Strange & Beautiful

14 stunning volcano creations

The remarkable and beautiful forms sculpted by volcanic eruptions

Presented by
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Volcanoes can blast, burn and sear their way to destruction. But in doing so, they can sculpt some unique and beautiful landforms.

Flowing sulpher at Kawah Ijen volcano, Java, Indonesia (credit: Westend61/GmbH Alamy)

Blue flames of sulphur

Kawah Ijen, a volcano in East Java, Indonesia, stands 2,600 metres tall and is topped with a large caldera and a 200-metre-deep lake of sulphuric acid. When the lava spills down the slopes it is interlaced with high temperature sulphuric gases. Once these gases make contact with oxygen in the air, they burn with eerie bright-blue flames. These flames give the illusion that blue lava is spilling down the mountainside.

The clean symmetry of a mud volcano (credit: Mark Ireland/CC by 2.0)

Mounds of mud

Mud volcanoes form in places where pockets of underground gas find a weak spot in the Earth. The gas forces its way to the surface, through the mud, to create oozing, gurgling mounds of sludge. Eastern Azerbaijan is home to more than a third of the world's 1000 mud volcanoes. These volcanoes top out around 700 metres high and around 10 kilometres wide - most of them are around 400 metres high. Unlike typical volcanoes, the contents of mud volcanoes are cold, but they can still be deadly. The gas can build up below the surface and, when finally escapes it can asphyxiate nearby victims and release a torrent of fast flowing mud from the volcano.

Basalt columns in Dyrholey, south Iceland (credit: Cultura Creative RF/Alamy)

Basalt columns

It might seem crazy that an event as chaotic as a volcano can produce features as regular as basalt column, but it all boils down to the physics of cooling. When magma - the molten and semi-molten rock that can pour out of volcanoes - starts to cool, it contracts and cracks begin to form. These cracks start at the cooling surface of the lava flow and then propagate into the magma to form stacks of plates, and thereby columns. The columns themselves usually stand perpendicular to the cooling surface, so when the lava has travelled horizontally, the columns are upright.

Love Valley's phallic rock formations (credit: Hercules Milas/Alamy)

Statues of love

Millions of years ago, volcanic eruptions left a thick layer of hardened and porous volcanic ash near Goreme, Turkey. Over time, wind and rain eroded this layer into a network of deep canyons and sculpted column- and cone-like formations called fairy chimneys. Because some of these rocks look like enormous penises, the region in Cappadocia, Turkey is known as Love Valley.

Cinder cones in Haleakala Crater, Maui, Hawaii (credit: Greg Vaughn/Alamy)

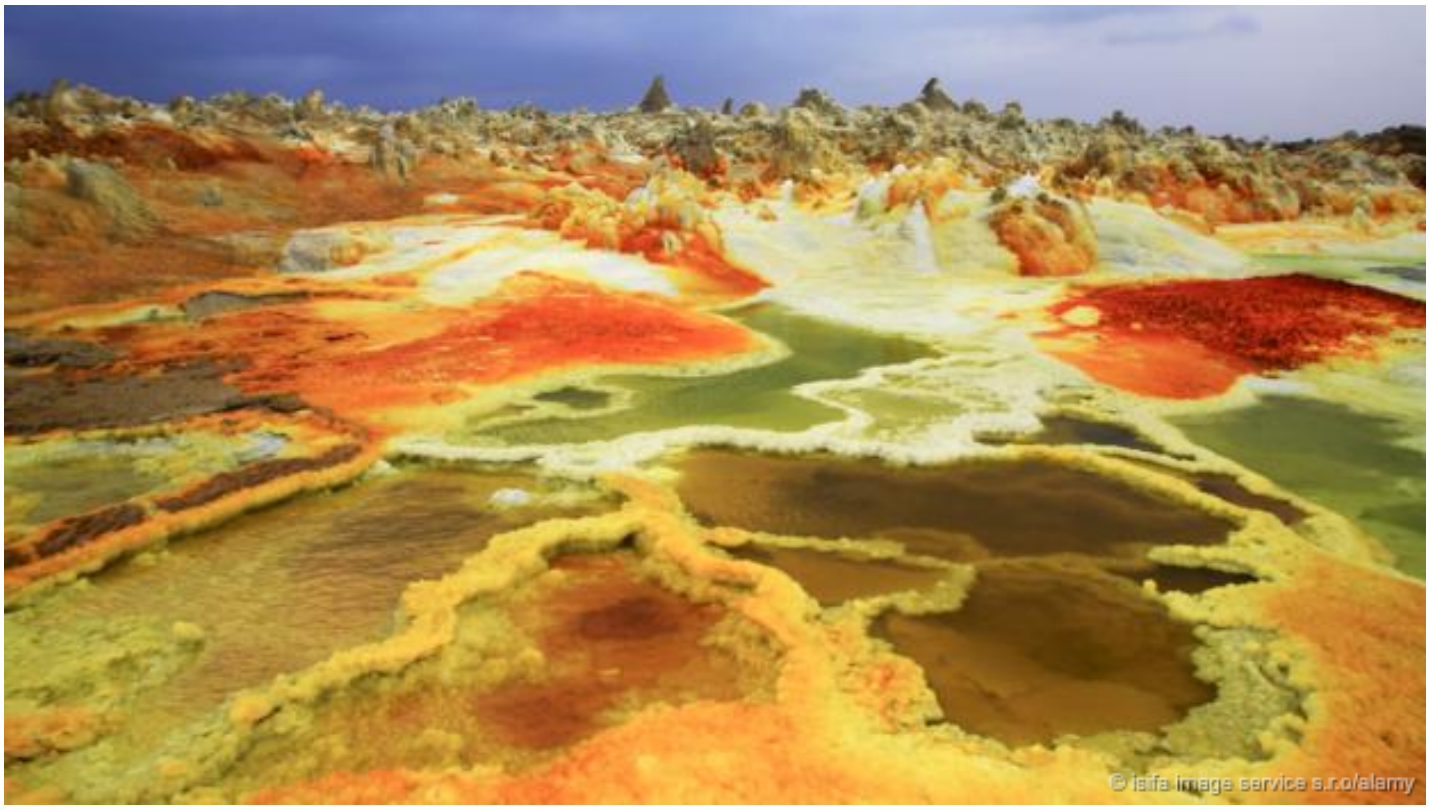
Cinder cones

During an eruption, gas bubbles inside underground chambers can try to expand in all directions, but the only way to relieve the pressure is up and out of one of the volcanoes' vents. The shear force of the gas sends scoria - vesicular, low-density basalt, otherwise know as cinder - shooting out vertically to create a lava fountain. Some of these fountains such as those during the early stages of the Mauna Ulu eruption were up to 500 metres high. Because the material is thrown so high, it cools down before it lands and it doesn’t stick together. Cinder cones are like giant anthills of scoria. If the gases oxidise and combine with moisture the cones can have a reddish colour. If a persistent wind blows during an eruption the cones can be asymmetric.

Lava Tubes at Dangcheomuldonggul, Republic of Korea (credit: CC by 2.0)

Lava tubes

Lava tubes are tunnels within solidified lava that formed during the time of a volcanic eruption. As lava flows from the eruption, it does so in separate channels and the top layer of each channel can “roof over” as the lava begins to cool and harden. The tube then becomes a conduit for fresh lava and the formation of the tubes means that the lava can flow longer distances than it would without them, as it is insulated from cooling. Without the tubes lava would simply have stacked up near the volcanoes vents.



Hydrothermal fields at Dallol volcano (credit: isifa Image Service s.r.o/Alamy)

Hydrothermal fields

The Dallol volcano and its hydrothermal fields are located in a remote part of North East Ethiopia, and the spectacular scene there is one of multicoloured white, pink, red, yellow, green, grey and black salt deposits, hot springs and miniature geysers cradled into volcanic craters. Most of Dallol's hot springs lie on a large mound that was formed by magma pushing upward and lifting the kilometre-thick salt deposits skywards. Groundwater, which has been heated by molten rock, then carries the dissolved salts to the surface. The relentless heat - average annual temperatures climb well above 30 degrees Celsius - quickly dries away the moisture to leave only salt deposits. The salt crystals create sculptures of various shapes and sizes, and a multitude of colours thanks to the sulphur and potassium salts coloured by various ions.

A scattering of volcanic bombs (credit: Geo M I/CC by 2.0)

Volcanic bombs

When a volcano erupts it can eject large globs of lava, which cool during flight into solid, or semi-solid rock, before hitting the ground. These “volcanic bombs” are shaped while flying and consequently take quite aerodynamic forms. In flight they can travel long distances and then travel even further when they hit the ground and begin to roll at high speeds. These projectiles are known as cannonball bombs. The bombs can be large - five to six metres in diameter - and move at a rate of 200-400 metres per second. Because they can fly up to five kilometres from the vent of a volcano they can be extremely dangerous to bystanders who believe they are a safe distance from the eruption site.

A lava dome (credit: Wilie Scott/USGS)

Lava domes

If there is not enough gas or pressure to erupt explosively, viscous lava will often pile up round a vent to create a lava dome. This lava is often too thick and sticky to flow very far. Typically the domes are steep-sided and thick - they can be several kilometres wide. Depending on the strength of the eruption, the slope of the land and the viscosity of the lava the domes can take many shapes. The circular, flat-topped domes are known as Tortas, the circular and spiny domes are called Peleean and the piston shaped lava domes are known as Upheaved Plugs. Repeated eruptions can also build on existing domes so that some domes will take more than 100 years to reach their full size.

A lava lake burns in the DRC (credit: National Geographic Image Collection/Alamy)

Lava lakes

When a vent in a volcanic crater erupts, the lava can partially fill the crater to create a lava lake. Alternatively, the lakes can form when the lava pours into a crater or broad depression. The lakes can also form on top of a new vent that erupts lava continuously for several weeks to build a new crater. Lava lakes can be both totally or partially molten, and even totally solidified. Unsolidified lava lakes are rare, however, and currently only five such long-lived lakes exist in the world, although the eruption of Nyamuragira in the Democratic Republic of the Congo volcano in late November 2014, may have birthed another. At the moment the churning lava simply comes and goes in the volcano's North Pit Crater but scientists believe the lake may eventually become long-lived.

Lava flowing at dusk (credit: Westend61 GmbH/Alamy)

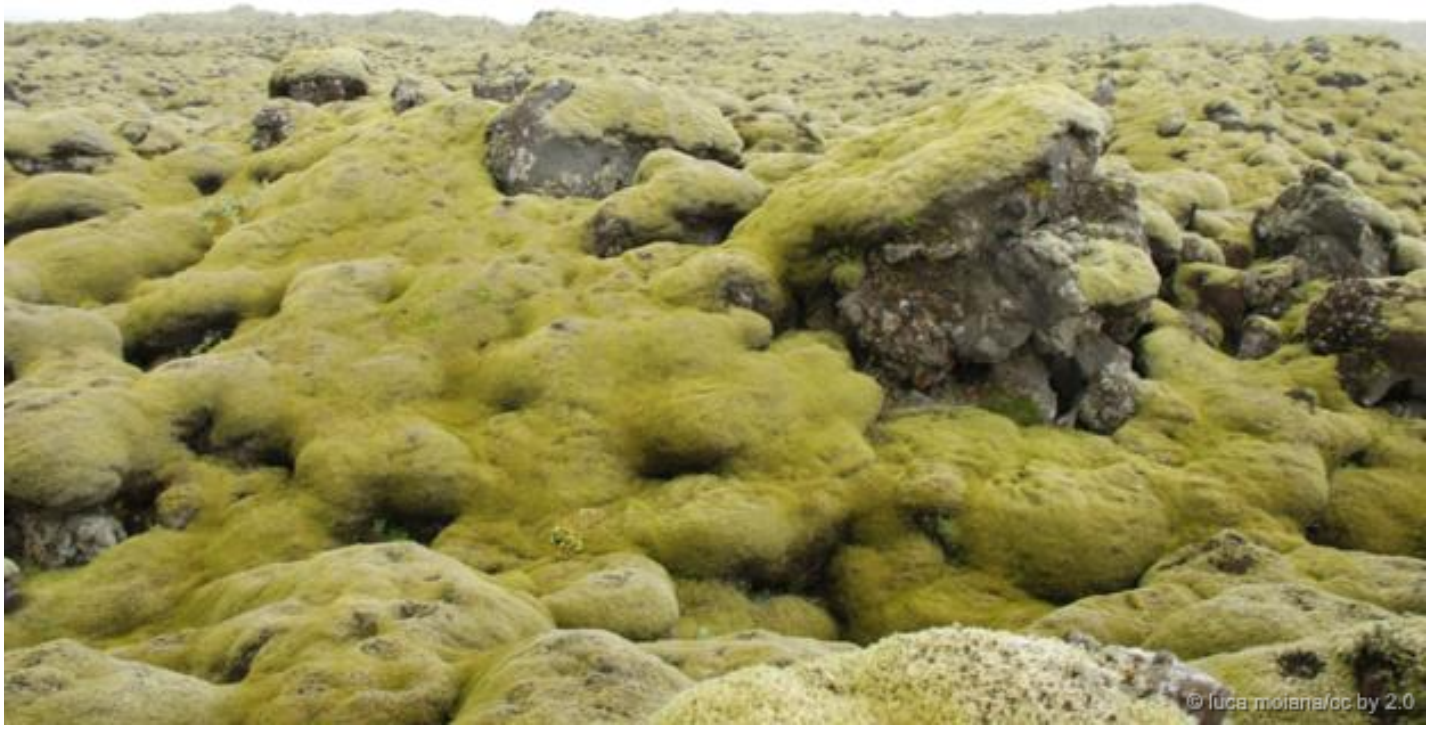
Rivers of fire

When a volcano erupts, lava oozes from vents or fissures. Although it can destroy everything in its path, lava typically moves so slowly that people can easily escape. “If you look at Hawaii, the volcano there has been erupting for ages and basically people just watch the lava flow coming up to a house and then hop in the car and move away,” says Jon Davidson, an earth sciences professor at Durham University. “You could walk in front of those lava flows and be probably safe.” That’s not always the case though. Less viscous lava travelling in a confined channel down steep slopes will move more quickly. Either way, lava can travel far: the leading edges of basalt flows can travel as fast as 10 km/hour on steep slopes but they typically advance less than 1 km/hour on gentle slopes. When basalt lava flows are confined within a channel or lava tube on a steep slope, the main body of the flow can reach velocities greater than 30 km/hour.

Crater lake is the 7th deepest lake in the world (credit: USGS)

Calderas

Calderas - large volcanic craters - are the classic calling cards of volcanic explosions. They are caused by explosive eruptions or the collapse of surface rock into an empty magma chamber. About 7700 years ago, as Mount Mazama in Oregon erupted and poured molten and semi-molten rock into the atmosphere it emptied a large underground chamber. The roof of the cavity then collapsed to produce a massive crater 10 kilometres wide. Centuries of rain and snow then filled the caldera to create Crater Lake, one of the world's most famous calderas. At 589 metres deep it is the deepest lake in the United States and the seventh deepest lake in the world.



Lava pillows can reach the size of a small bed (credit: Luca Moiana/CC by 2.0)

Pillow lava

Pillow lavas are aptly named rounded lumps of hardened lava that can be pillow-sized but can also reach the size of a small bed. When hot lava enters water the outer layer hardens quickly to form a glassy skin that surrounds remaining molten hot lava. The pressure of the trapped hot lava causes the shell to stretch and expand like a balloon full of water. Finally the hot lava bursts through the skin to go on to form a new pillow. The pillows can form piles up to tens of metres high and the flows can stretch kilometres long. Underwater pillow lava is very common on the Mid-Atlantic Ridge and the Juan de Fuca Ridge, but it can also be seen on land where lava has flowed into lakes and rivers, or in areas that were once submerged. If the conditions are right, mosses will cover the pillow lava to form a bumpy landscape akin to green bubble wrap.

Pumice rafts of frothy volcanic rock, Bequ Lagoon, Fiji (credit: David Fleetham/Alamy)

Rafts of pumice

When a large underwater volcano erupts, the lava cools quickly to trap gas bubbles in the rock. This forms pumice, a highly vesicular (or “beady”) porous rock that is so light that it can float on water. If copious amounts of pumice form, it collects in rafts on the ocean. When the deep volcano, Havre Seamount, erupted in 2012 it created a pumice raft that covered more than 400 square kilometres of water, which scientists discovered in the Kermadec Islands of New Zealand.

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