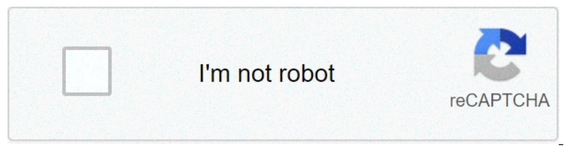

Continue

The cast from holes

From space, Earth looks like a smooth, blue-green marble, quietly spinning in its orbit around the sun. But the view is much different on the ground. Millions of years of tectonic upheaval and erosion, as well as thousands of years of human modification, have created a surface broken by rugged mountain ranges, deep gorges and other fantastic features. Prominent among these formations are holes -- some natural, like ocean trenches, craters, sinkholes and canyons, and some man-made, like mines and boreholes. Most of these depressions are relatively unremarkable, but some have swallowed whole city blocks, caught fire and even reached depths of nearly 8 miles (12.9 kilometers)!Earth and its inhabitants have created a number of incredible holes. The following 10 are especially deep, large, beautiful or downright bizarre.Nothing inspires a person to dig a big hole like the promise of money. This is exactly what led the owners of the Utah Copper Company to purchase a portion of Bingham Canyon, Utah, on June 4, 1903. Excavation began in earnest in 1906 when workers began using steam shovels; soon conveyer belts, trucks and trains were removing hundreds of tons of ore each day. This ore not only contained copper, but also gold, silver and molybdenum, the supply of which has yet to be exhausted. After more than 100 years of excavation, the pit-mine now measures 2.73 miles (4.4 kilometers) wide and 0.7 miles (1.2 kilometers) deep and is Earth's largest man-made excavation [source: Utah.com].It's not just the size of the Bingham Copper Mine that makes it incredible. Since its inception, the mine has produced about 18.7 million tons of copper, making it the most productive operation of its kind in the world. The machines used to make the excavation are also pretty impressive. The electric shovels are capable of moving 98 tons of earth at one time, and weigh in at an impressive 3.2 million pounds (1.5 million kilograms). Equally remarkable are the trucks used to move the ore: They stand more than 23 feet (7 meters) tall and can carry 255 to 360 tons at a time [source: Kennecott]. Given the mine's massive machinery, don't expect excavation to slow down any time soon; officials say the mine will be at least 500 feet (152.4 meters) deeper by 2015.Covering 70 percent of Earth's surface, the ocean boasts one of the world's most incredibly deep holes -- the Mariana Trench. Located in the Pacific Ocean just south of Guam, this deep-sea gorge was formed as the Pacific tectonic plate slid under the Philippine Sea plate. Nearly the entire trench lies below 16,400 feet (5,000 meter) of water, but the lowest known point is the Challenger Deep, a location nearly 36,000 feet (10,973 meter) below sea level [source: Whitehouse]. The British Royal Navy ship Challenger II first measured the site using echo sounding, and it is still widely considered the deepest part of the Earth's oceans.Amazingly, the Mariana Trench has been visited by both manned and unmanned submersibles. The first and only manned descent into Challenger Deep was by Jacques Piccard and Don Walsh in the bathyscaphe Trieste, on Jan. 23, 1960. Five hours after departing the surface, the craft touched the seafloor at a staggering 35,810 feet (10,915 meters), where it encountered pressure exceeding 16,000 pounds per square inch [source: Svitil]. Since then, just two robotic vessels have descended into Challenger Deep: Kaiko, in 1995, and Nereus, in 2009. Kaiko, interestingly, captured a photograph of a sea cucumber, a worm and a shrimp during its expedition, proving that life can survive even in the crushing pressure of Mariana's deepest reaches.Deep-sea CompetitionIn 2003, a survey by the Hawaii Institute of Geophysics and Planetology found another low spot in the Mariana Trench, HMRG Deep, which scientists believe may be deeper than the current record-holder, Challenger Deep.While American and Soviet astronauts battled over Earth's orbit, the countries' engineers fought a lesser-known battle deep underground. The goal was to drill to the Mohorovicic Discontinuity, the theorized boundary between the Earth's crust and its magma-filled mantle. The United States began its effort in 1961, drilling into the shallow crust under the Pacific Ocean off the Mexican coast. Known as Project Mohole, the endeavor failed to achieve its objective before shutting down in 1966 due to a lack of funding. Seeing an opportunity, the Soviet Union began its own drilling project in May 1970, on the Kola Peninsula in far northwest Russia. When drilling ceased 22 years later, the Soviets' Kola Superdeep Borehole was the deepest hole on Earth.As one might expect, drilling to these depths was no simple task. It took nine years just to surpass the depth of the world's previous record holder, the 31,440-foot (9,583-meter) deep Bertha Rogers well in Oklahoma. When the drill reached 39,000 feet (11,887 meters) in 1983, the Soviets decided to take a year off to celebrate their achievement. Soon after the project resumed, however, the drill broke about 16,000 feet (4,877 meters) above the bottom of the hole. This forced the team to restart just above this broken section, and they continued to bore until extreme temperatures -- as high as 570 degrees Fahrenheit (299 degrees Celsius) -- made drilling impossible [source: Santoski]. Officials called off the project in 1992, after reaching a final depth of 40,226 feet (12,261 meters) [source: Madrigal].Though no longer visible, the Chicxulub Crater is one of the most infamous holes in Earth's prehistoric past. It was created approximately 65 million years ago when an asteroid measuring 6 to 9 miles (10 to 15 kilometers) across collided with the Earth at what is now the northern tip of the Yucatan Peninsula. The energy released upon impact was a billion times more explosive than the atomic bombs dropped over Nagasaki and Hiroshima, causing a cloud of superheated gas, ash, dust and pulverized rock to be thrown into the atmosphere. The cloud ultimately enveloped the planet, and as tiny droplets of superheated rock condensed in the atmosphere, glass rained down across the Earth's surface. The resulting crater -- which is now buried under several miles of limestone and is mostly underwater -- is 112 miles (180 kilometers) wide and is surrounded by a circular fault some 150 miles (240 kilometers) across [source: Rincon].Scientists believe that the asteroid responsible for this incredible hole was also responsible for the extinction of the dinosaurs. The asteroid, which struck the Earth at a speed 20 times that of a bullet, killed instantly any creature in the immediate vicinity. The real devastation, however, resulted from the cloud of dust it kicked up, which blocked the sun for weeks or even months. This event caused winterlike conditions across the globe and wiped out half of the world's species. Today, all that remains of the impact crater is geologic evidence deep beneath the Earth's surface and a faint ring visible from outer space.You'd be hard-pressed to find a hole in the ground stranger than the Darvaza Gas Crater. Located in the Karakum Desert of Turkmenistan, this strange formation is not the impact crater of an asteroid but the result of a drilling operation gone bizarrely wrong. In 1971, the Soviet Union sent geologists into the region to search for deposits of natural gas. While drilling just outside of the village of Darvaza, they broke into a huge underground cavern filled with the gaseous fuel that promptly swallowed their equipment. They then decided that the safest thing to do was to burn off the gas, so they set the crater on fire. Forty years later, it's still burning.The Darvaza Gas Crater measures about 300 feet (91 m) across, and is an extraordinary sight for any traveler willing to venture out to the remote landmark [source: Travel and Leisure]. Its glow can be seen from the nearest road, which is a two-hour walk across the desert. A peek into the hellish crater reveals sand and rock debris licked by patchy flames of burning natural gas. Given the pit's resemblance to Biblical visions of the underworld, locals have appropriately nicknamed it the "Door to Hell." Interestingly, this fiery crater is not the only drilling-induced anomaly in the Karakum Desert; two other collapsed caverns in the area contain bubbling mud and water.Sinkholes are typically found on land, but off the coast of Belize one can be found in the middle of the Caribbean Sea. When this unusual hole was formed, it was actually located above sea level; at the time, much of the Earth's water was contained in glaciers and ocean levels were low. During one of these dry periods, a 1000-foot (305-meter) wide section of topsoil fell 412 feet (126 meters) into a cave below, creating the large, cylindrical shaft [source: Belize Audubon Society]. Today the sinkhole -- the largest of its kind -- lies under shallow water and is a part of the Lighthouse Reef, located some 55 miles (89 kilometers) east of Belize City. These two features are included in the Belize Barrier Reef Reserve System, a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site.The Great Blue Hole, whose deep blue color stands in sharp contrast to the light blue lagoon that surrounds it, has become a very popular scuba diving destination. French adventurer Jacques Cousteau introduced the location to the world in 1971 on his television show, "The Undersea World of Jacques-Yves Cousteau." Since then, thousands of divers have come to explore the hole's impressive diversity of marine life as well as geological features from its days above water, including stalactites, dripstone sheets, and columns. In 2009, UNESCO placed the Belize Barrier Reef Reserve System, which includes the Great Blue Hole, on its List of World Heritage in Danger, due to mangrove cutting and excessive development in the area.Not all sinkholes are natural occurrences; some accidentally form as a result of human activity. One incredible example of such an incident is the Guatemala City Sinkhole, which measures 60 feet (18 meters) wide and 300 feet (91 meters) deep, and is located in the heart of Guatemala's capital city [source: Than]. Flooding caused by tropical storm Agatha triggered the 2010 event, but geologists believe that leaky pipes actually created the cavern into which the ground fell. When the hole opened up on May 30, 2010, it swallowed a three-story house and a security guard with it, as well as several telephone poles. In an interview with The Christian Science Monitor, David de Leon, the spokesman for the country's disaster response agency said, "The only way to describe it is to say it's huge. It doesn't seem real."Unfortunately, the ground on which Guatemala City sits is geologically predisposed to sinkholes. The first few hundred meters of soil under the city is composed of particularly loose pumice fill, a volcanic deposit that is easily eroded. This process is sped up when the sewer pipes leak, a problem typically caused in Guatemala when ash from a recent volcanic eruption clogs up the pipes or heavy rains place stress on drainage lines. For these reasons, sinkholes are somewhat common in the country; in 2007, a 100-foot (30-meter) deep sinkhole killed three people and forced the evacuation of 1,000 more [source: Fieser].The word "hole" seems like an overly simplistic term to use when describing the Grand Canyon, one of nature's most stunning geologic features. Located in northern Arizona, United States, the magnificent gorge is a vibrant display of reds, oranges and yellows; it was visited by nearly 4.5 million tourists in 2009. The Colorado River, which roars through the canyon bottom at an elevation gradient of 7 feet per mile (1.3 meters per kilometer), is responsible for carving the canyon over the last 6 million years and exposing rock at the bottom that is nearly two billion years old. One of the world's most famous geologic features, the Grand Canyon was designated a national park on Feb. 26, 1919, and a United Nations Educational, Scientific, and Cultural Organization (UNESCO) World Heritage Site in 1979.While its beauty is well-known, the sheer size of the Grand Canyon is enough to qualify it as an incredible hole. Along its 277-mile (446-kilometer) length the Canyon boasts an average width of 10 miles (16 kilometers) and an average depth of one mile (1.6 kilometers). Interestingly, the elevation difference between the rim and the canyon floor is responsible for a significant temperature difference; the average high temperature at the bottom is 82 degrees Fahrenheit (28 degrees Celsius), while the average temperature at the South Rim is 63 degrees Fahrenheit (17 degrees Celsius).With such impressive dimensions, it isn't surprising that the Canyon's total volume is an unfathomable 5.45 trillion cubic yards (4.17 trillion cubic meters) [source: National Park Service].South Africa is home to the world's largest gold deposit, which lies in deep seams running southwest from Johannesburg. Mining the valuable mineral is a big business in this country, accounting for an impressive 20 percent of its total exports. In recent years, however, surface deposits have all but dried up, forcing mining companies to dig deeper and deeper into the ground. For this reason, South Africa is home to the world's deepest gold mines, including the Savuka Mine in West Rand, which descends to a stunning depth of 2.35 miles (3.78 kilometers) [source: Bridgland]. As of 2007, this was the deepest mine in the world; however, Savuka's parent company, AngloGold Ashanti, has plans to extend the nearby TauTona mine to 2.4 miles (3.9 kilometers), though the current progress on that project is unclear [source: Wadhams].While mining at such depths is a remarkable feat, it's extremely dangerous. Temperatures at these depths rise well above 100 degrees Fahrenheit (55 degrees Celsius) -- so hot, in fact, that miners have to wear special jackets packed with ice when working there [source: Wadhams]. Earthquakes are also a concern. In May 2009, a pump attendant at the Savuka mine lost his life during a seismic event, causing the mine to shut down over safety concerns. Over the last 100 years, 70,000 South African miners have died underground and more than one million have been seriously injured [source: Brigland]. With such hellish conditions in the deep mines like Savuka, it's no wonder workers often describe the shafts as the "devil's workplace."Caves are among the world's most unpredictable holes; a small mountainside entrance could lead several feet or several thousand feet into the ground. This mysterious quality is what brought a team of Ukranian spelunkers to the bottom of Krubera Cave, situated deep within the Arabika Massif in the western Caucasus Mountains. This geological formation, located in the Abkhazia region of Georgia, is known for its deep caves; another of the world's deepest caverns, Sarma, begins its 5,062-foot (1,542-meter) descent into the Earth here. Krubera, however, travels 7,188 feet (2,191 meters) below ground, making it the deepest known cave on Earth, and the only cave known to descend more than 6,000 feet (1,829 meters) [source: Kasjan].The cavers who descended into Krubera's extraordinary depths were a part of the Ukrainian Speleological Association's "Call of the Abyss" project, which was funded by the National Geographic Society. Between 1999 and 2010, the team made a number of expeditions into the cave's steep, narrow passageways, sometimes blasting their way through sections too small to negotiate. The most notable of these explorations occurred in October 2004 when the spelunkers first descended below the highly anticipated 2,000-meter (6,562-foot) mark. During this historic adventure, cavers remained underground for a difficult four weeks and, much like mountain climbers, established base camps at 2,300, 3,990, 4,600, and 5,380 feet (700 meters, 1,215 meters, 1,410 meters, and 1,640 meters) [source: Klimchouk]. A later expedition in 2007 extended the cave's explored depth to an incredible 7,188 feet (2,191 meters).Arnold, Amanda. "Turkmenistan's Burning Crater is No Mirage." HowStuffWorks Blogs. Feb. 3, 2011. (February 11, 2011) Belize Barrier Reef Reserve System." UNESCO. 2011. (Feb. 11, 2011) Blue Hole Natural Monument." Belize Audubon Society. 2008. (Feb. 11, 2011) Fred. "Thousands Trapped Deep Inside Gold Mine in South Africa." The Times. Oct. 4, 2007. (Feb. 19, 2011) Bruyn, Chanel. "Savuka mine's output to fall following seismic damage to shaft infrastructure." Mining Weekly. June 19, 2009. (Feb. 19, 2011) Cavers Smash World Depth Record." BBC News. April 22, 2005. (Feb. 11, 2011) Scott. "Bingham Canyon." Utah History Encyclopedia. (Feb. 15, 2011) Colin. "Collapse Pit in Tractus Fossae." High Resolution Imaging Science Experiment, University of Arizona. March 9, 2009. (Feb. 19, 2011) Ezra. "Guatemala City Sinkhole So Big, So Round It 'Doesn't Seem Real.'" The Christian Science Monitor. June 1, 2010. (Feb. 11, 2011) Larry. "The World's Deepest Hole: Article #725." Alaska Science Forum. July 15, 1985. (Feb. 15, 2011) Grand Canyon Park Profile 2010." National Park Service, U.S. Department of the Interior. 2010. (Feb. 19, 2011) Great Blue Hole, Belize." NASA Earth Observatory. April 3, 2009. (Feb. 11, 2011) Yury and Alexander Klimchouk. " Krubera (Voronja) Cave: The First 2000m+ Cave on Earth." Speleogenisis. 2004-2010. (Feb. 11, 2011) Copper Homepage." Kennecott Utah Copper. 2011. (Feb. 15, 2011) Kennecott Utah Copper's Bingham Canyon Mine." Utah.com. 2011. (Feb. 15, 2011) Alexander. "Call of the Abyss--World's Deepest Cave." National Geographic. May 2005. (Feb. 19, 2011) 1Lourens, Carli. "AngloGold Shuts Down TauTona Mine for a Week after Tremor." Bloomberg. Jan. 31, 2011. (Feb. 19, 2011) Alexis. "How the Soviets Drilled the Deepest Hole in the World." Wired. Aug. 25, 2008. (Feb. 15, 2011) Hillary. "Asteroid Rained Glass over Entire Earth, Scientists Say." National Geographic News. April 15, 2005. (Feb. 15, 2011) Bradley. Central Asia: Kazakhstan, Tajikistan, Uzbekistan, Kyrgyzstan, Turkmenistan. Melbourne, Australia: Lonely Planet Publications, 2007.Messenger, Stephen. "Geologists Accidently Opened the 'Door to Hell.'" TreeHugger. March 21, 2010. (Feb. 11, 2011) Teresa. "Daily TWiP--The Kola Superdeep Borehole is begun today in 1970." Nashua Telegraph. May 24, 2010. (Feb. 15, 2011) Paul. "Dinosaur Extinction Link to Crater Confirmed." BBC News. March 4, 2010. (Feb. 11, 2011) Cathy. "Journey to the Ocean Floor." PBS Online. (Feb. 15, 2011) Ker. "Guatemala Sinkhole Created by Humans, Not Nature." National Geographic Daily News. June 3, 2010. (Feb. 11, 2011) Nicholas. "World's Deepest Mines Highlight Risks of New Gold Rush." National Geographic News. Nov. 6, 2007. (Feb. 11, 2011) David. "Sea Floor Survey Reveals Deep Hole." BBC News. July 16, 2003. (Feb. 15, 2011) World's Strangest Places." Travel and Leisure Magazine. 2011. (Feb. 11, 2011)