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Earth Rhythms

The content is quated from Article: Global Coherence Research , Source: Global Coherence Research, HearthMathInstitute, Non profit Organization

»Earth has a strong internal magnetic field that appears to be generated by electrical currents in the liquid outer iron core that are driven by internal heat sources. The magnetic field resembles that of a bar magnet or “dipole field” with an axis tilted about 11.5 degrees from the spin axis, so, the magnetic poles are not the same as the geographic poles. Earth’s magnetic field strength was first measured by Carl Friedrich Gauss in 1835 and has been measured repeatedly since then. The field has shown a relative decay of about 10% over the last 150 years. The locations of the magnetic poles are not static; they wander as much as 55 kilometers every year.

The geomagnetic field is influenced by the sun and moon’s rotations, solar flares and probably interplanetary influences. Animals, including birds, can detect Earth’s magnetic field and use it to navigate during migration. It has been shown, for example, that cows and deer, when grazing, tend to align their bodies north-south in response to the earth’s magnetic field.

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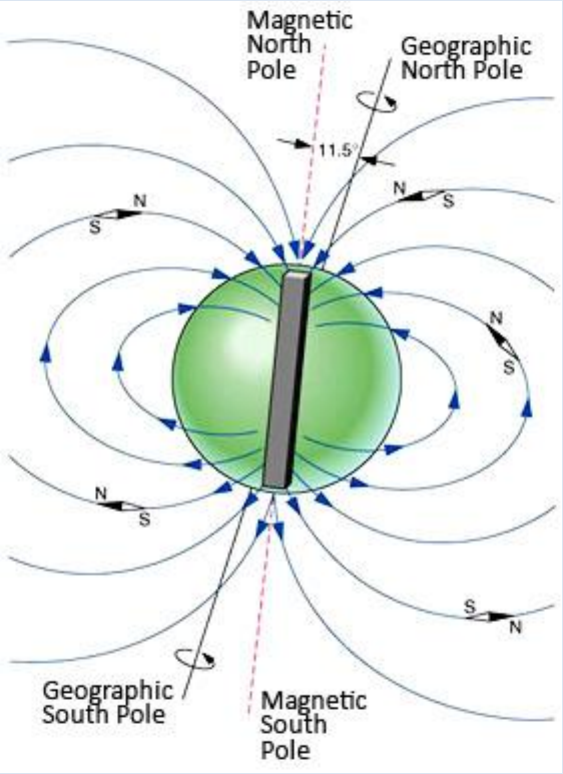

The forces of the solar wind include charged particles that push against Earth's magnetic field. Because of the solar wind, the portion of the geomagnetic field facing the sun is pushed in toward the earth's surface and flattened when the portion of the field facing away from the sun, known as the magnetotail, is pulled away from Earth. (See figure below.) A visible phenomenon of the collision of charged solar particles with Earth's magnetic field is auroras, or the northern and southern polar lights, which are commonly known as the aurora borealis and aurora australis.

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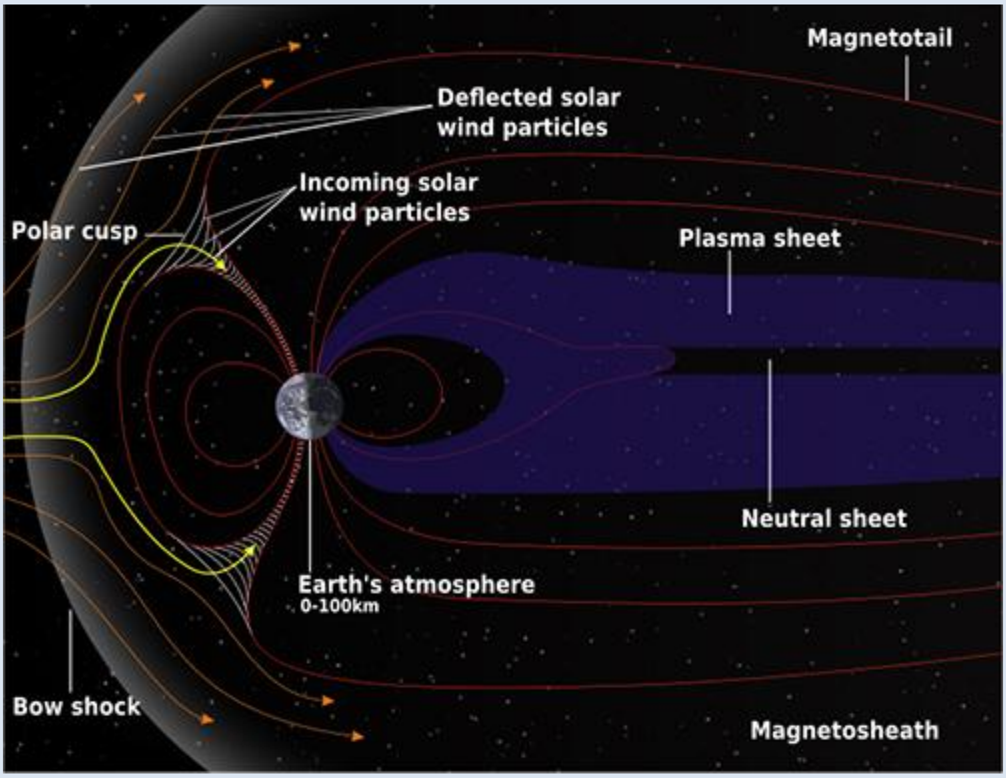

When the solar wind meets the earth's magnetic field it causes various types of complex oscillations in the field that often are referred to as micropulsations and field line resonances. Based on their waveforms, magnetic pulsations and field line resonances have been classified as pulsations that are continuous (Pc) and pulsations that irregular (Pi). Because their frequencies are so low, they are usually characterized by their period of oscillation rather than frequency.

There are a variety of mechanisms that produce these oscillations, such as interactions of solar wind and the earth's main magnetic field lines; sudden solar wind pressure changes that move/push the field in or allow it to expand out; and sudden changes in solar wind direction that cause the magnetotail to stretch and snap back. The figure below shows an example of these field line resonances, recorded at the GCI magnetometer site in Boulder Creek,

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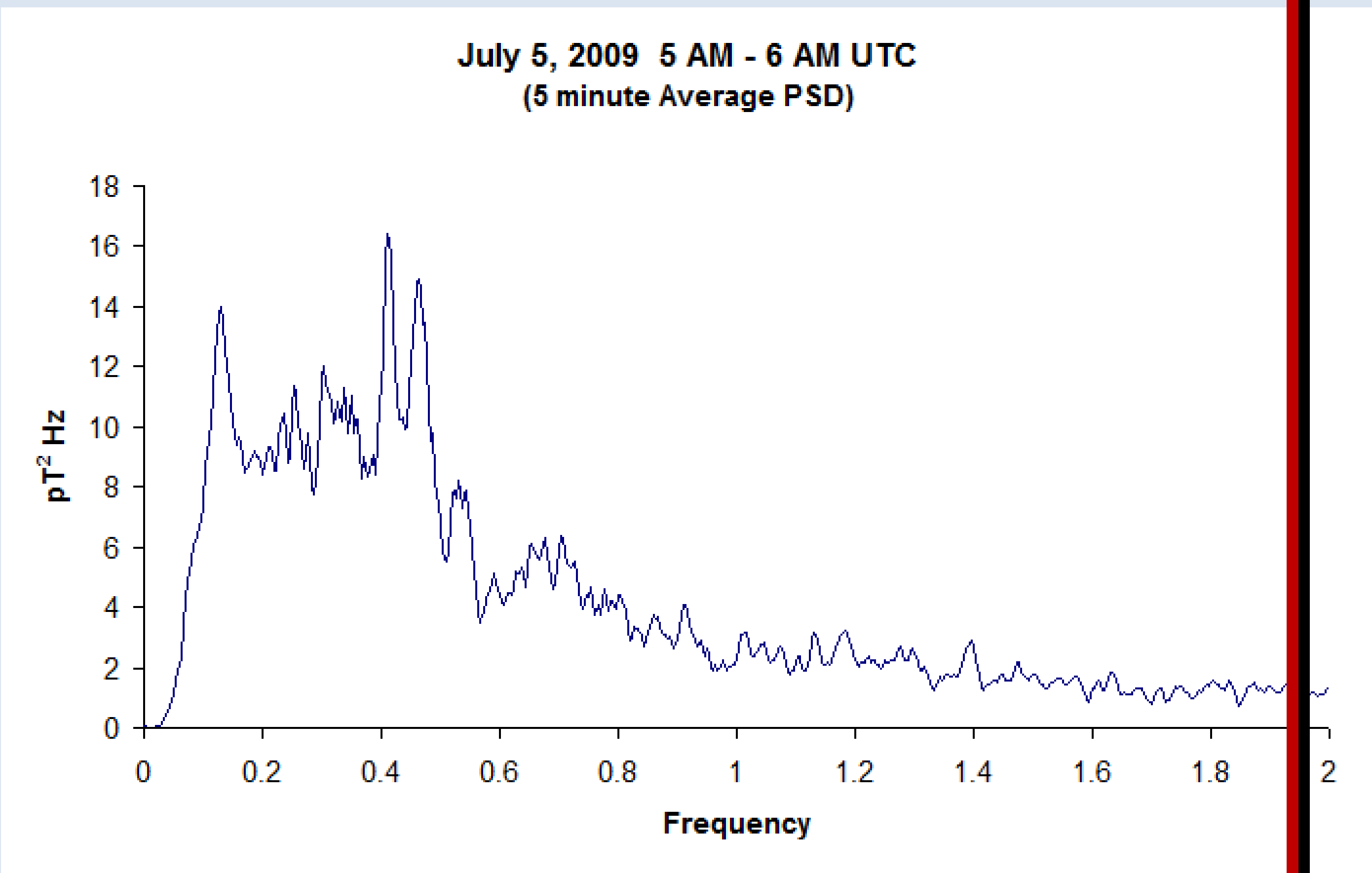
Calif. Important note: The frequencies of these field line resonances are in the same range as many of the rhythms found in human and animal cardiovascular and autonomic nervous-system functions.

In the Boulder Creek site example, there is a clear frequency at 0.1 hertz, which is the same frequency as the heart rhythm of someone who is in a heart-coherent state. Research has shown that changes in these ultralow frequencies (ULF's, also called Pc and Pi), caused by solar activity and changes in geomagnetic activity can affect human health and behavior.



Geomagnetic field line resonance data recorded from the GCI sensor site in Boulder Creek, Calif. Note that all the resonant frequencies overlap human

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autonomic and cardiovascular system frequencies. In this example, there is a clear standing wave frequency at 0.1 hertz, which is the same frequency of our heart rhythms when we are in a coherent state.

Schumann Resonances:

Schumann resonances are global electromagnetic resonances in the cavity formed between the earth's surface and the ionosphere. Schumann resonances were named after German physicist Winfried Schumann, who first predicted them in 1952. Electromagnetic impulses like those from global lightning flashes (Earth's thunderstorm activity) fill this cavity and excite the Schumann resonances. The first accurate measurements of the Schumann resonances were made from 1960 to 1963 and since then there has been an increasing interest in them across a wide variety of fields.

Radiation from the sun ionizes part of the earth's upper atmosphere and forms a conductive plasma layer, the ionosphere. The ionosphere surrounding our planet is negatively charged relative to the earth's surface, which creates a strong electrical field between the earth and ionosphere. Schumann resonances occur because the space between the surface of the earth and the conductive ionosphere acts as a closed waveguide. This waveguide acts as a resonant cavity for electromagnetic waves. Schumann resonances appear as distinct peaks at extremely low frequencies starting around 7.8 hertz, which is considered the fundamental frequency.

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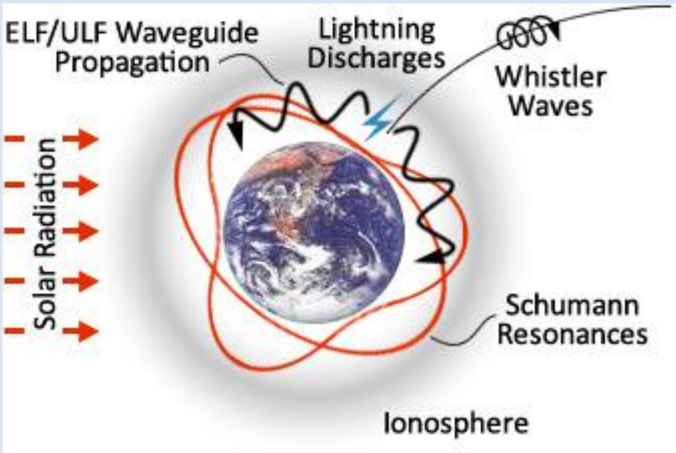
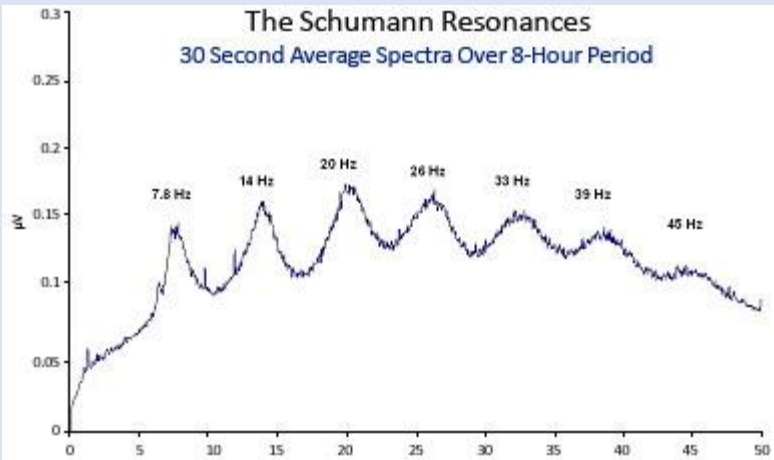


Schumann resonances in Earth-ionosphere cavity. Courtesy NASA.

Resonances can be observed at around 7.8, 14, 20, 26, 33, 39 and 45 hertz, with a daily variation of about ± 0.5 hertz, which is caused by the daily increase and decrease in the ionization of the ionosphere due to UV radiation from the sun (also see the live data).



The signals recorded from the GCMS Boulder Creek magnetometers are converted to the frequency domain with the Fourier transform. The Schumann resonances occurring over an eight-hour period can be clearly seen at approximately 7.8, 14, 20, 26, 33, 39, and 45 hertz.

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Interest in the Schumann resonances has gone beyond the boundaries of geophysics, into medicine, where it has posed questions about the interactions between planetary rhythms and human health and behavior (for more detail see the July 7, 2009 Commentary)

The similarity of the 7.8-hertz Earth resonance and human brainwave rhythms was quickly identified after the Schumann resonances were first measured, and early studies were able to demonstrate a correlation between these resonances and brain rhythms. Numerous studies conducted by the Halberg Chronobiology Center at the University of Minnesota along with other studies have since shown that there are important links between solar, Schumann and geomagnetic field line resonances and a wide range of human and animal health and wellness indicators.

Although the existence of the Schumann resonances is an established scientific fact, how these important planetary electromagnetic standing waves act as a background frequency that can influence biological systems such as the heart and brain is not completely understood.«

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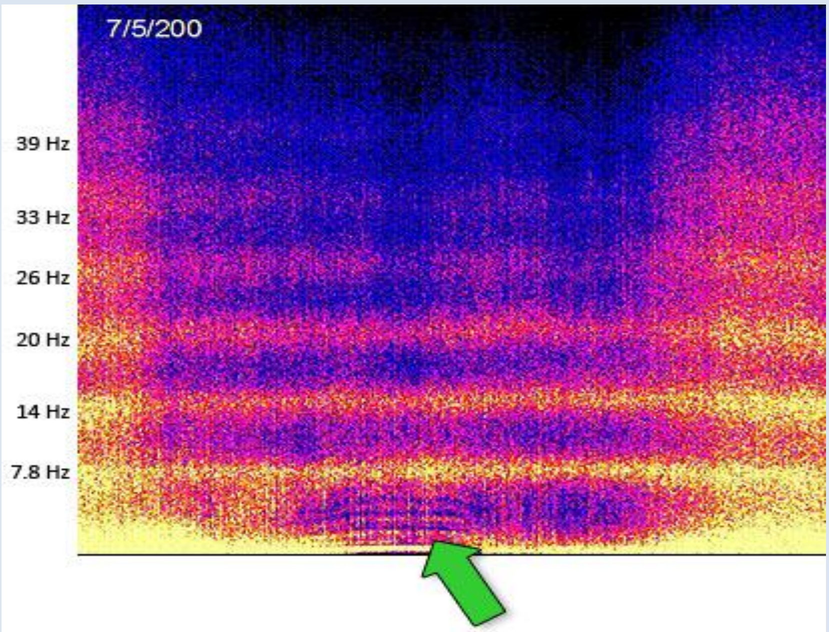

The green arrow in this spectrogram indicates continuous pulsations as well as the Schumann resonances. The data was collected by the magnetometer at GCI's Boulder Creek Calif., headquarters.

Want to listen to the earth's resonances? This three-minute audio file is data collected from GCI's magnetic sensor in Boulder Creek. The resonances have been shifted up in frequency to an audible range. They were recorded at nighttime during a period of relatively quiet ionospheric activity.

GCI hypothesizes that changes in the earth and ionosphere's resonant frequencies can influence the function of the human autonomic nervous system and brain and cardiovascular systems. Until recently, it has not been feasible to test this hypothesis scientifically. This is because there is a lack of reliable, continuous measures of ionospheric and field line resonances data and an inability to do long-term monitoring of people's physiological systems such as heart rate variability monitoring, which reflects autonomic nervous-system activity.