extract from

Insiders Alive: Earthquakes and Volcanoes

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Volcanoes in Focus

All volcanic eruptions begin deep inside the Earth. The heat down there melts the rocks into magma. This collects in a large, underground chamber. The pressure from the surrounding rocks rises, until the magma and any gas dissolved in it finally burst up through a gigantic pipe, called a conduit. The magma pours out through openings in the Earth's crust, called vents.

Pyroclastic flow
A pyroclastic flow is a deadly, red-hot avalanche of ash, rock and hot gas that flows down the sides of a volcano.

Fire fountain
Sometimes, thin, runny lava is forced out of a volcano by the pressure of gas trapped within it. It spurts out of the ground and shoots high into the air.

Eruption!
This picture shows lots of things that can happen during an eruption, but we would never really see them all happening at once.

Cloud of ash
In an explosive eruption, volcanic ash shoots up to make a towering cloud. This ash is made from tiny pieces of volcanic rock.

Lava curtain
When lava is forced up through a long crack in the ground, called a fissure, it makes a glowing curtain of fire.

Lava flow
Lava usually moves slowly, giving people time to escape. But trees, buildings and vehicles may be burned to cinders by a river of lava.

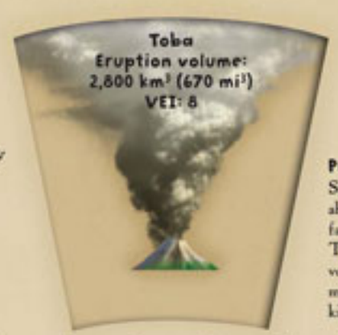
Lava bomb
A lava bomb is a lump of lava that is thrown high into the air during an eruption. The outside may be hard while the inside is still soft and red-hot.

On the surface

A volcano is made from hot lava, which hardens as it cools. From the outside, it looks like a mountain of solid rock. But beneath the volcano's surface, it is a different story. Lift the flap to find out more.

Measuring eruptions

The amount of material—gas, ash and rock—that erupts from a volcano gives a good idea of how powerful or explosive the volcano is. The VEI (which stands for "Volcanic Explosivity Index") is a scale used to describe the power of an eruption, based on the amount of material that erupts and the height of the eruption cloud.

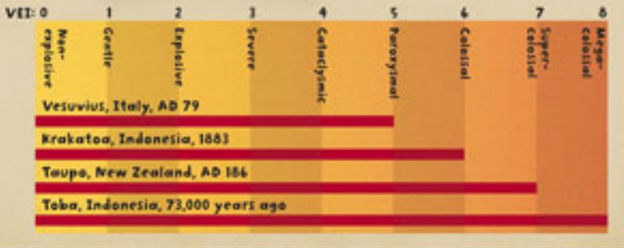


Turn

Past eruptions
Spin the wheel to find out about some of history's most famous and explosive eruptions. The measurements above each volcano show the volume of material that erupted in cubic kilometres and miles.

How explosive?

The VEI scale goes up to VEI-8. Each step up on the scale means the volcano's power increases ten times. Every stage has a name. VEI-1 is a "gentle" eruption, while VEI-8 is a "mega-colossal" eruption. Luckily, these are very rare.

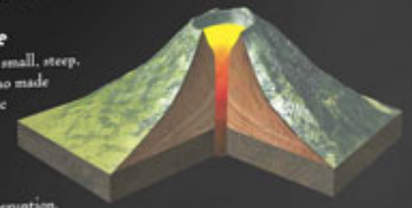


Types of volcano

An erupting volcano can be one of the most dramatic sights in nature, but not all volcanoes explode with a bang. Some are huge and impressive, while others are simply cracks in the ground where lava oozes out.

Cinder cone

A cinder cone is a small, steep, cone-shaped volcano made of cinders (volcanic dust and ash). A new layer of cinders is added to the outside of the hill after each eruption.

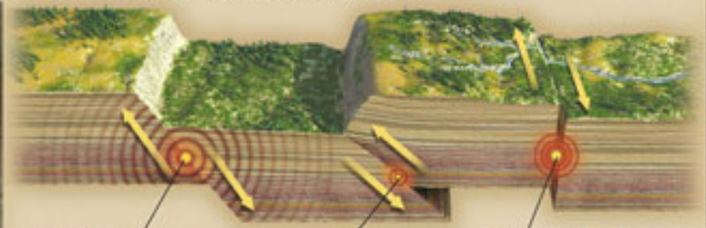


Earthquake!

Earthquakes happen when the Earth's plates jostle one another, putting the rocky crust under strain. Suddenly, the rocks can slip against each other with huge force. The point deep underground where the rocks slip is called the focus. Shock waves spread out from the focus like ripples when you throw a pebble into a pond. When the waves hit the Earth's surface, they make the ground shake. The epicentre is the point on the surface directly above the focus, where the earthquake's effects can be seen and felt.

Types of fault

Most earthquakes happen along deep cracks in the Earth's crust, called faults. These are where two plates meet. There are different types of fault, depending on how the plates move.



Normal fault
These faults usually happen where two plates are moving apart. Rocks on one side of the fault slump lower than the other side.

Thrust fault
Where two plates move together, thrust faults happen. The rocks on one side of the fault are thrust up above the rocks on the other side.

Strike-slip fault
These faults occur when two plates slide past each other. They sometimes get stuck together, causing pressure to build, until they come apart suddenly, causing an earthquake.

Counting the quakes

Each year, about 500,000 earthquakes are detected around the world. Luckily, most are no more than small movements, or tremors, that do not cause much damage. But at the other end of the scale, violent earthquakes can tear apart whole cities and kill thousands of people. One hundred quakes each year are strong enough to cause damage, and about ten are deadly.

Measuring earthquakes

There are several different scales used to measure earthquakes. The Richter Scale, from one to ten, measures the strength of an earthquake. Each step up the scale means that the quake's power has multiplied by ten—so a quake that measures seven is ten times more powerful than one measuring six. The Modified Mercalli Scale measures the damage a quake causes on the Earth's surface.

The Richter Scale
Each step up the scale means a tenfold increase in an earthquake's power.

Sturdy structures

Earthquakes are very common in Japan, where shocks shake the country almost every day. While many buildings there have been destroyed, Japan's Buddhist pagodas have somehow stayed standing. Engineers have now discovered the secrets of their quake-proof design.

Swinging
Each storey can swing on its own without disturbing the others. This helps keep the building balanced during a quake.

Flexing
The pagoda is made from timber parts that are slotted together without nails. These wooden pieces are flexible and can bend, twist and rub together without breaking or collapsing.