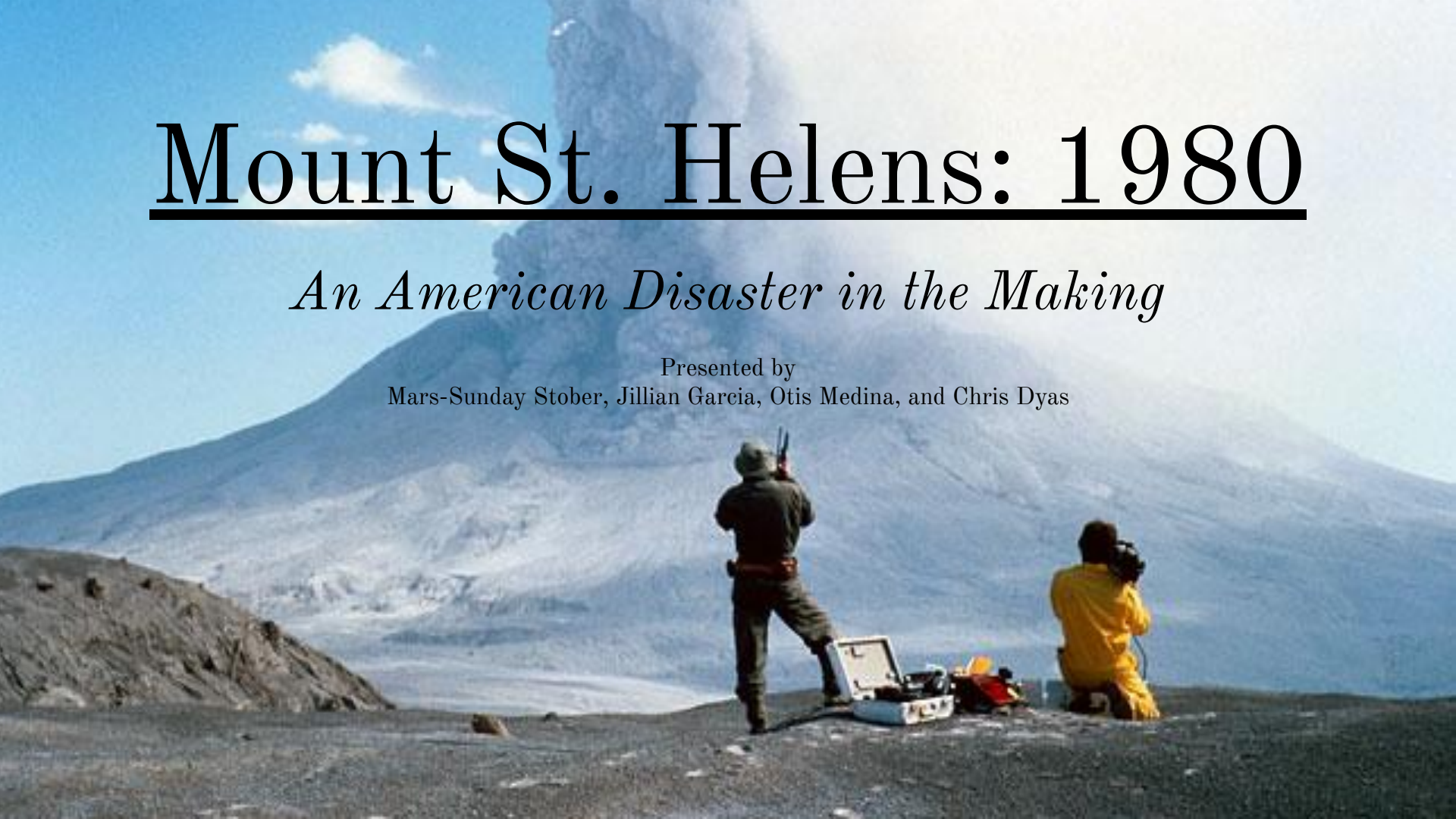
Mount St. Helens: 1980

An American Disaster in the Making

Presented by
Mars-Sunday Stober, Jillian Garcia, Otis Medina, and Chris Dyas



The Anatomy of a Sleeping Monster

To first understand the devastation of the 1980 Mount St. Helens eruption, we must understand the geological, geographical, and social components that were at play. First, we shall address the geological.

-Volcanic Classification: *Strato (subduction driven)*

-Parent Range/Volcanic Arc: *Cascades*

-Eruption Classification (1980): *Plinian*

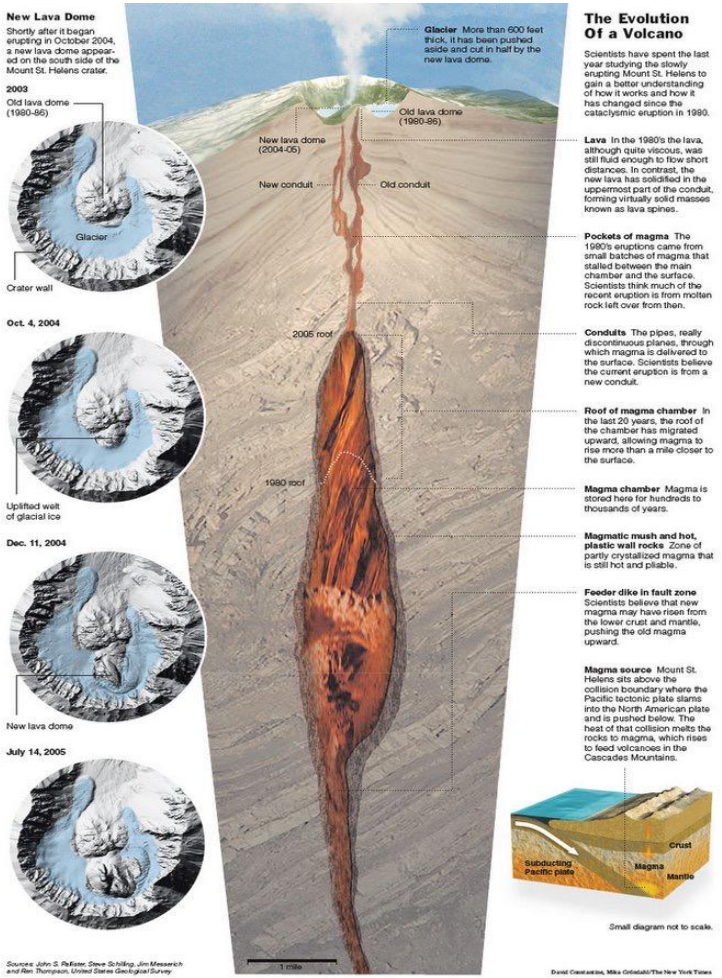
-Volcanic Explosivity Index (1980): *5.0–5.1*

-Destructive Description: *Cataclysmic*

-Primary Rock Type: *Silica-rich Andesite and Rhyolite; produced Dacite magma which is an intermediate*

-Added Aggitants to Eruption: *Primary chamber grew at an angle and the top of the mountain was canvassed in a thick layer of snow and glacier ice.*

At face value, Mount St. Helens appeared to be a typical stratovolcano that had been dormant for centuries. What geologists and the civilians in the surrounding towns would soon find out was that she, St. Helens, was not only becoming increasingly more active but that the magma chamber that was filling up was doing so in a way that scientists had never seen. And it would be this anomaly that would set off a chain of catastrophic events.



The Geographical and Ecological Breakdown

Location is key when discussing the 1980 eruption of St. Helens and worked hand-in-hand with the geology to create a perfect storm.

-Mount St. Helens sits on an active subduction or “destructive“ fault boundary. This plate boundary was and is currently active.

-The forests surrounding the base of the mountain were old and mature making it ideal for logging which was currently being conducted at the time of the eruption.

-Nearby was the placid and serene Spirit Lake which played host to a variety of fauna—aquatic, avian, and terrestrial.

-She is located between her two sister peaks—Mount Hood to the southeast and Mount Rainer to the Northeast. Sixty miles to the southwest is Vancouver, Washington which was where the teams for the USGS monitoring the mountain were located.

With a diverse terrain comes a diverse biosphere with varying flora and fauna. Because St. Helens is volcanic in nature the soil surrounding the mountains base is rich in the minerals needed to nurture mature forests of western hemlock, Douglas fir, western red cedar to thrive near the base of the mountain. Closer to the summit were stately Alaska yellow cedar, Pacific silver fir, and mountain hemlock. Inhabiting the treeline were American black bears, black-tailed deer, Roosevelt elk, and mountain lion.

Annually, Mount St. Helens receives an average of 93.4 inches of rain. This supports the dense forests, the Alpine meadows near the mountains base and summit, and maintains the snowpack that covers the peak. Mountain goats had been known to graze in the meadows prior to the eruption but their herds were wiped out by the 1980 eruption.

Room for Failure: Where it could and did go wrong

-Preparation was difficult to plan and execute due to the scientific uncertainty surrounding the potential of an eruption and the risk perception held by the public at the time. There had never been a major eruption of the mountain and the public saw the government's warnings as "hysteria" and "fear mongering."

-With both the timeline to an eruption as well as the magnitude unclear, the USGS was unable to properly convey the seriousness of the situation at hand creating distrust between them and the masses.

-Due to the mishandling of the information the pending eruption was seen as a non-threat.

-In March, the USFS made an effort to monitor the volcano and contacted seismologists and scientists with the University of Washington and the USGS.

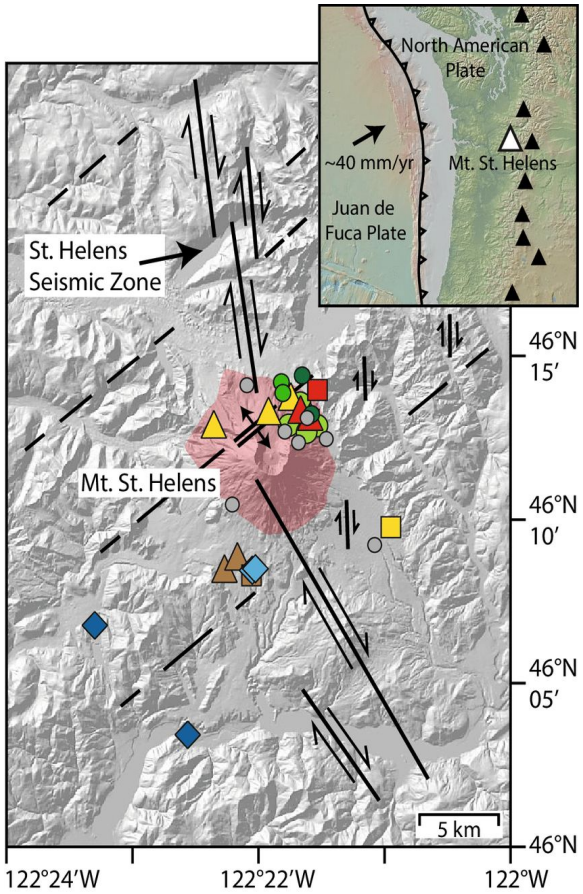
-Together, the organizations issued a formal hazard alert to state and local officials

-An evacuation plan was drafted soon after with established hazard zones.

-Red > off limits to anyone that was not part of cleared research facilities such as the USF and USGS or law enforcement.

-Blue > covered 5 miles from red zone allowed workers like loggers, miners, and property owners access during daytime.

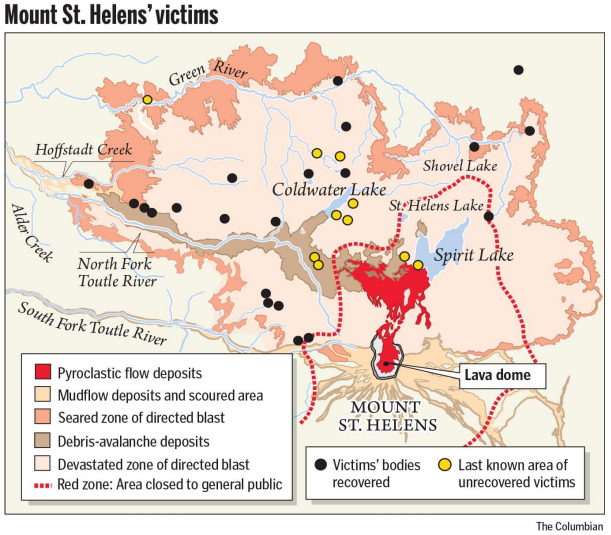
Murphy's Law: the Underlying Structure and Dangers

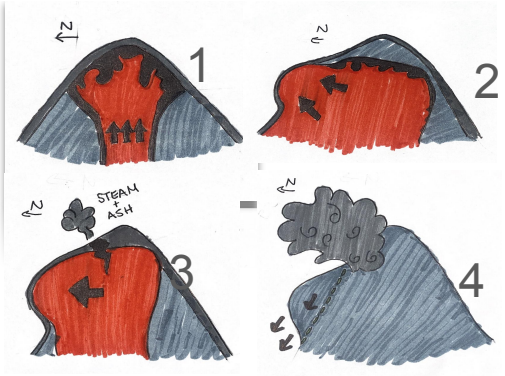


-Due to the displacement of magmatic material within the volcanic magma chamber, the bulge grow horizontally whilst increasing vertically as well. The growth, however, was not equal with the majority of displacement happening laterally on the northwest facing front of the mountain.

-Because the entire area surrounding St. Helens was and is seismically active, this meant the already unstable subterranean structure was being jouselled hundreds of times by micro tremors throughout the days and weeks leading up to the eruption. These shakes were discounted due to their frequency which was considered normal for dormant volcanoes along the Cascade mountain range.

-The day of the eruption, a 5.1 magnitude earthquake triggered a landslide that led to a release in pressure off the magma chamber resulting in structural failure and thus the titanic lateral explosion.





March 27, 1980: The Day the Sky Caught Fire

-March 16, series of thousands of earthquakes & steam explosions began, causing north side to grow over 260 feet

-March 27 - End of April, volcano spit ash into sky forming two large crater that eventually merged into one

-End of April, volcanic activity took break

-May 7th, activity resumed, magma pushed up causing Mount St. Helens to grow about 5 ft daily

-May 18th 8:32am, a 5.1 magnitude earthquake struck 1 mile under St. Helens triggering largest debris landslide in recent history

-Landslide took pressure off volcano's magma structure and cause massive lateral explosions.

- Lateral blast accelerated reaching up to 670 miles per hour covering a 230 square mile are north of the volcano with searing debris.

-Explosion triggered pyroclastic flow.

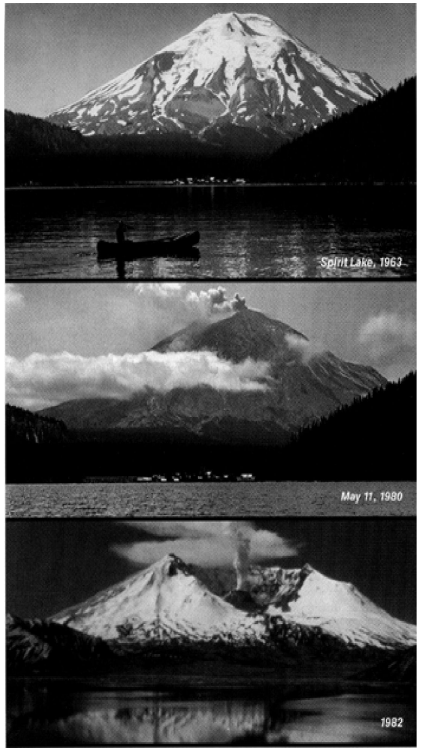
-Demolished every tree within 6 miles radius and scordef others.

-Essentially turned immediate surrounding area into a wasteland destroying plants, trees and entire ecosystems.

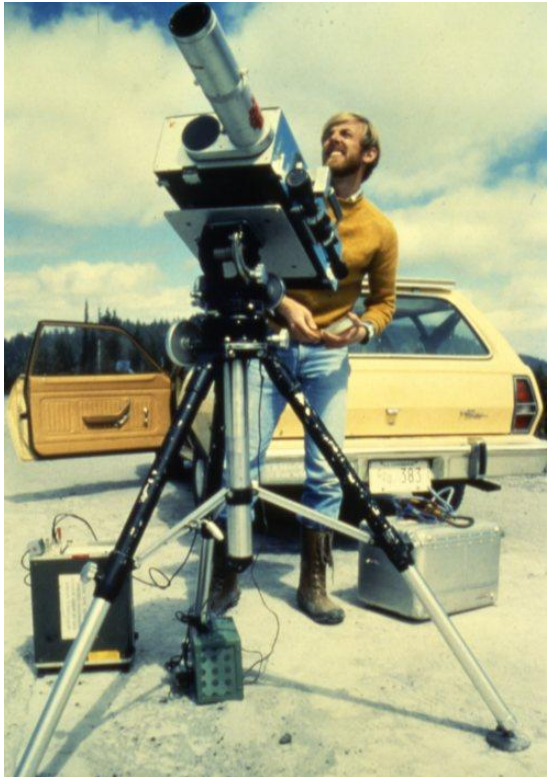
-The Corps of Engineers managed to make a handful of quick fixes for the potential floods such as debris dams.

-The ash removal was the most daunting chore. It took in excess of two months to get rid of with some businesses and homes being partially to entirely buried.

-USFS planted approximately 10 million trees to reforest thousands of acres devastated by the blast.



Humanity at the Mercy of Nature's Fury



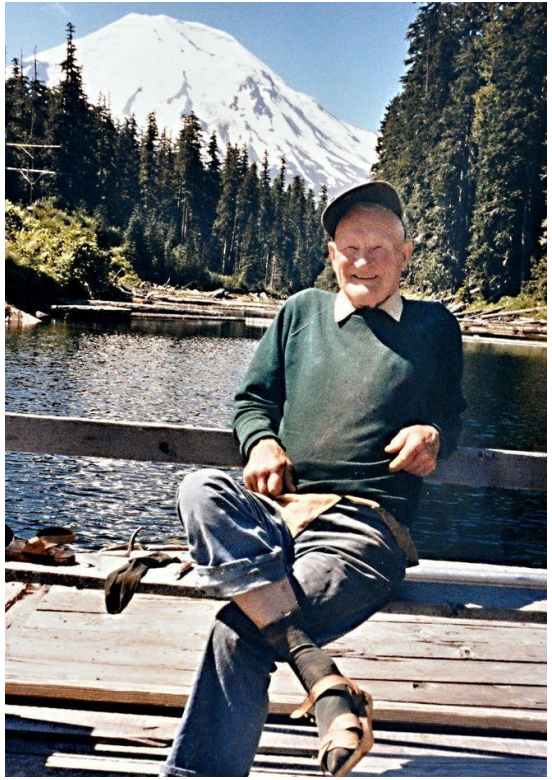
-57 people were killed total with many more injured. However, the lasting medical side effects of surviving the eruption continue to plague those who made it out with their lives.

-Among the dead was David Johnston (left), age 30, who was killed in the pyroclastic surge. He used his last moments to radio the USGS base just to the south. His final words were "Vancouver! Vancouver! This is it!" Johnston saved a handful of geology students that had accompanied him to Washington hoping to be there for the eruption. Instead he sent them back to Vancouver and, therein, saved their lives.

-Long-time Spirit Lake resident, Harry Truman, died that morning after refusing to leave his lakeside home that he had shared with his late wife. Widely regarded as a hero for being a "little guy standing up to the government", he was a retired businessman and bootlegger. Truman was 83 at the time of his death.

-Loggers working in the area were worried about the risk of an eruption and had previously filed complaints of unsafe working conditions over being sent into the blue zone with a possible eruption looming.

-Campers, permanent residents, and reporters contributed to the list of the deceased as well.



Lessons Written in Ash: Takeaways from Mount St. Helens

-Since 1980, the eruption has become of the most studied volcanic blasts in the US and the world due to the unique manner in which it blew. It is one of three volcanoes known to produce lateral blasts with the other two being Bezymianny in Russia and Mount Pelée on Martinique in the Caribbean.

-The Mount St. Helens eruption has largely been accredited with the subsequent boom in the field of volcanology and the vast knowledge that spawned from the disaster.

-Many scientists and emergency managements specialists have stated that if we had had the knowledge and interagency disaster cooperation we have today the disaster would have been handled with greater care and efficiency.

-Eruption triggered an increased investment in monitoring equipment for the volcano and surrounding area along with more thorough research to understand what's ”normal” behavior for St. Helens. This will help researchers in distinguishing between ambient activity and warning signs that an eruption could be imminent.

-Immediate emergency response to the eruption was inefficient and today, officials and experts say this was due to the multiple disasters that cascaded into one another (mud and debris flows, ash winds, and floods) which impacted response time due to assessment errors.

-Multi-agency response planning did not exist in the 80’s which proved to be key to the government’s mishandling of the event and subsequent failure.

-“When the mountain blew, everyone was kind of out there on their own” - Emergency Management Specialist for Yakima city

-The Corps of Engineers managed to make a handful of quick fixes for the potential floods such as debris dams.

-The ash removal was the most daunting chore. It took in excess of two months to get rid of with some businesses and homes being partially to entirely buried.

-USFS planted approximately 10 million trees to reforest thousands of acres devastated by the blast.

Mount St. Helens before the 1980 eruption (left) and current post-eruption (2023), 43 years after the historic disaster that reshaped the US’s understanding of volcanoes and their behavior.