

# Pipe, Volcanic Encyclopedia Article

## Pipe, Volcanic

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# Pipe, Volcanic

The central conduit by which **magma** rises through a **volcano** is termed a volcanic pipe. A volcanic pipe may be anywhere from a few yards to about 0.5 mi (0.8 km) in width. When a volcano ceases to erupt, its pipe generally becomes plugged by a column of solidified magma mixed with angular fragments of **rock** ripped from the walls of the pipe. This solid column is also termed a pipe (or neck, or plug). **Erosion** may strip the cone from around such a plug to create a free-standing pillar.

A pipe forms when magma from a deep reservoir drills or blasts upward. One mechanism by which this occurs involves convection, that is, vertical circulation driven by the density difference between hotter and cooler magmas: hotter magma rises, cooler magma sinks. Magma in a narrow vertical pipe quickly loses heat to surrounding rocks, and the magma thus cooled sinks along the sides of the pipe while hot, fresh magma ascends in the pipe's center. This central fountain erodes chunks of rock from the pipe's roof, extending the pipe upward. These chunks are transported by down-convecting magma to the reservoir below, where they are melted down and assimilated. This process enables a pipe to rise through many miles of rock without having to push rocks aside.

Magma containing large amounts of dissolved gas can widen a pipe explosively by a mechanism resembling that of an erupting **geyser**. If magma reaches the surface via a relatively narrow pipe and encounters substantial **groundwater**, a large steam explosion may occur: the pipe explodes at the top. This suddenly removes weight from the magma column in the pipe, reducing the pressure on magma deeper down. Gas dissolved in this deeper magma boils out explosively, blowing still more material out of the top of the pipe and further reducing the pressure on magma still deeper down. A series of explosive eruptions can thus propagate downward to great depth. The rubble-choked pipe left after such an eruption is termed a diatreme.

If an ascending pipe full of hot magma encounters a layer of groundwater but conditions are not right for a downward-propagating explosion, a simple steam explosion at the surface may result that excavates a large, shallow crater or maar. Maars closely resemble meteor impact craters because they do not rise above the terrain surrounding them.

## See Also

Crater, Volcanic; Fissure; Magma Chamber; Volcanic Eruptions; Volcanic Vent