COMETS, METEORS ASTEROIDS-HOW THEY AFFECT EARTH pdf

1: Asteroid Facts - Asteroids - Astronomy for Kids

Describes the characteristics of comets, meteors, and asteroids, considers how they may have affected evolution and climate on earth, and discusses the observation of these celestial bodies.

Will an asteroid hit Earth? But you should care about it: What is an asteroid, exactly? An asteroid is a small, rocky or metallic object orbiting the Sun. They are now usually defined as being larger than 1 meter in diameter with objects smaller than that being called meteoroids. The largest asteroid is Ceres at km mi diameter. There are several related terms that come up when talking about things hitting Earth, so here are some related definitions: What is a comet? Comets formed in the outer solar system where ice is stable. Most of them spend most of their time far beyond the orbit of Neptune, and all spend most of their time beyond Jupiter. What is a NEO? They are considered the objects that represent a possible danger to the Earth. What is a PHA? What is a meteoroid? A meteoroid is a rocky or metallic object in space that is smaller than an asteroid, the boundary usually being defined as 1 meter diameter. Very tiny meteoroids, smaller than 1 gram or so are often called micrometeoroids or space dust. What is a meteor? A meteor is the streak of light that occurs when an object e. What is a meteorite? If part of a meteoroid, asteroid, or comet makes it to the ground, it is called a meteorite. How do asteroids form? Where do asteroids come from? Asteroids are typically material left over from the period of planetary formation 4. Often they are fragments of collisions between asteroids in the past. How many near-Earth asteroids are there? Using the cut-off for asteroid diameter of 1 meter, there are estimated to be more than half a billion near-Earth asteroids. For objects that cause major damage if they hit Earth larger than about 30 meters , there are about a million. So far, we are approaching 20, found. Are there any asteroids heading for Earth? There are a few asteroids that currently are known to have a low probability of hitting Earth in tens to hundreds of years. For example, one of the highest probabilities currently is an approximately 37 meter diameter asteroid called SG that has a 1 in chance of impact in But these always are based on asteroid observations that have uncertainties in them. JPL keeps an online list of all asteroids with any probability of hitting Earth. Why do asteroids hit Earth? Space is really empty and big, but there is also a lot of stuff out there, and Earth is a big target with big gravity, so things run into Earth or Earth runs into them. Because of its gravity, Jupiter helps somewhat lessen the influx of comets from far out in the solar system, and its orbit and gravity allow some relatively stable orbits in the asteroid belt between Mars and Jupiter. Marat Ametvaleev Chelyabinsk meteorite trail in the sky Marat Ametvaleev was photographing the frosted landscape around his home near Chelyabinsk, Russia, the morning of February 15, , when he saw a bright flash in his peripheral vision and turned his camera to investigate. When will the next asteroid hit Earth? But we can talk about how often on average objects of different sizes hit Earth. The good news is there is a lot more little stuff out there than big stuff. About 30 small asteroids a few meters in size hit Earth every year. An asteroid of about 20 meters diameter like the one that exploded over Chelyabink, Russia in on average will hit once or twice a century. Its shock wave shattered windows and injured more than people. An asteroid like the one that exploded near the Tunguska River in Siberia in impacts on average once or twice a millenium. On average larger asteroids hit less frequently with increasing size, i. How are asteroids discovered? Astronomers use telescopes to look for objects that are moving relative to the background stars. They use the telescopes to take repeated pictures of a part of the sky over many hours or days. The stars will not move in one picture to the next. But asteroids will, as will planets and comets. Moving objects are compared against where known objects are expected to be. The objects that are left are possible asteroids. Other astronomers can then try to confirm the asteroid and start building up enough observations that an orbit can be calculated. How do we determine if an asteroid will hit Earth? You need to figure out its orbit in order to determine if it is going to hit Earth. To do that, you need to track it: These observations are done by talented amateur astronomers around the world as well as professionals. Those observations are submitted to the Minor Planet Center. Groups at Jet Propulsion Laboratory in the U. The number and quality of the observations will determine the uncertainty in predictions. Sometimes when asteroids come close enough to Earth, radar is used to get more precise distance data that can be used to refine the orbits. Occasionally, spacecraft visit near-Earth

asteroids allowing even more precise orbits to be determined. When asteroids are discovered, they are initially named with numbers and letters encoding when they were first spotted, for example RQ36 gives the discovery year followed by a code that indicates when in the year it was discovered. The International Astronomical Union has established rules to guide the selection of names for objects located in different parts of the solar system and have the final say in approving asteroid names. Only a small percentage of asteroids end up with names. Mars, Vesta, and Ceres. Can I see asteroids? Depending on their brightness, some asteroids can be seen as points of light with a telescope or binoculars. About the only asteroid that can be seen with just your eyes is one of the largest asteroid belt asteroids: Vesta , and it requires a dark viewing site. There are also very rare occurrences where a large enough asteroid comes close to Earth, for example in , the meter asteroid Apophis will come closer to Earth than geostationary satellites and be visible with just eyes for a few hours. What can you tell me about the asteroid that killed the dinosaurs? It hit off what is now the Yucatan Peninsula of Mexico. The impact is named after a small town closest to the impact center: The impact not only caused complete regional destruction, it also would have ejected dust into the atmosphere that likely resulted in years of reduced sunlight and cooling. Reduced sunlight was probably one of the contributors to global devastation as plants were starved of sunlight. The impact also would have created megatsunamis and ejected melted rock that could have started widespread fires. The good news for us, the mammals that had a chance to evolve because of that impact, is that we think we have discovered all similar sized asteroids and none are targeting Earth. But we are far from discovering all the asteroids capable of regional or even global disaster. How many asteroids have hit Earth? Probably billions, but most of that huge number were in the very early days of the solar system. We see a multi-billion year history of impact through craters on old surfaces like the Moon. But the Earth has lots of erosion, weathering, and plate tectonics that erase evidence of impact craters over time. About impact craters have been identified on Earth, with another or more possible impact craters. A Planetary Society-funded researcher has found evidence of possible new impact craters in South America. Image from Kulick expedition of The Tunguska blast leveled square kilometers of trees. What would happen if an asteroid hit Earth? That totally depends on the size and speed of the asteroid. Size varies more than speed and small asteroids hit more frequently. Small asteroids few meter hit frequently and burn up in the atmosphere and do little damage. Larger asteroids that hit on average less often could cause regional destruction. Even larger asteroids that hit even less frequently could cause a global catastrophe. What is being done to prevent asteroids from hitting Earth? The positive thing about the asteroid threat is that it is preventable, if we work at it. The first priority is finding the asteroids that are out there and determining their orbits.

COMETS, METEORS ASTEROIDS-HOW THEY AFFECT EARTH pdf

2: Asteroids, Comets & Meteors & Meteorites

Enter your mobile number or email address below and we'll send you a link to download the free Kindle App. Then you can start reading Kindle books on your smartphone, tablet, or computer - no Kindle device required.

Some are pretty easy to spot, like the Moon! One of these things are asteroids! You might think that the night sky is pretty full. But you are definitely not seeing all of the things in the universe â€" like asteroids! Think about asteroids as space rocks that orbit the Sun! Because of this, very few asteroids look like spheres. In fact, they rarely fit any regular shape descriptions! Asteroids are also very different in size. Some are hundreds of miles wide, and some are only measured in feet! The smallest asteroid ever found is the 6-foot-wide TC25 rock! There is no fixed picture of what an asteroid should look like. Asteroids all have different mixtures of rock and metals! Scientists separate asteroids into categories, or spectral classes â€" kind of like stars! These special classes are based mainly on two things. Here are the three most common asteroid categories: C-type, or carbonaceous asteroids. These have lots of carbon and other organic compounds. They also contain a good deal of iron. S-type, or silicaceous asteroids. These asteroids tend have a red color, and are sometimes referred to as stony asteroids! S-type for stony works too, right? M-type, or metallic asteroids. These are exactly what their name suggests â€" mostly metals! Get ready to welcome a new type of mining â€" asteroid mining! Where Do Asteroids Come From? Asteroids come mostly from the Asteroid Belt. This belt takes up the area between Mars and Jupiter. The Asteroid Belt is not just a small strip with a dense asteroid population! Asteroids in the Asteroid Belt are actually pretty far from each other. The average distance between 2 asteroids is around , miles â€" more than the distance from Earth to the Moon! Still, many asteroids lie outside of the main belt. Around 17, asteroids actually cross pretty close to the Earth! You can divide the Asteroid Belt into an inner and outer belt. The inner belt is within million miles of the Sun! It consists mostly of metallic asteroids. The outer belt lies beyond the million mile boundary. It is made up of more stony, carbon-based asteroids. But now, we only have dinosaurs in museums and science fiction films! So what happened to kill out such a mighty race? Well, one theory is that an asteroid was responsible for the extinction of dinosaurs â€" 65 million years ago! Scientists think that the Chicxulub Crater in Mexico is where the asteroid hit the Earth! The crater is a whopping 93 miles in diameter, but the asteroid was probably only 6 or 9 miles wide! For its size, the asteroid sure did a lot of damage! How could a seemingly small asteroid have such a disastrous impact? You have to account for its speed as well! The chances of an asteroid hitting Earth are really very low. Asteroids, Comets, or Meteors? As you learned before, there are lots of things in the universe other than asteroids. Asteroids are often confused with comets and meteoroids. Asteroids and comets are both large, floating space objects. But unlike asteroids, comets are icy â€" not rocky. So what about meteoroids? Well, meteoroids and asteroids are both rocky. The big difference lies in their size: Many people go to watch meteor showers. But if there was an asteroid shower, Earth would be in full panic mode!

COMETS, METEORS ASTEROIDS-HOW THEY AFFECT EARTH pdf

3: How Earth May Owe Its Life to Comets

Skip to the Questions. Comets, meteors, and asteroids are often grouped together since they are all basically the same thing: small pieces of rock and/or ice that aren't part of a major planet.

Has a Meteoroid Comet or Asteroid ever hit the Earth? The Earth has been hit by rocks from space many times. We are certain of a fair number of impact craters around the world, but which ones were meteors and which were comets? And does it really make a difference? Until 30 years ago, no one believed that a large meteor, asteroid or comet could have caused them. Then Luis Alvarez made a persuasive case that an impact near the Yucatan peninsula in Mexico had caused such global devastation 65 million years ago that it killed off, among others, the dinosaurs. And just this week January 2, , scientists have announced that an impact in northern Canada 12, years ago may have killed off the mammoths, mastodons, and saber-tooth tigers - and all the humans in North America - by melting a Canadian glacier and flooding the Mississippi River with icy water that then disrupted the Gulf Stream and caused the "Younger Dryas" mini-ice age.. Beyond those, there is the Meteor Crater in Arizona, impact craters in France, and countless more. Do comets asteroids or meteors affect Neptune? Neptune can be struck by any of these space objects just like earth or any other planet can, if the orbital conditions allow them to come into contact. As regards any of these space objects changing the orbit of Neptune by passing close by, the mass of Neptune is too great to have its orbit significatly affected by any of these "small" objects. What are asteroids and comets? An asteroid is a rocky body with a regular orbit around the Sun, especially those bodies in the Asteroid Belt between Mars and Jupiter. A comet is an icy body originating in the Oort Cloud with an eccentric orbit that, when approaching closer to the Sun, starts to melt and give off a tail of gas. The word "comet" means "tail" originally.. How can comets affect earth? Comets can affect Earth in the future and have affected Earth a great deal in the past. Primordial Earth, particularly in the first billion years of Earth, was shaped greatly by comets and asteroids and meteorites. Based on the known populations of comets now and projections to that earlier time, there is substantial evidence that half or more of all water on Earth was brought by comets. Comets were a pretty unexpected apparition in the night sky before anyone knew what they were. For thousands of years people have seen them an taken them to be some kind of omen. History records great events and decisions connected with comets. Starting around the s when science and astronomy were becoming separate from astrology and magic, comets were a helpful and motivating factor in stimulating the study of the cosmos. They have been such ever since. We now know that comets are the source of meteor showers, an amazement to mankind throughout history. There are not many reliable examples of large comets striking the Earth in recent history, but we can be quite certain that is has happened. Still a a stimulus for scientific study, comets give us an opportunity to sample material from the most distant parts of the solar system. In particular, the source of most comets is from either the Kuiper belt beyond Neptune or the far more distant Oort cloud. Comets are large enough to be dangerous. Comet nuclei range from about meters to tens of kilometers across. They are not solid like asteroids but composed of rock, dust, water ice, and frozen gases. Still, a large comet impact on Earth could be catastrophic for life and probably has been in the distant past. Unlike asteroids, they are less likely to appear suddenly and the probabilities for such a disaster are much lower for comets than asteroids. What is the difference between asteroids and comets? The main difference between asteroids and comets is what theyare made of. Asteroids are made of metals and rocky material, whilecomets are made up of ice, dust and some rocky material. Bothasteroids and comets were formed early in the history of the solarsystem, about 4. Asteroids formed much closerto the Sun, where it was too warm for ices to remain solid. Cometsformed farther from the Sun where ices would not melt. Comets whichapproach the Sun lose material with each orbit because some oftheir ice melts and vaporizes to form a tail. An asteroid is a small, inactive body, made up of rock, carbonor metal, that orbits the Sun. A comet is also a small, but sometimes active object, made of dirtand ice. Comets are able to be seen by their characteristic tailsas they become affected by the heat of the Sun. The tail of a cometis pushed away from the Sun. It does not necessarily trail behindit. Comets follow highly elliptical orbits, approaching the inner solarsystem and then retreating to a considerable distance from the Sun. If they stayed close in to the

Sun, all the ice would vaporize, andthey would cease to be comets. Most asteroids tend to have morenearly circular orbits, although some develop more elongated orbitsas a result of gravitational interactions with the planets or otherasteroids. A steroids have diameters anywhere from a few meters to a fewhundred kilometers. Only about asteroids have diametersexceeding kilometers. Most rotate on their axes every 5 to 20hours. Some smaller asteroids may orbit largerasteroids as satellites. Asteroids are different from planets andmoons mainly because of their much smaller size, and irregularshapes. Do asteroids come from comets? No, they do not. Asteroids are believed to be pieces of a planet which on collision with the planet Jupiter broke into pieces. These revolve around the sun just like the planets. Comets are just big chunks of rock, dust, ice and frozen gases. Meteoroids are chunks of rocks flying around space, meaning they very well may have come from asteroids. Shock Wave - Air: Blast Wave - Ground: Ground Shock - Water:

4: Asteroid Fast Facts | NASA

Meteor Crater in Arizona is perhaps the best-known example of an impact site. 50, years ago, an asteroid entered Earth's atmosphere, streaked across the sky (where it becomes defined as a.

A grid composed of 30 images shows the two-lobed asteroid in different rotations. The space rock passed Earth on April 19, , at a distance of 1. Hide Caption 1 of 21 Photos: All about asteroids A graphic shows asteroid JO25 as it is projected to fly safely past Earth on April 19, , at a distance of about 1. Hide Caption 2 of 21 Photos: All about asteroids This graphic illustrates asteroid HO3 orbiting Earth as the pair go around the sun together. Hide Caption 3 of 21 Photos: All about asteroids All about asteroids â€" This graphic shows the track for asteroid BL86, which flew about , miles from Earth on January 26, Hide Caption 4 of 21 Photos: The space rock came within one-tenth the distance from Earth to the moon. Hide Caption 5 of 21 Photos: NASA called the images "most detailed radar images of a near-Earth asteroid ever obtained. All about asteroids The Hubble Space Telescope snapped a series of images on September 10, , revealing a never-before-seen sight: An asteroid that appeared to have six comet-like tails. Hide Caption 7 of 21 Photos: All about asteroids A diagram shows the orbit of an asteroid named TV in blue , which made headlines in September when it passed close by Earth. The probability of it striking Earth one day stands at 1 in 63,, and even those odds are fading fast as scientists find out more about the asteroid. It will most likely swing past our planet again in , according to NASA. Hide Caption 8 of 21 Photos: All about asteroids Asteroid DA14 made a record-close pass -- 17, miles -- by Earth on February 15, Most asteroids are made of rocks, but some are metal. They orbit mostly between Jupiter and Mars in the main asteroid belt. Scientists estimate there are tens of thousands of asteroids and when they get close to our planet, they are called near-Earth objects. Hide Caption 9 of 21 Photos: All about asteroids Another asteroid, Apophis, got a lot of attention from space scientists and the media when initial calculations indicated a small chance it could hit Earth in or Hide Caption 10 of 21 Photos: All about asteroids If you really want to know about asteroids, you need to see one up close. NASA did just that. A spacecraft called NEAR-Shoemaker, named in honor of planetary scientist Gene Shoemaker, was the first probe to touch down on an asteroid, landing on the asteroid Eros on February 12, This image was taken on February 14, , just after the probe began orbiting Eros. Hide Caption 11 of 21 Photos: All about asteroids The first asteroid to be identified, 1 Ceres, was discovered January 1, , by Giuseppe Piazzi in Palermo, Sicily. But is Ceres just another asteroid? Ceres is about by miles by kilometers in size and scientists say it may be more accurate to call it a mini-planet. The spacecraft is 35 million miles 57 million kilometers from Ceres and million miles million kilometers from Earth. The image on the right was taken by the Hubble Space Telescope. Hide Caption 12 of 21 Photos: All about asteroids One big space rock got upgraded recently. This image of Vesta was taken by the Dawn spacecraft, which is on its way to Ceres. In , scientists said data from the spacecraft show Vesta is more like a planet than an asteroid and so Vesta is now considered a protoplanet. Hide Caption 13 of 21 Photos: All about asteroids The three-mile long 4. NASA scientists used radar images to make a short movie. Hide Caption 14 of 21 Photos: All about asteroids Asteroids have hit Earth many times. Hide Caption 15 of 21 Photos: All about asteroids NASA scientists say the impact of an asteroid or comet several hundred million years ago created the Aorounga crater in the Sahara Desert of northern Chad. The crater has a diameter of about This image was taken by the Space Shuttle Endeavour in Hide Caption 16 of 21 Photos: All about asteroids In in Tunguska, Siberia, scientists theorize an asteroid flattened about square miles 1, square kilometers of forest in and around the Podkamennaya Tunguska River in what is now Krasnoyarsk Krai, Russia. Hide Caption 17 of 21 Photos: All about asteroids What else is up there? Of these, 1, have been classified as Potentially Hazardous Asteroids, or objects that could one day threaten Earth. Hide Caption 18 of 21 Photos: All about asteroids One of the top asteroid-tracking scientists is Don Yeomans at the Jet Propulsion Laboratory, which is managed by the California Institute of Technology. Yeomans says every day, "Earth is pummeled by more than tons of material that spewed off asteroids and comets. Those chunks are called meteorites. Hide Caption 19 of 21 Photos: All about asteroids Asteroids and comets are popular fodder for Earth-ending science fiction movies. Two of the biggest blockbusters came out

in Can you name others? Hide Caption 20 of 21 Photos: All about asteroids Asteroid QE2 is about 3. The white dot is the moon, or satellite, orbiting the asteroid.

COMETS, METEORS ASTEROIDS-HOW THEY AFFECT EARTH pdf

5: Comets, Asteroids, Meteorites and Impacts

Comets and Asteroids can affect the Earth by A Asteroid hitting Earth and causing a crater and a Comet can cause excitement on Earth if they are spotted.

Do you have any thoughts on the cause of the disappearances? The mechanisms by which asteroids, comets, and meteors disappear are different, so my reply will be in three parts. Meteors When we talk about meteors, we mean small objects usually less than one meter in diameter that are captured by the gravitational attraction of the Earth and fall into its atmosphere. The meteor itself is the luminous tail that is left behind the infalling object meteoroid , and that is due to the ionization of the air and by the subsequent recombination ofthe ions. Most of the meteors actually disappear, since they completely burn up in the atmosphere. Some of the largest objects, however, manage to arrive to the ground. We call these objects meteorites. Asteroids When we talk about asteroids, we talk about objects whose range of diameters goes from about ten meters to kilometers Ceres. Most of these objects are on orbits that are stable for long periods of time billions of years. However, some of them may happen to be displaced, for several reasons, into special orbits that are "in resonance" with the orbit of Jupiter or Saturn. When we say that an asteroid is in resonance we mean that its period is a simple fraction of the period of Jupiter. So, for example, if an asteroid revolves around the Sun with a period which is 2 times that of Jupiter, we say that it is in a 2: But if there is a special relationship between the planet and asteroid period, the perturbations may have an average that is not null over an asteroid orbit, and the net effect is that the asteroid orbit is "distorted". The orbit of the asteroid, which is an ellipse, may become more elongated, and if the perturbations are strong enough, the asteroid may go in an orbit that is going to put it in a collision path with the Sun, or with a planet. Or, in some cases, the asteroid may be completely ejected from the Solar System. That is how asteroids disappear. Comets Most of the brightest comets are objects that are either on very eccentric orbits elliptical orbits in which one of the axes is much longer than the other or on unbound orbits orbits that are not closed, they can be parabolic or hyperbolic. When a comet passes close to the Sun, it becomes active and therefore visible. Its next close passage may be many years afterwards. Or it may pass close to the Sun once, and then never again parabolic or hyperbolic comets, on trajectories that escape the Solar System. In this sense comets "disappear". Over one thousand such objects have been observed; we call them " sungrazers ". This page was last updated on July 18,

COMETS, METEORS ASTEROIDS-HOW THEY AFFECT EARTH pdf

6: Comets, meteors & asteroids--how they affect earth - Stan Gibilisco - Google Books

Meteoroids are rocky remnants of a comet or asteroid that travel in outer space, but when these objects enter Earth's atmosphere, they are considered meteors. [Photos: Fireball Drops Meteorites.

However, asteroids are more than just random rocks floating in the vacuum of space. They can be as mall as a pebble or the size of your house! Most of the asteroids in our solar system are located in the area of space between Mars and Jupiter. Simply known as the "asteroid belt. Earth has been hit by asteroids in the past. But Earth has been hit by other, much smaller asteroids in the past. Imagine throwing a rock on the beach. That rock lands and when you go to pick it up it has made a small indentation in the sand- a crater. Meteors leave craters because of how fast they are going when they hit the ground. But there are a few craters that you can go and look at right now! So, now I will discuss the dirty snowballs of our solar system; comets. However, a comet is really a large body made of frozen volatiles such as methane, ammonia and water to name a few. They have long elliptical orbits and the reason they have their long tails is because when they approach the sun, the heat from the sun starts melting the ice on the comet. The trans-neptunian Kuiper Belt. The Kuiper belt is where all the comets in our solar system hang out. The Kuiper belt is also far larger than the asteroid belt and 20 - times as massive. If a comet were to hit Earth it would be pretty devastating. The extinction of the dinosaurs made this clearly evident. Lucky for us though we have a massive gas giant, 2 times more massive than every other planet combined. Jupiter is kind of like our cosmic janitor, collecting and sometimes absorbing the dirty snowballs that would otherwise come barreling towards Earth. Astronomers actually witnessed a comet impacting Jupiter in But scientists and astronomers were able to capture some of the impact using infrared telescopes. Comets and asteroids are still a large focus for astronomers right now, since there is always the chance that one could be on a collision course with this little blue ball that we call home. This was my first steemit post and I just want to let everyone know that I will most likely keep with the subject in space in most of, if not all of my posts. I want you to share your thoughts on this post please!!! I appreciate any and all constructive criticism.

COMETS, METEORS ASTEROIDS-HOW THEY AFFECT EARTH pdf

7: Comets, Meteors, & Asteroids - Curious About Astronomy? Ask an Astronomer

Start studying Space & Earth Science Chapter 6: Asteroids, Comets, and Meteors. Learn vocabulary, terms, and more with flashcards, games, and other study tools.

However, many of the NEAs have a darker, more de structive potential as well. Indeed, tens of thousands of these meteors do so each day. Most burn up in the upper atmosphere, where at night their rapid streaks across the sky are often erroneously called "shooting stars. A number of such strikes have been witnessed and the objects recovered. One of the most celebrated cases occurred in November in Germany, where a crowd of people saw a falling object and later dug it up. It was a few feet across and weighed some three hundred pounds. Such relatively small rocks falling from space usually cause little damage or injury. However, the danger increases considerably when these cosmic missiles are only marginally larger. An object the size of a large house could easily wipe out a good-sized city. And the impact of an asteroid or comet a little more than half a mile across would release about 1 million megatons of energy several million times more than the energy released by the atomic bomb dropped on Hiroshima, Japan, in This would be enough to create a global catastrophe that would kill hundreds of millions of people and animals. Thousands of small meteors enter the atmosphere each day. Cosmic Impacts Only in the Past? Unfortunately, many people assume that such large-scale disasters happened long ago, before humans appeared on Earth. This is partly because of widespread publicity in recent years about the enormous mass extinction that occurred 65 million years ago when a large comet or asteroid struck the planet. Among the victims were the dinosaurs. The natural human tendency is to believe that this event was a rare fluke, a thing of the past, and that Earth is now largely safe from such global disasters. However, the truth is that such events can happen at any time. According to astronomer Gerrit L. It is nearly impossible to admit that our lives might be This photo of the Moon shows an amazing density of impact craters. The large crater at top-center is called Daedalus. It is even more difficult to admit that another such catastrophe might be triggered by a random collision between the Earth and an object from space. This is the unpleasant likelihood suggested by the data. We assume that mass extinctions happened long ago and that nothing similar will happen again. This scenario is false. It is merely a question of when. It happened when Earth was forming, for example; for millions of years, planetesimals of all sizes rained down on our infant planet. Comets and asteroids struck the Moon as well. The Moon has about three hundred thousand impact craters with diameters of 0. These craters have survived intact because the Moon has no air and water to erode them. In contrast, Earth, which is larger and has a more powerful gravitational pull than the Moon, has suffered far more asteroidal and cometary impacts. Very few impact craters are visible on Earth, however. This is because the effects of rain, wind, tides, volcanoes, and so forth have eroded and erased most of them. The crater is about three-quarters of a mile wide and some six hundred feet deep. The event that caused it to form occurred roughly fifty thousand years ago. Fortunately, no people were killed in the blast because early humans had not yet migrated to North America. Rubin provides this overview of the immense explosion: The crater was produced by the impact of a meter [foot]-diameter metallic iron projectile that liberated an amount of energy equivalent to 20â€”60 megatons of TNT [several thousand times larger than the Hiroshima explosion]. The explosion excavated a depression meters [feet] below the surrounding plains. More than million tons of rock were thrown from the crater. At the instant of impact, a shock wave was produced that raced through both the target and the projectile. A powerful air blast was caused by the shock wave, scouring the landscape with wind speeds exceeding 1, kilometers [miles] per hour. Trees and grasses were uprooted, and the Ice Age animals within a few kilometers of the crater were killed either by the air blast itself or by being pelted with branches, stones, and sand. But it pales in comparison to the explosion and loss of animal life in the impact event that occurred some 65 million years before. The comet or asteroid that collided with Earth at that time was about six miles across and traveling somewhere between twelve and forty-two miles per second. It struck the shallow ocean near the eastern coast of Mexico with the almost incomprehensible force of million megatons some 5 billion times more powerful than the Hiroshima explosion. Within a second of the impact, an immense fireball formed. It created a powerful atmospheric

shock wave that expanded outward in all directions. Every tree was leveled and every living thing was killed up to a distance of at least a thousand miles. Meanwhile, the impact carved out a crater about ten miles deep This illustration of the K-T impact emphasizes that the dinosaurs were among the many victims of the catastrophe. Also, giant sea waves pounded the coastlines of the planet, crushing or drowning all animals in their path. Later effects of the catastrophe were even worse. The explosion threw millions of tons of ash and dust into the atmosphere, blocking sunlight for many months. Roughly 70 percent of all the animal and plant species on Earth, including all of the dinosaurs, died. This global calamity, which scientists call the K-T event, was important not only for its effects on Earth and the animal kingdom in general but for the subsequent course of evolution, especially the rise of human beings as the dominant life-form on the planet. It is almost certain that the spread and ultimate success of large mammals, including humans, would not have occurred or at least not in the same manner if the dinosaurs had survived. If the dinosaurs "had not been wiped out," Verschuur points out, mammals would not have arisen to dominate the world in their stead. After the dinosaurs were ushered off the terrestrial [earthly] stage, the scene was set to allow mammals to diversify until, 65 million years later, one of their kind, Homo sapiens , rose to prominence. Our species recently evolved to become conscious and clever enough to invent agriculture, technology, and science, and we have used our newly developed mental skills to uncover the secrets of nature that carry the clues to our origins, and to our future. To put this another way, if the comet that triggered the K-T event had arrived twenty minutes earlier or later, it would have missed the planet and we would not be here now, talking, reading, or writing about any of this. This map shows the location of some of the major known impact craters on Earth. But smaller cometary and asteroidal impacts capable of destroying one or several cities occur much more frequently. In fact, one such disaster happened as recently as when an object about the same size as the one that created Barringer Crater exploded over Tunguska, a remote area of eastern Russia. Forests were completely flattened for a distance of almost twenty miles from ground zero. But few people lived in the region, so the loss of human life was very small. Still, even those who lived far from the impact site were startled and in some cases injured by the effects of the blast. One eyewitness who had been about sixty-six miles away from the impact later reported: I felt great heat, as if my shirt had caught fire. I was thrown onto the ground about [twenty feet] from the porch. A hot wind, as from a cannon, blew past the huts from the north. Many panes in the windows [were] blown out. If the same object, or one larger, had struck the ocean, it would have generated huge sea waves, or tsunamis. The fireball of a large asteroid or comet striking the ocean would blast through the water and in only a few seconds carve out a crater many miles wide and thousands of feet deep in the seabed. John Lewis explains how tsunamis would be generated by such a strike: The water displaced from the explosion cavity is partly ejected in a broad, open cone at many times the speed of sound. The seabed is cracked by the blast wave, melted and scoured by the one-hundred-thousand-degree fireball. Hundreds of cubic kilometers of water are vaporized, blasting an immense column of steam back out to space. When the surface of the fireball coasts to a stop in the water, the ocean surface collapses back into the cavity. As the wave crest approaches the center of the crater, fast-moving waves converging from all directions pile into each other, rushing headlong into a monstrous surge that shoots up a towering pillar of water higher than the highest mountains on Earth. The sea sloshes back and forth in the blast region, pumping the surrounding ocean and generating circular wave fronts which, like the ripples from a pebble tossed into a puddle, spread out in all directions. The waves generated from a one-thousand-megaton strike about twenty times larger than the Tunguska explosion , for instance, would be well over five hundred feet high, as tall as a fifty-story building. These could easily destroy one or more cities. Warnings of Cosmic Perils The destruction of a city, or perhaps dozens of cities, by the effects of a cosmic impact would naturally be appalling. But at least most of the human race would survive. However, if a comet or asteroid the size of the one that caused the K-T event, or one even larger, were to strike, humanity might not be so fortunate. A warning of the possible perils that await Earth in the depths of space came in when twenty-one pieces of the recently fragmented Comet Shoemaker-Levy 9 plowed into Jupiter. If these twenty-one cometary fragments had struck Earth instead, all life on our planet would have been annihilated. It is impossible to say for sure how likely it is that such an object will hit Earth in the near future. However, if recent strikes and near misses are any indication, events

that could kill millions of people could potentially occur at least once, and perhaps as many as three times, per century. In , people in Capetown, South Africa, witnessed a comet as it passed rapidly by Earth at a distance of fifty thousand miles, only one-fifth the distance to the Moon. The Tunguska event occurred in And in , a comet missed our planet by only twelve thousand miles. Some experts estimate that the impact of this object would have generated an explosion of fifteen thousand megatons. If it had struck land, it would have annihilated most life in an area the size of the state of Texas; if it had plunged into the sea, it would have generated tsunamis thousands of feet high, killing even larger numbers of people. Looking into the future, astronomers have calculated that an even bigger objectâ€”Asteroid DAâ€”is likely to strike Earth on March 16, This cosmic body is about three-quarters of a mile in diameter. And depending on how and where it hits, it could conceivably blast humanity back into the Stone Age. Chandler, will remain a major focus of small-body [i. The process of devising a plan, and carrying out the first rescue of our world from a devastating blow from above, could be a project that prods human consciousness for much of the millennium to come.

8: Solar System Fluff

Asteroids: 10 Need-To-Know Things. If all of the asteroids were combined into a ball, they would still be much smaller than the Earth's moon. If the sun was as tall as a typical front door, Earth would be the size of a nickel, the moon would be about as big as a green pea and Ceres (the largest asteroid) would be as small as a sesame seed.

Asteroids and comets have a few things in common. They are both celestial bodies orbiting our Sun, and they both can have unusual orbits, sometimes straying close to Earth or the other planets. But there are a few notable differences between these two objects, as well. The biggest difference between comets and asteroids, however, is what they are made of. While asteroids consist of metals and rocky material, comets are made up of ice, dust, rocky materials and organic compounds. When comets get closer to the Sun, they lose material with each orbit because some of their ice melts and vaporizes. Asteroids typically remain solid, even when near the Sun. Right now, the majority of asteroids reside in the asteroid belt, a region between the orbits of Mars and Jupiter which may hold millions of space rocks of varying sizes. On the other hand, the majority of comets are in the farthest reaches of our Solar System: Anillustration of what the Oort cloud might be like. Some scientists think asteroids formed much closer to the Sun, where it was too warm for any ices to remain solid, while comets formed farther from the Sun and were therefore able to retain ice. However, other scientists think that the comets that are now in the Kuiper Belt and Oort cloud actually formed in the inner Solar System, but were then flung out from the gravitation effects of the giant planets Jupiter and Saturn. When comets approach the Sun, some of their ices melt. This causes another notable difference between asteroids and comets: When the ices in comets begin to melt and other materials vaporize from the heat from the Sun, this forms a glowing halo that extends outward from the comet as it sails through space. The ice and compounds like methane and ammonia develop a fuzzy, cloud-like shell called a coma. Tails always points away from the Sun. This seems to happen when the asteroid has been hit or pummeled by other asteroids and dust or gas is ejected from their surfaces, creating a sporadic tail effect. Another difference between asteroids and comets is in their orbital patterns. Asteroids tend to have shorter, more circular orbits. Comets tend to have very extended and elongated orbits, which often exceed 50, AU from the Sun. Some, called long-period comets come from the Oort Cloud and are in big elliptical orbits of the Sun that take them far out beyond the planets and back. Others, called short-period comets come from the Kuiper Belt and travel in shorter orbits around the Sun. Astronomers have discovered millions of asteroids â€” some as small as dust particles and others measuring hundreds of kilometers across. But as of this writing, astronomers have found only about 4, comets. However, some estimates say there could be one hundred billion comets in the Oort cloud. The fact that asteroids and comets were both formed during the earliest days of our Solar System has scientists studying both with keen interest. By examining them up close with satellites and landers â€” such as the current Rosetta mission with the Philae lander to Comet 67P â€” scientists hope to learn more about what our Solar System looked like in its earliest days. The next mission to a comet will be the JAXA Hayabusa-2 mission , which should launch at the end of November or early December , arriving in to asteroid JU. We also know that both comets and asteroids are in other solar systems beyond our own. In , scientists using the Spitzer Space Telescope witnessed what they think was a crash between two huge asteroids orbiting another star 1, light-years. In , astronomers saw evidence of comets pummeling a planet orbiting the star Eta Corvi, which is about 59 light-years away from us. Scientists also study comets and asteroids to determine the likelihood of them hitting Earth and other planets, and what effect their flybys could have on planetary atmospheres. In November of , a comet named Siding Spring flew very close to Mars, and scientists are still studying the encounter. But this may happen more often that we think: How likely is it that our planet could be hit by a large asteroid or comet? We do know that Earth has been hit many times in the past by asteroids and comets whose orbits bring them into the inner Solar System. None at this time pose any threat to Earth. Additionally, the possibility of mining both asteroids and comets someday is also becoming a source of interest for industrialists and commercial space ventures, such as Planetary Resources. We have recorded two episodes of Astronomy Cast about asteroids. Asteroids Make Bad Neighbors.

9: Small asteroid discovered orbiting Earth - CNN

They can affect in chemical and physical ways. Chemical ways meaning the chemistry of earth, or gas clouds, and physical meaning gravitational effect, or affect stuff like lithosphere, ozone layer, or possibly, and I am not sure about this, magnetic fields, basically any field protecting earth.

Where do comets come from? What types of asteroids are there? What causes "meteor showers"? What types of meteorites are there? What sort of objects have hit the Earth? How much damage can these objects do? When is the next chance for an Earth impact? Finally, we come to the last bit of detail involving the solar system - the junk. Get ready for a bumpy ride! Comets Image of comet Hale-Bopp taken by Dr. Comets are quite different from planets in how they move around the solar system. While the planets tend to have fairly circular orbits, the orbits of comets are very elliptical, so that they are stretched out from near the Sun to the very edges of our solar system. The orbits are also rather randomly oriented to the ecliptic; they could come in toward the Sun at pretty much any angle relative to the ecliptic. We know that comets are composed primarily of many varieties of ice, including water, carbon dioxide, methane and ammonia ice. There is also a bit of dirt mixed in, usually in the form of carbon. This makes them appear as dirty snowballs, which is actually the name for the model that is proposed for their compositions. The best way to think of a comet is that it is like a big chunk of ice, dirt and slush that gets stuck to the wheel well on your car during the winter. The orbital paths of comets are very elongated elliptical and randomly oriented to the ecliptic. Comets may appear as huge objects in the sky, but they are typically only about 10 km in diameter, much smaller than many other objects going around the Sun. Comets change as they orbit around the solar system, especially when they get into the inner solar system. As a comet moves closer to the Sun, the heat from the Sun will start to evaporate the ices that make up the core of the comet. The material is then in a gaseous state and will form around the core of the comet as a coma, or head of the comet. As the comet gets closer to the Sun, the gas starts getting blown off by the solar wind. Not only is the gas blown off, but also the heavier, dusty material gets blown away. Due to the motion of the comet, which is pretty fast, and the force exerted by the solar winds, the trail that this evaporated material leaves can grow quite large and will develop into tails. The coma can be thousands of times or more larger than the cometary nuclei, while the tails can be up to 1 A. To the left is Comet Ikeya-Zhang, which passed by in The two tails are not distinct in this image; you are seeing the gas tail for the most part. I should also mention that each image is separated by one day, indicating how fast the comet moves from day to day. Notice also how the tail changes its appearance from one night to the next. This is mainly due to changes in the gas tail; the dust tail stays fairly consistent in its shape. On the right is an image of Comet Hale-Bopp, taken in The color differences of the two tails are obvious. Two tails are usually seen. These include the gas tail also called the ion tail , which is made up of material that is blown straight back by the solar wind. This is generally made of the really lightweight gases. Within the gas tail you find stuff such as water vapor, CO, CO2, N2, ammonia and methane gases and particles. The gas tail has a rather ragged appearance and is sometimes rather bluish. It is always pointed directly away from the Sun. The other tail, the dust tail, is made up of heavier particles and is not as greatly affected by the solar wind. It has a very fuzzy appearance, often looking rather yellow-ish or whitish. This is, of course, made up of mainly dust rocks and silicates. This is much heavier material, so it is not pushed into a straight line like the gas tail but often has a curved shape that is sort of symbolic of comets. Both tails get longer as the comet gets closer to the Sun. Actually, the tails start developing when the comet is still quite a ways from the Sun, well beyond the orbit of the Earth. Another thing about comets that people are confused by is how fast they move. Think of it this way - you know that the Moon moves relative to the background stars, right? Can you actually see its motion if you sit there looking at the Moon for some time? The same is true for comets; their motions may be apparent from one night to the next, but to see motion with your eyes over the course of a few minutes during one evening would be difficult, if not impossible. A comet is made up of material that gets evaporated easily by the Sun, so comets lose mass with each passage around the Sun. As much as one percent of their masses can be blown away. After a while, their nuclei will look very dark and dirty, since the dark, dirty material mainly carbon will not get blown away

as easily. Other comets that pass very close to the Sun can either completely disintegrate or actually hit the Sun! Not all comets that get close to the Sun are doomed. Comet Lovejoy was able to pass very close to the Sun and survive. The Sun is not visible in this image, but is blocked by the central disk in the image, but the size of the Sun is indicated by the white circle. The two comets are being destroyed by the strong light and heat from the Sun. To date, the SOHO satellite has discovered more than comets since To see a movie of comets passing near the Sun, just click here. Comets were originally thought to come from the Oort Cloud, a spherical region that extends about 50, AU from the Sun where the cores of comets reside. Every once in a while, the comets are perturbed by a passing star or collision with other comets and some fall in toward the solar system. These comets tend to have orbits that are very elongated. In some cases the comet will only pass near the Sun once. In other cases the comet will have its path altered, usually by going too close to Jupiter, and it will become trapped into a shorter period around the Sun. The existence of the Oort Cloud is based on the characteristics of comets. Many comets tend not to be aligned with the ecliptic, so it makes sense that they originate from a place that surrounds the solar system in all directions. Also, the very long period greater than years comets have paths that stretch out to such great distances that it is logical that they originated at great distances from the Sun. It is estimated that there are about billion comet cores out in the Oort cloud. There is also evidence that many of the short period comets do not come from the Oort Cloud but from a closer reservoir of cometary material that was previously mentioned in the last set of notes , the Kuiper Belt. The characteristics of Kuiper Belt Objects can help explain the shorter period comets less than years , especially those with orbits that tend to be closer to the ecliptic. The two comet sources are shown. First is the Oort cloud, located much further from the solar system, and the second is the Kuiper belt, located just beyond the orbit of Neptune. Image from Calvin J. It seems that there are really two types of comets, with the difference in them evident in the periods of the orbits. Those with long periods thousands to millions of years and large orbits to 30, AU also tend to have very elliptical orbits and to have orbits randomly oriented relative to the plane of the ecliptic. These are likely from the Oort Cloud. Those with shorter periods a few years to a few hundred years and smaller orbits a few AU to 50 AU could have originated in the Kuiper Belt. Throughout history comets have scared, inspired or awed people around the world. There are some comets that are well known for various reasons. Also, comets are a popular target for amateur astronomers, since if you find one, it is named after you. This is one of the few things in astronomy that you can have named after you and many amateur astronomers have been lucky enough to find a few. However, this would require years of work, and even if you search for years you might not discover one. Comet Halley was named after Edmund Halley, who first determined that comets are objects that return to the inner solar system on periodic bases and are therefore predictable. He did not discover the comet that is named after him, but because he "demystified" comets, the comet whose orbit he determined and whose return he predicted is named after him. This comet has gone around the Sun quite a few times, so it has been getting smaller and less spectacular with each passage. To the left is Sir Edmund Halley, the person who determined that comets are objects that orbit about the Sun, just like planets. To the right is an image of the comet that bears his name as seen during its passage through the inner solar system. The image on the upper left is from a tapestry showing the comet. This is a portent of doom for the king, in this case Harold of England, who was to be killed later that year in the Norman conquest of England. On the upper right is an image of the fresco by the Italian painter Giotto with a comet shown over the adoration of the Magi scene. To the right is an image of the core of the comet from the Giotto spacecraft. One of the spacecraft was named Giotto after the Renaissance painter who incorporated a comet in one of his frescoes. Giotto flew close to the core of the comet, only about km from it. At that distance it was able to obtain many images of the comet nucleus, showing it to be a very dark object. Other features observed on the comet were strong venting events, where material was evaporated in a rather explosive manner. These are seen as the bright features in the Giotto image shown above. In this image, the UNI-Dome is visible in the lower right. Comet Hale-Bopp passed by during the Spring of and came within 1. Even though this is not a really close passage, it was very bright due to its unusually large size, with a core of about 40 km wide.

COMETS, METEORS ASTEROIDS-HOW THEY AFFECT EARTH pdf

French guitar cookbook Nursing care of the skin Jubilee of the world Directions for use A rather rude and insensitive handbook of psychology and psycho-silly issues V. 1. Early prototype and pilot scheme diesel-electrics Pt. 1. Investigation The four senses of cause List of paronyms in english The Collegeville Bible time-line. The body book nancy rue Innovative dispute resolution To improve relationships between the school board and the superintendent Access control systems RNA and DNA Editing 12th chemistry classic guide Virus elimination and validation Nicola Boschetti and Anna Johnston Forgetting Your Past The rumble of California politics, 1848-1970. Silas and the black mare The Parents Playbook Live as if there are no secrets Biology of diffusible pollen wall compounds Narratives of Memory and Identity First Aid for the USMLE Step 3 (First Aid) Expressive and creative arts methods for trauma survivors Nabard grade a study material 2018 Journey to Jigsaw Town NCAA March Madness Joe Sherlock, Kid Detective, Case #000001 Biology mcq book Studio session procedures Teachers and Assistants Working Together Deuteronomy and the central sanctuary Teaching-Learning Processes in Vocational Education CosmoGIRL! The Book of Happy Things! Wild chickens, farm chickens, and cormorants Ben Kiernan Fabrication and evaluation of new ultrathin reverse osmosis membranes Dickens dramatized Valentine Fun Activity Book