Addenda II to the Sciences Appendix of

Appendix-1-II: Human Sciences of Space and Earth
http://www.pfcn.net/Bulletins/Final%20Call-APPENDIX-Science-7-II.pdf

Note: Additional material seemed worth including. Rather than expand the existing Appendix, a second sciences section was created. -ASK

This science material is being shared because as “the great finality” emerges, ordinary human awareness gains some hint as to what really supports “physical reality”, that “reality” can change very quickly as if “in the blink of an eye”, and that planetary, solar, galactic, and beyond can all change very quickly. Along with these hints and insights from sciences, there are the dreams, visions, and glimpses out of the corner of the eye of something “*other*” than what is mistaken as reality, physical reality.

Years ago I wrote that human science will eventually be detecting indicators of powerful spiritual energies –and this year that is what has stood out the most as I have monitored various sciences. This includes indications of creation forces, the cosmic web of light that connects The All, and some of the forces of creational deletion –including time and space energies such as those from supernovae.

-Alex

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Why a Physics Revolution Might Be on Its Way

by Kelly Dickerson, Staff Writer | November 09, 2014 09:17am ET

http://www.livescience.com/48685-physics-field-revolution.html

The field of physics may be turned on its head soon, said renowned physicist Nima Arkani-Hamed during a live lecture from the Perimeter Institute for Theoretical Physics in Waterloo, Canada.

For one, he said, the tried and true physics of relativity and quantum mechanics don't get along well. The problem is that in some sense, the principles behind these theories seem to be impossible when physicists dig a little deeper into them, Arkani-Hamed said. Scientists run into a lot of problems when they try to apply these theories to the entirety of space and time.

The two ideas are also incredibly constraining, and they make it challenging for physicists to think outside the box and develop new ideas and theories, Arkani-Hamed said. [The 9 Biggest Unsolved Mysteries in Physics]

"It's almost impossible to monkey around with the rules and not be wrong immediately," Arkani-Hamed said.

Physicists have known about this disparity for a while, but progress on fundamental questions in physics takes a long time. Scientists proposed the existence of the Higgs boson particle, for example, decades before it was actually discovered.

An unexplained macroscopic universe

One problem is that conventional physics doesn't really account for why the universe is so large, Arkani-Hamed said.

Albert Einstein's theory of relativity showed that a huge amount of energy exists in the vacuum of space, and it should curve space and time. In fact, there should be so much curvature that the universe is a tiny, crumpled ball.

"That should make the universe horrendously different than what it is," Arkani-Hamed said.

But quantum mechanics also poses a problem. The theory is good at describing the very small realm of particle physics, but it breaks down when physicists try to apply it to the universe as a whole.

"Everything that quantum mechanics is, is violated by our universe because we're accelerating (referring to the idea that the universe is expanding) – we don't know what the rules are," Arkani-Hamed said. "When you try to apply quantum mechanics to the entire universe, quantum mechanics cries 'uncle.'"

Physics frontiers

One possible way to solve the problem is with an entirely new theory beyond the Standard Model, the reigning theory of particle physics, the physicist said. [Sparticles to Neutrinos: The Coolest Little Particles in the Universe]
One idea is called string theory, which proposes that particles aren't actually fundamentally particles. Instead, the particles and all the matter in the universe they make up are composed of tiny, vibrating strings. The equations that support string theory appear to work, but that doesn't mean there are no other viable formulas or explanations, Arkani-Hamed said.

Supersymmetry is another possible "new physics" explanation. Under this idea, all subatomic particles have a "superpartner" particle that physicists have yet to discover. Supersymmetry would also open up extra directions that the particles can move in. The discovery of supersymmetry would bolster the Standard Model of physics, scientists have said.

"It's the last thing nature can do to make itself compatible with the general principles of physics that already exist," Arkani-Hamed said.

When the world's largest atom smasher, the Large Hadron Collider (LHC), is up and running again next year, physicists will be looking for the extra particles that supersymmetry suggests should exist.

Either way, after a year or two of running the LHC, the question of whether supersymmetry exists should be answered, Arkani-Hamed said.

The experiments over the next few years will likely tell physicists if they need to fine-tune existing theories or if the field of physics is due for a much deeper and more dramatic paradigm shift.

The questions on the table now are the underpinnings of space and time, and the origin and fate of the universe, Arkani-Hamed said.
"Today we finally have the theoretical framework in place to ask these kinds of big questions," Arkani-Hamed said. "The next step will likely be a revolution."

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The Invisibility Cloak for Time

Experts create a cloaking device capable of hiding entire events in 'bubbles'

by Victoria Woollaston for MailOnline

http://www.dailymail.co.uk/sciencetech/article-2857281/The-invisibility-cloak-TIME-Experts-create-cloaking-device-capable-hiding-entire-events-bubbles.html

Background papers – requires subscription:
http://www.opticsinfobase.org/search2.cfm?reissue=J&journalList=&fullrecord=temporal+cloak&basicsearch=Go

The researchers separated strands of light frequencies before changing their respective height.

They then sent this light through a fibre optic cable.

By slowing the speed of photons on a particular strand, the intensity of that light dropped to zero.

This made that particular strand appear invisible, hidden behind or between other strands.

Using this method, the light travelling in front of this strand was sped up, while the trailing part was slowed down to create a gap.

The physicists then used this gap to insert hidden messages in data.

The hidden messages travelled along with the other frequencies, but arrived at the other end, marginally out of sync with the photons surrounding it.

The theory was proposed by scientists at Imperial College London in 2010, and the team of researchers from Purdue University made it a reality in 2013.

Last year, these experts concealed data, but were unable to retrieve this hidden data, and ultimately ended up erasing it.

They have since developed the technology, and their latest design is the first step towards using such cloaking devices in the real world.

Expanding this theory outside the realms of sending data, experts propose it has the potential to hide events featuring people, for example.

If a gap created between the light strands was large enough, a person could walk through the centre undetected, and appear in another location.

For example, if a pedestrian wanted to cross a road without interrupting the traffic, the cars that haven’t reached the crossing would appear slowed down, while the cars beyond the crossing would speed up.

This would create a gap for the pedestrian to cross, but an observer looking from afar would only see a steady stream of traffic. This creates a ‘bubble in time.’

To make such a large-scale cloak possible, it would require a system advanced enough to physically separate frequencies in light, which can then be manipulated - but the Purdue research proves it is at least possible.

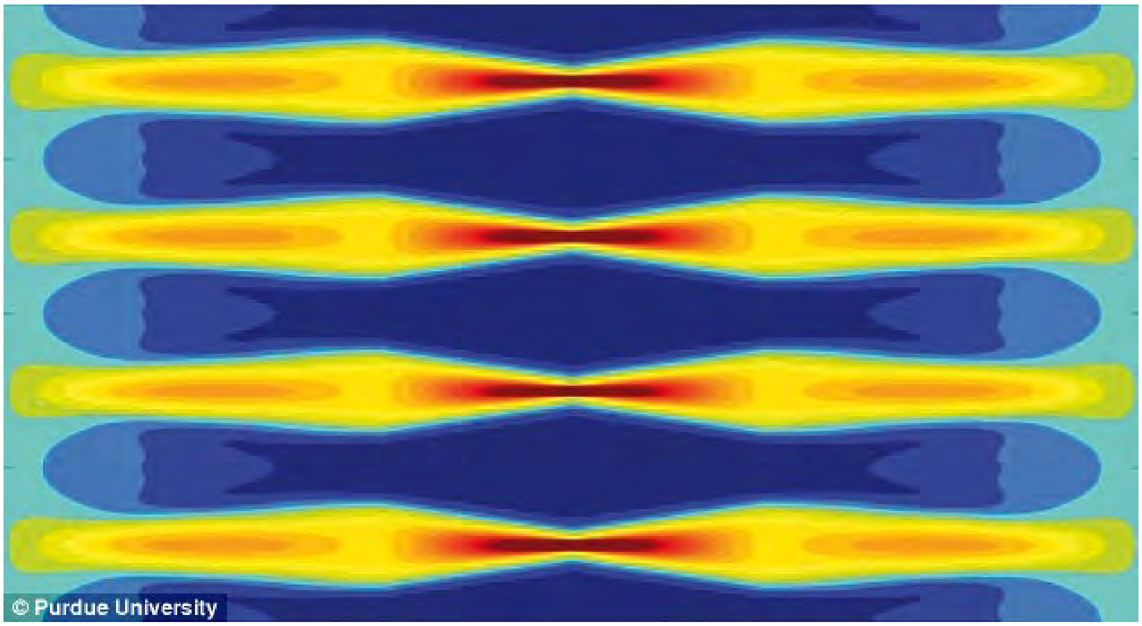
And in theory, by changing the speed on multiple strands of light could create a series of gaps into which multiple pieces of data could be hidden.

Lead researcher Joseph Lukens said: ‘It looks like no signal is being sent and [adds] a potentially higher level of security because it doesn't even look like you are communicating.

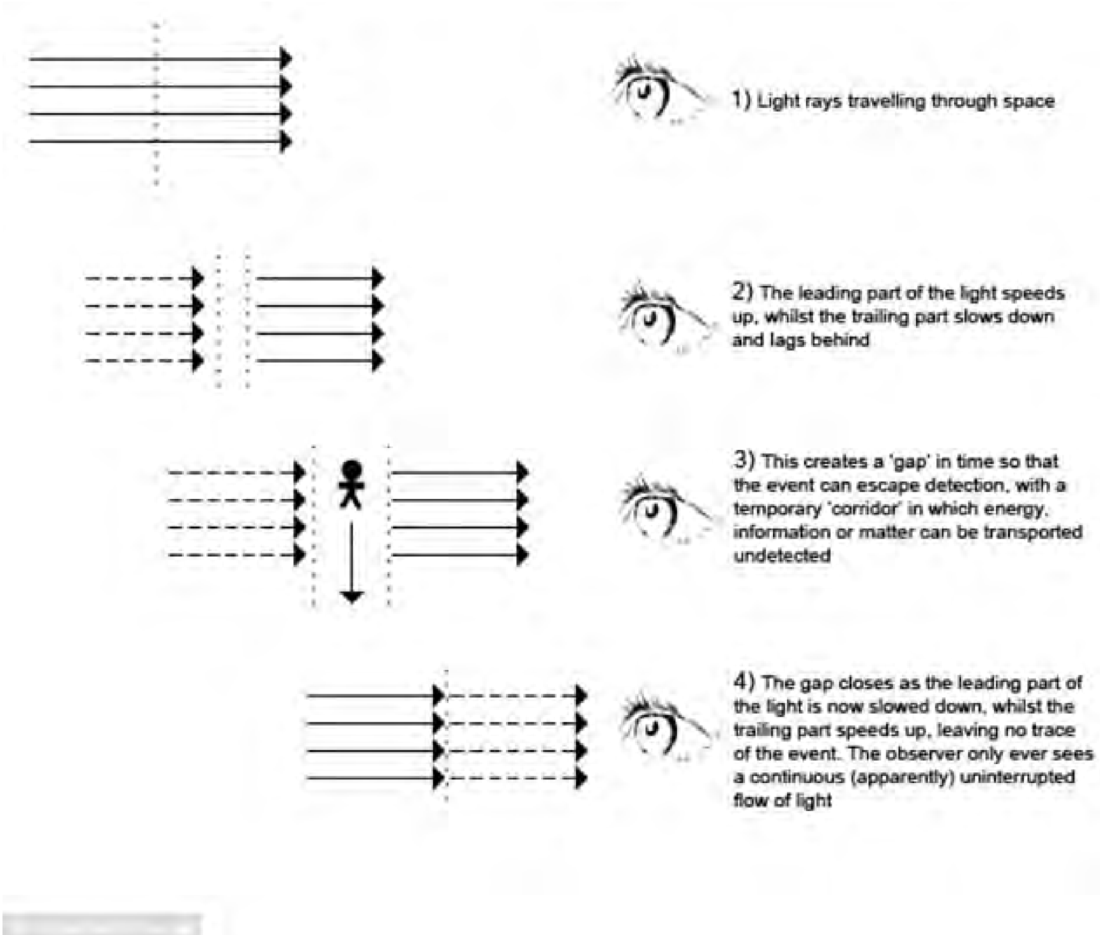
‘Eavesdroppers won't realise the signal is cloaked because it looks like no signal is being sent.

HOW TEMPORAL CLOAKING WORKS

- The technique uses lasers and fibre optics.
- The researchers separated strands of frequencies in laser light before changing their respective height.
- They then sent this light through a fibre optic cable.
- By slowing the speed of photons on a particular strand, the intensity of the light was dropped to zero.
- This made that particular strand appear invisible, hidden behind or between other strands.
- Using this method, the light travelling in front of this strand was sped up, while the trailing part was slowed down to create a gap.
- The physicists then used this gap to insert hidden messages in data.
- During test, the hidden messages travelled along with the other frequencies, but arrived at the other end marginally out of sync with the photons surrounding it.
- It is called a spacetime cloak because the data is transported in a 'bubble of time.'



To create their ‘temporal cloak’, researchers separated strands of frequencies in light before changing their respective height. By slowing the speed of photons on a strand, the intensity of the light dropped to zero. This created a gap (illustrated in red), in which physicists could insert and send hidden data messages.



The theory (pictured) was proposed by scientists at Imperial College London in 2010, and a team of researchers from Purdue University made it a reality in 2013. Last year, these experts concealed data but were unable to retrieve it, and ultimately ended up erasing it. They have since advanced the technology.

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Solar and Planetary Magnetic Reversal

November-December 2014

Human level sciences are well aware of the magnetic field reversals occurring with the Sun and with the Earth. While most “official” science public information releases state this will take hundreds of years or more to complete. It is also acknowledged that the magnetic North has increased its rate of movement in the recent decade or two. And there is good evidence that magnetic field reversals on Earth can take place quickly – within a human lifetime.

While this may seem as if it is only a small inconvenience for navigation, etc. there is more to this when one considers the role of the magnetic field in terms of its ability to deflect or filter solar and cosmic radiation.

> *What's going on? Cosmic rays are intensifying. Galactic cosmic rays are a mixture of high-energy photons and subatomic particles accelerated to near-light speed by violent events such as supernova explosions. Astronauts are protected from cosmic rays in part by the sun: solar magnetic fields and the solar wind combine to create a porous 'shield' that fends off energetic particles from outside the solar system. The problem is, as the authors note, "The sun and its solar wind are currently exhibiting extremely low densities and magnetic field strengths, representing states that have never been observed during the Space Age. As a result of the remarkably weak solar activity, we have also observed the highest fluxes of cosmic rays in the Space Age."*
>
> *The shielding action of the sun is strongest during solar maximum and weakest during solar minimum--hence the 11-year rhythm of the mission duration plot. At the moment we are experiencing Solar Max, which should be a good time for astronauts to fly--but it's not a good time. The solar maximum of 2011-2014 is the weakest in a century, allowing unusual numbers of cosmic rays to penetrate the solar system.*
>
> *This situation could become even worse if, as some researchers suspect, the sun is entering a long-term phase of the solar cycle characterized by relatively weak maxima and deep, extended minima. In such a future, feeble solar magnetic fields would do an extra-poor job keeping cosmic rays at bay, further reducing the number of days astronauts can travel far from Earth.*
>
> \- *Tony Phillips, http://www.spaceweather.com/*

Magnetic fields also facilitate the solar-interplanetary plasma and can exert kinetic torque on planetary bodies –especially between sun and Earth. This could be what helps trigger a major axial-crustal slip-shift for Earth. Gravitational influences from a very large and/or very dense body passing through the vicinity of this solar system –or something even larger that affect this region of the Milky Way galaxy could also be a major influencer upon a crustal-axial slip shift. The dreams and visions of immense oceanic waves and intense winds that have been reported by some, would fit such a scenario.

-Alex

End Notes:

I would refer readers to a few excellent summaries of recent space science

Suspicious Observers: Super-Flood summary
https://www.youtube.com/watch?v=vJKTLuvGAU4&list=PLHSoxioQtwZcJiKVxaGLoL3cD2WBPby3z&index=3

(Click on “see more” under the video for links to various research papers.)

Vacuum Catastrophe – Zero Point Energy
https://www.youtube.com/watch?v=m1FUraLn4v0&list=PLHSoxioQtwZcJiKVxaGLoL3cD2WBPby3z&index=4

Episode 3 - Symbols of an Alien Sky: The Electric Comet https://www.youtube.com/watch?v=34wtt2EUToo&list=PLwOAYhBuU3UfvhvcT1lZA6KbSdh0K2EpH

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Implications to mass extinction

Oxygen escape from the Earth during geomagnetic reversals

http://www.sciencedirect.com/science/article/pii/S0012821X14001629

Note: I found this article of particular interest given that a few individuals I know of have had visions of an enormous solar discharge that enveloped Earth. One of the elements shared by these visions was concern expressed over the possible loss of the Earth’s atmosphere. –*Alex*

- Geomagnetic field reversal substantially weakens the protection for the atmosphere.
- Solar wind energizes more oxygen ions to escape when geomagnetic field is weakened.
- Oxygen escape may explain the drop of atmospheric level during mass extinction.
- The causal relation between reversal and mass extinction should be “many-to-one”.
- The simulated oxygen escape rate based on knowledge of Mars support our hypothesis.

Abstract

The evolution of life is affected by variations of atmospheric oxygen level and geomagnetic field intensity. Oxygen can escape into interplanetary space as ions after gaining momentum from solar wind, but Earth's strong dipole field reduces the momentum transfer efficiency and the ion outflow rate, except for the time of geomagnetic polarity reversals when the field is significantly weakened in strength and becomes Mars-like in morphology. The newest databases available for the Phanerozoic era illustrate that the reversal rate increased and the atmospheric oxygen level decreased when the marine diversity showed a gradual pattern of mass extinctions lasting millions of years. We propose that accumulated oxygen escape during an interval of increased reversal rate could have led to the catastrophic drop of oxygen level, which is known to be a cause of mass extinction. We simulated the oxygen ion escape rate for the Triassic–Jurassic event, using a modified Martian ion escape model with an input of quiet solar wind inferred from Sun-like stars. The results show that geomagnetic reversal could enhance the oxygen escape rate by 3–4 orders only if the magnetic field was extremely weak, even without consideration of space weather effects.

This suggests that our hypothesis could be a possible explanation of a correlation between geomagnetic reversals and mass extinction. Therefore, if this causal relation indeed exists, it should be a "many-to-one" scenario rather the previously considered "one-to-one", and planetary magnetic field should be much more important than previously thought for planetary habitability.

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Losing air

New study finds a barrage of small impacts likely erased much of the Earth’s primordial atmosphere.

December 2, 2014
Jennifer Chu, MIT News Office

http://newsoffice.mit.edu/2014/impacts-obliterate-atmosphere-1202

Today’s atmosphere likely bears little trace of its primordial self: Geochemical evidence suggests that Earth’s atmosphere may have been completely obliterated at least twice since its formation more than 4 billion years ago. However, it’s unclear what interplanetary forces could have driven such a dramatic loss. Now researchers at Massachusetts Institute of Technology (MIT), Hebrew Univ. and Caltech have landed on a likely scenario: A relentless blitz of small space rocks, or planetesimals, may have bombarded Earth around the time the moon was formed, kicking up clouds of gas with enough force to permanently eject small portions of the atmosphere into space.

Tens of thousands of such small impacts, the researchers calculate, could efficiently jettison Earth’s entire primordial atmosphere. Such impacts may have also blasted other planets, and even peeled away the atmospheres of Venus and Mars.

In fact, the researchers found that small planetesimals may be much more effective than giant impactors in driving atmospheric loss. Based on their calculations, it would take a giant impact—almost as massive as the Earth slamming into itself—to disperse most of the atmosphere. But taken together, many small impacts would have the same effect, at a tiny fraction of the mass. Hilke Schlichting, an assistant professor in MIT’s Dept. of Earth, Atmospheric and Planetary Sciences, says understanding the drivers of Earth’s ancient atmosphere may help scientists to identify the early planetary conditions that encouraged life to form.

“[This finding] sets a very different initial condition for what the early Earth’s atmosphere was most likely like,” Schlichting says. “It gives us a new starting point for trying to understand what was the composition of the atmosphere, and what were the conditions for developing life.”

Schlichting and her colleagues have published their results in *Icarus*.

Efficient ejection

The group examined how much atmosphere was retained and lost following impacts with giant, Mars-sized and larger bodies and with smaller impactors measuring 25 kilometers or less—space rocks equivalent to those whizzing around the asteroid belt today.

The team performed numerical analyses, calculating the force generated by a given impacting mass at a certain velocity, and the resulting loss of atmospheric gases. A collision with an impactor as massive as Mars, the researchers found, would generate a shockwave through the Earth’s interior, setting off significant ground motion—similar to simultaneous giant earthquakes around the planet—whose force would ripple out into the atmosphere, a process that could potentially eject a significant fraction, if not all, of the planet’s atmosphere. However, if such a giant collision occurred, it should also melt everything within the planet, turning its interior into a homogenous slurry. Given the diversity of noble gases like helium-3 deep inside the Earth today, the researchers concluded that it is unlikely that such a giant, core-melting impact occurred.

Instead, the team calculated the effects of much smaller impactors on Earth’s atmosphere. Such space rocks, upon impact, would generate an explosion of sorts, releasing a plume of debris and gas. The largest of these impactors would be forceful enough to eject all gas from the atmosphere immediately above the impact’s tangent plane—the line perpendicular to the impactor’s trajectory. Only a fraction of this atmosphere would be lost following smaller impacts.

To completely eject all of Earth’s atmosphere, the team estimated, the planet would need to have been bombarded by tens of thousands of small impactors—a scenario that likely did occur 4.5 billion years ago, during a time when the moon was formed. This period was one of galactic chaos, as hundreds of thousands of space rocks whirled around the solar system, frequently colliding to form the planets, the moon and other bodies.

“For sure, we did have all these smaller impactors back then,” Schlichting says. “One small impact cannot get rid of most of the atmosphere, but collectively, they’re much more efficient than giant impacts, and could easily eject all the Earth’s atmosphere.”

Runaway effect

However, Schlichting realized that the sum effect of small impacts may be too efficient at driving atmospheric loss. Other scientists have measured the atmospheric composition of Earth compared with Venus and Mars. These measurements have revealed that while each planetary atmosphere has similar patterns of noble gas abundance, the budget for Venus is similar to that of chondrites—stony meteorites that are primordial leftovers of the early solar system. Compared with Venus, Earth’s noble gas budget has been depleted 100-fold.

Schlichting realized that if both planets were exposed to the same blitz of small impactors, Venus’ atmosphere should have been similarly depleted. She and her colleagues went back over the small-impactor scenario, examining the effects of atmospheric loss in more detail, to try and account for the difference between the two planets’ atmospheres.

Based on further calculations, the team identified an interesting effect: Once half a planet’s atmosphere has been lost, it becomes much easier for small impactors to eject the rest of the gas. The researchers calculated that Venus’ atmosphere would only have to start out slightly more massive than Earth’s in order for small impactors to erode the first half of the Earth’s atmosphere, while keeping Venus’ intact. From that point, Schlichting describes the phenomenon as a “runaway process—once you manage to get rid of the first half, the second half is even easier.”

Time zero

During the course of the group’s research, an inevitable question arose: What eventually replaced Earth’s atmosphere? Upon further calculations, Schlichting and her team found the same impactors that ejected gas also may have introduced new gases, or volatiles.

“When an impact happens, it melts the planetesimal, and its volatiles can go into the atmosphere,” Schlichting says. “They not only can deplete, but replenish part of the atmosphere.”

The group calculated the amount of volatiles that may be released by a rock of a given composition and mass, and found that a significant portion of the atmosphere may have been replenished by the impact of tens of thousands of space rocks.

“Our numbers are realistic, given what we know about the volatile content of the different rocks we have,” Schlichting notes.

Going forward, Schlichting hopes to examine more closely the conditions underlying Earth’s early formation, including the interplay between the release of volatiles from small impactors and from Earth’s ancient magma ocean.

Source: Massachusetts Institute of Technology

(Image courtesy of NASA)

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Planetary Imbalances

November 2014

This is one of a number of recent science articles that discuss interpretations of new data concerning the inner dynamics of the Earth. These gravity maps are only one of the results from new terrestrial and space sensing data. Gravity mapping also provides insight into the distribution of various layers within the planet. -ASK

The “Potsdam Gravity Potato” Shows Variations in Earth’s Gravity

by Matt Williams on November 29, 2014

People tend to think of gravity here on Earth as a uniform and consistent thing. Stand anywhere on the globe, at any time of year, and you’ll feel the same downward pull of a single G. But in fact, Earth’s gravitational field is subject to variations that occur over time. This is due to a combination of factors, such as the uneven distributions of mass in the oceans, continents, and deep interior, as well as climate-related variables like the water balance of continents, and the melting or growing of glaciers.

And now, for the first time ever, these variations have been captured in the image known as the “Potsdam Gravity Potato” – a visualization of the Earth’s gravity field model produced by the German Research Center for Geophysics’ (GFZ) Helmholtz’s Center in Potsdam, Germany.

And as you can see from the image above, it bears a striking resemblance to a potato. But what is more striking is the fact that through these models, the Earth’s gravitational field is depicted not as a solid body, but as a dynamic surface that varies over time. This new gravity field model (which is designated EIGEN-6C) was made using measurements obtained from the LAGEOS, GRACE, and GOCE satellites, as well as ground-based gravity measurements and data from the satellite altimetry.

Compared to the previous model obtained in 2005 (shown above), EIGEN-6C has a fourfold increase in spatial resolution.

“Of particular importance is the inclusion of measurements from the satellite GOCE, from which the GFZ did its own calculation of the gravitational field,” says

Dr. Christoph Foerste who directs the gravity field work group at GFZ along with Dr. Frank Flechtner.

The ESA mission GOCE (Gravity Field and Steady-State Ocean Circulation Explorer) was launched in mid-March 2009 and has since been measuring the Earth's gravitational field using satellite gradiometry – the study and measurement of variations in the acceleration due to gravity.

"This allows the measurement of gravity in inaccessible regions with unprecedented accuracy, for example in Central Africa and the Himalayas," said Dr. Flechtner. In addition, the GOCE satellites offers advantages when it comes to measuring the oceans.

Within the many open spaces that lie under the sea, the Earth's gravity field shows variations. GOCE is able to better map these, as well as deviations in the ocean's surface – a factor known as "dynamic ocean topography" – which is a result of Earth's gravity affecting the ocean's surface equilibrium.

Long-term measurement data from the GFZ's twin-satellite mission GRACE (Gravity Recovery And Climate Experiment) were also included in the model. By monitoring climate-based variables like the melting of large glaciers in the polar regions and the amount of seasonal water stored in large river systems, GRACE was able to determine the influence of large-scale temporal changes on the gravitational field.

Given the temporal nature of climate-related processes – not to mention the role played by Climate Change – ongoing missions are needed to see how they effect our planet long-term. Especially since the GRACE mission is scheduled to end in 2015.

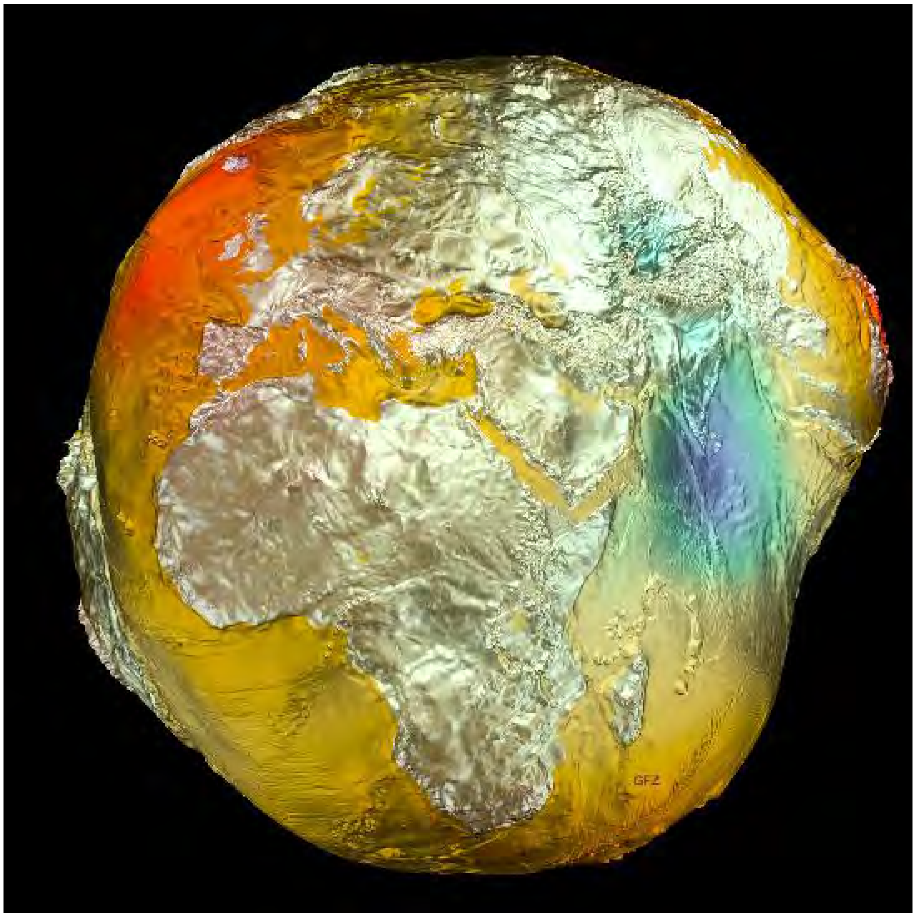
In total, some 800 million observations went into the computation of the final model which is composed of more than 75,000 parameters representing the global gravitational field. The GOCE satellite alone made 27,000 orbits during its period of service (between March 2009 and November 2013) in order to collect data on the variations in the Earth's gravitational field.

The final result achieved centimeter accuracy, and can serve as a global reference for sea levels and heights. Beyond the "gravity community," the research has also piqued the interest of researchers in aerospace engineering, atmospheric sciences, and space debris.

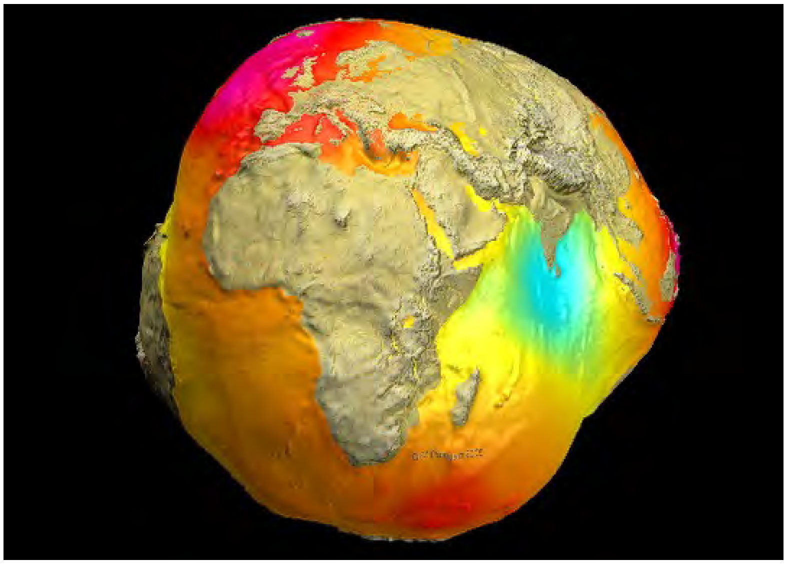
But above all else, it offers scientists a way of imaging the world that is different from, but still complimentary to, approaches based on light, magnetism, and seismic waves. And it could be used for everything from determining the speed of ocean currents from space, monitoring rising sea levels and melting ice sheets, to uncovering hidden features of continental geology and even peeking at the convection force driving plate tectonics.

Article source:

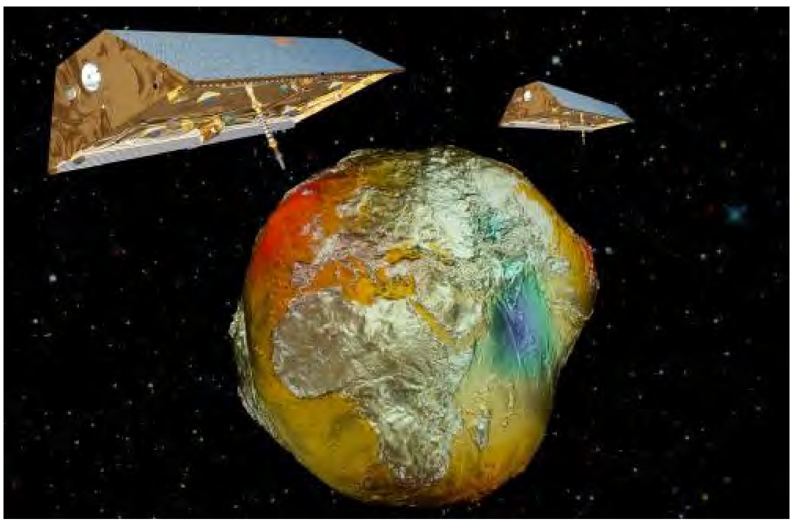
http://www.gfz-potsdam.de/en/media-communication/image-galleries/geoid-the-potsdam-gravity-potato/



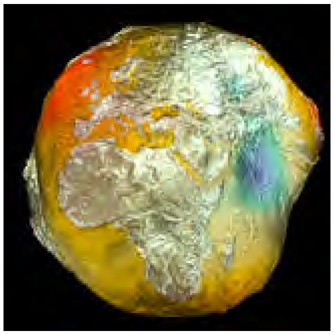
The Earth's gravitational model (aka the "Potsdam Potato") is based on data from the LAGEOS, GRACE, and GOCE satellites and surface data. Credit: GFZ



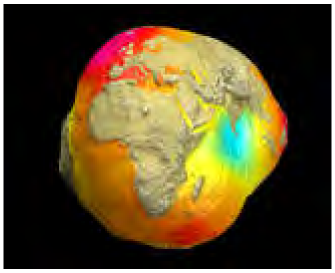
The 2005 model, which was based on data from the CHAMP and GRACE satellites and surface data, was less refined than the latest one. Credit: GFZ



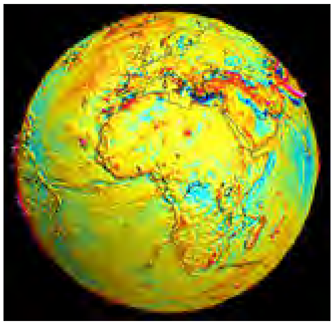
Twin-satellites GRACE with the earth's gravity field (vertically enhanced) calculated from CHAMP data. Credit: GFZ



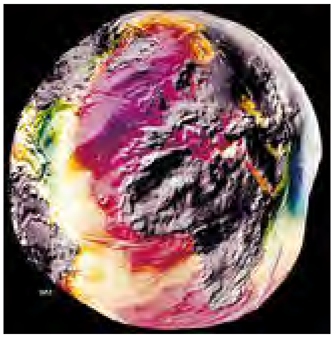
Geoid 2011, data based on satellite LAGEOS, GRACE and GOCE and surface data (airborne gravimetry and satellite altimetry). The improved resolution is partly due to a) Improved and new methods of satellite measurements SLR (LAGEOS, ERS), GPS (CHAMP), K-Band Ranging (GRACE), satellite gradiometry (GOCE) and b) Increased accuracy in the measurement of surface data (airborne gravimetry and satellite altimetry) as well as on the long-term data series. (Image: GFZ)



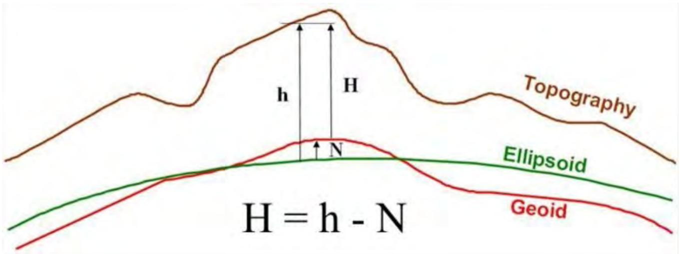
Geoid 2005, based on data of two new satellites (CHAMP and GRACE) plus surface data (airborne gravimetry and satellite altimetry)



Gravity Anomalies 2005. Gravity anomalies in mgal, deduced by CHAMP, GRACE and ground based measurement. (Image: GFZ)



Geoid 1995, The irregular gravitational field of the Earth in highly exaggerated representation. Become known as the "Potsdam Gravity potato". 37 satellites launched since 1960 (including ERS-1 and LAGEOS), measured by Satellite Laser Ranging (SLR) and other older methods of measurement, plus surface data (airborne gravimetry and satellite altimetry). (Image: GFZ)



The height H of a topographic point is derived from the difference of the geometric height h above an ellipsoid (based on GNSS navigation) minus the geoid undulation N (estimated from the Earth´s gravity field). (Image: GFZ)

Also see:

http://www.nytimes.com/2012/05/29/science/earths-core-the-enigma-1800-miles-below-us.html?pagewanted=all&_r=1&

http://www.scientificamerican.com/article/climate-change-has-shifted-location-north-south-poles/

http://www.csr.utexas.edu/grace/publications/brochure/page4.html

http://icgem.gfz-potsdam.de/ICGEM/potato/MassTransportAndDistributionInTheEarthSystem.pdf *(13MB file)*

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Universe may face a darker future: Is dark matter being swallowed up by dark energy?

October 31, 2014

...The entire notion of "dark matter" serves as a catch-all for whatever human science cannot explain, still I find it most human investigation and speculations on "dark matter" of interest. Partly humans are noticing the deletion of portions of extant creation. The rest is a mixture of misunderstood energetic impulses and mistaken assumptions about reality. –ASK

http://www.sciencedaily.com/releases/2014/10/141031082021.htm

New research offers a novel insight into the nature of dark matter and dark energy and what the future of our Universe might be.

Researchers in Portsmouth and Rome have found hints that dark matter, the cosmic scaffolding on which our Universe is built, is being slowly erased, swallowed up by dark energy.

Cosmologists use galaxies observed by the Sloan Digital Sky Survey to study the nature of dark energy. Credit: Sloan Digital Sky Survey

The findings appear in the journal Physical Review Letters, published by the American Physical Society. In the journal cosmologists at the Universities of Portsmouth and Rome, argue that the latest astronomical data favours a dark energy that grows as it interacts with dark matter, and this appears to be slowing the growth of structure in the cosmos.

Professor David Wands, Director of Portsmouth's Institute of Cosmology and Gravitation, is one of the research team.

He said: "This study is about the fundamental properties of space-time. On a cosmic scale, this is about our Universe and its fate.

"If the dark energy is growing and dark matter is evaporating we will end up with a big, empty, boring Universe with almost nothing in it.

"Dark matter provides a framework for structures to grow in the Universe. The galaxies we see are built on that scaffolding and what we are seeing here, in these findings, suggests that dark matter is evaporating, slowing that growth of structure."

Cosmology underwent a paradigm shift in 1998 when researchers announced that the rate at which the Universe was expanding was accelerating. The idea of a constant dark energy throughout space-time (the "cosmological constant") became the standard model of cosmology, but now the Portsmouth and Rome researchers believe they have found a better description, including energy transfer between dark energy and dark matter.

Research students Valentina Salvatelli and Najla Said from the University of Rome worked in Portsmouth with Dr Marco Bruni and Professor Wands, and with Professor Alessandro Melchiorri in Rome. They examined data from a number of astronomical surveys, including the Sloan Digital Sky Survey, and used the growth of structure revealed by these surveys to test different models of dark energy.

Professor Wands said: "Valentina and Najla spent several months here over the summer looking at the consequences of the latest observations. Much more data is available now than was available in 1998 and it appears that the standard model is no longer sufficient to describe all of the data. We think we've found a better model of dark energy.

"Since the late 1990s astronomers have been convinced that something is causing the expansion of our Universe to accelerate. The simplest explanation was that empty space - the vacuum - had an energy density that was a cosmological constant. However there is growing evidence that this simple model cannot explain the full range of astronomical data researchers now have access to; in particular the growth of cosmic structure, galaxies and clusters of galaxies, seems to be slower than expected."

Professor Dragan Huterer, of the University of Michigan, has read the research and said scientists need to take notice of the findings.

He said: "The paper does look very interesting. Any time there is a new development in the dark energy sector we need to take notice since so little is understood about it. I would not say, however, that I am surprised at the results, that they come out different than in the simplest model with no interactions. We've known for some months now that there is some problem in all data fitting perfectly to the standard simplest model."

Story Source:
The above story is based on materials provided by **University of Portsmouth**. *Note: Materials may be edited for content and length.*

Journal Reference:
Valentina Salvatelli, Najla Said, Marco Bruni, Alessandro Melchiorri, David Wands. **Indications of a Late-Time Interaction in the Dark Sector**. *Physical Review Letters*, 2014; 113 (18)
DOI: 10.1103/PhysRevLett.113.181301

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Plasma shield

December 1, 2014
Jennifer Chu, MIT News Office
https://newsoffice.mit.edu/2014/plasma-shield-against-harmful-radiation-1126

High above Earth's atmosphere, electrons whiz past at close to the speed of light. Such ultra-relativistic electrons, which make up the outer band of the Van Allen radiation belt, can streak around the planet in a mere five minutes, bombarding anything in their path. Exposure to such high-energy radiation can wreak havoc on satellite electronics, and pose serious health risks to astronauts.
Now researchers at Massachusetts Institute of Technology (MIT), the Univ. of Colorado, and elsewhere have found there's a hard limit to how close ultra-relativistic electrons can get to the Earth. The team found that no matter where these electrons are circling around the planet's equator, they can get no further than about 11,000 km from the Earth's surface—despite their intense energy. What's keeping this high-energy radiation at bay seems to be neither the Earth's magnetic field nor long-range radio waves, but rather a phenomenon termed "plasmaspheric hiss"—very low-frequency electromagnetic waves in the Earth's upper atmosphere that, when played through a speaker, resemble static, or white noise.

Based on their data and calculations, the researchers believe that plasmaspheric hiss essentially deflects incoming electrons, causing them to collide with neutral gas atoms in the Earth's upper atmosphere, and ultimately disappear. This natural, impenetrable barrier appears to be extremely rigid, keeping high-energy electrons from coming no closer than about 2.8 Earth radii—or 11,000 km from the Earth's surface.

"It's a very unusual, extraordinary, and pronounced phenomenon," says John Foster, associate director of MIT's Haystack Observatory. "What this tells us is if you parked a satellite or an orbiting space station with humans just inside this impenetrable barrier, you would expect them to have much longer lifetimes. That's a good thing to know."

Foster and his colleagues, including lead author Daniel Baker of the Univ. of Colorado, have published their results in *Nature*.

Shields up

The team's results are based on data collected by NASA's Van Allen Probes—twin crafts that are orbiting within the harsh environments of the Van Allen radiation

belts. Each probe is designed to withstand constant radiation bombardment in order to measure the behavior of high-energy electrons in space.
The researchers analyzed the first 20 months of data returned by the probes, and observed an "exceedingly sharp" barrier against ultra-relativistic electrons. This barrier held steady even against a solar wind shock, which drove electrons toward the Earth in a "step-like fashion" in October 2013. Even under such stellar pressure, the barrier kept electrons from penetrating further than 11,000 km above Earth's surface.

To determine the phenomenon behind the barrier, the researchers considered a few possibilities, including effects from the Earth's magnetic field and transmissions from ground-based radios.

For the former, the team focused in particular on the South Atlantic Anomaly—a feature of the Earth's magnetic field, just over South America, where the magnetic field strength is about 30% weaker than in any other region. If incoming electrons were affected by the Earth's magnetic field, Foster reasoned, the South Atlantic Anomaly would act like a "hole in the path of their motion," allowing them to fall deeper into the Earth's atmosphere. Judging from the Van Allen probes' data, however, the electrons kept their distance of 11,000 km, even beyond the effects of the South Atlantic Anomaly—proof that the Earth's magnetic field had little effect on the barrier.

Foster also considered the effect of long-range, very-low-frequency (VLF) radio transmissions, which others have proposed may cause significant loss of relatively high-energy electrons. Although VLF transmissions can leak into the upper atmosphere, the researchers found that such radio waves would only affect electrons with moderate energy levels, with little or no effect on ultra-relativistic electrons.

Instead, the group found that the natural barrier may be due to a balance between the electrons' slow, earthward motion, and plasmaspheric hiss. This conclusion was based on the Van Allen probes' measurement of electrons' pitch angle—the degree to which an electron's motion is parallel or perpendicular to the Earth's magnetic field. The researchers found that plasmaspheric hiss acts slowly to rotate electrons' paths, causing them to fall, parallel to a magnetic field line, into Earth's upper atmosphere, where they are likely to collide with neutral atoms and disappear.

Seen through "new eyes"

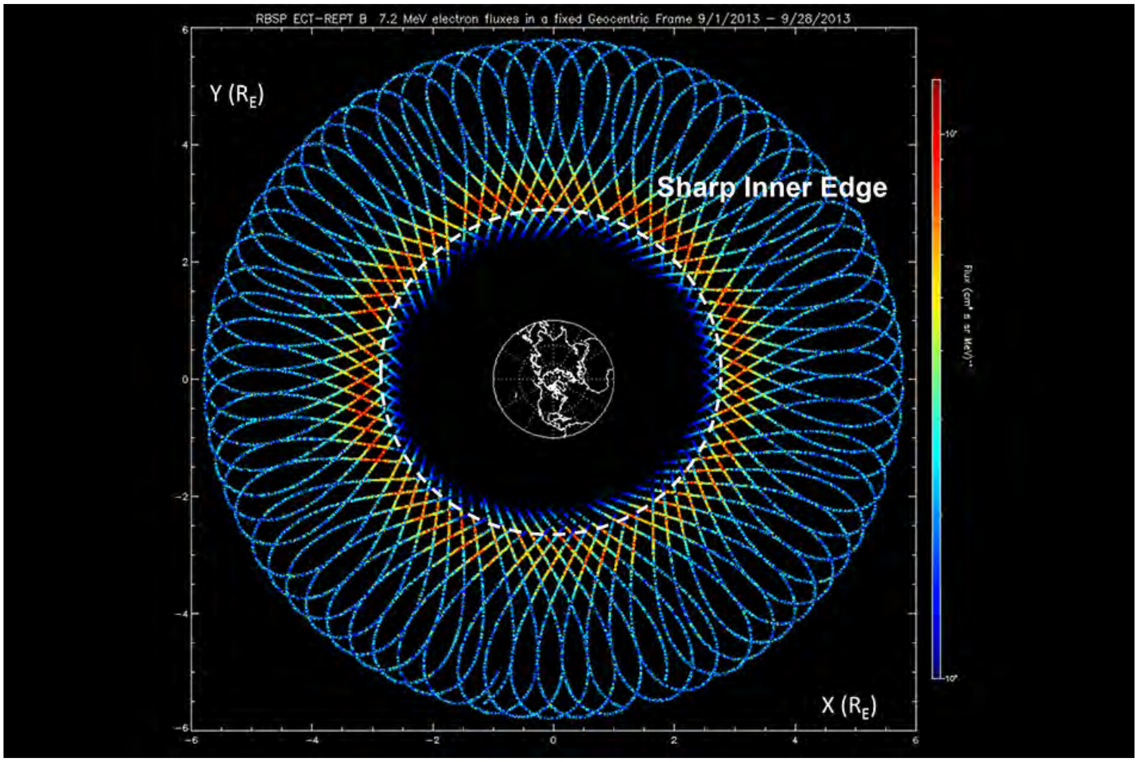
Foster says this is the first time researchers have been able to characterize the

Earth’s radiation belt, and the forces that keep it in check, in such detail. In the past, NASA and the U.S. military have launched particle detectors on satellites to measure the effects of the radiation belt: NASA was interested in designing better protection against such damaging radiation; the military, Foster says, had other motivations.

“In the 1960s, the military created artificial radiation belts around the Earth by the detonation of nuclear warheads in space,” Foster says. “They monitored the radiation belt changes, which were enormous. And it was realized that, in any kind of nuclear war situation, this could be one thing that could be done to neutralize anyone’s spy satellites.”

The data collected from such efforts was not nearly as precise as what is measured today by the Van Allen probes, mainly because previous satellites were not designed to fly in such harsh conditions. In contrast, the resilient Van Allen Probes have gathered the most detailed data yet on the behavior and limits of the Earth’s radiation belt.

“It’s like looking at the phenomenon with new eyes, with a new set of instrumentation, which give us the detail to say, ‘Yes, there is this hard, fast boundary,’” Foster says.



This image shows a color-coded geographic representation of ultra-relativistic electron fluxes, based on orbital tracks of the Van Allen Probe B spacecraft projected onto the geographical equatorial plane. As the spacecraft precesses in its elliptical orbit around the Earth, it forms a "spirograph" pattern in the Earth-centered coordinate system. Inside of this radial distance is an almost complete absence of electrons, forming the "slot" region. The superimposed circle shows a sharp, distinctive inner boundary for ultra-relativistic electrons, and how generally symmetric this boundary is around Earth. Image: Courtesy of the researchers/Haystack Observatory.

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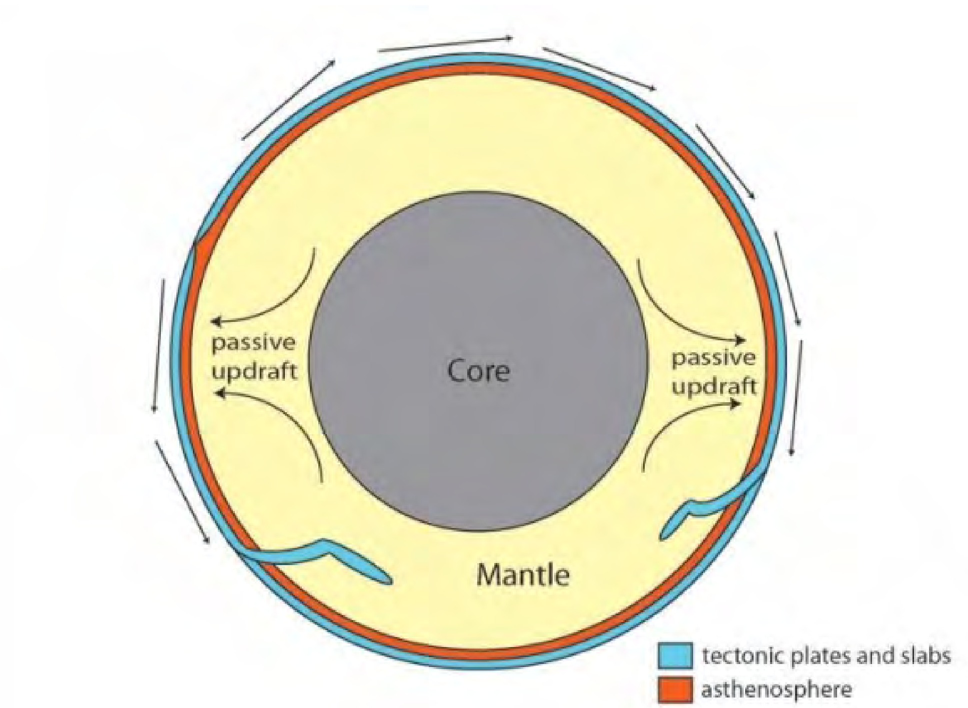
Source of volcanoes may be much closer than thought:

Geophysicists challenge traditional theory underlying origin of mid-plate volcanoes

http://www.sciencedaily.com/releases/2014/12/141204143130.htm

December 4, 2014
Virginia Tech

Geophysicists point to a super-hot layer beneath the tectonic plates as the place of origin for volcanoes, as opposed to deep within the Earth's core.



Traditional thought holds that hot updrafts from the Earth's core cause volcanoes, but researchers say eruptions may stem from the asthenosphere, a layer closer to the surface. -Image from Virginia Tech

A long-held assumption about the Earth is discussed in today's edition of *Science*, as Don L. Anderson, an emeritus professor with the Seismological Laboratory of the California Institute of Technology, and Scott King, a professor of geophysics in the College of Science at Virginia Tech, look at how a layer beneath the Earth's crust may be responsible for volcanic eruptions.

The discovery challenges conventional thought that volcanoes are caused when plates that make up the planet's crust shift and release heat.
Instead of coming from deep within the interior of the planet, the responsibility is closer to the surface, about 80 kilometers to 200 kilometers deep -- a layer above the Earth's mantle, known as the as the asthenosphere.

"For nearly 40 years there has been a debate over a theory that volcanic island chains, such as Hawaii, have been formed by the interaction between plates at the surface and plumes of hot material that rise from the core-mantle boundary nearly 1,800 miles below the Earth's surface," King said. "Our paper shows that a hot layer beneath the plates may explain the origin of mid-plate volcanoes without resorting to deep conduits from halfway to the center of the Earth."
Traditionally, the asthenosphere has been viewed as a passive structure that separates the moving tectonic plates from the mantle.

As tectonic plates move several inches every year, the boundaries between the plates spawn most of the planet's volcanoes and earthquakes.

"As the Earth cools, the tectonic plates sink and displace warmer material deep within the interior of the Earth," explained King. "This material rises as two broad, passive updrafts that seismologists have long recognized in their imaging of the interior of the Earth."

The work of Anderson and King, however, shows that the hot, weak region beneath the plates acts as a lubricating layer, preventing the plates from dragging the material below along with them as they move.

The researchers show this lubricating layer is also the hottest part of the mantle, so there is no need for heat to be carried up to explain mid-plate volcanoes.
"We're taking the position that plate tectonics and mid-plate volcanoes are the natural results of processes in the plates and the layer beneath them," King said.

Story Source: The above story is based on materials provided by Virginia Tech
Note: Materials may be edited for content and length.
Journal Reference:

1. D. L. Anderson, S. D. King. **Driving the Earth machine?** *Science*, 2014; 346 (6214): 1184 DOI: 10.1126/science.1261831

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2 Futures Can Explain Time's Mysterious Past

New theories suggest the big bang was not the beginning, and that we may live in the past of a parallel universe.

December 8, 2014 |By Lee Billings
http://www.scientificamerican.com/article/2-futures-can-explain-time-s-mysterious-past/

Physicists have a problem with time.

In the evolution of cosmic structure, is entropy or gravity the more dominant force? The answer to this question has deep implications for the universe's future, as well as its past.
Credit: NASA; ESA; G. Illingworth, D. Magee, and P. Oesch, University of California, Santa Cruz; R. Bouwens, Leiden University; and the

Whether through Newton’s gravitation, Maxwell’s electrodynamics, Einstein’s special and general relativity or quantum mechanics, all the equations that best describe our universe work perfectly if time flows forward or backward.

Of course the world we experience is entirely different. The universe is expanding, not contracting. Stars emit light rather than absorb it, and radioactive atoms decay rather than reassemble. Omelets don’t transform back to unbroken eggs and cigarettes never coalesce from smoke and ashes. We remember the past, not the future, and we grow old and decrepit, not young and rejuvenated. For us, time has a clear and irreversible direction. It flies forward like a missile, equations be damned.

For more than a century, the standard explanation for “time’s arrow,” as the astrophysicist Arthur Eddington first called it in 1927, has been that it is an emergent property of thermodynamics, as first laid out in the work of the 19th-century Austrian physicist Ludwig Boltzmann. In this view what we perceive as the arrow of time is really just the inexorable rearrangement of highly ordered states into random, useless configurations, a product of the universal tendency for all things to settle toward equilibrium with one another.

Informally speaking, the crux of this idea is that “things fall apart,” but more formally, it is a consequence of the second law of thermodynamics, which Boltzmann helped devise. The law states that in any closed system (like the universe itself), entropy—disorder—can only increase. Increasing entropy is a cosmic certainty because there are always a great many more disordered states than orderly ones for any given system, similar to how there are many more ways to scatter papers across a desk than to stack them neatly in a single pile.

The thermodynamic arrow of time suggests our observable universe began in an exceptionally special state of high order and low entropy, like a pristine cosmic egg materializing at the beginning of time to be broken and scrambled for all eternity. From Boltzmann’s era onward, scientists allergic to the notion of such an immaculate conception have been grappling with this conundrum.

Boltzmann, believing the universe to be eternal in accordance with Newton’s laws, thought that eternity could explain a low-entropy origin for time’s arrow. Given enough time—endless time, in fact—anything that can happen will happen, including the emergence of a large region of very low entropy as a statistical fluctuation from an ageless, high-entropy universe in a state of near-equilibrium. Boltzmann mused that we might live in such an improbable region, with an arrow of time set by the region’s long, slow entropic slide back into equilibrium.

Today’s cosmologists have a tougher task, because the universe as we now know it isn’t ageless and unmoving: They have to explain the emergence of time’s arrow within a dynamic, relativistic universe that apparently began some 14 billion years ago in the fiery conflagration of the big bang. More often than not the explanation involves ‘fine-tuning’—the careful and arbitrary tweaking of a theory’s parameters to accord with observations.

Many of the modern explanations for a low-entropy arrow of time involve a theory called inflation—the idea that a strange burst of antigravity ballooned the primordial universe to an astronomically larger size, smoothing it out into what corresponds to a very low-entropy state from which subsequent cosmic structures could emerge. But explaining inflation itself seems to require even more fine-tuning. One of the problems is that once begun, inflation tends to continue unstoppably. This “eternal inflation” would spawn infinitudes of baby universes about which predictions and observations are, at best, elusive. Whether this is an undesirable bug or a wonderful feature of the theory is a matter of fierce debate; for the time being it seems that inflation’s extreme flexibility and explanatory power are both its greatest strength and its greatest weakness.

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For all these reasons, some scientists seeking a low-entropy origin for time's arrow find explanations relying on inflation slightly unsatisfying. "There are many researchers now trying to show in some natural way why it's reasonable to expect the initial entropy of the universe to be very low," says David Albert, a philosopher and physicist at Columbia University. "There are even some who think that the entropy being low at the beginning of the universe should just be added as a new law of physics."

That latter idea is tantamount to despairing cosmologists simply throwing in the towel. Fortunately, there may be another way.

Tentative new work from Julian Barbour of the University of Oxford, Tim Koslowski of the University of New Brunswick and Flavio Mercati of the Perimeter Institute for Theoretical Physics suggests that perhaps the arrow of time doesn't really require a fine-tuned, low-entropy initial state at all but is instead the inevitable product of the fundamental laws of physics. Barbour and his colleagues argue that it is gravity, rather than thermodynamics, that draws the bowstring to let time's arrow fly. Their findings were published in October in *Physical Review Letters*.

The team's conclusions come from studying an exceedingly simple proxy for our universe, a computer simulation of 1,000 pointlike particles interacting under the influence of Newtonian gravity. They investigated the dynamic behavior of the system using a measure of its "complexity," which corresponds to the ratio of the distance between the system's closest pair of particles and the distance between the most widely separated particle pair. The system's complexity is at its lowest when all the particles come together in a densely packed cloud, a state of minimum size and maximum uniformity roughly analogous to the big bang. The team's analysis showed that essentially every configuration of particles, regardless of their number and scale, would evolve into this low-complexity state. Thus, the sheer force of gravity sets the stage for the system's expansion and the origin of time's arrow, all without any delicate fine-tuning to first establish a low-entropy initial condition.

From that low-complexity state, the system of particles then expands outward in *both* temporal directions, creating two distinct, symmetric and opposite arrows of time. Along each of the two temporal paths, gravity then pulls the particles into larger, more ordered and complex structures—the model's equivalent of galaxy clusters, stars and planetary systems. From there, the standard thermodynamic passage of time can manifest and unfold on each of the two divergent paths. In other words, the model has one past but two futures. As hinted by the time-indifferent laws of physics, time's arrow may in a sense move in two directions, although any observer can only see and experience one. “It is the nature of gravity to pull the universe out of its primordial chaos and create structure, order and complexity,” Mercati says. “All the solutions break into two epochs, which go on forever in the two time directions, divided by this central state which has very characteristic properties.”

Although the model is crude, and does not incorporate either quantum mechanics or general relativity, its potential implications are vast. If it holds true for our actual universe, then the big bang could no longer be considered a cosmic beginning but rather only a phase in an effectively timeless and eternal universe. More prosaically, a two-branched arrow of time would lead to curious incongruities for observers on opposite sides. “This two-futures situation would exhibit a single, chaotic past in both directions, meaning that there would be essentially two universes, one on either side of this central state,” Barbour says. “If they were complicated enough, both sides could sustain observers who would perceive time going in opposite directions. Any intelligent beings there would define their arrow of time as moving away from this central state. They would think we now live in their deepest past.”

What’s more, Barbour says, if gravitation does prove to be fundamental to the arrow of time, this could sooner or later generate testable predictions and potentially lead to a less “ad hoc” explanation than inflation for the history and structure of our observable universe.

This is not the first rigorous two-futures solution for time’s arrow. Most notably, California Institute of Technology cosmologist Sean Carroll and a graduate student, Jennifer Chen, produced their own branching model in 2004, one that sought to explain the low-entropy origin of time’s arrow in the context of cosmic inflation and the creation of baby universes. They attribute the arrow of time’s emergence in their model not so much to entropy being very low in the past but rather to entropy being so much higher in both futures, increased by the inflation-driven creation of baby universes.

A decade on, Carroll is just as bullish about the prospect that increasing entropy alone is the source for time’s arrow, rather than other influences such as gravity. “Everything that happens in the universe to distinguish the past from the future is ultimately because the entropy is lower in one direction and higher in the other,” Carroll says. “This paper by Barbour, Koslowski and Mercati is good because they roll up their sleeves and do the calculations for their specific model of particles interacting via gravity, but I don’t think it’s the model that is interesting—it’s the model’s behavior being analyzed carefully.... I think basically any time you have a finite collection of particles in a really big space you’ll get this kind of generic behavior they describe. The real question is, is our universe like that? That’s the hard part.”

Together with Alan Guth, the Massachusetts Institute of Technology cosmologist who pioneered the theory of inflation, Carroll is now working on a thermodynamic response of sorts to the new claims for a gravitational arrow of time: Another exceedingly simple particle-based model universe that also naturally gives rise to time’s arrow, but without the addition of gravity or any other forces. The thermodynamic secret to the model’s success, they say, is assuming that the universe has an unlimited capacity for entropy.

“If we assume there is no maximum possible entropy for the universe, then any state can be a state of low entropy,” Guth says. “That may sound dumb, but I think it really works, and I also think it’s the secret of the Barbour et al construction. If there’s no limit to how big the entropy can get, then you can start anywhere, and from that starting point you’d expect entropy to rise as the system moves to explore larger and larger regions of phase space. Eternal inflation is a natural context in which to invoke this idea, since it looks like the maximum possible entropy is unlimited in an eternally inflating universe.”

The controversy over time’s arrow has come far since the 19th-century ideas of Boltzmann and the 20th-century notions of Eddington, but in many ways, Barbour says, the debate at its core remains appropriately timeless. “This is opening up a completely new way to think about a fundamental problem, the nature of the arrow of time and the origin of the second law of thermodynamics,” Barbour says. “But really we’re just investigating a new aspect of Newton’s gravitation, which hadn’t been noticed before. Who knows what might flow from this with further work and elaboration?”

“Arthur Eddington coined the term ‘arrow of time,’ and famously said the shuffling of material and energy is the only thing which nature cannot undo,” Barbour adds. “And here we are, showing beyond any doubt really that this is in fact exactly what gravity does. It takes systems that look extraordinarily disordered and makes them wonderfully ordered. And this is what has happened in our universe. We are realizing the ancient Greek dream of order out of chaos.”

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Ancient Timelines – a short update

From 2012

http://newearthsummit.org/forum/index.php/topic,87.msg5918.html#msg5918

In the March-July 2012 A-List *Update*, we showed a rough timeline of significant events from recent ancient times to present. Roughly around 40,000 years ago there was a catastrophic event, perhaps a supernova that may have triggered a major magnetic pole reversal accompanied by major tectonic events. Radioisotope studies and more recent crustal core studies support this idea. Such an event is also reflected in some sketchy stories from ancient times when the “gods” (ET’s) observed some major planetary catastrophes. Once the planet stabilized enough, they came to earth to investigate further. It is most likely that these would be the same entities who had been involved in genetically developing early “homo sapiens sapiens”, something that has been estimated by modern research into the genetic history of the human species.

Link to March-July 2012 *Update*: *http://www.pfcn.net/Bulletins/Update-March-July-2012.pdf*. Now some new research has been published which further supports other research into planetary changes from around roughly 40,000 years ago.

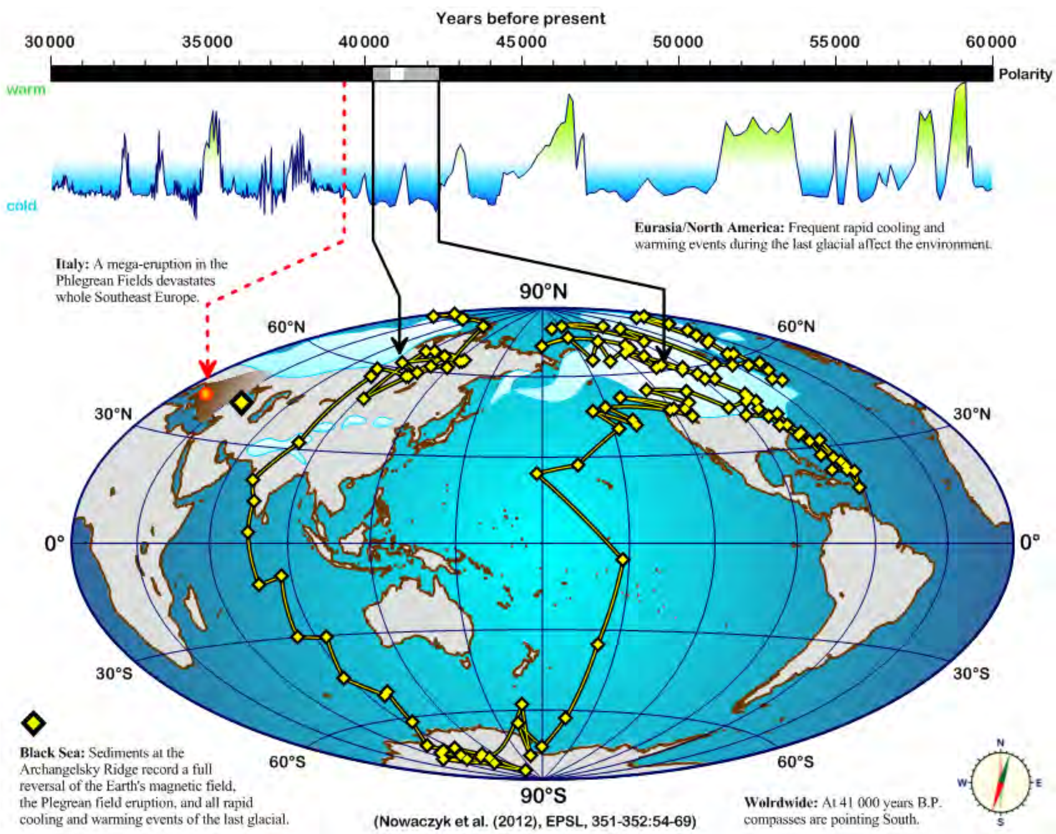

Illustration above: 41,000 years ago, a complete and rapid reversal of the geomagnetic field occurred. Magnetic studies of the GFZ German Research Centre for Geosciences on sediment cores from the Black Sea show that during this period, during the last ice age, a compass at the Black Sea would have pointed to the south instead of north. Moreover, data obtained by the research team formed around GFZ researchers Dr. Norbert Nowaczyk and Prof. Helge Arz, together with additional data from other studies in the North Atlantic, the South Pacific and Hawaii, prove that this polarity reversal was a global event. Their results are published in the latest issue of the scientific journal *Earth and Planetary Science Letters*.

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