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Plasma Changes in the Solar System

The increasing amount of plasma that has been entering our solar system over the last couple of decades has been receiving a lot of attention in the run up to 2012. A Russian team of scientists, headed by the planet physicist Dr. Alexey Dmitriev, has been following this phenomenon. Their research suggests that this influx of plasma may be responsible for some of the recent dramatic climate changes.

The Role of Plasma in Recent Solar System Changes

A team from the Siberian Russian Academy of Sciences has been investigating changes in the heliosphere, the electromagnetic envelope that surrounds our solar system. The heliosphere acts like a giant protective sheath surrounding our sun and the entire solar system as we travel through space. Normally, it functions as a giant deflector, protecting us from a potentially harmful influx of cosmic radiation and keeping conditions within the inner solar system relatively stable. However, it is now being bombarded with so much radiation that an unprecedented amount is breaking through. This is reaching our sun and all of the planets of the solar system, including our own.

What is a plasma?

A plasma is a partially ionized gas and is sometimes called the fourth state of matter. The behavior of plasma is quite unlike those of solids, liquids, and gases. In nature, plasmas are usually found in gas-like clouds, as in the case of interstellar nebulae. Other examples of plasmas include ball lightning and the phenomenon of the aurora borealis.

The increase in incoming interstellar plasma, Dmitriev suggests, is dramatically impacting the behavior of our sun and its solar system. "Strong evidence exists that these transformations are being caused by highly charged material (in) interstellar space which have broken into the interplanetary area of our solar system," Dmitriev wrote in 1997.

Changes in Interstellar Space

For much of the twentieth century, space was visualized as a near vacuum. The astronomical reality, it is now being discovered, is actually quite different. Our solar system moves through something called the Local Interstellar Space Medium (LISM).

The LISM is not uniformly empty at all, but has greater and lesser amounts of plasmic flux density created by the presence of highly charged particles. The amount of energy within empty interstellar space is actually highly variable. Scientists are now coming to realize that space has more in common with our terrestrial oceans, with their complex tides and currents, than was previously recognized.

The quantity of plasma, in the form of ionized hydrogen, helium, and hydroxyl, that we encounter in the LISM is a critical variable for what happens in the wider behavior of our solar system. This increased influx of energy is the fundamental cause of the multiple magnetic and climatic changes that have recently been observed in the sun and across all of the planets. Dmitriev even goes as far as to say the consequence of the increase in this interstellar plasmic energy is far more important, in his opinion, than human greenhouse gas emissions are in the creation of our planet's current global warming crisis.

Changes in the Heliosphere

The heliosphere itself has exhibited a dramatic change in behavior over the last ten years. The transition through this increased plasma flux has expanded the heliosphere's bow shock wave in front of the solar system more than ten-fold. Dmitriev gives an extensive catalogue of changes he claims this has caused within the solar system.

Recent Planetary Changes

--Significant physical, chemical, and optical changes observed on Venus; an inversion of dark and light spots detected for the first time and a sharp decrease of sulfur-containing gases in its atmosphere.

--The first stages of atmosphere generation on the Moon, where a growing sodium-based atmosphere that reaches 5,500 miles in height has been detected.

--Changes in the atmosphere of Mars, including a cloudy growth in the equatorial region and unusual growth in ozone concentration.

--Significant melting of the Martian polar ice caps.

--A doubling of the magnetic field intensity on Jupiter after the series of impacts from the fragments of the Shoemaker-Levy comet in 1994; also, the appearance of large auroral anomalies, excessive plasma generation, and radiation belt brightening.

--The creation of an ionic flux tube between Jupiter and the volcanic regions of its moon, Io. This stream of plasma is millions of miles in length and is 1 million amperes in strength. It is affecting Jupiter's magnetic field and intensifying its plasma genesis.

--Reporting of auroras and a visible increase in brightness on Saturn.

--Abrupt large-scale growth of magnetosphere intensity and an increase in brightness on Uranus.

--A change in light intensity and light-spot dynamics on Neptune.

--A growth of dark spots on Pluto.

Dmitriev notes that Uranus and Neptune, which are magnetically conjugate planets, have both undergone magnetic pole shifts in recent decades. Earth is magnetically conjugate to Jupiter, so he theorizes that the dramatic changes on Jupiter could well have consequences for our planet.

The claim of a direct causal link between the increase in plasma entering the solar system and recent planetary changes is still very controversial, but Dmitriev's research is quite comprehensive and is backed up with extensive scientific references. It seems likely that the increase in this cosmic energy does have some role to play in influencing climate, but it may be one of many contributing factors, rather than a sole cause. Dmitriev himself points out that planetary changes are complex affairs with many interdependent factors. It is the total sum of all these influences that actually determines what happens.

Changes to the Sun

There have also been some recent dramatic changes to the sun. The Ulysses spacecraft sent by NASA to measure the magnetic field of the sun found the magnetic fields of the poles enormously diminished. The magnetic poles of the sun usually reverse at the end of an eleven-year sunspot cycle. At the end of the most recent cycle, the poles only moved to the sun's equator and did not completely invert. This behavior alters everything that was previously believed about the sun's magnetic field. Effectively, the sun no longer has a single north or south magnetic pole; instead, it has four poles located in the equatorial regions.

The data gathered by the Ulysses spacecraft showed that the sun's magnetic field interacts with the rest of the solar system in a much more complex fashion than previously believed. NASA scientists determined that the polar magnetic field is much weaker than previously observed and the amount of cosmic dust entering the solar system is thirty times more than expected.

X-Ray Flares

After the peak of the last eleven-year sunspot cycle in 1999, the sun has had a number of extremely large x-ray flare events. One of these, on April 2, 2001, was so large that it went off the scale completely. The previous scale ran to X-20 as the highest category, but this solar flare had to be categorized as an X-22 event. The x-ray burst was not in the direction of Earth, but a much smaller x-ray flare in 1989 was responsible for knocking out the whole Canadian power grid. If the X-22 event had hit Earth, possible consequences could have included major power outages, interruption of the Internet, damage to telecommunications and GPS satellites, and even the wiping of computer hard drives. The most powerful flare observed since then happened on November 4, 2003. It lasted eleven minutes and produced an x-ray flux of X-28.

The Carrington Event

These recent events, though very significant, are not actually the largest solar flares ever recorded. That honor goes to a flare that happened on September 1, 1859. This has become known as the Carrington event after Richard Carrington, the young English astronomer who saw the event as it happened from his private observatory.

It was a remarkable piece of luck that he happened to be observing the sun at the particular moment that the flare erupted, because the event lasted for less than five minutes. In that time, a huge knot of sunspots appeared and generated

a plume that was by far the biggest observed in the 160 years records have been kept.

Before dawn on the following day, a huge firework display of auroral lights bathed Earth, reaching as far south as the Caribbean. The rainbow-hued lights were so brilliant that it was said to be possible to read by them as if it were daylight. The Carrington event also caused major disruption to the telegraph system worldwide.

Conventional astronomy suggests that a flare of this size may only happen once every 500 years or so, but even greater flares have been observed on other stars. Some of these stellar megaflares have emitted quantities of radiation that would be likely to cause major loss of life on Earth.

The Maunder Minimum

Sunspot activity has been broadly increasing since the Maunder minimum period from 1645 to 1715, when there were very few sunspots. At a typical peak of the sunspot cycle, there may be as many as 1,000 spots a year, but during the Maunder minimum the number of spots dropped as low as one or two a year for a thirty-year period. This was also the peak of what has been called the Little Ice Age. This was a period of approximately 400 years, from the fifteenth to the nineteenth centuries, when the drop in temperature was so great that the winter mortality rate in Europe increased dramatically. In London, the river Thames froze over completely every winter. The edge of the Atlantic ice pack moved southward during the Maunder minimum and glaciers started expanding.

The Maunder minimum was named after the astronomer Edward Maunder, who measured and photographed sunspots at the Greenwich Royal Observatory. It was his studies of this unusual period in history that led to his discovery of the important eleven-year sunspot cycle.

Sunspot Cycles

The general increase in the sun's activity has been consistent for more than 100 years, but it seems to have reached a peak in sunspot cycle 22 from 1986 to 1996. Sunspot cycle 23 began in 1996 and ended in 2008. The cycle was six months late and weaker than normal.

Cycle 24 was due to start in March 2008, but it is more than a year late already. As of March 2009, there was still no sunspot activity whatsoever. This is the

longest period that the sun has been spotless for more than 100 years. Considering the maximum of this cycle is due in 2012, this might seem to suggest that the peak of the cycle may again be less than the recent average. Yet, generally this cycle is still predicted to be 30-40 percent more intense than the last one. The official prediction of the NOAA Space Weather Prediction Center is a peak of ninety sunspots in August 2012. There are also some predictions that delay in the cycle may cause the sun to suddenly burst into violent activity with another series of x-ray megafares in the X-20+ range, or even cause another Carrington event.

NASA's THEMIS satellite found that a 4,000-mile-thick layer of solar particles has gathered and is rapidly growing within the outermost part of the magnetosphere, a protective bubble created by Earth's magnetic field. This is causing a breach in the planet's magnetic defenses. This is not a problem at solar minimum, but at peak solar activity it could allow up to twenty times more plasma to impact Earth, making some of the worst solar storms in decades possible.

Solar Shutdown

The sharp downturn in the sunspot cycle may mark the point where solar activity significantly decreases as the sun enters the beginning of another minimum period. The result of this would be dramatic cooling; in some ways, it could have worse consequences than global warming. The lack of activity in solar cycle 24 has prompted concerns about this.

This shift in global temperature could have a substantial impact on the agricultural belts of Europe, North America, and Russia, which are responsible for a substantial part of the world's current food supply. These are vulnerable to a downward temperature change of more than a few degrees. Greater decreases in temperature are certainly possible if the sunspot cycle fails to gain momentum.

For Europe, the possible collapse of the gulfstream and its underwater equivalent, the Atlantic warm conveyor, could signal a massive change in climate. The warming these currents provide prevents European countries from being as cold as those on the equivalent latitudes in North America. Without them, some of the most populated parts of the European continent would be under Arctic conditions.

Cosmic Rays and Climate Change

Dmitriev is not the only scientist who thinks this influx of cosmic rays has a major part to play in the recent increases in global temperature. Henrik Svensmark is the head of Center for Sun-Climate Research at the Danish Space Research Institute. In his book *The Chilling Stars: A New Theory of Climate Change*, he suggests that when cosmic radiation, especially protons, hit Earth's atmosphere, the reaction they cause has the effect of creating clouds. The more cosmic rays there are the greater the cloud cover.

A shutdown in solar activity and a decrease in the magnetic field of the sun leave our planet more open to the influx of plasmic energy from outside the solar system. This then leads to an increase in cloud cover and the kind of climate change we are now seeing. Svensmark predicts we could be about to enter a new Maunder minimum-like period and that global temperatures are about to rapidly cool.

Dr. Nir Shaviv, an astrophysicist, also thinks cosmic rays affect our planet's climate. By reconstructing the temperature on Earth over the past 500 million years, Shaviv thinks he has found that changes in the amount of cosmic rays are responsible for more than two-thirds of Earth's temperature changes, making it the most important driver of climate change over long periods of time.

Shaviv hypothesizes that the sun's passage through the spiral arms of the Milky Way appears to have been the cause behind the major Ice Ages over the past billion years. He has correlated variations in the cosmic-ray flux to the solar system's orbit around the center of the galaxy and through its spiral arms. In the more crowded spiral arms, like our Orion arm, there is a higher density of cosmic rays. Shaviv agrees with Svensmark that the result of this increase is that Earth becomes cooler.

The study of meteorites that have hit Earth during its passage through the arms of the Milky Way have shown up to 10 percent more cosmic-ray damage than those sustained elsewhere. Shaviv believes that kind of cosmic ray variation could alter global temperatures by as much as 15 percent. This would be sufficient to turn the Ice Ages on or off.

Both Svensmark and Shaviv are considered climate skeptics who dispute the extent to which the creation of greenhouse gases is contributing to the current climate change. The year 2012 is significant in the context of research into cosmic rays because:

--It coincides with the next predicted solar sunspot maximum, and recently discovered breaches in Earth's magnetosphere make us more vulnerable to solar-flare events.

--The effects of increased cosmic dust and radiation entering the solar system will be likely to accelerate by this point, which coincides with 2012.

According to these scientists, whether the planet cools or heats up depends on the balance of solar activity and cosmic radiation.

It is not necessary to agree to with their views on climate change to share their conclusion that an increase of cosmic radiation may cause significant changes. Svensmark points out that it is actually well established and uncontroversial that solar activity has a direct influence on the eleven-year variation of stratospheric pressure levels found in the upper atmosphere. The electromagnetic fields of our planet are highly sensitive and respond to a range of influences from solar wind to tropical storms. A tenfold increase in cosmic radiation is likely to affect these fields and the upper and lower atmosphere of the planet in ways that may be unpredictable. The debate is to what extent and how these changes will manifest.

Earth Changes and the Pole Shift

In the approach to 2012, Earth is undergoing a variety of major geophysical changes unprecedented in scale and effect. The causes of some of these appear to be manmade, but others appear to be responses to changes in the behavior of the sun and an increase in cosmic radiation. There is widespread speculation linking these events with a planetary catastrophe in 2012, possibly a reversal of Earth's poles.

Earth Changes

The fact that Earth's climate is in a state of rapid change is now well established. Climate change is a notoriously difficult area in which to make accurate predictions. One of the major problems is that science has become very specialized, which makes assessing all the different factors that act on a system as large as a planet challenging. While the unusually high concentration of carbon dioxide in the atmosphere is certainly having some effect on climate, the influence of solar activity and cosmic rays on global temperature may be equally, if not more, important. If the sun's behavior changes, Earth's climate is likely to respond. Assessing these trends and the balance of probabilities is a matter of fierce debate.

Other important changes are also happening. There appears to be an increase in the number and severity of extreme weather events such as tropical storms,

flash flooding, droughts, and tornadoes. There is also evidence that major geophysical events like earthquakes and volcanic activity appear to be increasing substantially. For instance:

--In the last fifty years, the number of tornadoes has doubled and there has been a dramatic increase in the geographical area in which tornadoes are found.

--The number of recorded earthquakes in the last century has increased by 500 percent and measurements of volcanic activity are up by at least 200 percent. This may be at least partly due to the increase in the number of seismic and volcanic detectors around the world. The spread of humans into what were once remote parts of the world may also be a factor.

Increase in Plasma

The increase in plasma entering our solar system affects our planet in a variety of ways. The incoming plasma is magnetized to the poles of the earth and concentrates in these regions, creating the effect of the polar auroras. The radiation belts around the planet and Earth's magnetic field are also affected. Scientists from the Russian Academy of Sciences are predicting wide-ranging and various changes for our planet. The direct effects of increasing cosmic rays include:

--Increased plasma generation in the ionosphere.

--Increased magnetic storms in the magnetosphere.

--Increased number of cyclones in the atmosphere.

K. M. Hiremath, from the Indian Institute of Astrophysics in Bangalore, has studied variations in the Asian monsoons and concluded that there is a causal connection between solar activity, incoming cosmic rays, and rainfall. He has also found a significant connection with the cycles of El Niño.

The Magnetic Pole Shift

Dmitriev's point of view on the pole shift is that it is already happening. In fact, he believes that the shift actually began in 1885. In the last 100 years, Earth's magnetic south pole has traveled almost 560 miles toward, and into, the Indian Ocean. The magnetic north pole has moved more than 170 miles between 1973 and 1994 in the direction of Siberia via the Arctic Ocean. The rate of the

magnetic pole's movement has also increased in the last century compared with fairly steady movement in the previous four centuries.

Oregon State University researchers investigating the sediment record from Arctic lakes have been able to use carbon dating to track changes in the magnetic field. They found that the north magnetic pole has shifted significantly in the last 1,000 years. It generally migrated between northern Canada and Siberia, but has occasionally moved in other directions. The causes of these magnetic changes are related to changes in behavior of the electrical flow in the iron at the core of the planet. This, in turn, is influenced by incoming plasma at the poles of Earth.

Earth's magnetic field is not uniform and is becoming less so. There are a number of areas called world magnetic anomalies that generate a substantial magnetic field independently of the two poles. The four most significant ones are in Canada, Siberia, Antarctica, and Brazil. These anomalies have recently undergone significant growth.

Earth's magnetic field has decreased by around 10-15 percent in strength since it was measured by Carl Friedrich Gauss in 1835. Fluctuations in the magnetic field are cyclical, and a downward trend has been observed for around the last 4,000 years. Most scientists believe this trend could just as easily reverse.

Dmitriev thinks the movement in the magnetic poles and the growth in magnetic anomalies indicate something very dramatic is going on in the core of our planet. The scale of these changes indicates something beyond even the magnitude of the Gothenburg magnetic flip event that happened around 14,200 years ago, when the magnetic poles migrated to near the equator. He believes the signs suggest a complete magnetic pole reversal is already underway.

Dmitriev estimates the speed of this process will increase to around 125 miles or more a year in the near future, and that we should prepare for the consequences of this in a globally coordinated way. The appropriate response, he says, should be to draw up a "global, ecology-oriented, climate map which might reveal (the location of) these global catastrophes."

The Impact of Technological Civilization on the Biosphere

One of the most important and unpredictable variables in the process of rapid magnetic change that Dmitriev reports is the effect our industrial and technological civilization is having on our planet. The extent of human impact on the biosphere is now so great that we are impacting the electromagnetic skeleton of the planet. More than 30 percent of disturbances in the

magnetosphere are now caused by electricity production, transmission, or consumption.

For example, the Van Allen radiation belts over the eastern United States have moved inward from more than 200 miles above the surface of the planet to slightly more than six miles. This is caused by the massive amount of energy being transmitted between the power stations around the Great Lakes to the eastern seaboard. The transmission route runs along one of Earth's magnetic meridians, and the frequency of electricity transmission in the United States is at 60Hz, which is resonant with the ionosphere.

What are the Van Allen radiation belts?

These are two belts of plasma surrounding Earth that are held in place by the planet's magnetic field. The inner belt extends 200-6,000 miles from Earth's surface and has a high concentration of protons. The outer belt extends 12,000-26,000 miles and is made of electrons.

This is just one of the many ways in which we are changing our electromagnetic environment, potentially with unforeseen consequences. This may well dramatically complicate the changes that already appear to be happening as a result of the extra-solar energy shift. Dmitriev regards these events as irreversible and fundamental. Possible outcomes, he predicts, may include a major reorganization of life on Earth. He concludes that the combination of the manmade technological impact on the planet and the increase of magnetic saturation coming into the solar system mean we are entering a period of rapid and unstoppable geophysical change.

Changes in the Magnetic Field Affecting Nature

Some species and habitats are more sensitive than others to the effects of these changes. Unfortunately, some of those animals and insects that may be most severely affected occupy key ecological niches in the world's ecosystem.

Bees

The rapid decline in bee population, known as Colony Collapse Disorder (CCD), may be a symptom of the change in the earth's magnetic polarity. While some scientists believe that bees find their hives by following polarized lines of light in the sky, research at National Tsing Hua University of Taiwan into magnetic

reception in bees has shown the presence of magnetite. This suggests they have magnetic homing senses.

Changes in Earth's magnetic field and the influence of manmade electromagnetic pollution are possible causes of the dramatic bee decline. A survey commissioned by the Apiary Inspectors of America found losses of more than 30 percent in the bee population from CCD. Some scientists estimate that life on Earth is so dependent on bee pollination that the current human population would be unable to feed itself just eight years after the collapse of the bee colonies.

Whales

Whales may also have a biomagnetic sense, which allows them to navigate by sensing Earth's magnetic fields. Whales following magnetic field lines could beach themselves in areas where the field lines intersect with the coast.

A study in the United Kingdom by Margaret Klinowska found a correlation between local magnetic field lines and sites where whales were stranded on shore. The biomagnetic theory may also explain why there are multiple-species strandings. The use of underwater sonar has also been implicated in whale beachings.

Frogs

The weakened magnetosphere allows more ultraviolet light to penetrate through the atmosphere to the surface. Frogs and other moist-skinned amphibians are among the species most sensitive to these increases in ultraviolet radiation. There has been a recent sharp decline in frog and other amphibian populations in both tropical and temperate climates.

Humans

New Scientist magazine has reported research showing how human behavior is influenced by changes in Earth's magnetic field. Oleg Shumilov of the Institute of North Industrial Ecology Problems in Russia looked at activity in Earth's geomagnetic field from 1948 to 1997 and found that it grouped into three seasonal peaks every year: one from March to May, another in July, and the last in October. He also found that geomagnetism peaks matched up with peaks in

the number of emotional disorders such as depression, anxiety, mood swings, and even suicides in the northern Russian city of Kirovsk.

Responding to the Electromagnetic Crisis

If the rapid increase in manmade electromagnetic emissions is left unchecked, it seems likely there will be an increase in consequences for human health and the health of the biosphere. The combination of a number of other geophysical effects converging in 2012 may mean that this impact is compounded. These effects include:

- Weakened magnetosphere.
- Solar maximum due in 2012.
- Increase in interstellar plasma and cosmic rays.
- Movement of the magnetic poles.

One possible scenario is that at the solar maximum around 2012, a massive solar eruption on the scale of the Carrington event could pass through the weakened magnetosphere of Earth. This could massively impact our global communications systems and computer networks and dramatically accelerate the changing motion of the magnetic poles. If the magnetic flux of the flare event is of sufficient magnitude to overwhelm the ring main of Earth's magnetic field, it could theoretically produce a rapid magnetic pole shift.

The sun's recent behavior does suggest that major solar eruptions are quite likely at the next solar maximum. The Carrington event megaf flare happened at the end of the 300-year-long solar shutdown of the Maunder minimum period. This was followed by more than 100 years of increased solar activity on the sun. During this period, the strength of the sun's magnetic field more than doubled. The recent decline in the sun's polar magnetic field may mark the end of that warm period.

It may be that during the shift to a colder period, the sun's behavior goes into oscillation between less and much greater activity, increasing the likelihood of megaf flare events. It is also possible that a Carrington event megaf flare could signal the beginning, as well as the end, of one of these periods of much decreased solar activity and colder temperatures on Earth. The flare that caused the shutdown of the Canadian power grid in 1989 was rated as an X-20 event; a Carrington event flare could be twenty times that size.

Electromagnetic Disruption

In the event of a really large solar event, not only might our electromagnetic infrastructure be damaged, but the resulting impact on the biosphere may require us to act to stabilize the electromagnetic field of the planet. This may require turning off sources of electromagnetic pollution that are considered essential services.

Some of the major industrial sources of electromagnetic disruption include:

- Electricity power grids.
- Mobile phone networks.
- Satellite communications networks.
- ELF communication systems.
- Radar.
- Microwave networks like WiFi and CCTV monitoring systems.
- Auroral research projects like HAARP.

Power Lines

Power lines lose energy in the process of transmission. Where power lines are very long, they can lose as much as 40 percent of the total energy transmitted. This electromagnetic energy leaking out into the atmosphere has a very pronounced effect on the ionosphere and can cause it to warp and bend. Many major power lines transport currents in the range 750 megavolts and some carry up to 1,500 megavolts. Extremely low frequency (ELF) waves from power lines are probably the biggest source of manmade electromagnetic radiation into Earth's atmosphere. ELF pollution has been doubling every decade for the last thirty years, and the average intensity of the manmade ELF magnetic fields is now more than ten times stronger than the natural planetary and cosmic background. Other significant contributors to ELF pollution include radar stations and hydroelectric power plants.

Electromagnetic Warfare

The electromagnetic spectrum has been used in the past for more than energy transmission and communication. On July 4, 1976, a radio mast in Kiev started emitting a complex harmonic ELF signal based around 11 Hz that spread across the world. This powerful signal upset radio communications everywhere and was named the Russian woodpecker after the buzz-saw sound it made. The intention behind this was to deliberately broadcast frequencies that were damaging to human health and mental well-being. These transmissions ended after the fall of the Soviet Union, but they illustrate how much influence ELF signals can have. ELF waves will penetrate anything and everything, which is why ELF transmissions are used for submarine communication.

HAARP and Disruption of the Ionosphere

The highly controversial High-Frequency Active Auroral Research Program (HAARP) is the most versatile and largest radio-frequency radiation transmitter in the world. The HAARP Ionospheric Research facility based in Alaska is a high-power transmitter and antenna array operating in the high-frequency (HF) range. The transmitter is capable of delivering up to 3.6 million Watts to an antenna system consisting of 180 antennas arranged as a rectangular array.

HAARP's research focuses on plasmas and the relationship between the sun's energy and events on Earth. There have been some claims that HAARP could perform significant weather-control experiments. Radio operators monitoring HAARP transmissions noticed a correlation between RF output from the station and the growth of hurricanes Katrina and Rita into dangerous storms in 2005. This may be coincidental, but the ionosphere is delicate. High-energy physicist Dr. Elizabeth Rauscher has predicted that if a big enough hole is punched through it, it could pop.

A major breach in the planet's ionosphere, on top of its already weakened magnetosphere, could change the effect of a major solar event from severe to potentially disastrous. The ionosphere is part of a complex system responsible for stabilizing the planet's atmosphere. The hole in the ozone layer, which has been caused by the human production of chlorofluorocarbons (CFCs), is an example of the kind of negative impact human activity can unexpectedly have on the sensitive upper atmosphere.

Even radical action to reduce the electromagnetic impact of humans may not stabilize a magnetic pole shift whose progress is already steady and unstoppable. Failure to take action, however, may accelerate the rate of change, which may

prove seriously undesirable. A final possibility is that manmade electromagnetic tinkering with Earth's magnetic field may actually induce or catalyze such an event.

Magnetic Versus Physical Pole Shift

In a physical pole inversion of the planet, the planet actually rolls over on its axis. A physical pole shift would likely be catastrophic for the global ecology. One probable consequence would be major crustal displacement, as the flip causes tectonic plates and continents to collide with each other.

Patrick Geryl, author of *How to Survive 2012*, strongly believes a complete magnetic pole reversal will inevitably trigger a disastrous physical pole shift, simply because Earth's core is iron and therefore will respond to the new polarity. This is an overly simplistic view that is not supported by scientific or historical evidence.

There is no evidence that this has happened during previous magnetic pole shifts and nothing to indicate why it should happen this time. An event like this has happened once before in the geological record, but not for many hundreds of millions of years. His belief that a pole shift is certain in 2012 has led Geryl to conclude that the only reasonably safe places to be in such an event will be in special unsinkable ships or deep underground, high up in a major mountain range. Even then, survival is not guaranteed.

Geryl believes Earth reversing its direction of spin will initiate the pole shift. This idea comes from Greg Braden's book *Approaching Zero Point*, in which he examines a scenario where Earth's rotation actually slows, momentarily stops, and then reverses in the opposite direction. This theory would require an unknown force to negate Earth's spin, slow it to a halt without tearing the crust of Earth from its mantle, and then reverse the force so that Earth spins in the opposite direction. The forces responsible for the miniscule slowing Earth is already undergoing would in no way be adequate to do this, nor would any other known force in our solar system.

The Schumann Frequency

Another idea put forward in Braden's *Approaching Zero Point* is that the fundamental frequency of the earth is shifting upward. This change in planetary vibration is said to be responsible for creating the current Earth changes. The frequency Braden is talking about is called the primary Schumann resonance.

This is a function of the amount of time it takes for electromagnetic waves to travel around the planet. It is calculated by dividing the speed of light by the circumference of Earth.

The primary Schumann frequency is 7.8Hz, and varies slightly with changes in the ionosphere. Neither the speed of light nor the circumference of Earth is changing, so the primary Schumann resonance is not going to fundamentally alter either.

Despite the scientific inaccuracy, Braden should be given credit for articulating ideas whose popularity seem to come from their resonance with many peoples' intuitive perceptions of the changes happening on our planet. The vibrations of our planet are changing, but in a much more complex way unrelated to the Schumann frequency.

The notion of Earth reversing its direction of spin mirrors in some ways the much more subtle change of polarity represented by the winter solstice meridian crossing the galactic equator. The science may be wrong, but the notions of a pole shift and an ascending planet tap into the popular psyche in a powerful way. Better science can reveal much more and help us get a clearer view, but the value of new ideas and speculations like these is that they get people to ask important questions.

The kind of massive tsunami in the movie *2012* would probably only be induced by a physical pole shift rather than a magnetic one. An event of this magnitude could possibly trigger a wave of water a mile and a half high that could circumnavigate the globe. Very little of human civilization would be likely to survive.

The mechanism of a magnetic pole reversal is not well understood and the consequences are difficult to quantify, but they are likely to be some significant ones, including major climatic disruption.

--Some scientists think that the poles can spontaneously migrate from one orientation to the other over the course of a few decades to a few thousand years.

--Others think the geodynamo at the earth's core first turns itself off spontaneously and then restarts itself with the magnetic North Pole pointing either north or south.

--External events such as an asteroid impact are not thought to cause magnetic field reversals. The ages of impact craters do not line up with the timing of previous reversals.

--The mainstream scientific opinion is that the current wandering of the magnetic poles does not foretell a magnetic pole shift and no such event is likely in our immediate future.

The historical record shows, however, that magnetic pole shifts are quite frequent events over a geological time scale and it is inevitable that one will happen sooner or later. This could be as long as a few thousand years away but it will certainly happen at some point, as it has happened many times before. In the last 25 million years, the poles have inverted once every 250,000 years, on average. In the last million years, the inversions have happened closer to once every 125,000 years. Estimates for the amount of time a magnetic field reversal would take to complete vary widely, from 5,000 years to a couple of months.

Magnetic Field Drops to Zero

As the magnetic field inverts, the strength of the magnetosphere would likely drop to zero. This would mean our main planetary defense against incoming cosmic radiation would be removed. There is a theory that these periods of magnetic cancellation are responsible for jumps in evolution because the massive increase in cosmic radiation triggers genetic mutations.

An extended period of magnetic cancellation and increased exposure to the solar wind could also result in major disruption to life and possible species extinction. In some ways, a rapid pole reversal may be more desirable than a slower one. At least a functioning magnetosphere provides protection from the solar wind.

The Chandler Wobble

A good indicator of the possibility of changes in the physical poles of Earth is an effect called the Chandler wobble. This is the change in the spin of the earth on its axis. It's named after Seth Carlo Chandler, an American astronomer who first discovered the wobble back in 1891 after thirty years of observations. The effect causes Earth's physical poles to move in an irregular circle. This wobble has a seven-year cycle. The wobble:

--Produces a very small ocean tide, the pole tide, which is the only tide not caused by bodies outside Earth.

--Has varied in amplitude since its discovery, reaching its largest size in 1910 and fluctuating noticeably from one decade to another.

--Is caused by fluctuating pressure on the bottom of the ocean, caused by temperature and salinity changes and wind-driven changes in the circulation of the oceans, according to the Jet Propulsion Laboratory

Independent researcher Micheal Mandeville of *www.earthchanges-bulletin.com* has been exhaustively analyzing trends in seismic and volcanic activity from around the world. Using a very detailed statistical analysis, Mandeville claims to have found correlations between the position and motion of the pole with increases and decreases in earthquakes and volcanic eruptions. These correlations are sufficiently consistent, he claims, to conclude that the Chandler wobble stresses Earth's crust, which in turn creates a cycle of earthquakes and volcanic activity.

The Anomaly of the Wobble

For a six-week period beginning in November 2005, there was no discernable wobble motion in Earth. The track of the spin axis began to slow down, and by about January 8, 2006, it ceased nearly all relative motion. Mandeville suggests that the anomaly in Earth's wobble could be a response to the massive earthquake and the devastating tsunami of December 26, 2004.

After an initial earthquake that measured 9.3 on the Richter scale, a cluster of several thousand earthquakes followed, including dozens of earthquakes greater than 6.0 in magnitude and at least three above 7.0. This caused substantial uplifting, down-warping, and lateral movement in the two tectonic plates that could have ruptured their mutual junction.

The scale of this tectonic activity is by far the greatest on the planet in the last twenty years. Mandeville theorizes this could have caused warping that pushed the Indian continental plate deep enough down into the liquid mantle of Earth to cause a measurable drag on the spin of the equator.

Another contributing factor to this anomaly may be the shifting location of the magnetic north pole, which is currently migrating toward the north spin axis of the wobble. During the past eighty years, for unknown reasons, this rate of drift has been accelerating. The change of the wobble and the drifting of the pole may be seen as symptoms of the early stages of a pole reversal. However, neither of these events necessarily means a complete inversion is imminent or likely.

Alternate Theories

An extended wandering of the poles, also known as a geomagnetic excursion, remains more likely than a complete reversal. The most compelling evidence that a complete pole reversal may be about to occur comes from Dmitriev's theory that incoming interstellar plasma is responsible for current planetophysical changes. The poles of both Uranus and Neptune have both flipped within the last decade. If this is due to the influx of interstellar plasma into our solar system as Dmitriev believes, our own planet is being subjected to these same conditions.

It is not necessary to insist that a pole shift must be about to occur in 2012 to conclude that Earth is entering a period of major geophysical change. There are many contributing factors to this, including increasing cosmic radiation, climate change, and the technological impact of humanity.

On the other hand, the combination of the weakening of Earth's magnetosphere, the large increase in interstellar plasma, and the solar maximum due in 2012 may produce large-scale effects for life on Earth. Given these circumstances, the possibility of a sudden magnetic pole shift cannot be completely discounted, but it is far from inevitable. However, most scientists think a magnetic pole shift is highly unlikely in the near future and that it would be gradual, rather than sudden.

[...and some Astrology](#)

Submitted by [Five](#) on Fri, 11/06/2009 - 17:12.

From Maurice Fernandez's Evolutionary Astrology Forum:

[Time of Radical Shift](#)

by [Maurice](#) » Tue Oct 27, 2009 5:32 am

The Times Are Changing: A look into the coming cycle

Greetings

I feel compelled to write this note about what we astrologers are seeing coming. We are in the beginning of a very unique time in history that will redefine the foundations of our lives. The astrological circumstances are uncommon and very dramatic. Change is likely to affect every level of our being, even though each person will feel it differently and in varying degrees of intensity.

I'm writing this note so that you may make better use of this time and

understand what it is about. As astrologers we are aware of cycles that affect our existence; because this coming cycle is very unique, I feel it is important to share this information. I will try to keep it simple and not burden you with a long text and excessive details.

There are multiple planetary bodies that are gradually forming a very particular and rare alignment. This configuration began to form during the fall of 2008. Politically, that time was when the economical crisis exploded and when US president Barack Obama was elected. The configuration will move into a second phase during November 2009 and January/February 2010. (Saturn will move into the Cardinal sign of Libra and will form powerful angle to Pluto in Capricorn).

The third phase is probably the most dramatic and intense, and will occur from the end of June to the end of July 2010, when all the factors of the configuration will align together in a cross at the very beginning of Cardinal signs in astrology. (Cardinal signs are the signs of new cycles. The planets in questions are Pluto, Uranus, Saturn, Jupiter, and Mars).these planets are slow moving bodies and therefore it is absolutely exceptional that these slow moving bodies end up all aligned in a cross on these very sensitive degrees!

In normal circumstances, some people go through changes while others continue their routine. Here the alignment is so strong and dramatic that everyone's life can be considerably affected... it is likely that your life will not be the same by fall 2010!

The question that often arises is:" Is it bad, or is it good?" The answer is that it depends on the way one deals with the events; a conscious approach can make a difference.

One thing for certain: do not expect security, consistency, and predictability during this time. Reality is bound to change fast and so it is better to move with the flow, while remaining conscious of what is going on. Flexibility is one of the most important assets during this time. This influence is analogous to a gigantic wave forming...you can ride on that wave and go farther than ever expected — experience a powerful transformation that can elevate you to new grounds. But this wave can also destroy a lot of what you are currently attached to.

Redefinition may occur in different fields: you may change vocation, relationships, location, mindsets, to name but a few. New people will move into your life, current ones may leave. New ideas and projects will develop and you may feel inspired to completely reinvent yourself! The cards are re-shuffled! This is a time of an awakening, a revolution...an internal and social revolution.

Everything is shaking up... everything...from November 2009 until August 2010, nothing will stay still. It can be very good, but you have to learn to navigate these changes and seize opportunity when it comes. Don't try to have it all perfect, don't try to keep the cake and eat it: change can take you to a completely new and perhaps higher level of what you are about, but you will have to let go of your security during this time. It is a time for risk, reinvention, new ideas, new concepts, new vision, and the impetus to make it happen. Marriages may break, jobs and possessions may be lost, people may get sick, and simultaneously, new relationships may emerge, new passion may awaken, a completely new lifestyle is in the making...You are embarking on an adventure whether you know it or not, whether you like it or not. My suggestion: make peace with the idea, don't resist the adventure. If you are accepting it, you will make the best of it. If you fight and resist it, you won't win. This is what I mean by being open to risk taking... it may be time to take that "plunge!"

Risking does not mean giving in to every silly venture. It is about hearing a calling for truth...things you have denied, postponed, avoided, feared, but things you know were true. This is a time to be more truthful and follow a calling.

Collectively, while the forces of corruption and manipulation may attempt to control the course of events, they are bound to disintegrate. Scandals will continue to hit the news...Natural events will continue to shake the earth. At worst, a war may break during summer 2010 or later because dramatic changes can spur fear and conflict. But it does not have to go that way; we are creators of our own destiny in the midst of the given circumstances.

As you go through these changes, it is crucial that you take good care of your immune system because as positive as changes may be, they can overwhelm you and weaken your immune system: eat more healthy, avoid fast sugar, ingest raw garlic and onions daily (sandwich), exercise, take time out of the intensity loop, do not let negativity take over—these are basic tips that can keep you grounded.

Importantly: the situation heating up is like a piece of molten iron that can be beaten into a better form—personally and collectively. Be an ambassador of good and avoid wasting time on trivial details. For example, as we see the earth being depleted and all resources and species dwindling, people waste time arguing if global warming is or is not happening...if it is man-made or not! IT DOESN'T MATTER! What matters is that the natural world is vanishing before our eyes because of our misaligned actions: excessive pollution, deforestation, and peaking toxicity levels are a reality beyond global warming debates.

Similarly, the economy is not likely to stabilize any time soon...but perhaps,

necessarily so. And so it will be with many other aspects of your life...you will not have immediate answers. Be patient and keep doing your best. When the cycle will complete, new circumstances will emerge. This cannot be artificially rushed. These dramatic times are an opportunity for us to restructure our lives, personally and collectively. As many things are being redefined, we can relinquish bad habits and attachments, open up to new ideas, and invest in what works rather than settle for immediate gratification. Patience is another essential asset.

In this context, do not expect others to change for the better if you don't do it yourself. We blame the governments and project our frustration on distant "evils," but fail to open our hearts ourselves. Being pro-active may work better than being self-righteous.

IMPORTANT	DATES	TO	NOTE:
October 30	to	early December	2009
January 15	to	February 15,	2010
June 25	to	August 5,	2010
November 1	to	December 26,	2010

GENERAL SUGGESTIONS:
 Understand this is an opportunity to reinvent ourselves in a better way. Understand there will be a price to pay, something may need to go. If you lose something or someone, understand this is the sign of these times, use a crisis to venture into new horizons and create something new. Understand this is an adventure and risk must be taken. Understand that this is not a time when we can expect security—we are in transition.
 Listen to your inner truth, make your life truly happen now. Take care of your immune system: avoid bad diets in general...they render you vulnerable to opportunistic viruses. Support your friends and family, we all shall need one another for support during this transition time. Cultivate your spiritual practice: this is also important for your immune system. Do your best to do good: whatever you seed now will have effect now and later.

There is probably more than can be said and explained, but you get the point... An incredible opportunity is arising, now and throughout 2010...this type of cycle has not happened in recent history. We can expect a certain level of destruction to occur—that is the price to pay...but the prospect of experiencing an awakening and creating a better future is now within reach. We are now in the midst of a revolution—a cultural, social, and political revolution. On a personal level, it is a conceptual, emotional, and or spiritual revolution...truly, it is in the making!

I wish you the very best and infinite blessings during this time and beyond!
May you be guided and manifest the highest of your potential...

With love,
Maurice
"Anyone who believes the Stars are just something above the head...lacks the
true "'eye' of knowledge...
Nietzsche

[Re:](#)

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[Thanks](#)

Submitted by [bonszaisean](#) on Fri, 11/06/2009 - 21:53.
Maurice, you have put many of my disorganized thoughts and feelings into a
beautiful and uplifting piece. I would love to have a discussion with you.

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[Fascinating research Mark](#)

Submitted by [drew hempel](#) on Fri, 11/06/2009 - 19:49.
Fascinating research Mark Heley! Thanks. Of course the concept of quantum
chaos -- of the inability to predict nonlinear stochastic feedback -- the authors of
the "Nonlocal Universe" get into this more.

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[Grand Squares In The Sky](#)

Submitted by [Five](#) on Sat, 11/07/2009 - 08:50.

The Grand Squares- Galactic Underworld

Fixed Grand Squares involving the 'outer planets'- Chiron, Neptune, Uranus and
Pluto, are exceedingly rare....occurring only in THOUSANDS of years..and Fixed
Grand Squares are the big feature of the remainder of the Galactic
Underworld....2008-2011.

~They cause monumental changes in the world and perhaps beyond.....

Grand Squares are when 4 or more planets are configured in a T square at 90* angles that involve 2 or more planets in opposition at 180* angles....

These patterns are so extraordinary and long lasting that nothing like this has occurred since the Mayan Calendar was borne.

These squares encourage individuals to enter into a flow --in this case cosmic consciousness..

These configurations in the heavens do have the potential to culminate evolution, so that the 'new human' can be born...

The astrological patterns in play during the Galactic Underworld demonstrate that the planets support the theorized time acceleration of the Mayan Calendar...

The most profound energies available in the cosmos- the ability to advance in consciousness..and to be in joy..emerge as the creation of the Galactic and Universal Underworlds into 2011.

Comments by Barbara Hand Clow- The Mayan Code

Barbara Hand Clow is a world renowned astrologer/cosmologist..ceremonial leader and initiated Mayan Elder .

...as the owl flies

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[Evolutionary Catalysts?](#)

Submitted by [Five](#) on Sun, 11/08/2009 - 09:34.

As a very (amateur) astronomer, we have been witnessing these changes in the solar system for quite a while now.

Changes in the magnetosphere, heliosphere, changes in the Sun, planets, etc. Saturn gave us some beautiful sacred geometry on it's surface, several years ago.

Is this what the Mayan Calendar is about?

Changes in the consciousness of the entire Solar System...along of course, with changes in human consciousness..perhaps we ourselves are causing these changes, as our consciousness evolves...

Great article, Mark.

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[Really intersting article.](#)

Submitted by [ada](#) on Sat, 11/07/2009 - 14:33.

Really intersting article, nice to see all this information condensed into one article.

I find something very satisfying about the notion of a massive solar flare almost symbolically and literally clearing out or cleansing the planet's atmosphere of mankind's seemingly destructive influence. I think it would seem like a very humbling event.

From the article - 'There are also some predictions that delay in the cycle may cause the sun to suddenly burst into violent activity with another series of x-ray megaflares in the X-20+ range, or even cause another Carrington event.'

It would be nice to have references or links to these predictions.

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[response to ada](#)

Submitted by [Mark Heley](#) on Sat, 11/07/2009 - 17:45.

The predictions were made by NASA in their revised anaylsis of what sunspot cycle 24 has in store for us.

Here is the link:

http://science.nasa.gov/headlines/y2009/29may_noaaprediction.htm

For more info on the Carrington Event look here:

http://science.nasa.gov/headlines/y2008/06may_carringtonflare.htm

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Time & Tide

Submitted by [Rehdien](#) on Sat, 11/07/2009 - 18:18.

Thank you Mark for this fascinating article.

"Scientists are now coming to realize that space has more in common with our terrestrial oceans, with their complex tides and currents, than was previously recognized."

Right away I found the connection between this discovery and the creation stories of the Vedic and Biblical traditions striking. In Genesis, God moves over the face of the waters that existed before creation became manifest. The Hindu story goes something like: Brahma comes to the awareness that he is sitting on a lotus surrounded by water that reaches infinitely in every direction. After pondering "where did all this water come from?" "who is Brahma?", he meditates for 1000 years. When he opens his eyes Saraswati rises out of the water and together they create the universe.

The Mantra Pushpam, chanted after all Puja rituals, states that water is the basis of the universe.

" Fire is the source of water, He who knows this, Becomes established in himself, Water is the source of fire, He who knows this, Becomes established in himself. He who knows the source of water, Becomes established in himself, Air is the source of water, He who knows this, Becomes established in himself, Water is the source of air, He who knows this, Becomes established in himself. He who knows the source of water, Becomes established in himself,"

It continues, including the other elements, the sun, moon and the stars, in this dance of metaphysical principles. My understanding, is that by "water" more is meant than simply H₂O. Chemical water, like blood, like outer space with its tides of cosmic energies, is a symbol, a physicalisation of eternal principles, beyond time, space and becoming. As indeed, all of creation is. Water has the power to give life, and also take it away. Floods, in many wisdom traditions represent the

"rising up" of new possibilities. To me, conflict between the "literal" and "symbolic" is a result of misunderstanding.

Who wants to go surfing?

Shanti ca Prema

-Rehdien

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Still Daniel Pinchbeck is

Submitted by [drew hempel](#) on Sat, 11/07/2009 - 19:37.

Still Daniel Pinchbeck is correct in stating reality is a fractal -- as Arthur C. Clarke's Mandlebrot Set documentary is reminiscent of an ayahuasca trip: <http://vodpod.com/watch/572423-fractals-arthur-c-clarke-3-of-6>

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The universe is a fractal,

Submitted by [drew hempel](#) on Sat, 11/07/2009 - 19:39.

The universe is a fractal, the solar 11 year cycle is an "alternator" http://www.fractaluniverse.org/v2/?page_id=141

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Science and Intuition

Submitted by [Quanta](#) on Sun, 11/08/2009 - 13:21.

Thanks for pulling all this information together.

With the disclaimer that I'm not a scientist nor do I rely heavily on science to inform my reality, in recent years I've been diving deeper into various realms of consciousness for personal insights about life and its intimate relationship with the cosmos. While quite challenging to articulate and share, I've felt compelled to do so.

Following are links to a couple of these shorter pieces that are comprised mostly of inspired musings about some of the topics you touch on here, for those who

may enjoy a bit of lighter reading and perhaps a gentle nudge from the scientific platform onto a more intuitive train of thought:

Exploring connections among 2012, the Great Pyramid, and the two most recent solar minimums: <http://inter-intelligence-communications.com/?p=453>

Exploring a possible connection between solar minimum and consciousness expansion: <http://inter-intelligence-communications.com/?p=28>

Stace Tussel

"Meaningful breakthroughs in science come through intuitive leaps." -Itzhak Bentov