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Summary:

- Volcanic Vortex Rings: Mount Etna, Europe’s largest volcano, has been producing rare and near-perfect smoke rings, known as volcanic vortex rings, from a new pit crater.
- Formation Process: These rings are created when gas, mainly water vapor, is expelled rapidly through a near-circular vent, resulting in a swirling motion maintained by air pressure and density differences.
- Etna’s Significance: The phenomenon is a scientific spectacle, offering insights into volcanic activity and aiding in the understanding of eruption dynamics.
- Living with Etna: The volcano presents both challenges and opportunities for nearby residents, balancing the risks of eruptions with benefits like fertile soil and geothermal energy.

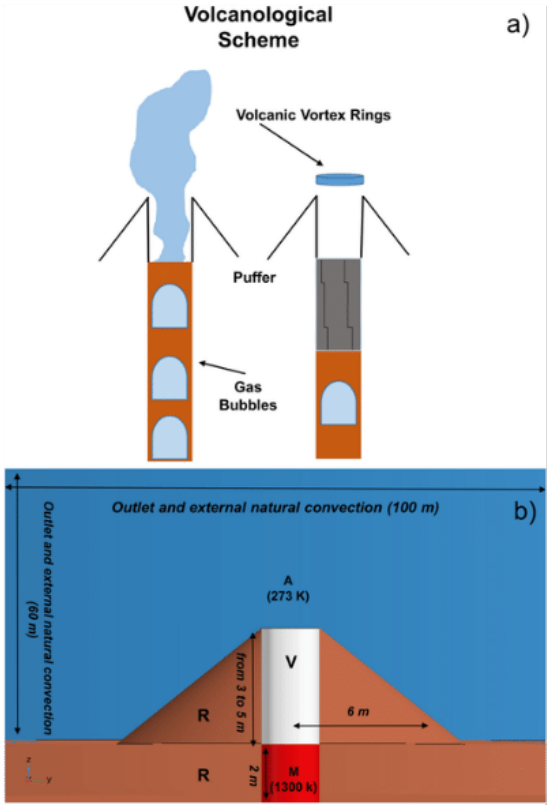
What is the news?

- Mount Etna, the towering giant of Sicily and Europe’s largest volcano, has recently captured the world’s attention with a mesmerizing display — the production of near-perfect smoke rings, a rare phenomenon known as volcanic vortex rings.
- These ethereal circles of gas, composed mainly of water vapor, have been gracefully billowing from a new pit crater on the volcano’s northern flank.

Demystifying the Vortex: How Volcanic Smoke Rings Form?

- Volcanic vortex rings are formed through a fascinating interplay of physics and volcanic activity. Imagine a puff of air blown out in a perfect circle – the same principle applies here.

- When gas, primarily water vapor from the erupting magma, is expelled rapidly through a near-circular vent, it creates a swirling motion. This swirling motion, influenced by air pressure and density differences, allows the gas to maintain its coherent ring shape for a short period before dissipating. The near-circularity of the vent in Etna's new crater is key to producing these spectacular rings.



(Pic:google img)

A Rare Occurrence, Not a Cause for Alarm

- While volcanic eruptions are often associated with danger, the presence of vortex rings doesn’t necessarily indicate an impending eruption. In fact, these rings have been documented at Etna as far back as 1724, making them a historical curiosity rather than a harbinger of doom.
- The frequency of these rings at Etna, however, appears to be unprecedented this month. Volcanologists are studying this surge in activity to understand the specific conditions that might be influencing it. Their observations may provide valuable insights into the dynamics of Etna’s volcanic processes.

A Scientific Spectacle and a Natural Wonder

- Mount Etna’s smoke rings serve as a captivating reminder of the power and beauty of nature. They offer a glimpse into the complex interplay of forces that drive volcanic activity. Studying these fleeting phenomena can enhance our understanding of volcanoes and potentially improve our ability to predict and manage future eruptions.
- So, the next time you see images of these ethereal smoke rings billowing from Mount Etna, remember – they are not just a visual spectacle, but a window

into the fascinating world of volcanic science.

About Mount Etna:

- Mount Etna is a towering giant on the east coast of Sicily, Italy. It is the tallest and most active volcano in Europe, with an eruptive history stretching back an astounding 500,000 years. Here’s a detailed look at Mount Etna:

Geography and Location

- Etna towers above the city of Catania on the island of Sicily. It’s location on a convergent plate boundary, where the African Plate meets the Eurasian Plate, is a major contributor to its frequent eruptions.

Eruptive History

- Etna’s long and well-documented eruptive history makes it a valuable resource for volcanologists. The volcano has a variety of eruption styles, including Strombolian eruptions characterized by short, explosive bursts, and Etnean eruptions, which produce long curtains of fluid lava.
- Mount Etna has been erupting almost continuously since 1500 BC, making it one of the most active volcanoes in the world.
- Mount Etna has been a UNESCO World Heritage Site since 2013.

Volcano Type:

- Etna being a stratovolcano explains its layered structure. Stratovolcanoes are built up over time through the accumulation of lava, ash, and rock fragments ejected during eruptions. This continuous cycle over thousands of years contributes to Etna's massive size and towering presence.

Eruptive Powerhouse:

- The detail about Etna's multiple craters and vents further highlights its active nature. The five summit craters and numerous lateral vents act as multiple channels for the volcano to release lava, ash, and other volcanic material. This variety in eruption points also explains the different eruption styles observed at Etna, from explosive bursts to fluid lava flows.

How often does Mount Etna erupt?

- Mount Etna, one of the world's most active volcanoes, erupts frequently. Before 2001, its eruptions occurred approximately once every two years. However, since then, Etna has erupted at least once a year.
- Since 2000, Etna has had four flank eruptions – in 2001, 2002–2003, 2004–2005, and 2008–2009. Summit eruptions occurred in 2006, 2007–2008, January–April 2012, in July–October 2012, December 2018 and again in February 2021.
- The volcano follows almost cyclic "eruptive

phases," which recur every ten or twenty years. During a decade, it erupts from the top with effusive and relatively calm episodes. Later, it transitions to more explosive eruptions, sometimes seeking alternative routes to the summit craters.

- Its constant activity and proximity to populated areas have led to its designation as a Decade Volcano by the United Nations.

Activity

- Mount Etna is one of the most closely monitored volcanoes in the world. Volcanologists keep a watchful eye on the volcano's activity, and there are a number of early warning systems in place to warn residents of impending eruptions.

The Future

- Mount Etna is a force of nature, and it will continue to erupt for many years to come. By understanding the volcano's eruptive history and monitoring its current activity, volcanologists can help to mitigate the risks posed by Etna and ensure the safety of the people who live on its slopes.

QuizTime:

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Are you Ready!

Thank you, Time Out !

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General Studies

CURRENT AFFAIRS QUIZ

Read the Below Instructions Carefully:

- Click on - Start Quiz
- Attempt all questions (You can attempt or leave)
- After Attempting Last Question.
- Enter Name & Email
- Click on - Check Result
- Scroll down - Check out Solutions too.

Thank you.

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Category: **General Studies**

The formation of volcanic vortex rings at Mount Etna is a rare phenomenon. What can be inferred from their presence?

○ They are a precursor to a major eruption.

○ They indicate a change in the composition of volcanic gas.

○ They are a result of unique atmospheric conditions.

○ They do not necessarily signify any impending volcanic activity.

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Category: **General Studies**

Volcanologists closely monitor Mount Etna. What is the PRIMARY reason for this?

○ To understand the formation of volcanic vortex rings.

○ To predict and mitigate the risks of future eruptions.

○ To study the impact of eruptions on agriculture.

○ To exploit geothermal energy from the volcano.

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Category: **General Studies**

Consider the following statements about Mount Etna:

(1) It is the tallest active volcano in Asia.
(2) It is located on a convergent plate boundary.
(3) It has a history of Strombolian and Etnean eruptions.
(4) The ash from its eruptions disrupts agricultural activities in the region.

Which of the statements given above are correct?

- ○ (1) and (2) only
- ○ (2) and (3) only
- ○ (1) and (3) only
- ○ (2), (3), and (4) only

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Category: **General Studies**

What is the significance of the multiple craters and vents on Mount Etna?

- ○ They contribute to the volcano's overall height.
- ○ They act as channels for releasing volcanic material.
- ○ They are remnants of ancient eruptions.
- ○ They are inactive and pose no threat.

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Category: **General Studies**

Stratovolcanoes like Mount Etna are characterized by:

- ○ A single, large central crater.
- ○ Layers of lava, ash, and rock.
- ○ Primarily explosive eruptions.
- ○ Long periods of dormancy.

Prev Finish

Check Rank, Result Now and enter correct email as you will get Solutions in the email as well for future use!

Check the Result

Your score is

0%

Restart quiz

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Mains Questions:

Question 1:

Mount Etna, Europe's most active volcano, has recently been producing volcanic vortex rings.

Explain the formation of these rings and discuss their significance in the context of volcanic activity at Mount Etna. (250 words)

Model Answer:

- Volcanic vortex rings are formed due to the interaction of gas dynamics and the specific vent geometry. When gas, primarily water vapor from the erupting magma, is expelled rapidly through a near-circular vent, it creates a swirling motion. This swirling motion, influenced by air pressure and density differences, allows the gas to maintain its coherent ring shape for a short period before dissipating. The near-circularity of the vent in Etna's new crater is crucial for producing these spectacular rings.
- The presence of volcanic vortex rings is not necessarily a cause for alarm. While they are a rare phenomenon, historical records show they have occurred at Etna previously. However, the recent surge in their frequency has sparked scientific interest. Studying these rings can provide insights into the specific conditions within the volcano's conduit system, potentially offering clues about the dynamics of future eruptions. It's important to note that further research is needed to establish a definitive link between vortex rings and eruption patterns.

Question 2:

Mount Etna has a long history of both destruction and sustenance for the people living on its slopes. Discuss the challenges and opportunities associated with living near an active volcano like Mount Etna.(250 words)

Model Answer:

Challenges:

- Volcanic eruptions: Frequent eruptions pose a constant threat to life, property, and infrastructure. Lava flows, ashfall, and pyroclastic flows can devastate entire settlements.
- Seismic activity: Earthquakes often accompany eruptions, further increasing the risk of damage and casualties.
- Air pollution: Volcanic ash can contaminate air and water sources, impacting health and agriculture.

Opportunities:

- Fertile soil: Volcanic ash decomposes over time, enriching the soil with essential minerals, making it ideal for agriculture. This has historically supported a thriving agricultural industry on Etna’s slopes.
- Geothermal energy: The heat generated by the volcano can be harnessed for geothermal power generation, offering a clean and renewable energy

source.

- Tourism: Mount Etna is a popular tourist destination, attracting visitors interested in witnessing its eruptions and exploring its unique volcanic landscape. This tourism industry can be a source of income for local communities.
- Living near Mount Etna requires a delicate balance between managing the risks and harnessing the potential benefits. Robust monitoring systems, evacuation plans, and investment in mitigation strategies are crucial for ensuring public safety. At the same time, promoting sustainable agricultural practices and developing the geothermal potential can contribute to economic growth and a better quality of life for the surrounding population.

Remember: These are just sample answers. It's important to further research and refine your responses based on your own understanding and perspective. Read entire UPSC Current Affairs.

Relevance to the UPSC Prelims and Mains syllabus under the following topics:

Prelims:

- **General Science / Geography (Paper-I):** A question on volcanoes, their types, and associated phenomena (like volcanic rings) could be potentially asked. Understanding stratovolcanoes and eruption styles would be helpful here.
  Current Affairs (Paper-II): A current affairs question related to volcanic eruptions or disaster management could touch upon Mount Etna's activity.

Mains:

- **GS Paper I (Indian Heritage and Culture, History and Geography of the World and Society)Geography:**
  Section on Landforms: A question on "World's major physiographic features" could indirectly be connected to discussing stratovolcanoes like Mount Etna and their formation process.
  Section on Disasters: A question on "Volcanic eruptions and associated hazards" might be an opportunity to discuss the case of Mount Etna

and the challenges faced in such scenarios.

- **GS Paper II (Governance, Constitution, Polity, Social Justice and International Relations)**Governance:
  Section on Disaster Management: A question on “Strategies for disaster preparedness, mitigation, response and rehabilitation” could involve discussing the case of Mount Etna and the measures taken by Italian authorities to manage volcanic risks.
  Section on International Cooperation: A question on “India’s role in international cooperation for disaster management” could be broadened to discuss international efforts in monitoring active volcanoes like Mount Etna.
- **GS Paper III (Technology, Economic Development, Security and Social Development)**Security:
  Section on Internal Security Challenges: A question on “Natural disasters and their impact on internal security” could be an opportunity to discuss the security risks associated with volcanic eruptions, using Mount Etna as an example.**Essay Paper:** An essay on topics like ‘Disaster Management’ or ‘Living in Harmony with Nature’ could potentially draw connections to Mount Etna’s eruptions and the challenges faced by people living near volcanoes.**Geography (Optional Subject):** If you choose Geography as an optional, a question on ‘Landforms and associated processes’ might involve discussing stratovolcanoes and volcanic activity.

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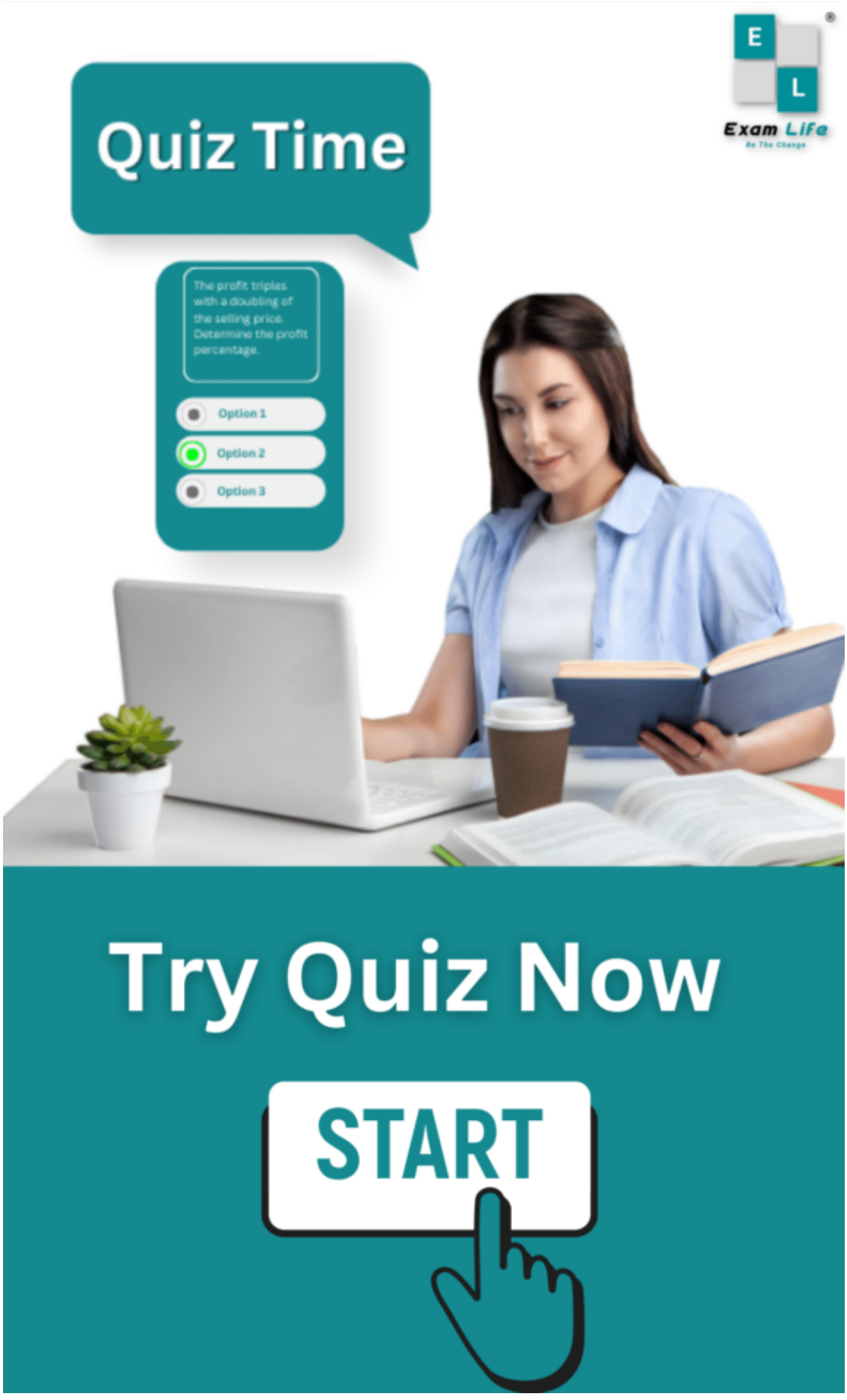
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