Niagara Falls



Location: Niagara Falls, NY (on the border between Canada and United States)

How old is it? Geologically speaking, Niagara Falls is quite young. The history of Niagara Falls goes back thousands of years, to the Ice Age, when large torrents of water were released from melting ice, draining into what is now known as the Niagara River. Some 12,300 years ago, the water plunged over the edge of the Niagara Escarpment--a steep slope that runs east/west from New York through Ontario, Michigan, Wisconsin and Illinois. Native Americans living in the Niagara region were most likely the first people to behold the power of Niagara Falls. The first European to document the area was a French priest, Father Louis Hennepin. During a 1678 expedition, he was overwhelmed by the size and significance of Niagara Falls. When he returned to France, Hennepin published an account of his travels in "A New Discovery." The book brought Niagara Falls to the attention of the western world for the first time and inspired further exploration of the region.

How was it made? Niagara Falls is a natural wonder unlike any other. The formation of Niagara Falls was a slow process that still continues today. The annual freezing and thawing of the Niagara River wears away at the rocks under the surface and gradual erosion and periodic rock falls steadily move Niagara Falls farther upstream. Modern influences, however, have caused the falls to wear away less quickly. Remedial work has been done to preserve the falls and the volume of water has been reduced by diversion for hydroelectric power. Hydroelectricity is one of Niagara Falls' most important products. Together, power plants on both the American and Canadian sides of the falls have the capacity to produce up to 2.4 million kilowatts of electricity.

Hawaiian Islands

Location: North Pacific Ocean

How old is it? The ages of the Hawaiian Islands correspond directly with their geographical positions. The main islands are positioned in order of age, from oldest to youngest, from northwest to southeast. Kauai is approximately 5.1 million years old, followed by Oahu at 2.2 to 3.4 million years old. Molokai is next, at 1.3 to 1.9 million years old; Lanai, at approximately 1.3 million years; and Maui, at 0.8 to 1.3 million years old. The oldest parts of the Big Island are less than 0.7 million years old, and contemporary lava flows consistently add brand-new land.

How was it made? The process began millions of years ago deep below the Pacific Ocean where the current islands are anchored to one of the rocky slabs that make up Earth's outer crust. This slab creeps over a hot spot, or a fixed plume of heat below Earth's surface. Like a blowtorch, the heat transforms deep rocks into oozy magma. The magma rises upward until it erupts onto the seafloor. When the sizzling lava (which is what magma is called when it erupts) hits the cooler water, it hardens into an underwater volcano. Over time — and numerous eruptions — the volcano packs on enough hardened lava to pop above the ocean surface, forming an island. As the rocky seafloor slab inches along, it carries the island beyond the hot spot, cutting it off from its lava source. The cycle of volcanic birth and extinction has left behind a trail of islands.

Mount St. Helens

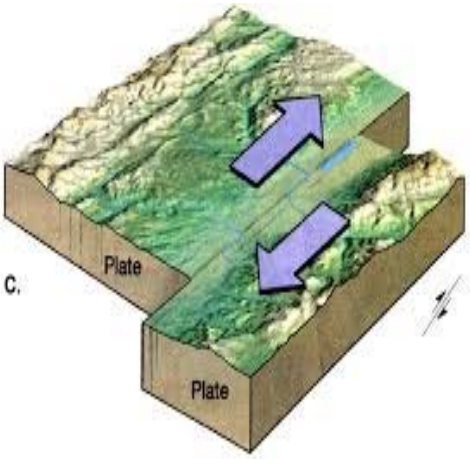


Location: Skamania County, Washington

How old is it? Mount St. Helens was formed during four eruptive stages beginning about 275,000 years ago and has been the most active volcano in the Cascade Range during the Holocene Period. Prior to about 12,800 years ago, lava domes and flows erupted and formed the older St. Helens edifice, but a few lava flows extended beyond the base of the volcano. The bulk of the modern edifice was constructed during the last 3,000 years.

How was it made? Prior to 1980, Mount St. Helens had the shape of a conical volcano. During the 1980 eruption the upper 1,300 feet of the summit was removed by a huge debris avalanche, leaving a horseshoe-shaped crater now partially filled by a lava dome and a glacier. It is primarily an explosive volcano with a complex magma system. Since its 1980 eruption, the summit elevation has decreased. A survey in 1982 gave a measurement of 8365 ft. However, a geological survey done in 2009 found the maximum elevation to be 8330 ft. The difference in elevation is likely due to erosion and loss of rimrock by crater-wall collapses.

San Andreas Fault



Location: San Diego, Los Angeles, & Big Sur, California (from Cape Mendocino to Mexico border)

How old is it? The San Andreas Fault is about 28 million years old, and in many places like the Carrizo Plain and the Olema Trough, the fault is easy to see as a series of scarps and pressure ridges. In other places, it is more subtle because the fault hasn't moved in many years and is overgrown with brush. In San Bernardino and Los Angeles Counties, many of the roads along the fault cut through great mountains of gouge, the powdery, crumbled rock that has been pulverized by the moving plates.

How was it made? The San Andreas Fault is the sliding boundary between the Pacific Plate and the North American Plate. The plates are slowly moving past one another at a couple of inches a year - about the same rate that your fingernails grow. But this is not a steady motion, it is the average motion. For years the plates will be locked with no movement at all as they push against one another. Suddenly the built-up strain breaks the rock along the fault, and the plates slip a few feet all at once. The breaking rock sends out waves in all directions, and it is the waves that we feel as earthquakes. There are many myths and legends about the San Andreas Fault, the biggest being that it will one day crack and California will slide into the sea. WRONG! It won't happen and it can't happen. Nor is there anything such as "earthquake weather" or preferred times of day when earthquakes hit.

“Old Faithful” Geyser



Location: Yellowstone National Park, Wyoming

How old is it? Old Faithful was named by the first official expedition to Yellowstone, the Washburn Expedition of 1870. It is the biggest regular geyser in Yellowstone National Park. Furthermore, it has been erupting in nearly the same fashion throughout the recorded history of the park. Through the years, it has become one of the most studied geysers. One result of this close observation is that the Park Rangers are able to predict its eruptions fairly accurately. This makes Old Faithful geyser one of the easiest geysers in Yellowstone to see.

How was it made? Old Faithful erupts every 35 to 120 minutes for 1 1/2 to 5 minutes. Its maximum height ranges from 90 to 184 feet. A geyser is a spring characterized by intermittent ejection of water accompanied by steam. As a fairly rare phenomenon, the formation of geysers is due to particular geological conditions that exist only in a few places on Earth. Generally all geyser field sites are located near active volcanic areas, and the geyser effect is due to the proximity of magma. Generally, surface water works its way down to an average depth of around 6,600 feet where it contacts hot rocks. The resultant boiling of the pressurized water results in the geyser effect of hot water and steam spraying out of the geyser's surface vent (a hydrothermal explosion). Once the eruption starts, the jetting will grow, stop, grow again and in two or three of these steps, reach maximum height. It takes 10-20 seconds to reach full height.

Great Lakes

Location: Michigan, on the border between United States and Canada

How old is it? Water began filling the glacially scoured basins as soon as the ice from the Laurentian ice sheet receded, some 14,000 years ago. It is generally accepted that Lake Erie reached its present level about 10,000 years ago, Lake Ontario about 7,000 years ago, and Lakes Huron, Michigan, and Superior some 3,000 years ago.

How was it made? Two previously fused tectonic plates split apart and created the Midcontinent Rift, which formed a valley that provided a basin that eventually became modern day Lake Superior. A second fault line, the Saint Lawrence rift, formed the basis for Lakes Ontario and Erie along with what would become the Saint Lawrence River. The retreat of the ice sheet left behind a large amount of meltwater that filled up the basins that the glaciers had carved, thus creating the Great Lakes as we know them today. Because of the uneven nature of glacier erosion, some higher hills became Great Lakes islands. A notable modern phenomenon is the formation of ice volcanoes over the lakes during wintertime. Storm-generated waves carve the lakes' ice sheet and create conical mounds through the eruption of water and slush. The process is only well-documented in the Great Lakes, and has been credited with sparing the southern shorelines from worse rocky erosion.

Grand Canyon



Location: Arizona

How old is it? The Colorado River, or some ancestor to it, has carved the Grand Canyon. But as new techniques are developed, information from the canyon's rocks tells us more about its history. Using a technique that can tell how deeply buried the canyon's rocks were at specific time intervals, scientists determined that western Grand Canyon was cut to within a few hundred meters of its present depth 70 million years ago, while eastern Grand Canyon (where most visitors see the canyon) was the site of a gorge of similar proportions to the modern canyon, but cut into Mesozoic-age rocks that are now completely stripped away.

How was it made?The Grand Canyon is one of the most recognizable landforms on planet Earth. Geologists know that the canyon and the river had to have formed when the landscape was uplifted from the seabed. An initial river system developed and drained to the northeast, exactly opposite to the flow direction of the Colorado River today. The larger geologic setting of the American West at this time reveals that an Andean-type mountain range existed to the southwest of Grand Canyon near the modern-day cities of Las Vegas, Nevada; Kingman, Arizona; and Needles, California. This ancient range is where the ancestor of the Colorado River originated. As strange as this may sound, it is one of the few parts of the Colorado River story that all geologists agree upon.