DOWNLOAD PDF IS THE EARTHS CRUST MOVING?

Chapter 1 : The Moving Crust by Reed Thomson on Prezi

The Earth's crust is an extremely thin layer of rock that makes up the outermost solid shell of our planet. In relative terms, it's thickness is like that of the skin of an apple. It amounts to less than half of 1 percent of the planet's total mass but plays a vital role in most of Earth's natural.

The plates are moving at a speed that has been estimated at 1 to 10 cm per year. Oceanic crust the thin crust under the oceans is thinner and denser than continental crust. Crust is constantly being created and destroyed; oceanic crust is more active than continental crust. Under the crust is the rocky mantle, which is composed of silicon, oxygen, magnesium, iron, aluminum, and calcium. The upper mantle is rigid and is part of the lithosphere together with the crust. The lower mantle flows slowly, at a rate of a few centimeters per year. The asthenosphere is a part of the upper mantle that exhibits plastic properties. It is located below the lithosphere the crust and upper mantle , between about and kilometers deep. Divergence, Convergence, and Lateral Slipping At the boundaries of the plates, various deformations occur as the plates interact; they separate from one another seafloor spreading , collide forming mountain ranges , slip past one another subduction zones, in which plates undergo destruction and remelting , and slip laterally. Where the oceanic plates are moving away from each other is called a zone of divergence. When two plates collide at a convergent plate boundary , some crust is destroyed in the impact and the plates become smaller. The results differ, depending upon what types of plates are involved. Oceanic Plate and Continental Plate - When a thin, dense oceanic plate collides with a relatively light, thick continental plate, the oceanic plate is forced under the continental plate; this phenomenon is called subduction. Two Oceanic Plates - When two oceanic plates collide, one may be pushed under the other and magma from the mantle rises, forming volcanoes in the vicinity. Two Continental Plates - When two continental plates collide, mountain ranges are created as the colliding crust is compressed and pushed upwards. Lateral Slipping Plate Movement: When two plates move sideways against each other at a transform plate boundary , there is a tremendous amount of friction which makes the movement jerky. The plates slip, then stick as the friction and pressure build up to incredible levels. When the pressure is released suddenly, and the plates suddenly jerk apart, this is an earthquake. The fossil record supports and gives credence to the theories of continental drift and plate tectonics. Wegener hypothesized that there was an original, gigantic supercontinent million years ago, which he named Pangaea, meaning "All-earth". It existed from the Permian through Jurassic periods. It began breaking up during the Jurassic period, forming continents Gondwanaland and Laurasia , separated by the Tethys Sea. Pangaea started to break up into two smaller supercontinents, called Laurasia and Gondwanaland, during the Jurassic period. By the end of the Cretaceous period, the continents were separating into land masses that look like our modern-day continents. Wegener published this theory in his book, On the Origin of Continents and Oceans. In it he also proposed the existence of the supercontinent Pangaea , and named it Pangaea means "all the land" in Greek. He named this large land mass Gondwanaland named after a district in India where the fossil plant Glossopteris was found. This was the southern supercontinent formed after Pangaea broke up during the Jurassic period. He based his deductions on the plant Glossopteris, which is found throughout India, South America, southern Africa, Australia, and Antarctica. Fossils of Mesosaurus one of the first marine reptiles, even older than the dinosaurs were found in both South America and South Africa. This lent further support to A. It had tongue-shaped leaves and was about 12 ft 3. It was the dominant plant of Gondwana.

Chapter 2 : Earth's Continental Plates - blog.quintoapp.com

Fact Check: A viral story on social media and WhatsApp purports to show couple of Shocking Videos of Earth Crust Moving in Mongolia. It is said that Mongolia experienced the moving of earth crust due to high difference in pressure & temperature under the earth.

Estimates of average density for the upper crust range between 2. Formation of the Earth Earth formed approximately 4. It formed via accretion, where planetesimals and other smaller rocky bodies collided and stuck, gradually growing into a planet. This process generated an enormous amount of heat, which caused early Earth to melt completely. As planetary accretion slowed, Earth began to cool, forming its first crust, called a primary or primordial crust. Since then, Earth has been forming secondary and tertiary crust. Secondary crust forms at mid-ocean spreading centers, where partial-melting of the underlying mantle yields basaltic magmas and new ocean crust forms. This "ridge push" is one of the driving forces of plate tectonics, and it is constantly creating new ocean crust. That means that old crust must be destroyed somewhere, so, opposite a spreading center, there is usually a subduction zone: This constant process of creating new ocean crust and destroying old ocean crust means that the oldest ocean crust on Earth today is only about million years old. In contrast, the bulk of the continental crust is much older. The oldest continental crustal rocks on Earth have ages in the range from about 3. Some zircon with age as great as 4. Such old continental crust and the underlying mantle asthenosphere are less dense than elsewhere in Earth and so are not readily destroyed by subduction. Formation of new continental crust is linked to periods of intense orogeny ; these periods coincide with the formation of the supercontinents such as Rodinia , Pangaea and Gondwana. The crust forms in part by aggregation of island arcs including granite and metamorphic fold belts, and it is preserved in part by depletion of the underlying mantle to form buoyant lithospheric mantle. Geology of the Moon A theoretical protoplanet named " Theia " is thought to have collided with the forming Earth, and part of the material ejected into space by the collision accreted to form the Moon. The cumulate rocks form much of the crust. Most of this plagioclase-rich crust formed shortly after formation of the moon, between about 4. The best-characterized and most voluminous of these later additions are the mare basalts formed between about 3. Minor volcanism continued after 3. There is no evidence of plate tectonics. Study of the Moon has established that a crust can form on a rocky planetary body significantly smaller than Earth. Although the radius of the Moon is only about a quarter that of Earth, the lunar crust has a significantly greater average thickness. This thick crust formed almost immediately after formation of the Moon. Magmatism continued after the period of intense meteorite impacts ended about 3.

Chapter 3 : Learning that the Crust of the Earth Moves

Therefore, "moving crust" is an incorrect description of what is depicted in these videos. blog.quintoapp.com has long been engaged in the battle against misinformation, an effort we could not sustain.

The division is based on differences in mechanical properties and in the method for the transfer of heat. The lithosphere is cooler and more rigid, while the asthenosphere is hotter and flows more easily. In terms of heat transfer, the lithosphere loses heat by conduction , whereas the asthenosphere also transfers heat by convection and has a nearly adiabatic temperature gradient. This division should not be confused with the chemical subdivision of these same layers into the mantle comprising both the asthenosphere and the mantle portion of the lithosphere and the crust: The key principle of plate tectonics is that the lithosphere exists as separate and distinct tectonic plates , which ride on the fluid-like visco-elastic solid asthenosphere. Tectonic lithosphere plates consist of lithospheric mantle overlain by one or two types of crustal material: Because it is formed at mid-ocean ridges and spreads outwards, its thickness is therefore a function of its distance from the mid-ocean ridge where it was formed. The location where two plates meet is called a plate boundary. Plate boundaries are commonly associated with geological events such as earthquakes and the creation of topographic features such as mountains , volcanoes , mid-ocean ridges , and oceanic trenches. These boundaries are discussed in further detail below. Some volcanoes occur in the interiors of plates, and these have been variously attributed to internal plate deformation [7] and to mantle plumes. As explained above, tectonic plates may include continental crust or oceanic crust, and most plates contain both. For example, the African Plate includes the continent and parts of the floor of the Atlantic and Indian Oceans. The distinction between oceanic crust and continental crust is based on their modes of formation. Oceanic crust is formed at sea-floor spreading centers, and continental crust is formed through arc volcanism and accretion of terranes through tectonic processes, though some of these terranes may contain ophiolite sequences, which are pieces of oceanic crust considered to be part of the continent when they exit the standard cycle of formation and spreading centers and subduction beneath continents. Oceanic crust is also denser than continental crust owing to their different compositions. Oceanic crust is denser because it has less silicon and more heavier elements " mafic " than continental crust " felsic ". Types of plate boundaries Main article: List of tectonic plate interactions Three types of plate boundaries exist, [9] with a fourth, mixed type, characterized by the way the plates move relative to each other. They are associated with different types of surface phenomena. The different types of plate boundaries are: The relative motion of the two plates is either sinistral left side toward the observer or dextral right side toward the observer. Transform faults occur across a spreading center. Strong earthquakes can occur along a fault. The San Andreas Fault in California is an example of a transform boundary exhibiting dextral motion. Divergent boundaries Constructive occur where two plates slide apart from each other. At zones of ocean-to-ocean rifting, divergent boundaries form by seafloor spreading, allowing for the formation of new ocean basin. At zones of continent-to-continent rifting, divergent boundaries may cause new ocean basin to form as the continent splits, spreads, the central rift collapses, and ocean fills the basin. Active zones of mid-ocean ridges e. Convergent boundaries Destructive or active margins occur where two plates slide toward each other to form either a subduction zone one plate moving underneath the other or a continental collision. At zones of ocean-to-continent subduction e. Earthquakes trace the path of the downward-moving plate as it descends into asthenosphere, a trench forms, and as the subducted plate is heated it releases volatiles, mostly water from hydrous minerals , into the surrounding mantle. The addition of water lowers the melting point of the mantle material above the subducting slab, causing it to melt. The magma that results typically leads to volcanism. Aleutian islands , Mariana Islands , and the Japanese island arc , older, cooler, denser crust slips beneath less dense crust. This motion causes earthquakes and a deep trench to form in an arc shape. The upper mantle of the subducted plate then heats and magma rises to form curving chains of volcanic islands. Deep marine trenches are typically associated with subduction zones, and the basins that develop along the active boundary are often called "foreland basins". Closure of ocean basins can occur at continent-to-continent boundaries e. Plate boundary zones occur where the effects of the interactions are unclear, and the boundaries, usually occurring along a broad belt, are not well defined and may show various types of movements in different episodes. The vectors show direction and magnitude of motion. It has generally been accepted that tectonic plates are able to move because of the relative density of oceanic lithosphere and the relative weakness of the asthenosphere. Dissipation of heat from the mantle is acknowledged to be the original source of the energy required to drive plate tectonics through convection or large scale upwelling and doming. The current view, though still a matter of some debate, asserts that as a consequence, a powerful source of plate motion is generated due to the excess density of the oceanic lithosphere sinking in subduction zones. When the new crust forms at mid-ocean ridges, this oceanic lithosphere is initially less dense than the underlying asthenosphere, but it becomes denser with age as it conductively cools and thickens. The greater density of old lithosphere relative to the underlying asthenosphere allows it to sink into the deep mantle at subduction zones, providing most of the driving force for plate movement. The weakness of the asthenosphere allows the tectonic plates to move easily towards a subduction zone. The same is true for the enormous Eurasian Plate. The sources of plate motion are a matter of intensive research and discussion among scientists. One of the main points is that the kinematic pattern of the movement itself should be separated clearly from the possible geodynamic mechanism that is invoked as the driving force of the observed movement, as some patterns may be explained by more than one mechanism. Driving forces related to mantle dynamics Main article: Mantle convection For much of the last quarter century, the leading theory of the driving force behind tectonic plate motions envisaged large scale convection currents in the upper mantle, which can be transmitted through the asthenosphere. This theory was launched by Arthur Holmes and some forerunners in the s [15] and was immediately recognized as the solution for the acceptance of the theory as originally discussed in the papers of Alfred Wegener in the early years of the century. However, despite its acceptance, it was long debated in the scientific community because the leading theory still envisaged a static Earth without moving continents up until the major breakthroughs of the early sixties. Such density variations can be material from rock chemistry , mineral from variations in mineral structures , or thermal through thermal expansion and contraction from heat energy. The manifestation of this varying lateral density is mantle convection from buoyancy forces. Somehow, this energy must be transferred to the lithosphere for tectonic plates to move. There are essentially two main types of forces that are thought to influence plate motion: Plate motion driven by friction between the convection currents in the asthenosphere and the more rigid overlying lithosphere. Plate motion driven by local convection currents that exert a downward pull on plates in subduction zones at ocean trenches. Slab suction may occur in a geodynamic setting where basal tractions continue to act on the plate as it dives into the mantle although perhaps to a greater extent acting on both the under and upper side of the slab. Lately, the convection theory has been much debated, as modern techniques based on 3D seismic tomography still fail to recognize these predicted large scale convection cells. Plume tectonics This section needs additional citations for verification. Please help improve this article by adding citations to reliable sources. Unsourced material may be challenged and removed. November Learn how and when to remove this template message In the theory of plume tectonics developed during the s, a modified concept of mantle convection currents is used. It asserts that super plumes rise from the deeper mantle and are the drivers or substitutes of the major convection cells. These ideas, which find their roots in the early s, find resonance in the modern theories which envisage hot spots or mantle plumes which remain fixed and are overridden by oceanic and continental lithosphere plates over time and leave their traces in the geological record though these phenomena are not invoked as real driving mechanisms, but rather as modulators. This theory, called "surge tectonics", became quite popular in geophysics and geodynamics during the s and s. Gravitational sliding away from a spreading ridge: According to many authors, plate motion is driven by the higher elevation of plates at ocean ridges. Cool oceanic lithosphere is significantly denser than the hot mantle material from which it is derived and so with increasing thickness it gradually subsides into the mantle to compensate the greater load. The result is a slight lateral incline with increased distance from the ridge axis. This force is regarded as a secondary force and is often referred to as " ridge push ". This is a misnomer as nothing is "pushing" horizontally and tensional features are dominant along ridges. It is more accurate to refer to this mechanism as gravitational sliding as variable topography across the totality of the plate can vary considerably and the topography of spreading ridges is only the most prominent feature. Other mechanisms generating this gravitational secondary force include flexural bulging of the lithosphere before it dives underneath an adjacent plate which produces a clear topographical feature that can offset, or at least affect, the influence of topographical ocean ridges, and mantle plumes and hot spots, which are postulated to impinge on the underside of tectonic plates. Current scientific opinion is that the asthenosphere is insufficiently competent or rigid to directly cause motion by friction along the base of the lithosphere. Slab pull is therefore most widely thought to be the greatest force acting on the plates. In this current understanding, plate motion is mostly driven by the weight of cold, dense plates sinking into the mantle at trenches. However, the fact that the North American Plate is nowhere being subducted, although it is in motion, presents a problem. The same holds for the African, Eurasian , and Antarctic plates. Gravitational sliding away from mantle doming: This gravitational sliding represents a secondary phenomenon of this basically vertically oriented mechanism. This can act on various scales, from the small scale of one island arc up to the larger scale of an entire ocean basin. November Learn how and when to remove this template message Alfred Wegener , being a meteorologist , had proposed tidal forces and centrifugal forces as the main driving mechanisms behind continental drift ; however, these forces were considered far too small to cause continental motion as the concept was of continents plowing through oceanic crust. However, in the plate tectonics context accepted since the seafloor spreading proposals of Heezen, Hess, Dietz, Morley, Vine, and Matthews see below during the early s , the oceanic crust is suggested to be in motion with the continents which caused the proposals related to Earth rotation to be reconsidered. In more recent literature, these driving forces are: Forces that are small and generally negligible are: The Coriolis force [24] [25] The centrifugal force , which is treated as a slight modification of gravity [24] [25]: Ironically, these systematic relations studies in the second half of the nineteenth century and the first half of the twentieth century underline exactly the opposite: Later studies discussed below on this page , therefore, invoked many of the relationships recognized during this pre-plate tectonics period to support their theories see the anticipations and reviews in the work of van Dijk and collaborators. The other forces are only used in global geodynamic models not using plate tectonics concepts therefore beyond the discussions treated in this section or proposed as minor modulations within the overall plate tectonics model. In , George W. In a more recent study, [29] scientists reviewed and advocated these earlier proposed ideas. In a recent paper, [30] it was suggested that, on the other hand, it can easily be observed that many plates are moving north and eastward, and that the dominantly westward motion of the Pacific Ocean basins derives simply from the eastward bias of the Pacific spreading center which is not a predicted manifestation of such lunar forces. In the same paper the authors admit, however, that relative to the lower mantle, there is a slight westward component in the motions of all the plates. The debate is still open. The diversity of geodynamic settings and the properties of each plate result from the impact of the various processes actively driving each individual plate.

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Chapter 4 : What Happens to the Earth's Crust After an Earthquake? | Sciencing

A post containing two videos with the message 'Mongolia experienced moving of the earth's crust due to high differences in pressure and temperature under the earth' is going viral on social.

Earthquakes occur both around the boundaries of these plates and within them. Stress The movement of tectonic plates causes stress to build up on the boundaries of and within the plates. It deforms the crust through a process of crushing, stretching or uplifting. Stress builds up over years, decades, centuries, thousands or millions of years. As the stress exceeds the strength of the rock, the rock breaks. Faults A fault is the plane along which rocks break. When rocks move laterally relative to each other, they create a strike-slip fault. An example of this is the San Andreas Fault in California. When one piece of crust falls relative to another, this is a normal fault. Normal faults exist along the boundaries of rift valleys, such as Death Valley in California and the Rhine Valley in Germany. When one piece of crust moves over or under another, it creates a thrust fault. Thrust faults bound the entire Pacific Ocean Basin. Sciencing Video Vault Rupture Rupture is the area of rock breakage during an earthquake. On the ground, it appears like a fracture that moves along the length of a fault. A rupture 21 feet in length along miles of the San Andreas Fault caused the San Francisco earthquake. Propagation Propagation is the movement of a rupture through the Earth. During the Feb 27, Maule earthquake in Chile, the rupture moved along the fault plane to the north, south and west at a speed of between 1 and 1. Ground Shaking Rupture propagation disturbs neighboring rocks. This disturbance travels within the Earth to its surface and along its surface in waves of energy known as seismic waves. Liquefaction Strong shaking of the soil along shorelines or river banks loosens grain cohesion and the structure of the soil. Lacking strength, the soil behaves like a liquid. Buildings sink in liquefied soil while buried pipelines and tanks float upwards as if by buoyancy. Liquefaction during the Feb 22, , earthquake in Christchurch rendered half the city and its suburbs uninhabitable.

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Chapter 5 : How does Earth's crust move

Fake News The Truth Behind Viral Videos Claiming To Show The 'Earth's Crust Moving In Mongolia' Two old and unrelated videos are recycled to give a new spin on geology.

Students reconstruct the super continent Pangaea. The ocean floors are underlain by oceanic crust. These material have different compositions; the continental crust is like the igneous rock granite, and the oceanic crust is like basalt, another igneous rock. Students and many adults often equate the geographic continents, i. You may wish to explain this to your students by saying that the continental crust "ride on the back" of a plate. Moreover, continental and oceanic crust are often part of the same plate. For example, the North American plate has continental crust essentially the land area of North America at its core and is surrounded on most sides by oceanic crust. As they move, plates interact at their edges or boundaries. There are three basic directions or types of boundary interactions. In some places, two plates move apart from each other; this is called a diverging plate boundary. Elsewhere two plate move together, which is called a converging plate boundary. Finally plates can also slide past each other horizontally. This is called a transform plate boundary. Volcanoes and earthquakes help define the boundaries between the plates. Volcanoes form mostly at converging and diverging plate boundaries, where much magma is generated. Earthquakes occur at all three types of boundaries. Because the plates are rigid, they tend to stick together, even though they are constantly moving. This builds up stress in the rocks at the plate boundary. When the strength of the rocks is exceeded, they move rapidly, "catching up" with the rest of the plates. We feel this release of energy as an earthquake. One of the first observations used to suggest that the outer portion of the Earth is mobile is the fit of the continents, particularly the west coast of Africa against the east coast of South America. This observation predates plate tectonics. It was first noticed in the 18th century, and most recently proposed by a German scientist, Alfred Wegener in Wegener called his theory "continental drift", referring to the apparent movement of continents alone. However, "continental drift" is a only historical term. We now know it is not the continents that move, but the plates, in which the continents are embedded. South America and Africa were once together, but were split apart by the formation of a diverging plate boundary. This is also confirmed by matches between the rocks and fossils of the two continents. The two continents are still moving away from each other today. A map of Pangaea shortly after it began to split. At that time, these five continents were all part of a single large super continent, called Pangaea. Starting about million years ago, Pangaea began to break up; new diverging plate boundaries formed within it. This eventually created the continents we see today. In this exercise, the students will reconstruct Pangaea. They will use the fit of the continental crust to put Pangaea back together. Remind the students of the information they learned in the Pre Lab. Explain again that the plates are moving, due to convection and gravity. Explain that this movement causes stress within the plates, which generates earthquakes and volcanoes. You may want to show students a map of the plates. Review the composition of the plates with the class. Make sure the students understand that the continents make up the non-oceanic part of the crust. Discuss with them that the edges of the continents look as if they may have fit together at one time. Have the students label, color, cut out, and fit the continents together. The lines and numbers make this puzzle a little easier. You may want your students to work in pairs. Matching up the continents is not as easy as it looks. Once the students have placed the continents together have them move the pieces apart very slowly. They are to move the pieces until they reach their present positions. Ask students if they think this movement could have happened. Let them come up with stories about why it took place. Remind them of convection and the moving of the plates. This is a difficult concept to get across to the students.

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Chapter 6 : Earth's Surfaces Are Always Moving

The Earth's tectonic plates do not move on top of the crust, they are the crust. The crust is made out of plates. The plates float on top of the mantle, which is made of molten rock, called magma.

Scientists who study the Earth tell us the continents and ocean floors are always moving. This movement sometimes can be violent, causing death and destruction. Today, we examine what causes earthquakes and volcanic activity. The first pictures of Earth taken from space showed a solid ball covered by brown and green landmasses and blue-green oceans. It appeared as if the Earth had always looked that way -- and always would. Yet the surface of the Earth is not as solid or as permanent as had been thought. Scientists found that the surface of our planet is always in motion. New crust is created as melted rock pushes up from inside the planet. Old crust is destroyed as it moves toward the hot rock and melts. The Earth seems to melt into the sea. In the 20th century, scientists began to understand that the Earth is a great, living and moving structure. Some experts say this understanding is one of the most important revolutions in scientific thought. Scientists say the surface of the Earth is cracked like a huge eggshell. They sometimes hit each other, and sometimes move away from each other. Because some continents are above two plates, the continents move when the plates do. The movement of tectonic plates can cause earthquakes and volcanoes. Understanding this movement can help predict where earthquakes will take place. Research shows that about 90 percent of all earthquakes happen along a few lines in several places around the Earth. These lines follow underwater mountains, where hot liquid rock flows up from deep inside the Earth. Sometimes, the melted rock comes out with a great burst of pressure. Some earthquakes take place at the edges of continents. Pressure increases as two plates move against each other. One example of this pressure is found on the west coast of the United States. Part of California is on what is known as the Pacific plate. The other part of the state is on what is known as the North American plate. Scientists say the Pacific plate is moving toward the northwest, while the North American plate is moving toward the southeast. These two huge plates come together at what is called a fault line. This line between the plates in California is called the San Andreas Fault. Many smaller fault lines can be found throughout the Los Angeles area. Alfred Wegener at work. Scientists began making major discoveries about plate tectonics in the 20th century. One of those scientists was Alfred Wegener of Germany. One hundred years ago, he proposed that the continents had moved and were still moving. Wegener said the idea came to him when he saw that the coasts of South America and Africa fit together like two pieces of a puzzle. He suspected that the two continents might have once been one, and then split apart. And, he said the pieces were still floating apart. Alfred Wegener investigated the idea that continents move. He noted that a line of mountains that appears from east to west in South Africa looks almost exactly the same as a line of mountains in Argentina -- on the other side of the Atlantic Ocean. Wegener said the mountains and fossils were evidence that all the land on Earth was united at some time in the distant past. Wegener also noted differences between the continents and the ocean floor. He said the oceans were more than just low places that had filled with water. Even if the water was removed, he said, a person would still see differences between the continents and the ocean floor. Also, the continents and the ocean floor are not made of the same kind of rock. The ocean floor is basalt rock, a mixture of silicon and magnesium. The German scientist said the lighter continental rock floated up through the heavier basalt rock of the ocean floor. Two American scientists found that the continents moved as new sea floor was created under the Atlantic Ocean. Harry Hess and Robert Dietz said a thin valley in the Atlantic was a place where the ocean floor splits. They said hot melted material flows up from deep inside the Earth through the split. As the hot material reaches the ocean floor, it spreads out, cools and hardens. It becomes new ocean floor. The Americans proposed that the floor of the Atlantic Ocean is moving away from each side of the split and expanding. The movement is very slow -- a few centimeters a year. In time, they said, the moving ocean floor is blocked when it comes up against the edge of a continent. Then it is forced down under the continent, deep into the Earth, where it is melted again. Harry Hess said the Pacific Ocean was getting smaller. He and Robert Dietz said this spreading does not make the Earth bigger. As new ocean floor is created, an equal amount is destroyed. The two scientists said Alfred Wegener was correct.

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The continents do move as new material from the center of the Earth rises, hardens and pushes older pieces of the Earth away from each other. New research also supports Mr. Scientists in Britain recently reported that large amounts of water may be trapped under the ocean plates near northern Japan. Their findings were published in the journal Geology. Giant tsunami waves hit coast of Japan. The quake and resulting tsunami waves killed almost 16, people. A team of researchers from the University of Liverpool studied the tectonic plates in the area where the earthquake took place. Their report says that when two plates meet, one may bend and end up underneath the other. The researchers said a large hole lies near the fault lines in Japan. They said the hole could be as much as kilometers deep. Water gets carried down the hole. The idea of plate tectonics explains both volcanoes and earthquakes. Volcanoes are also found in the middle of plates, where there is a well of melted rock. However, as the plate moves over it, a line of volcanoes is formed. The Hawaiian Islands were created in the Pacific Ocean as the plate moved slowly over a hot spot. This process is continuing, as the plate continues to move. Similar to earthquakes, volcanos can cause destruction and displace populations. Because of this, scientists are also hoping to learn more about volcanic activity. Recently, the United States National Science Foundation provided financial support for research on volcanos. The scientists say that volcanos become active when the rock or magma inside becomes as hot as degrees Celsius. The American scientists believe the magma at Mt. Hood had been stored in the volcano for at least 20, years, or even as long as , years. They say that modern technology should be able to sense when the magma is getting warmer, and could possibly explode. This could prevent disasters when volcanos erupt around the world. Join us again next week for more news about science on the Voice of America. We are sorry, but this feature is currently not available Plate Tectonics.

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Chapter 7 : Crust (geology) - Wikipedia

The crust of the earth is constantly moving. However, with the exception of faults accompanied by earthquakes, this rate of movement is far too slow to notice. In the mountain ranges of Idaho, movement generally occurs at a much higher rate than it does in the more stable interior of the continent.

The theory of plate tectonics is our current "best explanation" and working model. Plate tectonic theory has developed slowly and progressively since it was developed in the s. It is a theory that truly has the entire world as its experiment. The ocean floors are underlain by oceanic crust. These material have different compositions. The continental crust is lighter, similar to granite, and the oceanic crust is denser like basalt, another igneous rock. Continental and oceanic crust can both be part of the same plate. For example, the North American plate has continental crust essentially the land area of North America at its core; this is surrounded on most sides by oceanic crust. A geographic "continent" does not equal a plate. The lithospheric plates are solid rock. There are several very large plates, each consisting of both oceanic and continental portions. There are a dozen or more smaller plates. The plates average about 80 kilometers 50 miles in thickness. Introduce the phrase "plate tectonics" to the class. Illustrate the crust of the earth by using a globe or an orange the peel is the crust and the fruit inside is the rest of the Earth. Show the students a globe. Ask the students this question: They may answer yes or no. Both answers are actually correct; sometimes split continents still match up, i. In other cases, such as Europe, Greenland, and North America, the match-up is very obscure. To understand plate tectonics, students must be familiar with the globe. Point out the continents and the oceans by making the class repeat the names of the continents. Explain that the continents are merely the crust exposed above sea level, and that the solid surface of the Earth below sea level is also crust. Tell the class that the crust is broken into pieces which are called "plates. However, some continents may be composed of the exposed sections of more than one plate. Therefore "continent" does not equal a plate. This may be a confusing point for adults and children alike. Have the students complete the worksheet. Instruct them to color Moppy and Moppa, the continents, and the oceans. When they have finished coloring they should cut Moppy and Moppa out and fit them together once again. You can create a story about Moppy and Moppa being together on a continent that was riding on a single plate. The plate broke apart when they had a fight. Now Moppy and Moppa have made up and want the plate to come together again. Have the students observe that the edges of the plates fit. Make sure they see that there is only one part of the plate on which Moppy and Moppy can meet the continent.

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Chapter 8 : Plate tectonics - Wikipedia

According to the theory of plate tectonics, the Earth's crust and upper mantle are broken into moving plates of "lithosphere." The Earth has two types of crust. Continental crust underlies much of the Earth's land surface.

June 22, But when you look at the sky, you can see evidence that we are moving. Some of the earliest astronomers proposed that we live in a geocentric universe, which means that Earth is at the center of everything. They said the sun rotated around us, which caused sunrises and sunsets â€" same for the movements of the moon and the planets. Sometimes, a planet would back up in the sky before resuming its forward motion. We know now that this motion â€" which is called retrograde motion â€" happens when Earth is "catching up" with another planet in its orbit. For example, Mars orbits farther from the sun than Earth. At one point in the respective orbits of Earth and Mars, we catch up to the Red Planet and pass it by. As we pass by it, the planet moves backward in the sky. Then it moves forward again after we have passed. Another piece of evidence for the sun-centered solar system comes from looking at parallax , or apparent change in the position of the stars with respect to each other. Look at it with your left eye only, closing your right eye. Then close your right eye, and look at the finger with your left. The same thing happens on Earth when we look at stars. It takes about days for us to orbit the sun. If we look at a star located relatively close to us in the summer, and look at it again in the winter, its apparent position in the sky changes because we are at different points in our orbit. We see the star from different vantage points. With a bit of simple calculation, using parallax we can also figure out the distance to that star. How fast are we spinning? The circumference distance around the largest part of the Earth is roughly 24, miles 40, kilometers , according to NASA. This area is also called the equator. If you estimate that a day is 24 hours long, you divide the circumference by the length of the day. If we move halfway up the globe to 45 degrees in latitude either north or south , you calculate the speed by using the cosine a trigonometric function of the latitude. The cosine of 45 is 0. That speed decreases more as you go farther north or south. By the time you get to the North or South poles, your spin is very slow indeed â€" it takes an entire day to spin in place. How fast does Earth orbit the sun? We can calculate that with basic geometry. First, we have to figure out how far Earth travels. Earth takes about days to orbit the sun. The distance from Earth to the sun â€" called an astronomical unit â€" is 92,, miles ,, kilometers , according to the International Astronomers Union. That is the radius r. So in one year, Earth travels about million miles million km. So, Earth travels about 1. Sun and galaxy move, too The sun has an orbit of its own in the Milky Way. The sun is about 25, light-years from the center of the galaxy, and the Milky Way is at least , light-years across. We are thought to be about halfway out from the center, according to Stanford University. Even at this rapid speed, the solar system would take about million years to travel all the way around the Milky Way. The Milky Way, too, moves in space relative to other galaxies. In about 4 billion years, the Milky Way will collide with its nearest neighbor, the Andromeda Galaxy. The two are rushing toward each other at about 70 miles per second km per second. Everything in the universe is, therefore, in motion. What would happen if Earth stopped spinning? This latter motion is called centripetal acceleration. NASA says the probability for Earth stopping its spin is " practically zero " for the next few billion years. Theoretically, however, if the Earth did stop moving suddenly, there would be an awful effect. This means that everything would be swept off of land, including people, buildings and even trees, topsoil and rocks, NASA added. What if the process was more gradual? That would give plenty of time for humans, animals and plants to get used to the change. By the laws of physics, the slowest the Earth could slow its spin would be 1 rotation every days. That situation is called "sun synchronous" and would force one side of our planet to always face the sun, and the other side to permanently face away. But back to the no-spin scenario for a second: For one, the magnetic field would presumably disappear because it is thought to be generated in part by a spin. Then Earth would be naked against the fury of the sun. Every time it sent a coronal mass ejection charged particles toward Earth, it would hit the surface and bathe everything in radiation.

Chapter 9 : How Fast Is Earth Moving?

DOWNLOAD PDF IS THE EARTHS CRUST MOVING?

The mantle is the layer of the earth that lies below the crust and is by far the largest layer making up 84% of Earth's volume. The mantle starts at the Mohorovicic Discontinuity, also known as.