

Natural Disasters

Lecture 22

Ch 7 – Volcano Case Histories: Killer Events

Text Source Today:

Chapter 7

7.2: Ch. 7 – Volcano Case Histories: Killer Events

● Historic Volcanic Eruptions (continued):

♦♦ **Tambora, 1815, VEI=7:** the most violent and explosive stratovolcano eruption of the last **200 years** and perhaps the **most deadly!** On 10 April, a Plinian eruption tossed out nearly 3 mi³ of pumice. Five days later, an even more powerful Plinian eruption blasted up to 27 miles high for 3 hours. This eruption eroded and widened the vent of the volcano, such that the eruption column stopped, but the magma poured out of the caldera in overwhelming pyroclastic flows (12 mi³).

♦ **Tambora** killed at least 10,000 people directly by the eruption, but was responsible for over 100,000 deaths worldwide due to the **pyroclastic fallout** devastating **crops**, leading to **famine and disease**. **Tambora** affected global climate. Here in the U.S., **1816** is known as the “*year without a summer!*”

♦♦ **Krakatau, 1883, VEI=6:** Vulcanian eruptions began on 26 August, with one large blast sending one of the volcanic cones into the sea, setting off a **tsunami**. Early the next morning saw more huge eruptions and more volcanic collapses that set off more **giant tsunami**.

● At 10 AM on 27 August, a Plinian eruption was accompanied by a **stupendous blast** that was heard thousands of miles away. The final blast sent **huge tsunami**, higher than 35 m (115 ft) into the coastlines of Sumatra and Java. The **pressure wave** bounced around the Earth 7 times over 5 days. **Krakatau** destroyed 165 villages and killed more than 36,000 people. The eruption lowered global temperatures 1.2° C (~2¼° F).

- In 1927, **Anak Krakatau** (“**child** of Krakatau”) broke the surface and is rebuilding a new volcanic cone. Since the 1950s, **Anak Krakatau** has grown, with almost continuous **Strombolian** eruptions, at an average rate of 13 cm (5 inches) per **week**! Its most recent eruption was in **April 2008**.

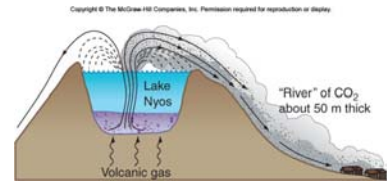
♦♦ **St. Helens, 1980, VEI=5:** in March, after 123 years, this stratovolcano began showing signs of life, with dozens of **3 M_w EQs**. For months, sightseers jammed traffic to get a view of St. Helens. Then, on 18 May, a **5.1 M_w EQ** shook the volcano and it **blew off the top of its cone**, which fell as an **avalanche** of fragmented rock, ice blocks, snow, magma, soil and broken trees! Most of the 62 people killed in the eruption had found ways around the barricades, to get a “**better view of an erupting volcano!**” For more than 9 hours, a vigorous plume of ash erupted, reaching up to 27 km (16 miles) high.

♦ **St. Helens** is still the deadliest and most economically destructive volcanic event in the history of the U.S.

♦♦ **Pinatubo, 1991, VEI=6:** in March, after 500 years of dormancy, thousands of small **EQs** signaled that **magma was on the move upward** in this stratovolcano. There was also an increase of **SO₂** gas. Magma oozed out onto the surface on 7 June, but on 12 June, gas-charged magma exploded out of **Pinatubo**. On 15 June, the cataclysmic Plinian eruption began, blowing magma and rock 35 km (22 miles) into the sky. **Pyroclastic flows** rolled down the volcano flanks and filled valleys up to 200 m (660 ft) deep. The arrival of **Typhoon Yunya**, with its torrential rain, created a tremendous **lahar**. **Pinatubo** was perhaps the **best forecast** eruption in history, saving an estimated 20,000 lives and \$500 million in property!

● Volcanic Gas Release:

♦♦ **Lake Nyos, Cameroon, 1986:** A series of **crater lakes** can be found in western Africa over a **failed rift**. On the evening of **21 August 1986**, a gigantic volume of **CO₂ gas (>14% kills)** belched forth from the crater at Lake Nyos in Cameroon and swept down the adjacent valleys, overwhelming four villages. Only about a half-dozen people survived, as 1700 were asphyxiated. About 3000 cattle were dead, along with every bird, other animals and even insects! Only the luxuriant plants were unaffected. The source of the **gas** is from the magma under the lake in an inactive volcano. No one is sure what triggered the gas release, but **degassing pipes** have been installed to allow the **CO₂ gas** to leak out harmlessly.



(Fig. 7.36)

● **Lava Flows:** most lava flows move **slowly** and usually do not kill lots of people, but there are exceptions.

♦♦ **Nyiragongo, Zaire, 2002:** the Nyiragongo stratovolcano is in the East African Rift Valley and has a long-lived **lava lake** in its summit crater. In 2002, a sudden **lava flow** raced down the slopes of the volcano, killing 45 on the mountain, and then flowed right through the city of **Goma** (>½ million residents), toward **Lake Kivu**. About 25% of **Goma** was destroyed, as the **low viscosity (low silica content) lava** reached speeds of **40-60 mph!** A similar **swift lava flow** in 1977 killed ~300 people.

● There were also fears of **gas release** from nearby **Lake Kivu**, which holds about **1000** times the **CO₂ gas** as **Lake Nyos**.

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- **DVD: “*Inside the Volcano*”, History Channel, 2008**

♦ **Question #1:** Where did the largest landslide and debris avalanche ever observed in historic time take place?

_____ **You must watch the video to get these answers!** _____

♦ **Question #2:** What is the most hazardous volcano in the United States? Why?

_____ **You must watch the video to get these answers!** _____

♦ **Question #3:** Compared to a typical volcanic eruption, which lasts for a few days, how long does a supervolcano erupt?

_____ **You must watch the video to get these answers!** _____
