VOLCANO

WHAT IS VOLCANIC ERUPTION?

- A volcano is a rupture in the crust of a planetary-mass object, such as Earth, that allows hot lava, volcanic ash, and gases to escape from a magma chamber below the surface.
- On Earth, volcanoes are most often found where tectonic plates are diverging or converging, and most are found underwater.

- **Lava- magma that comes out. Lava cools and forms igneous rocks.**
- **Volcanic rocks are formed if lava cools on earth surface and plutonic rocks are formed if it cools inside crust. Alongwith lava, N and S gas, Cl, H2, Ar, dust, pyroclastic debris and ash is released.**
- **Magma- inside earth molten material. Temperature 1000-15000 degree Celsius.**

HISTORIC ERUPTION

Eruption	Significance
Thera (Santorini), 1650 BC	One of the largest explosive eruptions on Earth; may have contributed to the decline of Minoan civilization
Vesuvius, AD 79	First major historical eruption to occur within range of major cities; first eruption to be documented by an eyewitness
Etna, 1669	Major lava flow event with widespread destruction in Catania from lavas
Lakagigar, 1783	Largest lava flow eruption on Earth; catastrophic impact on iceland population from haze produced by volcanic gas emission
Asama, 1783	Local devastation from pyroclastic flows; country-wide impact in Japan from climate effects
Tambora, 1815	Largest historic volcanic eruption on Earth; highest eruption column (43 km); global sulfuric acid aerosol causes global climate change; largest known death toll of over 92,000 people

Krakatau, 1883	First large eruption of the modern age; severe impact and death toll from tidal waves (tsunami)
Mount Pelée, 1902	The classic example of a small eruption causing severe loss of life; the beginning of the study of pyroclastic flow and surge processes
Paricutin, 1943	The birth and growth of a new volcano observed
Bezymianny, 1956	One of the highest known eruption columns in a historic event (42 km)
Surtsey, 1963	Best evidence of magma–water interaction during explosive eruption
Mount St Helens, 1980	First major eruption to be monitored intensively with modern technology
El Chichon, 1982	Most widespread pyroclastic surges from a historic explosive event
Nevado del Ruiz, 1985	Another example of a small eruption causing severe loss of life; tragic example of lack of hazard mitigation measures
Pinatubo, 1991	Largest eruption of the twentieth century; major societal impact in Philippines; important global atmospheric effects

CAUSES

- The earth interior contains radioactive elements like uranium, thorium, potassium which disintegrate to produce excess heat for melting of rocks into magma.
- This magma escapes into earth surface by means of weak zones of earth such as plate margin, fault line and folding joints.
- Plate tectonics- volcanic eruption most common at both convergent and divergent plate boundary.
- This plate boundary provides weak zone for magma to erupt. Example Ring of fire & Great Rift Valley of Africa.

GLOBAL OCCURANCE

Maximum volcano or earthquake occurs-

- **Ring of fire Pacific Ocean 66%,**
- **Mediterranean Sea (Rift Valley) 13%,**
- **Isolated island like Hawaii 21%.**

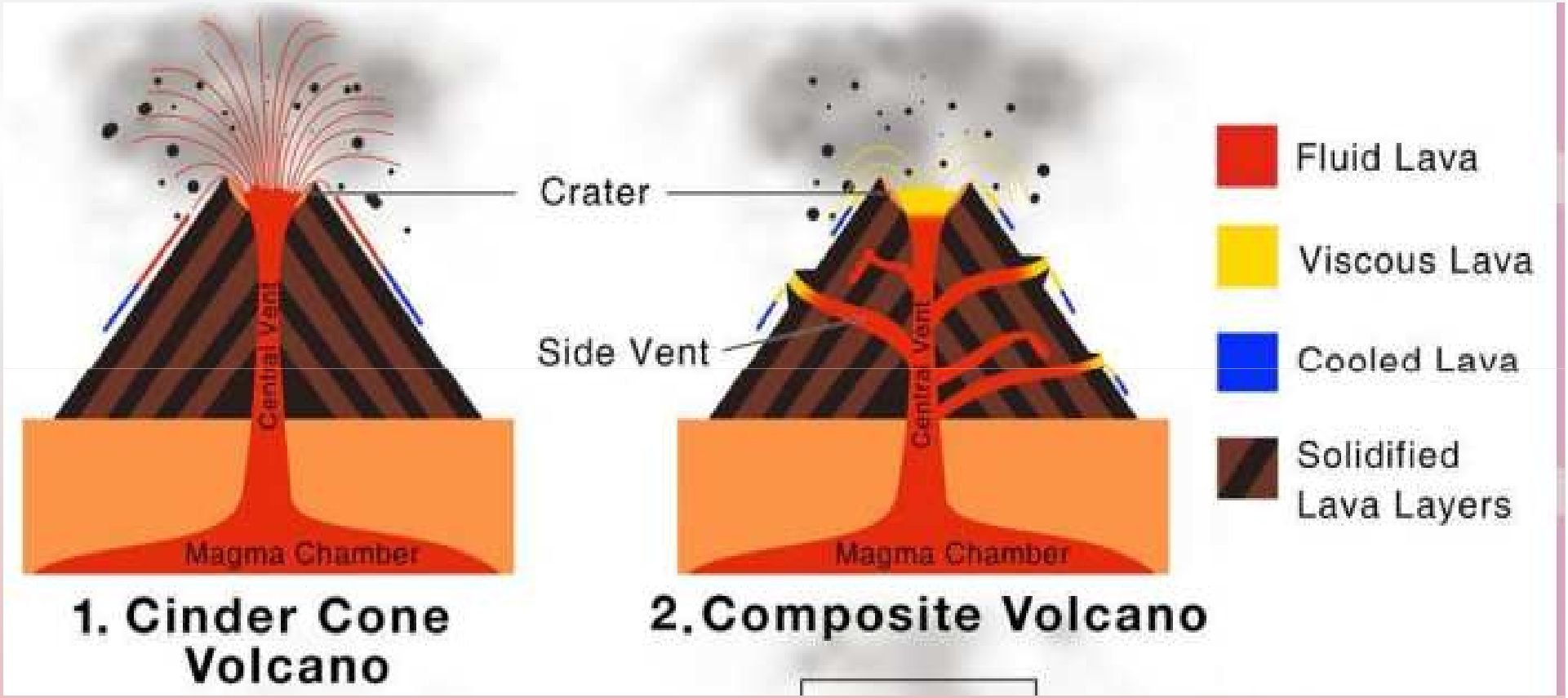
TYPE OF VOLCANOES

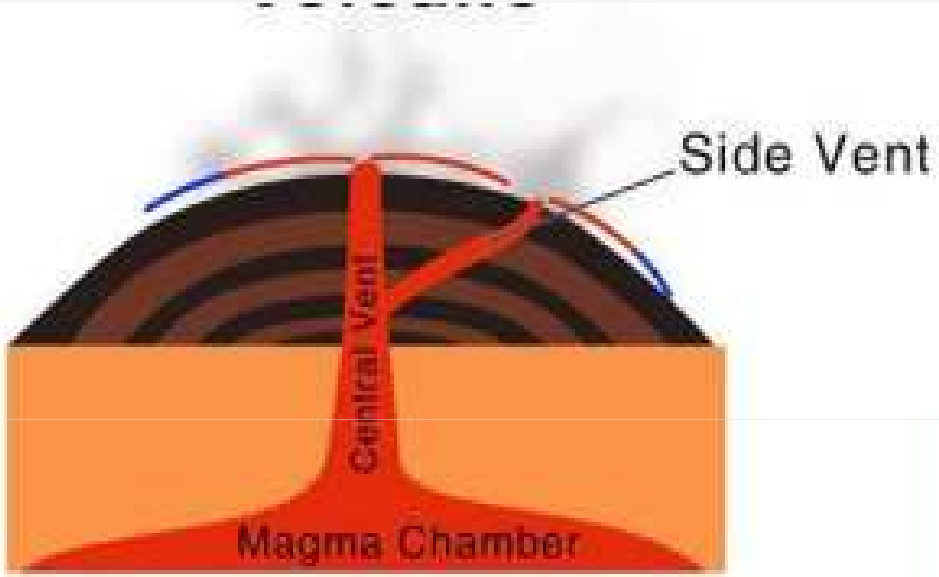
On the basis of frequency of eruption 3 types of volcanoes are found.

Active- eg. Barren islands (Andaman Nicobar)

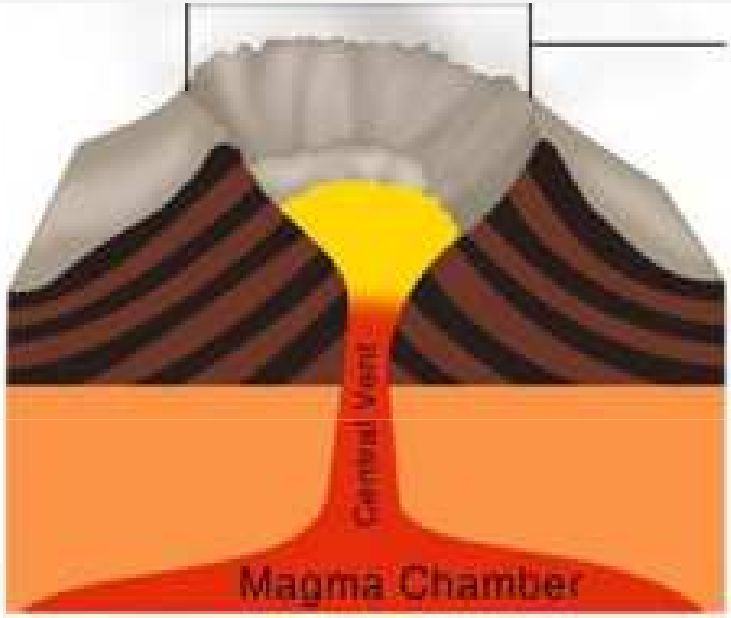
Dormant - eg. Narcondam (Andaman Nicobar)

Extinct-


Crater
Side Vent
Central Vent
Magma Chamber
Central Vent
Magma Chamber
Fluid Lava
Viscous Lava
Cooled Lava
Solidified Lava Layers
1. Cinder Cone Volcano
2. Composite Volcano

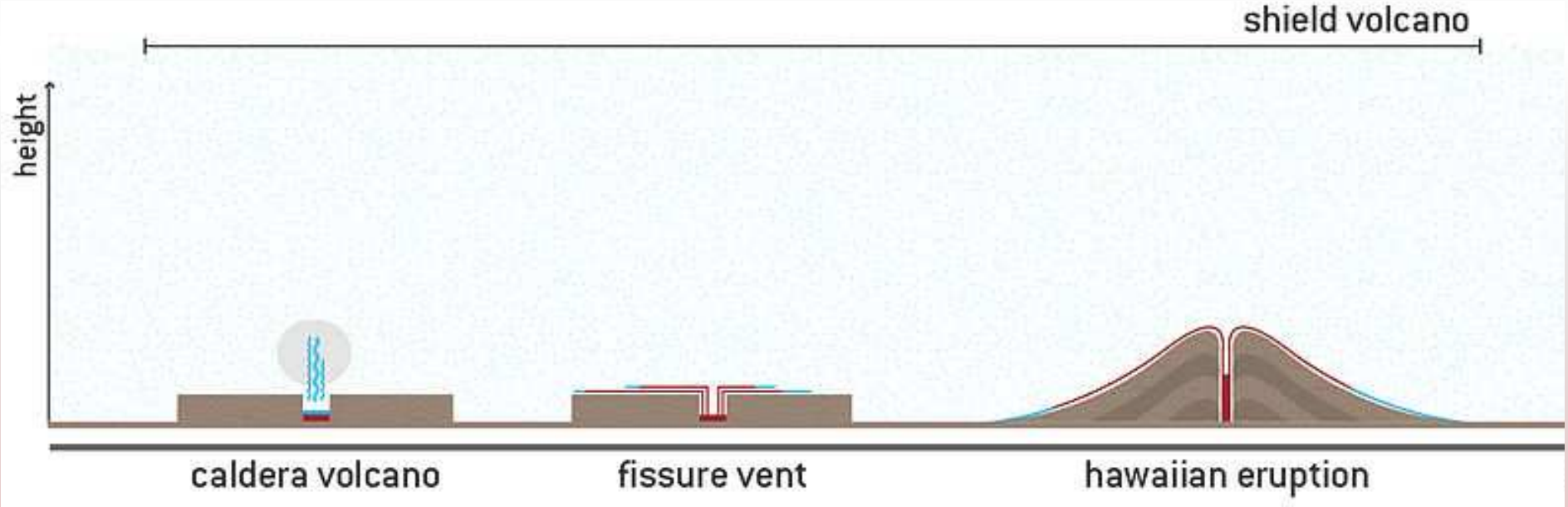


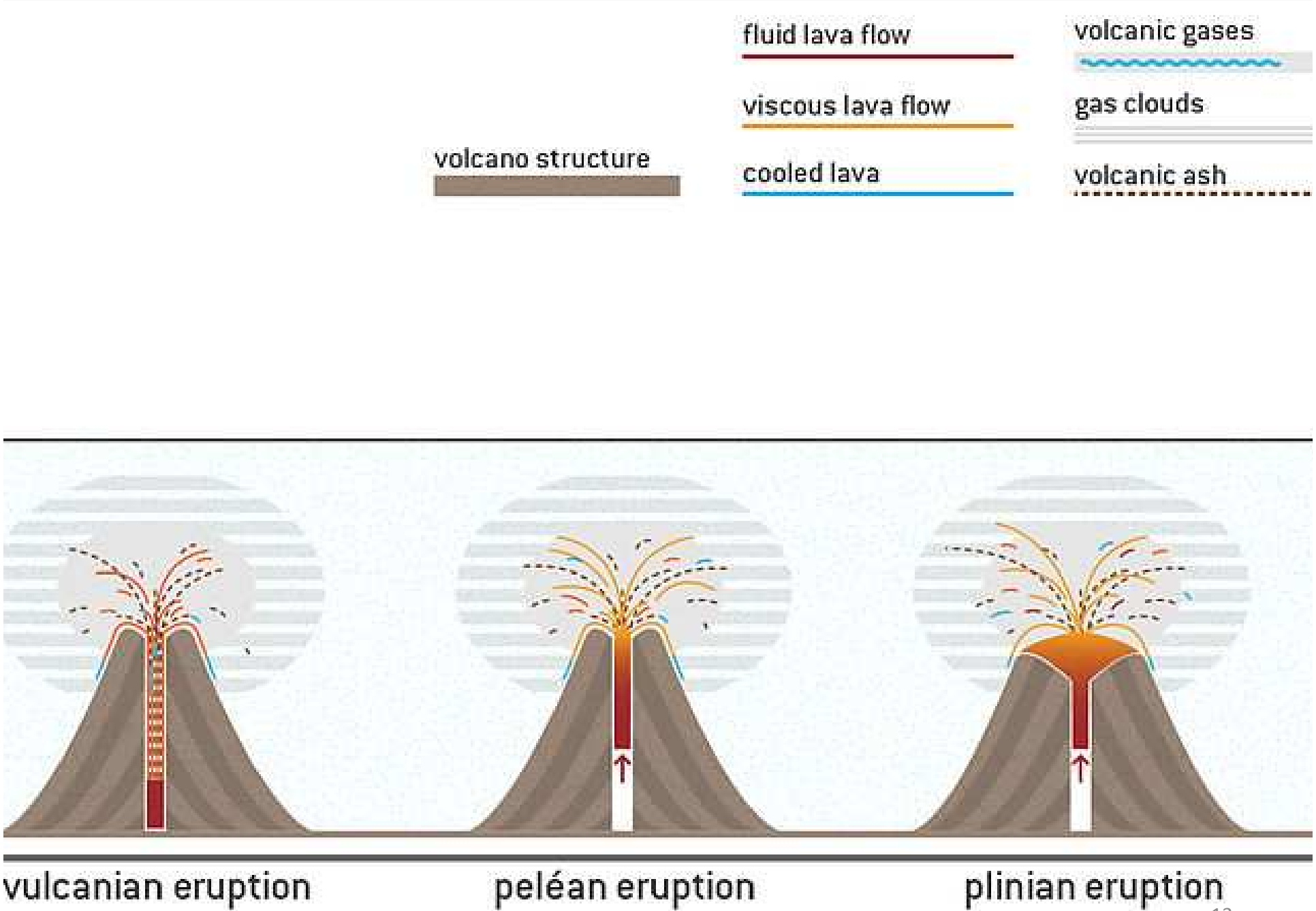
3. Shield Volcano



4. Lava Dome

- **Basalt plateau- flat or gentle slope, magma basaltic, gentle eruption, eg- Deccan plateau and Columbia river plateau.**
- **Shield volcano- slightly sloped, basaltic magma, gentle eruption, eg- Hawaii island in Mauna Loa.**
- **Cinder cone- moderate slope, basaltic or andesite magma, moderately violent eruption, eg- little lake volcano in California USA.**
- **Composite cone- highly sloped, various types of magma, violent eruption, eg- Mount Fuji.**


shield volcano
height
caldera volcano
fissure vent
hawaiian eruption


fluid lava flow
viscous lava flow
cooled lava
volcanic gases
gas clouds
volcanic ash
volcano structure
vulcanian eruption
peléan eruption
plinian eruption

VOLCANIC EXPLOSIVITY INDEX

- The Volcanic Explosivity Index (commonly shortened to VEI) is a scale, from 0 to 8, for measuring the strength of eruptions.
- It is used by the Smithsonian Institution's Global Volcanism Program in assessing the impact of historic and prehistoric lava flows.
- It operates in a way similar to the Richter scale for earthquakes, in that each interval in value represents a tenfold increasing in magnitude.
- The vast majority of volcanic eruptions are of VEIs between 0 and 2.

VOLCANIC ERUPTION BY VEI INDEX

VEI	Plume height	Eruptive volume *	Eruption type	Frequency **	Example
0	<100 m (330 ft)	1,000 m^3 (35,300 cu ft)	Hawaiian	Continuous	Kilauea
1	100–1,000 m (300–3,300 ft)	10,000 m^3 (353,000 cu ft)	Hawaiian/Strombolian	Daily	Stromboli
2	1–5 km (1–3 mi)	1,000,000 m^3 (35,300,000 cu ft) †	Strombolian/Vulcanian	Fortnightly	Galeras (1992)
3	3–15 km (2–9 mi)	10,000,000 m^3 (353,000,000 cu ft)	Vulcanian	3 months	Nevado del Ruiz (1985)
4	10–25 km (6–16 mi)	100,000,000 m^3 (0.024 cu mi)	Vulcanian/Peléan	18 months	Eyjafjallajökull (2010)
5	>25 km (16 mi)	1 km^3 (0.24 cu mi)	Plinian	10–15 years	Mount St. Helens (1980)
6	>25 km (16 mi)	10 km^3 (2 cu mi)	Plinian/Ultra-Plinian	50–100 years	Mount Pinatubo (1991)
7	>25 km (16 mi)	100 km^3 (20 cu mi)	Ultra-Plinian	500–1000 years	Tambora (1815)
8	>25 km (16 mi)	1,000 km^3 (200 cu mi)	Supervolcanic	50,000+ years[8][9]	Lake Toba (74 k.y.a.)

MITIGATION MEASURES

- Early warning system,
- Measure concentration of Ne and Ar
- Choking of water pipeline
- Use of remote sensing and GPS
- Micro zonation of volcano affected areas
- Strict implementation of NIDM norms
- Recognize role of NGO and self help groups