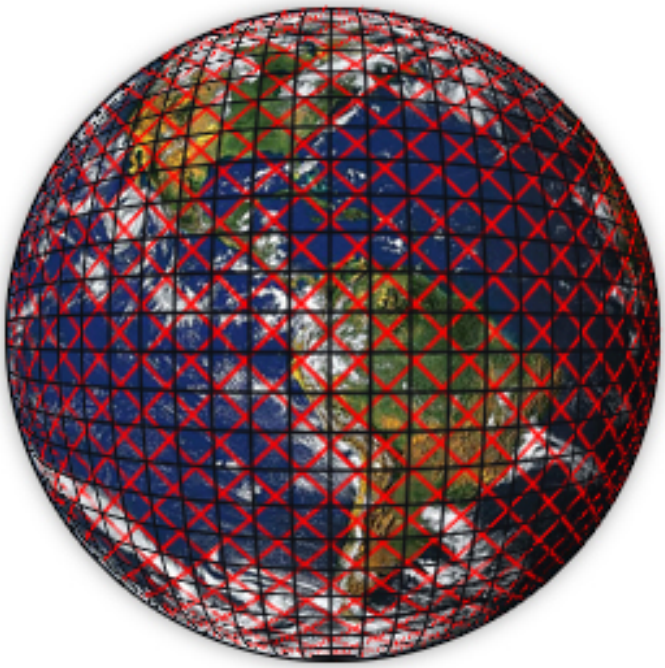
LONGITUDINAL ELECTRIC WAVES



CREATED BY THE SOLAR WIND AND THE EARTH MAGNETIC FIELD

Hans Giertz, MSc
Miklagård Research

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BY

HANS GIERTZ, MSc.

ABSTRACT

A new form of longitudinal electric wave is presented. This wave consists of slowly propagating and oscillating electrons and ions. The electrons propagate in one direction during 12 hours and then back in the opposite direction during the next 12 hours. It creates a longitudinal electric wave with the period 24 hours and its overtones. The surface of the earth is full of such longitudinal electric waves. The longitudinal electric waves form a grid that encompasses the surface of the Earth. We don’t know how this grid was established far back in time. When established it creates a grid of electromagnetic fields that guides the electrons and ions inside the longitudinal electric waves, it creates electromagnetic forces that keep the grid stable. It's a self sustained system of longitudinal electric waves. The grid contains only standing waves, therefore the power needed to sustain the grid is small. The period of the waves is exactly 24 hours (and its overtones) and the electrons always change direction at the same time; at noon and at midnight. It's therefore assumed that the longitudinal electric waves are synchronized to the rotation of the Earth magnetic field and that it's supplied with electrons from the solar wind. The low frequency longitudinal electric wave is the third most common electric wave on earth, next to heat and light (manmade energies not included). This paper describes how the longitudinal electric wave is created, its characteristics and how we can measure it with commercially available instruments.

1. INTRODUCTION

Radio waves, heat, and light are transversal electromagnetic waves. Maxwell described, in 1864, the transversal electromagnetic wave by means of four equations. These equations are still valid, modern wave theory is based on Maxwell’s theory. Maxwell’s equations also include the existence of longitudinal electric waves in the near field. Science has described longitudinal electric waves in numerous reports. Longitudinal electric waves have been measured and described in ionized gases (1), plasma and in the ionosphere (2). However, science has not been able to prove the existence of longitudinal electric waves at the surface of the earth and in air under normal conditions (near field excluded).

When we describe very high frequencies, such as light, Maxwell's equations must be modified with quantum physics in order to make a correct description. When we describe extremely low frequency longitudinal electric waves we must think in terms of quasi static physics (3). Maxwell's equations are still valid but we have to liberate ourselves from the way we interpret them. If we do that we will understand the low frequency longitudinal electric wave that is created by the solar wind and magnetic field lines when the Earth rotates.

This paper describes how low frequency longitudinal electric waves are created and its characteristics. It describes how we can measure low frequency longitudinal electric waves. The low frequency longitudinal electric wave is very different from what science expect. Therefore appendix 1 &2 are primarily based on a large amount of experiments and measurements that describe the wave. These experiments are easy to repeat. The experiments have led the author to make a number of assumptions aiming at describing the content and the characteristics of the low frequency longitudinal electric wave. This paper describes longitudinal electric waves in an overview form. Appendix 1 & 2 describe it on a deeper level. The measurements have been performed during a five year period. They have been repeated a large number of times under different conditions and at different locations. Some of the experiments have been repeated by other persons. The results have always been consistent.

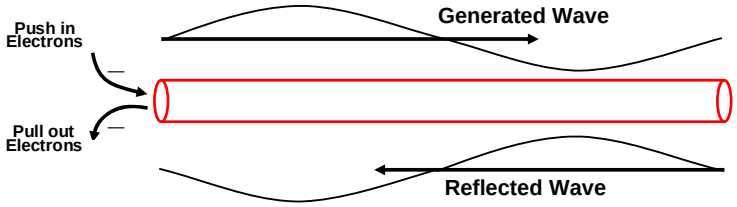
The next chapter describes the basic characteristics of the longitudinal electric wave. It will make it easier for the reader to understand the next chapters.

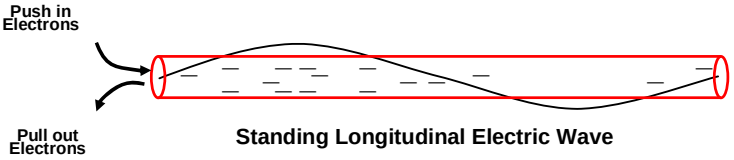
2. THE LONGITUDINAL ELECTRIC WAVE.

The low frequency longitudinal electric wave violates the perception of many people with a science background. The immediate reaction is; this can't be true. This longitudinal electric wave violates one of the most accepted facts in electromagnetism; free electrons can't propagate through air. They will bounce into air molecules, they will be absorbed by ions and they dissolve. Science is right, **fast** moving electrons will **dissolve.** However, this is not the complete answer. Electrons that propagate **slowly** and that are **guided** by electromagnetic fields can propagate in air and create longitudinal electric waves. It's a matter of the **conditions** in which the electrons propagate.

Let us assume that we have a source (generator) that is coupled to air. The source emits (push in) electrons in one direction during a certain time and then it changes direction and attracts (pull out) electrons. The prerequisite is that this process is extremely slow, almost like a static situation. Let's assume that the electrons propagate with a speed that is in the same magnitude as the velocity of free electrons in air. The change in electron flow will create a wave along its path. Let's assume that the wave is reflected at the end of the path. The generated wave and the reflected wave add and we have created the classical situation for a standing wave. The standing wave has nodes that are positioned at the same position all the time. The antinodes vary from a maximum positive value to a maximum negative value and back again with the same period as the generated wave. We have created a standing longitudinal electric wave.

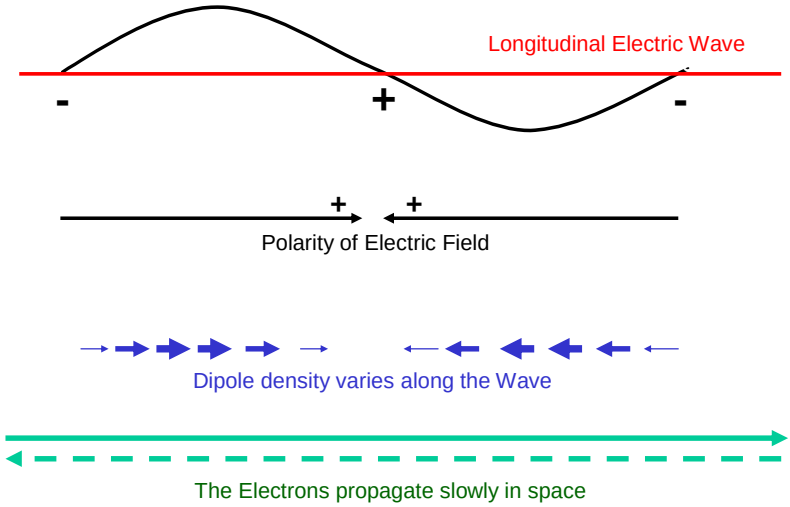
LONGITUDINAL ELECTRIC WAVE





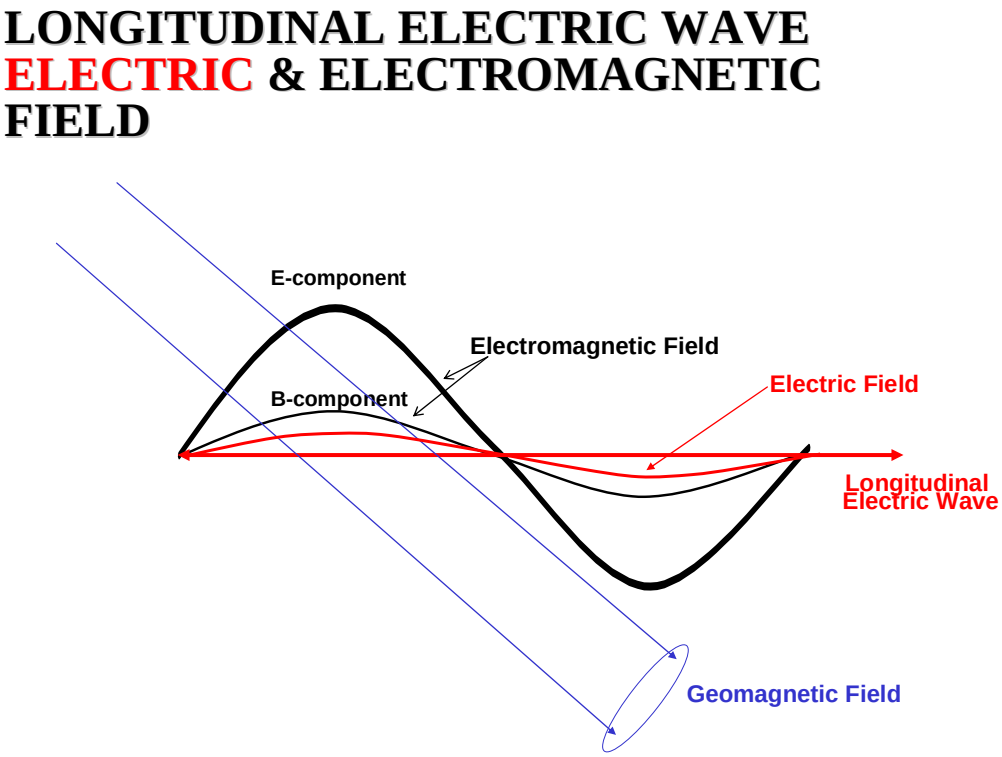
Let's analyze the situation at the left part of the wave, i.e. close to the source. During the positive half cycle (of the generated wave) the electrons will be pushed in, there is a net flow of electrons in that direction. During the negative half cycle there is a net flow of electrons in the opposite direction, because the electrons are pulled out and because the reflected wave contributes with its positive half cycle. This creates dipoles along the wave which in its turn creates an electric field that will vary with the same period as the source. That is how the longitudinal electric wave is created. The longitudinal electric wave can be described with the model below.

LONGITUDINAL ELECTRIC WAVE CONSISTING OF A SLOWLY PROPAGATING ELECTRONS



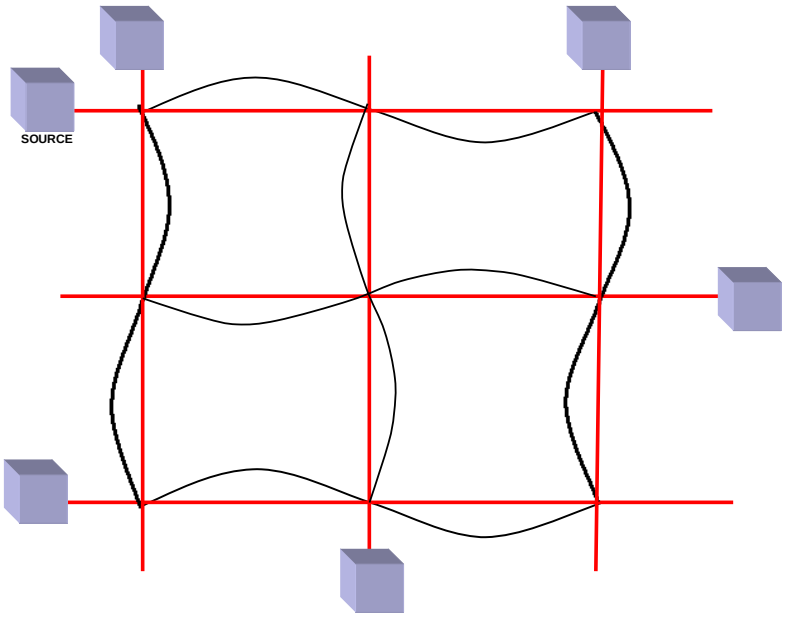
Scientist, with a good knowledge of electromagnetism knows that a wave like this can't exist. Free electrons can't propagate through air, they will bounce into air molecules and they will be absorbed by positive ions. The wave will dissolve. However, it can propagate far if the electrons propagate slowly and the wave is guided by an electromagnetic field and at the same time constantly supplied with new electrons.

Above we learned that the longitudinal electric wave contains an electric field. The wave propagates through the geomagnetic field of the earth. According to Faraday's law the electric field induces an electromagnetic field that consists of an electric (E-) and magnetic (B-) component. The longitudinal electric wave thus consists of an electric field and an induced electromagnetic field. Since it's a standing wave these fields have nodes which have the same stable position.

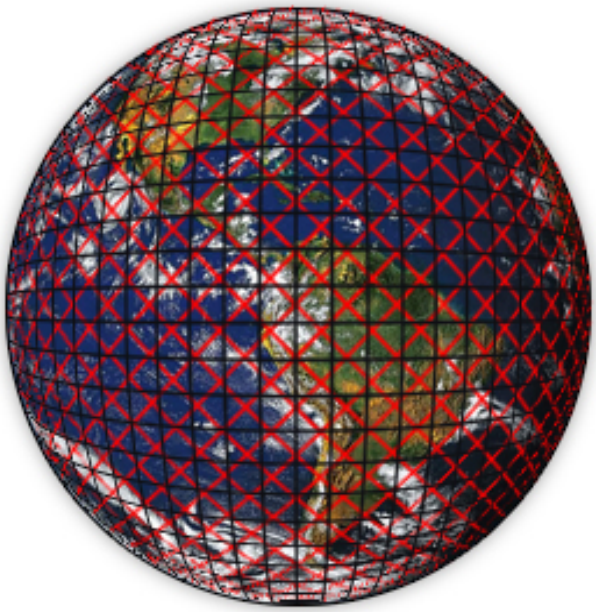


Let's build 6 of these sources or generators, all of them deliver exactly the same frequency and wavelength. They are phase locked to each other. We arrange 3 in a vertical row and 3 in a horizontal row. The distance between the sources is exactly one half wavelength. The longitudinal electric waves form a grid of waves that intersect each other in their nodes.
We have created a grid of electric and electromagnetic fields where the fields intersect in their nodes. Any change in the position of one wave will cause a change in the electric and electromagnetic fields. Furthermore, if the phase is shifted 180 degrees between adjacent waves Biot-Savart´s law will make the waves repel. Altogether this produces forces which strive to regain the previous position. Electrons that are pushed into the longitudinal electric waves are guided by the fields. We have created a self aligned and stable grid. It will continue to be stable as long as we feed in new electrons with the same frequency and phase.

GRID OF LONGITUDINAL ELECTRIC WAVES



Theoretically we can make this model very large with almost infinite amount of sources. In that case the longitudinal electric waves and its grid will encompass the whole globe. The purpose with this report is to prove that the globe is encompassed by such grids of low frequency longitudinal electric waves.

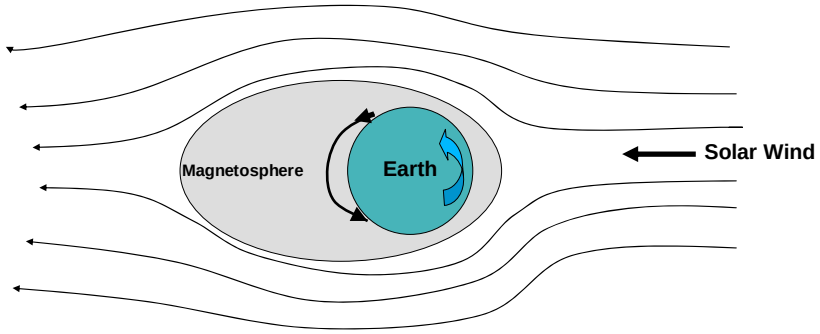


3. THE SOLAR WIND AND THE MAGNETIC FIELD LINES GENERATE LONGITUDINAL ELECTRIC WAVES

The surface of the Earth is full of longitudinal electric waves. All of these waves have the period 24 hours and overtones of 24 hours. The period is always the same and the phase is the same, year after year. We can measure the direction of these waves, i.e. the net flow of electrons. The direction changes at midnight and at midday. There is also a certain interplanetary influence; we can measure a disturbance at full moon and at moon eclipse. From this we can conclude, with very large certainty, that these longitudinal electric waves are related to the Earth rotation and electrons in the solar wind. The following explanations serves only the purpose to illustrate what might cause it. It can have a somewhat different mechanism.

The Sun emits a large amount of particles, among them free electrons. It's called the solar wind and it fills the solar system and passes the Earth. The Earth contains the North and South Pole and the magnetic field (the magnetic field lines). The Earth magnetic field creates a cavity around the Earth and it protects the Earth from the solar wind. It's called the magnetosphere. Since the solar wind is magnetized, solar magnetic field lines can interact with the terrestrial magnetic field lines, connecting across the magnetospheric boundary. This results in a configuration in which an electrical conductor (the solar plasma) moves in a magnetic field composed of the magnetic field lines connected across the magnetospheric boundary. This constitutes a dynamo which is capable of producing 20-150 kV of electric potential across the magnetosphere and can generate one million MW (ten to the twelve W) of power, see reference (4) from NASA. Satellites have observed a large flow of electrons that follow the magnetic field lines and penetrate the magnetosphere, in particular in the tail region, i.e. on the night side of the Earth. The main flow of electrons is **in** on the morning side of midnight and **out** on the evening side of the midnight. The two current streams connect in the magnetosphere and in the atmosphere or surface of the earth. This is called the Birkeland current, see reference (5) from NASA.

THE BIRKELAND CURRENT



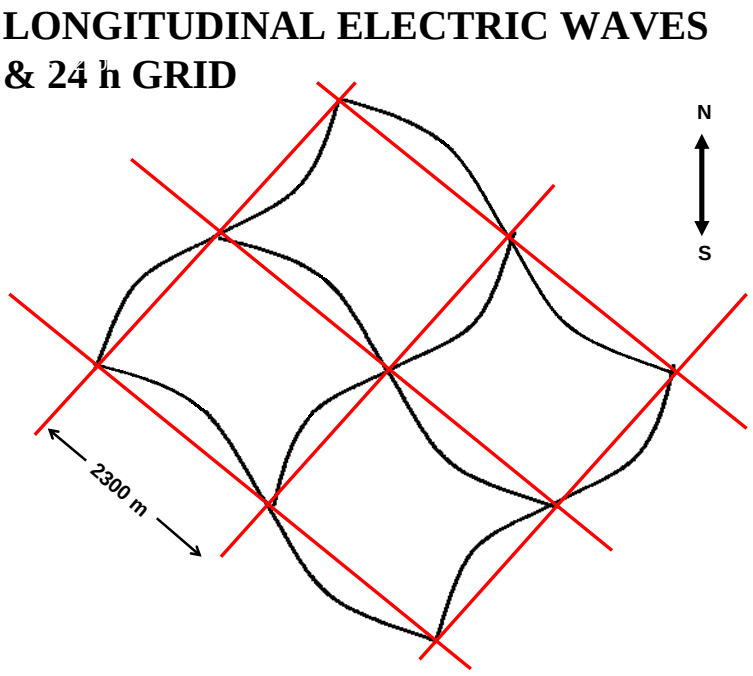
Electrons from solar wind flow in on morning side of midnight and out on evening side of midnight, i.e. with a 24 hour period
THE PICTURE IS SCHEMATIC

We can conclude that the rotation of the Earth is capable of producing large electron flows (currents) in the atmosphere that varies with the period 24 hours. The behaviour of the longitudinal electric waves coincides in some ways with effects that can be caused by the Birkeland current such as the periodicity, the time of change in the current flow and the influence from the moon.

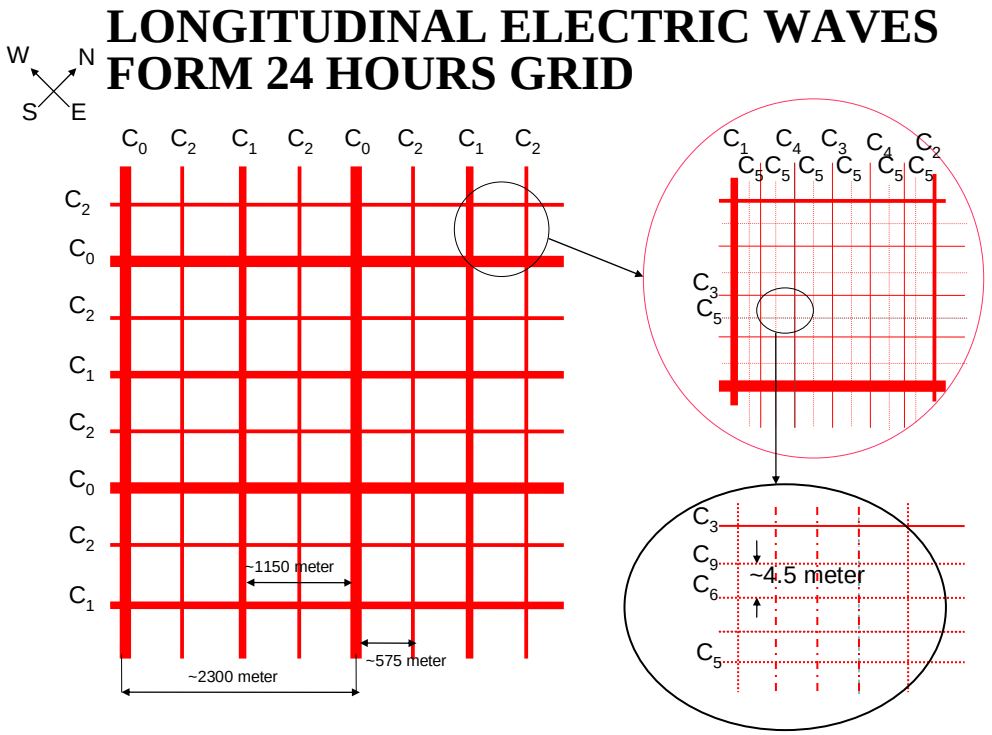
The longitudinal waves that are produced by the rotation of the Earth are standing waves, they emanate from the same source with the same period (24 hours). Based on this we can see two scenarios:

- Scenario 1. The longitudinal electric waves propagate in random directions. It creates maximum disorder, their fields will cancel each other and it results in high energy loss.
- Scenario 2. The longitudinal electric waves strive for maximum order, maximum stability, it results in low energy loss.

In the latter case the longitudinal electric waves will propagate 45 degrees to the geographical directions. In these directions the induced electromagnetic field is at its maximum (see appendix 1). Furthermore the longitudinal waves will arrange themselves so that their fields interact as little as possible. This is achieved if they run parallel at a distance which corresponds to half the wavelength. In that case the longitudinal electric waves will always intersect in their nodes, i.e. where their field or energy is zero. The wavelength of the longitudinal wave at 24 hours period is 4600 m, the distance between the nodes is 2300 m. This grid of longitudinal electric waves can be measured at the surface of the Earth, it's creates a strong electric field that can be measured with an E-field probe. The magnetic field (B-component) of these waves can be measured in the horizontal plane and the peak to peak amplitude of the antinodes is approx.100 m. We also notice that wavelength is extremely short compared to a transversal electromagnetic wave and this is explained in chapter 4.



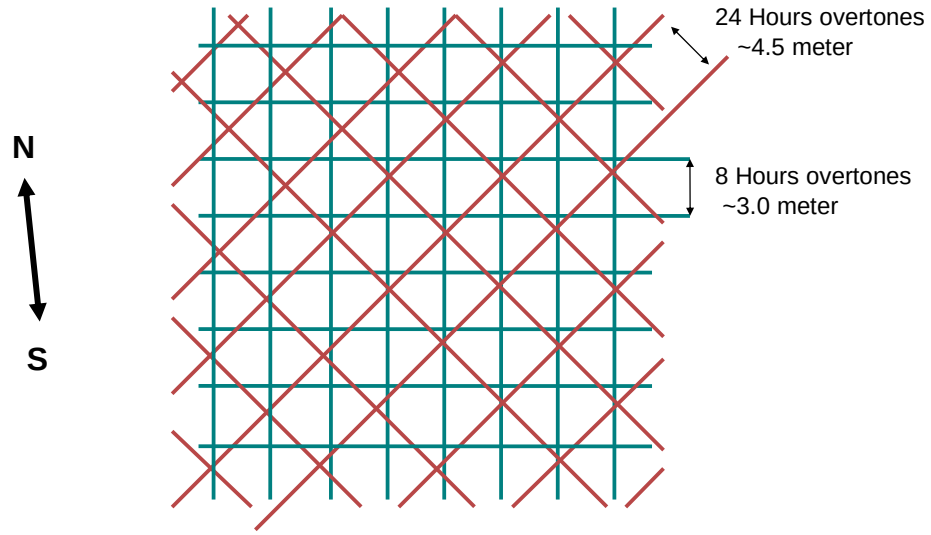
The flow of electrons with 24 hours period produces even overtones and this creates longitudinal electric waves with the period 12, 6, 3, 1.5 hours and 45, 22.5, 11.2, 5.6, 2.8 minutes. The longitudinal electric wave created by the first overtone has a period of 12 hours and a wavelength of 2300 m. It has a node every 1150 m and creates a new grid within the previous with a spacing of 1150 m. Every new (even) overtone will make the grid finer and finer. The 9th overtone has a period of 2.8 minutes and creates a grid with a spacing of 4.5 m.



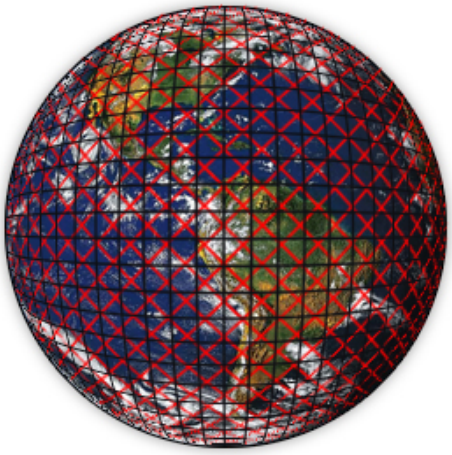
In the above description the longitudinal electric waves have been described in two dimensions, however they propagate in three dimensions. It looks like similar layers of grids stacked on top of each other.

The flow of electrons with 24 hours period also produces longitudinal electric waves based on the odd overtones, i.e. the 3rd, 5th, 7th etc overtone. The most dominant odd overtone is the 3rd overtone, i.e. 24/3 = 8 hours. The 8 hours and its even overtones; 4, 2, 1 hours and 30, 15, 7.5, 3.75, 1.9 minutes create a similar grid. The longitudinal electric waves in the 8 hours grid run close to the east-west and north-south direction.

THE 24 HOURS & 8 HOURS GRID



The longitudinal electric waves have a direction, i.e. there is a net flow of electrons in one direction. In the 24 hours grid the electrons change direction at midnight and at noon (in Stockholm, Sweden, it is assumed that it does so globally). In the 24 hours grid the longitudinal electric waves with the period 2.8 minutes flow in one direction, the rest of the longitudinal electric waves flow in the opposite direction. This implies that adjacent longitudinal electric waves always propagate in opposite directions. The 8 hours grid is organized in a similar way. This means that the net flow of electrons is close to zero at any place and any time. During a 24 hours cycle it is zero (except for a certain loss). This contributes to the stability of the system. The following chapters and appendix 1 gives a deeper description of the longitudinal electric wave and the grids.



During my business trips I have measured the longitudinal electric waves in many countries and on many continents. The longitudinal electric waves always have the same periods and the grids they form are always the same. The distance between the longitudinal electric waves

and their direction can vary somewhat due to variations in the earth crust and the magnetic field. From this we can conclude, with large probability, that the longitudinal electric waves encompass the whole Earth.

The conclusion is that the surface of the Earth is completely filled with longitudinal electric waves and they are organized in two grids. The grids are stable because the longitudinal electric waves create electric and electromagnetic fields that intersect in their nodes. These fields guide the electrons so that they propagate along the longitudinal electric waves. The longitudinal electric waves are organized so that adjacent waves propagate in opposite directions. Therefore the net flow of electrons is small. The fact that the waves propagate in opposite directions imply that they repel according to Biot-Savart´s law. This contributes to the stabilization of the grids. The longitudinal electric waves propagate through matter with negligible loss. The longitudinal electric waves are standing waves, i.e. they transfer information and not energy. This means that the two grids have a small loss and that the amount of energy needed to sustain the grids is small. All of the forces that stabilize the grids are relatively small, almost subtle. However the sum of all forces contributes to a stable system. All that is needed to sustain the grids is a relatively small refill of electrons to compensate for loss and a gentle push ever 24 hours to sustain the 24 hours oscillation. This gentle push can be the flow of electrons from the Birkeland current but it can also have another origin. The low frequency longitudinal electric wave is the third most common electric/electromagnetic wave on earth, next to heat and light (manmade energies not included).

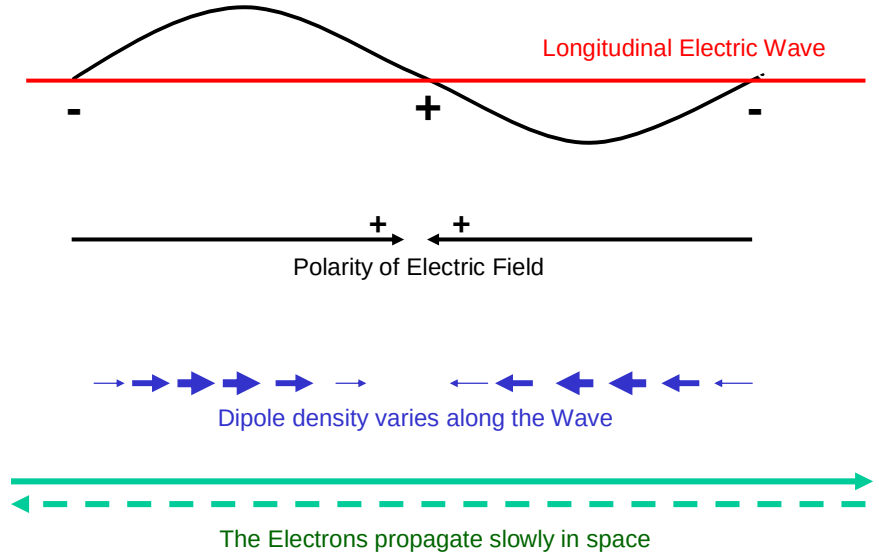
4. CHARACTERISTICS OF THE LONGITUDINAL ELECTRIC WAVES

We can measure the characteristics of the longitudinal electric wave with commercially available instruments and this is described in detail in appendix 1. We can summarize these findings as follows:

- The longitudinal electric wave is sinus shaped, i.e. its electric field density in the longitudinal direction is sinus shaped.
- It's a standing wave, i.e. its nodes and antinodes don’t change positions.
- It's a pure electric wave and it contains only the electric field (E-component).
- The longitudinal electric wave propagates through thick metal plates (and most matter) without measurable loss. It propagates through Faraday’s cage.
- The longitudinal electric wave is very sensitive to electric fields and will repel from a negative field and be attracted by a positive field.
- The wavelength is proportional to the frequency.
- The wavelength is very dependant of the matter in which it propagates, i.e. the phase velocity is very different in copper, in ground (such as rock) and in air.
- The longitudinal electric waves in the 24 hours grid are coherent. All waves have the same phase (zero or 180 degrees phase), they are standing waves of even overtones.
- The longitudinal electric waves in the 8 hours grid are coherent. All waves have the same phase (zero or 180 degrees phase), they are standing waves of even overtones. The 8 hours grid is 100 % synchronized to the 24 hours grid (based on a 24 hours period).

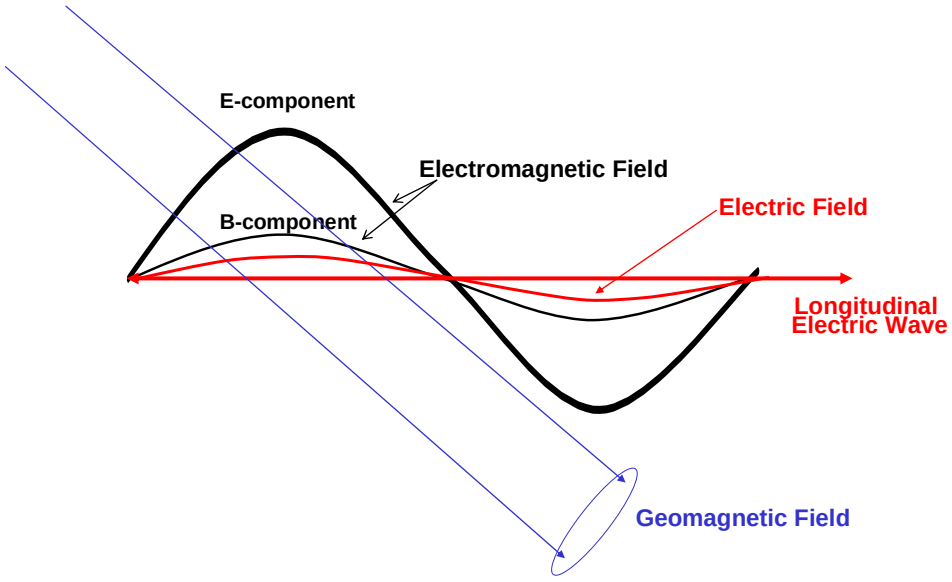
It's assumed that the longitudinal electric wave consists of slowly propagating electrons. It probably also consists of negative ions that are collected from the space in which it propagates. The longitudinal electric wave can be described with the following model:

LONGITUDINAL ELECTRIC WAVE CONSISTING OF A SLOWLY PROPAGATING ELECTRONS



The longitudinal electric wave propagates through the magnetic field lines and it induces an electric field and a magnetic field. The amplitudes of these fields are proportional to the electric field of the longitudinal electric wave at that spot.

LONGITUDINAL ELECTRIC WAVE ELECTRIC & ELECTROMAGNETIC FIELD



An important characteristic of a transversal electromagnetic wave is that it creates resonance in an antenna (wire) provided the length of the antenna equals the wavelength of the electromagnetic wave. The longitudinal electric wave behaves in the same way. The longitudinal electric wave with the period 24 hours creates resonance and a standing longitudinal electric wave in a 65.6 m long copper wire (the longitudinal electric wave in the copper wire will also interact with the Earth magnetic field and create an electromagnetic field with the “wavelength” 65.6 m). A copper wire, 32.8 m long, creates resonance with a 12 hours period longitudinal electric wave. The relation between the wavelength and the length of the copper wire is always the same and accurate. The wavelength in copper is 0.76 mm/Hz. Previously we learned that the wavelength of the 24 hours wave is 4600 m, i.e. approx. 5 cm/Hz. This wave propagates primarily in the upper layer of the Earth crust and it is assumed that the wavelength is defined by the phase velocity in the crust (rock, soil etc). The wavelength of a longitudinal electric wave that propagates only in air is approx. 24 m/Hz.

Lehnert (6) has pointed out that the longitudinal electric wave perhaps can be interpreted in terms of ion oscillations in plasma, described by Spitzer (1). We have measured the number of electrons (coulomb/s) in the longitudinal electric wave, this value gives approx the correct wavelength according to Spitzer. The wavelength and amplitude in air is approx linearly dependant of the number of ions which supports Spitzers theory (see appendix 1). This can offer an explanation for the propagation in air but more investigations are required. In conducting material such as copper it seams to be a completely different mechanism that creates the wave. It's worth to note that the phase velocity in copper (0.76 mm/Hz) is close to the drift velocity of electrons in copper (approx. 1 mm/Hz. The wavelength is approx. the distance the electrons will drift during one cycle. In that case the oscillation is related to the drift velocity of electrons in the conducting material.

5. COMPARISON WITH HEAT AND LIGHT

The characteristics of the longitudinal electric waves (that are created by the Earth rotation) are unique, very different from transversal electromagnetic waves. The main reason is that all longitudinal electric waves are created from one source, the 24 hours period. They are longitudinal, standing, coherent waves. The mechanism that creates the wave is completely different from the transversal electromagnetic wave. Let's make a comparison with heat and light:

LONGITUDINAL WAVES	HEAT & LIGHT
Extremely low frequency	Very high frequency
Few descrete frequencies, overtones of 24 hours	Random mix of frequencies
Propagates in well defined lines	Semi random direction
Allways standing waves	Random
All energy is coherent	Not coherent
Allways the same polarization	Random polarization
Very large depth of penetration	Short depth of penetration

We can summarize that heat and light represents disorder. The longitudinal electric waves are meticulously organized down to the smallest detail. It's a COHERENT SYSTEM of energy that encompasses the surface of the globe. Because the longitudinal electric waves are coherent, they will easily create resonance. Since they have a large depth of penetration they will penetrate almost all matter and create resonance far inside that matter.

6. CONCLUSIONS

The extremely low frequency longitudinal electric wave that is described in this paper has been a puzzle to science because it can't exist. And science is right, it can't exist in solitary. It will immediately dissolve. Science has overlooked that the solar wind and the magnetic field lines have pumped electrons with the same frequency and phase during hundreds of million years. These streams of electrons became more and more organized, eventually it created stable grids of longitudinal electric waves. That changed the conditions completely. It created electric fields that stabilise the grid structure and guide the propagation of electrons and ions. It created a self sustained system of longitudinal electric waves. It created a system of longitudinal electric waves with unique characteristics. The globe is encompassed by an enormous amount of COHERENT longitudinal electric waves that are meticulously organized down to the smallest detail. It's the third most common electric or electromagnetic wave on Earth, next to heat and light. Heat and light has had an impact on the evolution of life.

Reference 1; Physics of fully ionized gases. L Spitzer, Princeton University Observatory, 1956.

Reference 2; Propagation and dispersion of electrostatic waves in the ionospheric E region, Annales Geophysicae, 1997.

Reference 3; Electricity and Magnetism, B.I Bleaney, Oxford University Press, 1965

Reference 4; http://uvisun.msfc.nasa.gov/GG/GG15-AIAA97/home.htm Global auroral imaging as a remote diagnostic of geospace by G.A. Germany et.al. AIAA Plasmadynamics and Lasers Conference 1997.

Reference 5; http://www-spof.gsfc.nasa.gov/Education/Ielect.html Secrets of the Polar Aurora by David P. Stern. Presentation Anchorage, Alaska 2002.

Reference 6; Private communication with Professor B. Lehnert (2007)

Appendix 1; Experiments with low frequency longitudinal electric waves.
Appendix 2; Memory function in materials.

hans@miklagaard.com

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