

POLLUTED NATURAL TOURIST AREAS

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Abstract: Volcanic eruptions are the geologic hazards, rare and extreme events, natural nature, which affects life, property and human activity and whose extension leads to disaster.

KEY-WORDS: volcanic eruptions, air pollution

1. Introduction

Natural pollution is contamination of the environment, under the influence of natural factors, has become an important phenomenon because significant quantities of pollutants (dust, gases and vapors).

Volcanic eruptions are the geologic hazards, rare and extreme events, natural nature, which affects life, property and human activity and whose extension leads to disaster:

- volcanoes generate gaseous products, liquid and solid micro and mezorelieful changing local area and where there is negative influence on air quality exercise.
- volcanic ash, volcanic water vapor and dust are blown into the atmosphere, where they form thick clouds that float great distances from the place of issue, being able to remain in air suspension 1-2 years
- influence the thermal balance of the atmosphere, preventing dispersion of energy radiated from Earth to the Universe and contributing to an increase of the phenomenon of greenhouse effect, produced by increasing the concentration of CO₂ in the atmosphere
- Pinatubo eruption, in 1991, the Philippines, the volcanic ash emitted so that the global temperature down for the next two years
- volcanic activity on Earth is not evenly distributed, being much richer in active areas of tectonic plates (fig.1.), more than two thirds of active volcanoes are located in the northern hemisphere and in tropical regions.

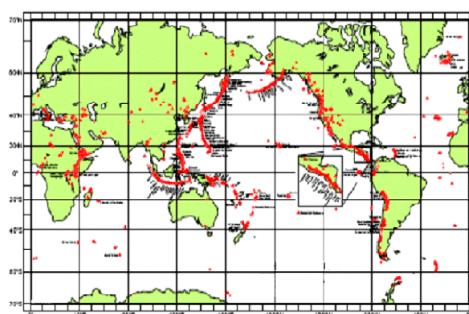


Fig. 1. Locating areas with volcanic activity in the Earth

- table 1 play pollutants emitted by volcanic eruptions, the rate and quantity released to air (t / year)

Table 1. Pollutants, the rate and quantity (t / year) released into the air by volcanic eruptions

pollutants	H ₂ O	CO ₂	SO ₂	H ₂ S	COS	CS ₂	HCl	HBr	HF
(% vol.)	50-90	1-40	1-25	1-10	10-4-10-2	10-4-10-2	1-10	10-4-10-2	< 10-3
million t / year	100-200	75	1,5-50	1-2,8	0,006-0,1	0,007-0,096	0,4-11	0,0078-0,1	0,06-6

2. Natural volcanic eruptions of air pollution sources

- in table 2 removed gas compositions are given three volcanoes that have polluted the air, tectonic style and that temperature.

Table. 2. Gas compositions removed from volcanoes

Pollutans (%)	Kilauea Summit/ Hot wells /1170°C	Erta`Ale/ Divergent plates /1130°C	Momotombo/ Divergent plates/ 20°C
H ₂ O	37.1	77.2	97.1
CO ₂	48.9	11.3	1.44
SO ₂	11.8	8.34	0.50
H ₂	0.49	1.39	0.70
CO	1.51	0.44	0.01
H ₂ S	0.04	0.68	0.23
HCl	0.08	0.42	2.89
HF	---	---	0.26

- the most abundant volcanic gas is water vapor, CO₂, SO₂, HBr, HF, H₂S.
- H₂O vapor form - a quantity of 200 million tons / year is 200 km³ water from volcanoes / year, plus the total volume of the Earth.
- CO₂ - 130 million tons annually volcanoes release CO₂ into the atmosphere that contribute to the greenhouse effect and global warming, a concentration of 30% CO₂ in air quickly lead to death
- SO₂ - gas suffocating odor that irritates skin and mucous membranes, SO₂ emissions from an active volcano are 20 tons / day, can form a volcanic smog, also known as VOG, create aerosols that lead to climate cooling.
- atmospheric sulfate aerosols type reflected back into space some of the sunlight and thus cool the Earth
- H₂S - SO₂ is converted into the atmosphere and oxidizes in a few days at El Chichon volcano eruption, about 3.5 million tons of sulfur was emitted as H₂S, eruption of Mount Pinatubo on 15 June 1991, eliminated 3-5 km³ of dacite magma type and 17 million tons of SO₂ into the stratosphere
- HCl - has the highest concentration of volcanic gases halogen
- HF - give rise to acid rain which causes fluorosis due to fluoride, a disease that destroys the animal bones

3. Volcanic eruptions worldwide. Pollution. Islands and tourist attractions

- Aegean island of Thira (1640 BC): eruption sank most of the island, creating Santorini volcanic pit
- Vesuvius, ancient Rome (79 d. Hr.): Within minutes, the eruption destroyed the cities of Pompeii, Herculaneum and Stabiae, whose total population amounts to 30. 000 people, is the most famous ancient eruption, due to the writings of Pliny the Younger, witnessed the event
- Laki, Iceland (1783): the largest lava eruption in history, through a crack in the earth's crust 25 km, a part of the gas evolved were condensed over the island and contaminated soil, causing an environmental catastrophe and agricultural and lowering the population.
- Tambora, Indonesia (1815): the largest explosive eruption in history, which killed at least 10. 000 people and compromise on the islands surrounding crops, the emission of SO₂ led to the formation of H₂SO₄ acid curtains above the planet, which has attracted a temporary cooling of the climate.
- Krakatoa, Indonesia (1883): eruption created tsunami waves 30 feet high, which drowned more than 34. 000 people in Sumatra and Java. Pyroclastic materials, expelled more than 40 km around, killed other 2. 000.
- Mount Erebus in Antarctica, volcanoes in the Aleutian Islands and Alaska are places that can produce strong volcanic eruptions, but there is danger of some volcanoes in unexpected places such as Iceland (fig. 3.)



Fig.3. Volcanic eruption in Iceland

- volcanism is a complex phenomenon, but the image that comes to mind is that of a conical mountain, who „spitting,, the crater at the top, ash, lava and hot rocks
- volcanic eruptions are viewed as an exotic phenomenon (there are active volcanoes in Hawaii, the Philippines, Indonesia and Europe)

3. 1. The case of Iceland

- Iceland is a volcanic island situated above the ocean back to the place where two tectonic plates - the American and Eurasian - meet, the narrow space between them, magma comes to surface on the ocean floor, where solidificându the forms „crest,, - dorsal ocean, which is a submarine mountain range
- Iceland is volcanic paradise, there are over 30 volcanoes, geysers and fumarole - gushing springs from great heights, hot water, geothermal evidence of intense activity on the island
- in 2000, the volcano Hekla erupted spectacularly, located in the south of the island (fig. 4.)



Fig. 4. Hekla volcano after eruption, in 2000

- the most active volcano in Iceland, the frequency of eruptions is Grímsvötn volcano, covered, for the most part, the glacier Vatnajökull (the largest glacier in Europe)
- in periods of intense geothermal, ice melts and drains water from the valley, causing floods.
- 50 years ago, Iceland was enriched with a new island Surtsey, one of the youngest islands in the world, rises in the sea after a series of undersea volcanic eruptions Vestmannaeyjar system between November 1963 and 1967 (fig. 5.)



Fig.5. Surtsey Island appeared in the period 1963-1967, following volcanic eruptions

- Eyjafjallajökull eruption is likely to awaken a sleeping volcano Katla 90 years, much larger and more aggressive
- Eyjafjallajökull released into the atmosphere between 150. 000 and 300. 000 tonnes of CO₂ per day, an amount that, if maintained at this level for one year, will place the Icelandic volcano on the same level with Austria in the emissions of greenhouse gases (fig. 6.)



Fig.6. Volcano in Iceland releasing between 150,000 and 300,000 tons CO₂/day

3.2. Fire tips of Italy

- Catania ETNA rises above (the second largest city in Sicily), is the highest and most voluminous volcano of Etna volcano eruptions are Italy
- effusion type, manifested by a large quantity of lava outpouring, not scenario involving a loud rumble and the rain of stones and ash, as is the case with explosive eruptions (fig. 7)



Fig.7. Explosive eruption Etna in Italy

3.3. Stromboli Island case

- Stromboli volcano is in operation for several millennia, spitting out the crater, rocks and „bombs,, of lava, the small-scale explosive eruptions.
- volcano is one of the charming sights and Stromboli island is famous for his show of lights, impressive at night (showers darted from the crater's glow, like fireworks and as an extra delight, can be admired close: a short distance of Stromboli, there is another volcano crater, now extinct, and on its outskirts one can see from a distance of 200 meters, magnificent representation)
- occasionally makes Stromboli and most brutal demonstration of force, as happened in 1919, 1930 and 2003, but is considered more spectacular than dangerous, coming from him the name given to these eruptions explosive eruptions stromboliene weaknesses, which are characteristic (fig. 8.)



Fig.8. Islands volcano Stromboli and the show gave

3.4. The case of Vesuvius

- Vesuvius volcano is dangerous, because in 24 August 1979 the largest outbreak took place in the world, in two days, two flourishing Roman towns - Pompeii and Herculaneum and two smaller settlements - and Oplontis Stabiae were destroyed and all the inhabitants have died, the catastrophe occurred in two phases: the first day of the city fell a shower of stones, and the next day, a pyroclastic surge (cloud of hot gas and rocks), passed with tremendous speed over settlement, has drowned, burned and killed
- more than 4 cubic kilometers of rock and ash fell on the cities, burying buildings, people, animals, under a layer of eruptive material, which was three meters thick

- specialized Institute, Osservatorio Vesuvio, continuously monitors the area, but recent studies have detected the presence of magma at depths below 10 km. (fig.9.)



Fig.9. Vesuvius volcano

3.5. The four hot spots in Greece

1. **Milos** is the island, which is under hydrothermal system, where temperatures exceed 300 degrees C. Hundreds of fumarole (openings in the earth's crust through which steam and gases rise to the surface hot) span the island, demonstrating that in its depths there is a intense geothermal activity (fig. 10.).

2. **Methane and the Saronic Gulf** (fig.11.). Methane is a peninsula, all of volcanic origin, which are over 30 centers of eruption.



Fig. 10. Milos Island in Greece



Fig.11. Methane volcanic area in Greece

BIBLIOGRAPHY

1. Cristian Muresanu, "Revelation climate and its causes, Ed.Cartimpex, Cluj-Napoca, 2006
2. Ajtai, N., Stefanie, H.I., Stoian, L.C., Oprea, M.G., The volcanic ash and its impact on European air transport industry. A case study on the detection and impact of the the Eyjafjallajokull volcanic ash plume over North-Western Europe between 14th and 21st April, 2010