabilizes, then as the charged particles from the Van Allen Belts are depleted into the atmosphere, there is a possibility of a continued renewal of charged particles from the sun and from cosmic radiation. We might then end up with a steady state process between depletion and renewal of charged particles in the Van Allen Belts during its period of interaction with the earth's atmosphere.

These hypothetically much more powerful lightning bolts could, in effect, heat up the atmosphere, as well as the earth itself, causing a much faster evaporation of moisture. Ice ages cannot occur unless a part of the earth is hot enough to create the evaporative moisture which then condenses over the cooler parts of the earth. The Milankovitch Theory[2,3] and other theories give astronomical causes for ice ages, but these theories are apparently not entirely in accord with all the evidence. Perhaps there are non-astronomical or terrestrial contributions to the theory of ice ages. While this paper assumed powerful lightning bolts as flows of electrons, there are other charged particles in the Van Allen Belts. Could there ever be proton lightning bolts?

References

1. https://www.physics.org/facts/frog-magnetic-field.asp

2. http://curry.eas.gatech.edu/Courses/6140/ency/Chapter10/Ency_Atmos/Ice_age.pdf

3. P. Colinvaux, *Amazon Expeditions: My Search for the Ice-Age Equator*, (New Haven & London: Yale University Press, 2007) p. 235