



# Volcanic Vortex Rings

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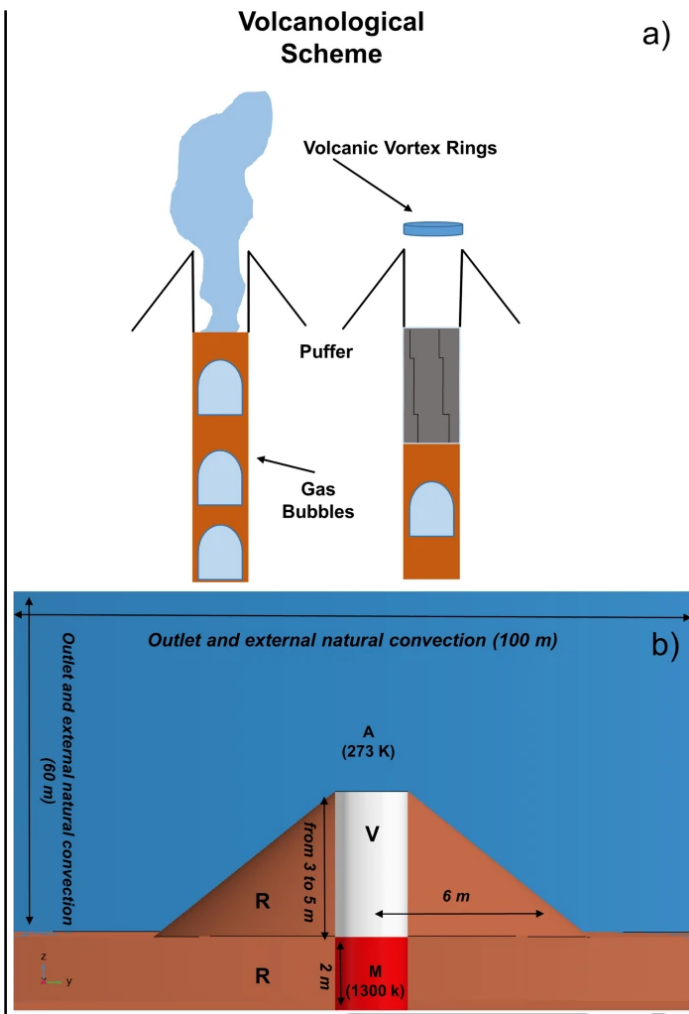
## Why in News?

**Mount Etna**, the largest volcano in Europe, and among the world's most active volcanoes, has been **sending up almost perfect rings of smoke into the air**, which is a rare phenomenon that scientists refer to as **volcanic vortex rings**.

## What are Vortex Rings?

- Vortex rings are generated when **gas, predominantly water vapour, is released rapidly through a vent in the crater**.
- The vent that has opened up in volcano's crater is almost perfectly circular, so the rings that have been seen are also circular.
- Volcanic vortex rings were first observed at Etna in 1724 and have since been documented at various volcanoes worldwide.
- These rings can remain in the air for up to 10 minutes but tend to disintegrate quickly if conditions are windy and turbulent.



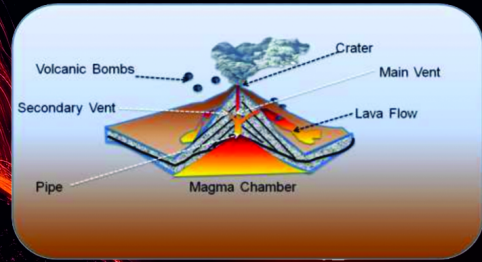


## What are the Key Facts About Mount Etna?

- Mount Etna is a **stratovolcano**, which means it is composed of layers of lava, ash, and rocks that have accumulated over thousands of years of eruptions.
  - Etna's **summit has five craters**, which are responsible for most of the volcano's eruptions and hundreds of lateral vents that can produce different types of eruptions, such as explosive, effusive, or mixed.
- It is located on the **east coast of Sicily**, an island in the [Mediterranean Sea](#) that belongs to Italy.
- Mount Etna has been erupting almost continuously **since 1500 BC**, making it one of the most [active volcanoes](#) in the world.
- Etna has been a [UNESCO World Heritage Site](#) since 2013.

# VOLCANOES

A volcano is a vent or a fissure in the crust from which lava (molten rock), ash, gases, rock fragments erupt from a magma chamber below the surface



## Types: On basis of -

### Periodicity of Eruption:

- Active volcano: Recently Erupted
- Dormant Volcano: Potential for eruption, no imminent signs
- Extinct: No recent eruptions, low possibility in future

### Nature of Eruption:

- Hawaiian: Calmest types (low gaseous content)
- Strombolian: Formation of large gas bubbles in magma
- Vulcanian: More explosive
- Plinian eruptions: Magma's volatile gases rise via a narrow conduit
- Icelandic: Often build lava plateaus

### Shape of Volcanoes:

- Shield volcanoes: Composed of basaltic lava, low slope
- Cone volcanoes (Cinder Cones): Most abundant
- Composite cones (stratovolcanoes): Formed by layers of diverse materials.

## Volcanic Features:

### Extrusive :

- Crater: Cone-shaped vent for magma
- Caldera: Large, crater-like depression
- Volcanic Plateaus: Levelled areas from fissure eruptions

### Intrusive:

- Batholiths: Central core of a volcanic mountain.
- Dyke: Vertical intrusion cutting across country rock bedding.
- Sills: Tabular intrusions along sedimentary bedding.
- Laccoliths: Magma injection along horizontal sedimentary bedding.

### Minor:

- Geysers: Underground water above 100°C, powered by magma, results in powerful eruptions with steam and diluted minerals.
- Hot Springs: Heated water flows quietly along fault zones.

## Distribution of Volcanoes:

- Subduction zones (Circum Pacific Belt)
- Divergence zones (Mid Atlantic Ridge)
- Intra-plate oceanic volcanism (Hawaiian chain)
- Mid-continental belt and volcanoes in Mediterranean region

## Volcanoes in India:

- No volcanoes in Himalayans
- Barren Island (Only active volcano)

## Products of Volcanic Eruption:

- Gases: H, C, O, S, N, CH<sub>4</sub>, NH<sub>3</sub>
- Solid: Pyroclastic materials
- Liquid: Lava



# Volcano Facts

## The Bad

- ● ● ● ● **Ash**
  - Causes respiratory problems
  - Triggers **lightning**
- ● ● ● ● **H<sub>2</sub>O (water vapour)**
  - Largest contributor to **greenhouse gas** effect on earth
- ● ● ● ● **CO<sub>2</sub> (carbon dioxide)**
  - **Toxic** in large amounts >10%
  - Contributes to **global warming**
- ● ● ● ● **SO<sub>2</sub> (sulfur dioxide)**
  - Dissolves in water vapour to form damaging **acid rain**
- ● ● ● ● **H<sub>2</sub>S (hydrogen sulfide)**
  - **Highly toxic** gas that smells like rotten eggs

## The Good

### Source of materials

Metals, **precious gems**, and construction material

### Power Generation

Geothermal and hydroelectric opportunities

### Rich volcanic soils

Yay coffee! The **best coffee** grows in volcanic soils

92,000

People killed in the deadliest volcano in **Indonesia** in **1815**

20

Volcanoes are **erupting** right **Now**

### Supervolcanoes

can plunge the world into an **ice age**

Krakatoa eruption **ruptured eardrums** within **50 KM radius**

**2X** more **ash** by weight erupted from Mt. St Helens (USA) in 1980 than garbage the entire US produces in 1 year

**\$2.2 Billion** worth of electrical energy wasted by Krakatoa volcano in **1883, Indonesia**

## UPSC Civil Services Examination, Previous Year Question (PYQ)

### Prelims:

Q. Consider the following statements: (2018)

1. The Barren Island volcano is an active volcano located in the Indian territory.
2. Barren Island lies about 140 km east of Great Nicobar.
3. The last time the Barren Island volcano erupted was in 1991 and it has remained inactive since then.

Which of the statements given above is/are correct?

- A. 1 only
- B. 2 and 3
- C. 3 only
- D. 1 and 3

**Ans: A**

**Mains:**

**Q.** Mention the global occurrence of volcanic eruptions in 2021 and their impact on regional environment. **(2021)**

PDF Refernece URL: <https://www.drishtias.com/printpdf/volcanic-vortex-rings>

