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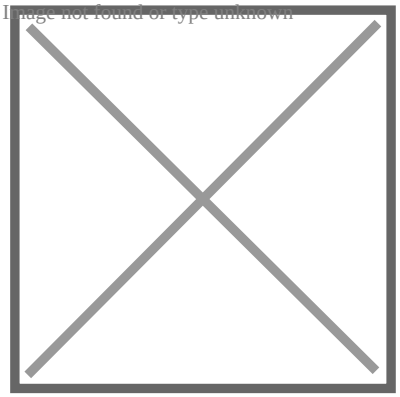

You Can’t Teach An Old Climate Change Dogma New Tricks

Description

WORLD : Any author trying to publish anything even remotely critical of the IPCC climate change story will be stymied by toe-the-line peer-reviewers who are too conflicted, hostile, venal, lazy, or dull to formulate a coherent rebuttal.

In my case (12 attempts) it was the article which forms the basis of today’s post, a publication downloadable here from PSI PROM, that commits numerous heresies, the main one being the proposal of an integrated physical model characterizing geomagnetism and geothermal heat, two of the main Earth-internal time-variable power sources.

Scientific “heresies” are hereby defined as demonstrably true theories that have not (yet) been published in a peer-reviewed journal, and are therefore deemed dismissible without judgment, reason or thought by peer-reviewers – a Catch-22.

Heresy 1: Earth-incident solar particle events transfer significant energy to Earth’s Outer Core

A solar particle event (SPE) is an energetic stream of charged particles – mostly protons – that is sporadically emitted by the sun.

When an SPE enters the interplanetary space it follows the heliomagnetic field that oscillates around the heliomagnetic equator, which in turn is at a slight angle to the “invariable plane” of my previous post.

Earth incident SPE’s, such as the 1859 Carrington event, cause so-called geomagnetic storms, or periods when the Earth’s magnetic field is severely disrupted: the Carrington event caused geomagnetic disruptions of up to -1,750 nT.

The cartoon below demonstrates how Earth’s magnetosphere is disrupted and deformed during the deflection of an SPE stream: charged particles such as protons that move through the geomagnetic field are deflected by the Lorentz Force, which deviates them at a right angle to both their movement and the magnetic field direction.

The overall result is a deformed geomagnetic field that is compressed on its day side and extended on its night side.

Faraday's law (3rd Maxwell equation) predicts that a magnetic field that changes in time (i.e. is deformed) induces a circuiting electric field, whose magnetic field in turn opposes ("tries to undo") the initially varying magnetic field.

The word "induces" – whereby one disturbance creates the other is somewhat inappropriate, as Faraday's law states that one cannot exist without the other.

In other words, the law states that the deformation of the geomagnetic field by the SPE must be accompanied by a circuiting electric field.

Mini-heresy 1a: this electric circuit is generated in Earth's outer core

It's surprising that this heresy generates any controversy. It is commonly accepted that Earth's magnetic field is generated in its ferromagnetic Outer Core, so Faraday's law states that deforming the geomagnetic field in the Outer Core should generate a circuiting electric field there, a circuiting current whose magnetic field opposes the initially varying magnetic field.

Consensus science however maintains that the circuiting electric field is generated and dissipated in the low conductivity Mantle, despite the fact that this hypothesis clearly violates a Maxwell equation, which would earn you an "F" on your high school physics paper. An example avoids diving fully down this rabbit hole, and demonstrates the truth of the matter.

A plot of the historic magnetic north pole positions shows that a magnetic excursion – a sudden shift in the travel direction of the magnetic north pole – happened in 1859, the year of the large SPE Carrington event.

Such large SPE's occur once every 500 years, while large magnetic excursions happen once every 100-1000 years.

The probability of the both fortuitously happening in the same year is therefore very small: the Carrington event demonstrably disrupted the geomagnetic field in 1859 and therefore almost certainly (p>99%) caused the geomagnetic excursion.

Geomagnetic intensity animations indicate the geomagnetic field intensity was increasing in North America up until the Carrington event, after which it started decreasing.

It is commonly accepted that geomagnetic field strength decreases when Outer Core temperatures increase[1].

The Carrington event therefore very likely induced an Outer Core electric current circuit that generated magnetic energy that opposed the event's deformation of the geomagnetic field and dissipated some energy as waste heat.

The waste heat warmed the Outer Core which in turn caused the geomagnetic field strength under North America to start decreasing, causing the magnetic north pole movement to reverse.

Heresy 2: Earth-incident solar wind transfers its energy to Earth's Outer Core

The solar wind consists of a stream of charged particles – primarily protons – that is ejected from the Sun's corona at supersonic speeds, and is accompanied by stream-embedded magnetic energy. Its main difference with an SPE is that it forms the fairly steady plasma stream that carries the interplanetary heliomagnetic field.

The magnetosphere cartoon above can therefore also be used for solar wind emissions as the principles are identical: the solar wind deforms the geomagnetic field and thereby induces an electrical current in the Outer Core that opposes the original deformation, whereby some of the electrical energy is dissipated as waste heat.

The average Earth-incident solar wind power of 5 TW[2] is similar to the estimated 4 TW of heat lost by the Outer Core to the Mantle[3,4], as well as the estimated 3.6-10 TW[3] necessary to power the geomagnetic field, all of which are very unlikely to be fortuitous given that solar wind energy is inducing electric current circuits in the Outer Core, and that a time- or spatially-varying electric circuit induces/accompanies a varying magnetic field.

The solar wind power estimate of 5 TW is based on an average solar wind speed of 400 m/s, though solar wind speeds are regularly twice as fast, indicating that 4-10 TW is a reasonable estimate of its power.

Note that due to Earth's rotation the solar wind causes a longitudinally-shifting ~35 nT decrease of the geomagnetic field on Earth's sun side; a back of the envelope calculation of the maximum power of the Carrington event yields -1750/-35 * 5 = ~250 TW, which is more than enough to severely disrupt the geomagnetogenic process.

Heresy 3: the Carrington event caused an increase in geothermal heat flux and volcanism

Heresy 1 documented that the Carrington event heated the Outer Core under North America. The Outer Core can only cool – and the geomagnetic intensity can only ever increase again – if this excess heat is shed via the Mantle to Earth's surface, that is through an increase in geothermal heat flux.

A plot of erupting North American volcanos (VEI>=4; summed per decade) versus time documents the increase in volcanic activity 10-30 years after the Carrington event (1873-1889). Two other probable SPE's preceded periods of increased North American volcanic activity, though their occurrence is still being debated.

The "NIDE" event around 1900 was recognized by Shea et al.[5] as the second most powerful SPE (after Carrington) in the last 450 years, based on nitrate impulsive deposition events in polar ice cores, while the IC14D event documents a significant IntCal20 C14 deviation around 320 BP, or ~1700.

Heresy 4: the covariation of geothermal heat and geomagnetic intensity

Another controversy where the truth is self-evident. It is commonly accepted that Outer Core energy

powers both the geomagnetic field as well as the estimated 4 TW of heat lost by the Core to the Mantle[3,4].

The magnetogenic process that generates the Earth's global magnetic field cannot be 100% efficient, and therefore almost certainly generates waste heat on a large (global) scale.

Most energy forms readily convert to heat, but the reverse is a highly inefficient process: for example, a theoretical magnetogenic thermal dynamo's efficiency is on the order of 10-20%[3,4].

The geomagnetogenic process generates magnetic energy and waste heat that are not evenly distributed, so very likely generates at least some of the observed geothermal and geomagnetic anomalies at Earth's surface. Geothermal and geomagnetic data should – and do – therefore show significant spatial and temporal covariation.

The Northern Hemisphere (NH) has two geomagnetic non-dipole (radial geomagnetic energy) anomalies centered around 55° N latitude and 90° W and 100° E longitude resp. (top left map), locations that coincide with surface heat flow low anomalies (top right map).

Both locations are in the center of their continental plates, remote from any hot, active plate margins. An argument can be made that a relatively thick continental crust results in a lower surface heat flow than a thinner oceanic crust, but this cannot explain why – in a hemisphere that is ~60% covered by ocean – the geomagnetic anomalies are located at the center of continental plates.

No plausible feedback mechanism exists between the Outer Core geomagnetogenic process and crustal composition or thickness, so the observed NH geomagnetic and geothermal anomalies are likely caused by a single process that focusses radial magnetic energy at the center of continental plates while focusing waste heat at the plate margins, thereby – at least partially – also driving continental drift.

The disruption of the magnetic field by SPEs and solar wind powers large-scale electric current circuits (bottom right map, grey lines) that generate geomagnetic energy (Faraday's law) and waste heat.

An integrated geomagnetic-geothermal-temperature model

The previous sections document the elements of the geomagnetic-geothermal feedback loop.

Negative loop: the Outer Core heats when SPE and solar wind energy increase, causing a geothermal heat flux increase and a geomagnetic intensity decrease
Positive loop: the Outer Core cools when SPE and solar wind energy decrease, causing a geothermal heat flux decrease and a geomagnetic intensity increase.

Geomagnetic field intensity and geothermal heat flux are therefore mostly anti-phased, a topic that will be demonstrated and further explored in the next week's post.

The previous post's (normalized) Orbital Inclination (OI; black), SPECMAP temperature (dashed blue), and Guyodo Valet geomagnetic intensity (dashed red) combination graph below may at first glance seem a mass of uncorrelated spaghetti. However, the previous post. demonstrated their strong, common 100 ka periodicity links them.

a) 3/8 period OI increase and SPE and solar wind energy decrease subcycle: as the orbital inclination angle increases, and Earth moves further away from the heliomagnetic equator, and incident SPE and solar wind energies decrease, causing the Outer Core to cool, whereby geothermal heat flux and surface temperatures decrease and geomagnetic intensity increases.

b) 1/8 period OI peak and SPE and solar wind energy decrease subcycle: although the orbital inclination angle is still increasing, the rate of change in OI and therefore incident SPE and solar wind energy is becoming smaller, weakening the electric current circuits.

The Outer Core temperature hereby drops to a minimum temperature whereby it no longer supply heat to the Mantle and Inner Core, reversing the heat flow direction and preventing the Outer Core from further temperature decrease.

The geomagnetic intensity however decreases due to the still decreasing SPE and solar wind power.

The progressively lower strength geomagnetic field will be increasingly deformed by the incident SPE and solar wind energy, generating relatively stronger currents that heat the Outer Core, causing further decline in the geomagnetic intensity.
c) and d) are resp. the inverse of a) and b).

Summary

An integrated geomagnetic-geothermal-surface temperature model is presented whereby Orbital Inclination variations drive changes in Outer Core temperature, geomagnetic field intensity, geothermal heat flux, and surface temperatures in 100 ka cycles.

The main takeaway point – discussed further in the next post – is that geothermal heat flux and surface temperature variations are anti-phased to geomagnetic intensity variations.

by Koen Vogel PhD

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