Mt St Helens, USA, 1980

“Vancouver, Vancouver, this is the big one!” Such were the last words spoken by geologist David Johnston of the United States Geological Survey as he radioed his headquarters in Vancouver, a city on the Columbia River in Washington. His transmission came in at 8:32 a.m. on May 18, 1980.

Johnston, who was camped on Coldwater Ridge just a few miles from Mt St Helens, was witnessing the collapse of the entire north face of the volcano. The swollen and over-steepened north flank had been destabilized by a magnitude 5.1 earthquake. The giant avalanche, traveling at over 150 miles per hour (240 km/h), was immediately followed, and rapidly overtaken, by a massive explosion of escaping gas moving at about 300 miles per hour (480 km/h). Moments later, his transmission was cut. Johnston was completely obliterated by a menacing gray wall of hot gas, ash, rocks, and other debris.

Photographers face death
Geologists Keith and Dorothy Stoffel were in a light aircraft directly above the summit when the eruption took place. Running out of film probably saved their lives. They managed to dive steeply and swing their plane to the south, narrowly missing the rapidly rising vertical cloud column.

Elsewhere on the mountain, photographer Robert Landsberg also realized that there was no escape from the ground-hugging cloud flattening everything in its path. He continued to shoot the approaching cloud until the last moment. Just before the end, he quickly rewound the film into its canister in the airplane, grabbed his backpack and his body were recovered from the ash. Landsberg’s heroic actions have left a photographic legacy so that future generations of geologists can study volcanic processes first hand.

Mt St Helens volcano in Washington State forms part of the Cascade Mountain Range. It is one of a chain of hundreds of active volcanoes that line the edge of the Pacific Plate. This circum-Pacific belt of intense volcanic and earthquake activity is aptly named the Pacific “Ring of Fire.” Its volcanoes are constantly being destroyed and rebuilt by rising molten material called magma that is generated as the oceanic plates of the Pacific are forced beneath the continental North American Plate.

Youngest, most active major volcano
Louwala-Clough or smoking peak was the name for Mt St Helens used by the Native Americans of the Pacific Northwest. Its stable cone has grown up entirely within the last 2,200 years and the oldest volcanic ash deposits date back only 40,000 years, which makes it the youngest major volcano in the Cascade Range. As such, Mt St Helens’ slopes are smooth and symmetrical compared with its older, glacially scarred, neighbors—Mt Rainier, Mt Adams, and Mt Hood. The volcano was intermittently active in the mid-nineteenth century between 1831 and 1857, but apart from some minor steam explosions, it had not been a hazard since that time.

As such, to the twentieth-century residents of the area, Mt St Helens was a serene, graceful, conical peak known as the Mt Fuji of America. Visitors came by the thousands, lured by the mountain’s reputation for tranquility, to fish and swim in the clear water lakes, or hike and camp on its forested slopes. However, all of that changed in May 1980 when the upper 1,300 feet (397 m) of the mountain’s summit was blown away, leaving a 1½ mile by 2 mile (2 km by 3.5 km) horseshoe-shaped crater. The sudden pressure release due to the avalanche allowed the superheated groundwater around the volcano’s magma chamber to flash to steam. It blasted laterally northward, out of the avalanche scar, and formed a hot, destructive, ground-hugging, gas-charged mixture of ash and debris. Immediately north of the volcano a one-square-mile forest fire.
The Blizzard of 2003, USA

The two-part President’s Day Storm of 2003 pounded the United States’ midwestern and southern regions for days, reaching the east coast on February 15 with light snowfalls. The second part hit the northeast with the fury of a blizzard on February 16, soon becoming a deadly nor’ easter with whiteout conditions, terrifying snowstorms, and dangerous wind chills.

Record snowfalls across the seaboard paralyzed major cities, and buried most of the United States northeastern states in snowfalls from 1.5 to 4 feet (30 cm to 1.2 m). Gale-force winds blew the snow into high drifts, effectively shutting down coastal transportation. The blizzard caused 44 deaths, cost over US$655 million in repair and snow removal, and over US$1 billion in other damages.

By February 10 there were warnings that a major snow event would occur by the weekend, and that this would be brought in by two successive storm fronts. On February 14, the initial storm front began in the Rocky Mountains, causing heavy rain, snow, and freezing across the country. Iowa had approximately 11 inches (28 cm) of snowfall, and ice storms froze and shutdown Kentucky.

Snow started falling in Washington DC, Virginia, and Maryland on February 15. A low-pressure front formed in the Carolinas as the storm slowly climbed northward, creating very heavy precipitation from Tennessee to West Virginia. Overnight, the low front was impacted by a cold mass of air coming down from Canada, and just before dawn on February 16, heavy snow began falling at a rate of approximately 2 inches (5 cm) per hour across the DC metropolitan region. Over the next five hours, Washington DC became blanketed in almost a foot of snow.

Fueled by the cold air mass, the storm built up momentum quickly, dropping record amounts of snow. It fell up to 4 inches (10.2 cm) per hour as the storm headed into Philadelphia, with temperatures dropping to 15º F (-10º C).

The second storm strikes

By evening on February 16, the snow had become slush and freezing rain in Delaware’s south, and a state of emergency had been declared for Virginia, Pennsylvania, Maryland, and Delaware. Overnight, another low-pressure system off the Virginia coast, moving northeast, upgraded the storm to a nor’ easter, and it struck New York and New England on the morning of February 17.

Snow stopped late that night in New York, but continued in Boston on February 18 before losing its intensity. Snowfalls ranged from around 16.7 inches (42 cm) at Reagan National Airport, Washington’s fifth-highest amount on record, to 40 inches (122 cm) in Garrett County, Maryland. Boston had 27 inches (69 cm), while New York received 20 inches (51 cm), the fourth-highest total ever recorded in its weather history. With 27 inches (69 cm), Baltimore, Maryland had some of its highest levels of snowfalls.

The State Department of Transportation of Rhode Island used its entire fleet of 400 snow-clearing vehicles to clear the roads for stranded commuters. There were 44 fatalities across 13 states. In the state of Tennessee, a seven-year-old girl and her 12-year-old brother died after being swept away in a flooded stream. Four of the deaths in Maryland were also children, lulled by carbon monoxide poisoning in snowbound cars. Major airports in Washington, Pennsylvania, and New York shut down and over 2,000 flights were cancelled. In Baltimore, the roof of the historic 1884 Baltimore and Ohio Railroad museum collapsed, destroying many of the valuable displays of railway artifacts. A roof collapsed at an Edison, New Jersey trade school, killing one man. The heavy snowfall and the extensive flooding from the melting of the snow caused structural damage across the affected regions.

The heavy snowfalls made driving near impossible (above). The residents of the US Northeast began digging out snowdrifts that were several feet high to clear the way for their cars (far left, above). Commuters frequently experienced vehicle breakdowns due to the severe conditions and many were forced to face the bitter outdoor conditions (far left, below).

WHAT IS A NOR’EASTER?

A nor’ easter is a powerful storm that occurs in America between October and April, and has a counter-clockwise center of rotation like a hurricane, with winds from the northeast. Two elements create the necessary conditions—a warm low-pressure system from the Gulf Stream providing counter-clockwise winds, and a cold high-pressure system from Canada with a clockwise rotation. The warm air cutting up through the cold air creates an unstable front; the more disparate the temperature, the faster and more violent the storm. A nor’ easter brings immense dark storm clouds, heavy rain or snowfall, flooding, storm surges, and gale-force winds.
Europe, 2002

Several days of heavy rain resulted in massive flooding in several European countries in August 2002. Over 100 people were killed and tens of thousands were forced to evacuate. Damages ran into billions of euros. Old and historic buildings were ruined, and public transportation was severely disrupted.

W hat has been called a 100-year flood hit Europe starting around August 12, 2002. Storm fronts caused heavy rainfalls across the Italian, Bavarian, and Austrian Alps. The storms traveled across Bavaria and into the Czech Republic, causing massive flooding. The cities of Prague and Dresden sustained the bulk of the worst damage to buildings, infrastructure, and transportation systems.

Evacuation of villages and cities
The storm’s deluge soaked the Bohemian Forest, where the Elbe and Vltava rivers rise. The river surged caused massive rises in water levels through Austria and the Czech Republic, as the rivers overflowed and the waterways expanded. In Northern Bohemia, Thuringia, and Saxony, several villages were swept away by the raging torrents of water. Saxony suffered nine casualties and nearly 20,000 people were evacuated by military and police.

At 4:00 a.m. on Wednesday, August 14, residents of Prague, in the Czech Republic, woke to find 400,000 strong population fled from the rising flood waters. The Elbe River surpassed a record high of 30 feet (9 m) on August 16, according to the Dresden Emergency Centre. As in Prague, numerous buildings were damaged as the floodwaters breached emergency retaining walls, forcing the rescuers to retreat further. The Zwinger Palace and neighboring Semper Opera opera house were also flooded. Across Germany, over 435 miles (700 km) of roadways and 180 bridges were destroyed.

Damages and disaster management
The Elbe River also reached record-breaking levels, but minimal flooding occurred in Vienna due to extensive and effective flood management systems. In the worst-hit areas, the extent of the damage was attributed to the combination of towns built on floodplains and widespread deforestation that had occurred in recent years. The Regional Environmental Center for Central and Eastern Europe commented to reporters that, “The more extensive and effective flood management systems put in place in recent years, the less damage was caused. This is because the water was able to flow more easily and faster, and the levees were able to hold up.”

While the flood damage was widespread, there were relatively few fatalities due to good emergency management of the disaster situation. All of the evacuations were carried out in time following the reasonably accurate flood predictions. However, experts still insist that better pre-disaster planning is needed in more regions, along with redesign of areas to take massive flooding potential into account. In all, the 2002 flood resulted in damages and restoration costs exceeding 2 billion euros.