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Powerful phreatic (steam-driven) eruptions at Bulusan volcano, Philippines

A powerful phreatic eruption took place at Bulusan volcano, Philippines at 02:37 UTC (10:37 LT) on June 5, 2022. As a result, the Philippine Institute of Volcanology and Seismology raised the Alert Level for the volcano from 0 to 1.

A week after a phreatic eruption triggered the declaration of Alert Level 1 for Bulusan Volcano in Sorsogon, a similar eruption occurred early Sunday, June 12.

The Philippine Institute of Volcanology and Seismology (PHIVOLCSs) informed in an advisory at 4:20 am LT (9:20 p.m. UTC) that a phreatic or steam-driven eruption was detected at 3:37 am LT (8:37 a.m. UTC) on Sunday, lasting around 18 minutes.

Based on the initial report, the heavily affected areas were villages of Añog, Puting Sapa, Bacolod, Buraburan, Catanusan, Calateo, Rangas, Sipaya and Aroroy, all in Juban.

According to the Tokyo VAAC, the eruption ejected ash to an estimated altitude of 5.2 km (17, 000 feet) above sea level.

As per PHIVOLCS, the explosion was felt at Intensity III by residents of Brgy. Añog, Juban and at Intensity II in Brgy. Inlagadian, Casiguran, all within 5 km (3.1 miles) of the Bulusan summit. It maintained Alert Level 1 status in effect over Bulusan as all other monitoring parameters as of this time indicate that current unrest is driven by the volcano's restive hydrothermal system.

Source: Sorsogon Provincial Information Office

Geological summary of Mt Bulusan

Luzon's southernmost volcano, Bulusan, was constructed along the rim of the 11-km-diameter (6.8 miles) dacitic-to-rhyolitic Irosin caldera, which was formed about 36,000 years ago. Bulusan lies at the SE end of the Bicol volcanic arc occupying the peninsula of the same name that forms the elongated SE tip of Luzon.

With elevation of 1,565-m-high (5,134 feet), Bulusan volcano is unvegetated and contains a 300-m-wide (984 feet), 50-m-deep (164 feet) crater. Three small craters are located on the SE flank. Many moderate explosive eruptions have been recorded at Bulusan since the mid-19th century.

Source: Google

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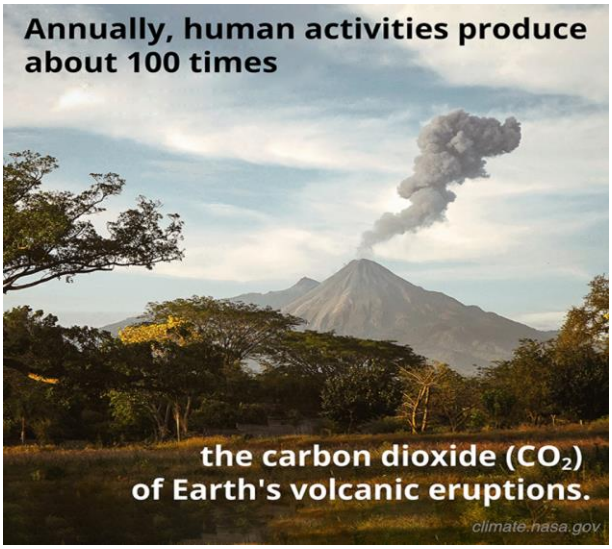
What is a Volcano?

A volcano is a vent in the Earth's crust from which eruptions occur. There are about 1500 potentially active volcanoes worldwide. When volcanoes erupt, they can spew hot, dangerous gases, ash, lava and rock that can cause disastrous loss of life and property, especially in heavily populated areas. Volcanic activities and wildfires affected 6.2 Mln people and caused nearly 2400 deaths between 1998-2017.

There are different types of volcanic eruptive events, including:
• pyroclastic explosions, with is fast-moving hot gas and volcanic matter
• hot ash releases
• lava flows
• gas emissions
• glowing avalanches, when gas and ashes release

Volcanic eruptions can also cause secondary events, such as floods, landslides and mudslides, if there are accompanying rain, snow or melting ice. Hot ashes can also start wildfires.



Volcanic eruptions can impact climate change through emitting volcanic gases like sulfur dioxide, which causes global cooling, and volcanic carbon dioxide, which has the potential to promote global warming.

Impact on Humans

Fine ashfall can cause irritation and breathing problems, especially among the vulnerable population – the elderly, children, expecting mothers and those with respiratory disorders – and can be particularly dangerous when inhaled in copious amounts. In addition, ashfall even when thin but having high amounts of sulphur can also cause irritation.

Affected populations are advised to protect their mouths and noses using N95 grade facemasks or wet cloth or towel. Motorists are advised to drive with extreme caution as ash can cause poor visibility and, when wet, can make roads slippery.

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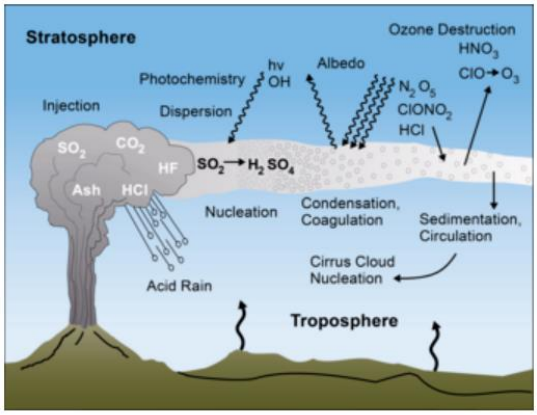
Volcanoes & Climate change

Volcanoes can impact climate change. During major explosive eruptions huge amounts of volcanic gas, aerosol droplets, and ash are injected into the stratosphere. Injected ash falls rapidly from the stratosphere -- most of it is removed within several days to weeks -- and has little impact on climate change. But volcanic gases like sulfur dioxide (SO_2) can cause global cooling, while volcanic carbon dioxide, a greenhouse gas, has the potential to promote global warming.



Volcanic gases react with the atmosphere in various ways; the conversion of sulfur dioxide (SO2) to sulfuric acid (H2SO4has the most significant impact on climate.

The most significant climate impacts from volcanic injections into the stratosphere come from the conversion of sulfur dioxide to sulfuric acid, which condenses rapidly in the stratosphere to form fine sulfate aerosols. The aerosols increase the reflection of radiation from the Sun back into space, cooling the Earth's lower atmosphere or troposphere.

Several eruptions during the past century have caused a decline in the average temperature at the Earth's surface of up to half a degree (Fahrenheit scale) for periods of one to three years. The climactic eruption of Mount Pinatubo on June 15, 1991, was one of the largest eruptions of the 20th century and injected a 20 Mln ton SO_2 cloud into the stratosphere at an altitude of more than 20 miles. The Pinatubo cloud was the largest SO_2 cloud ever observed in the stratosphere since the beginning of such observations by satellites in 1978. It caused what is believed to be the largest aerosol disturbance of the stratosphere in the 20th century. Consequently, it was a standout in its climate impact and cooled the Earth's surface for three years following the eruption, by as much as 1.3 degrees F at the height of the impact.

Sources/Usage: Public Domain.

The June 12, 1991 eruption column from Mount Pinatubo taken from the east side of Clark Air Base.

Volcanic Eruption and Insurance

The insurability of the risk emanating from volcanic eruptions can be questioned from the perspective of insurance theory. One reason is that data and tools for assessing the volcanic risk quantitatively lag far behind those for earthquake risk, for example. In addition, the nature of volcanic risk is extremely complex. In consequence, the calculation of an insurance premium and probable maximum loss is fraught with many problems.

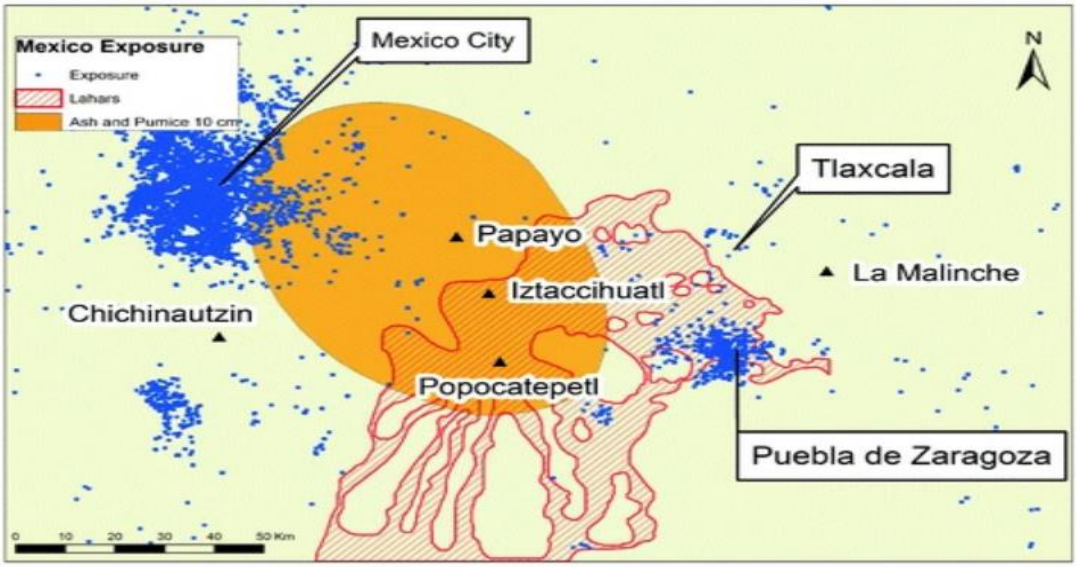
A 2017 study of Swiss Re mentions that then only Iceland has compulsory volcano insurance; elsewhere, losses from volcanic eruptions are largely uninsured, creating a huge protection gap. With one in seven of the world's largest urban areas located within a 150 km radius of an active volcano and some of the largest cities at risk of total economic losses of as much as USD 30 Bln. able 1 shows Volcanic Eruptions Since 1970 that Caused Significant Insured Losses

Location	Year	Economic Loss (USD Mln)	Insured Loss (USD Mln)
Mount S Helens, USA	1980	860	31
Pinatubo Philippines	1991	750	70
Tavurvur, Vulcan Papua New Guinea	1994	300	66
Montserrat, UK	1995-1997	200	100
Merapi, Indonesia	2010	380	Minor

Modelling and Communicating Volcanic Risk

There are currently few commercially available probabilistic catastrophe models for volcanic risk. Those that are available tend to focus on one hazard such as ash or pyroclastic density currents (PDCs). Development of new models is driven by industry demand; to date volcanoes have not caused sufficient insured losses to create a demand.

Developing deterministic scenario models is much more straightforward. Realistic Disaster Scenarios (RDSs) are commonly used within re/insurance to give companies a view of loss from a single event as shown in figure below. However, these do not always include a view on how frequently such an event might be expected.



Example of a volcano RDS for Mexico City and Popocatepetl volcano. The exposure of two separate insurance portfolios has been overlain in blue and green on scenario hazard layers for
(i) ash and pumice fall >10 cm
(ii) lahars

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