6 Volcanic Landforms

Parcutin Volcano, Mexico

KEY CONCEPTS

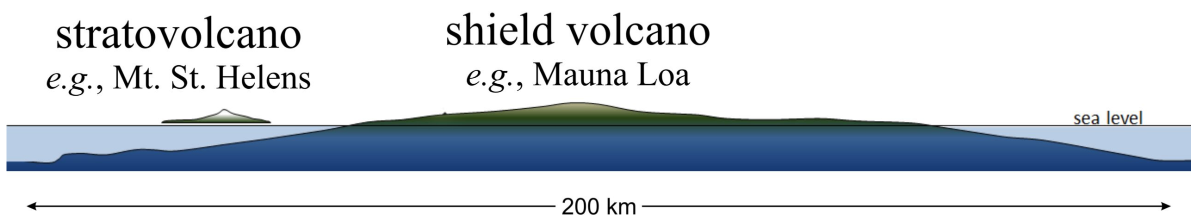
- Volcanic mountains may be shield volcanoes or stratovolcanoes.
- Shield volcanoes are much larger than stratovolcanoes. They vary in size with most having a diameter of 100s of km. In contrast most composite volcanoes have diameters of 15-30 km.
- Geologists sometimes list caldera, lava domes, maars, craters, and cinder cones as additional kinds of volcanoes. Although they are types of volcanic landforms, they do not create volcanic mountains like shield and composite volcanoes do.
- Most shield volcanoes are found on ocean islands above

hot spots or on continents at continental rifts.

- Shield volcano eruptions commonly occur at a central vent, but flank eruptions and fissure eruptions are common on the slopes or even near the base of a volcano.
- Most shield volcanoes have craters at their summits and sometimes on their flanks.
- Stratovolcanoes form during multiple eruptions and are made of combinations of lava flows and pyroclastic debris of variable composition.
- Stratovolcanoes are found at subduction zones associated with continental margins.
- Eruption of silicic and intermediate magmas, the magmas that create stratovolcanoes, often produces lava domes.
- Some lavas of intermediate viscosity magmas have characteristics of both domes and flows and form coulees.
- Multiple basaltic flows in the same area can produce large lava fields, sometimes called *lava plains*, sometimes creating lava plateaus that contain flood basalts.
- Caldera form as a result of magma withdrawal and subsequent ground collapse. They may be small or very large.
- Caldera and craters of any size may fill with water to produce crater lakes.

6.1 Volcanoes and Related Features

Volcanic mountains may be *shield volcanoes* or *stratovolcanoes* (also called *composite volcanoes*). Geologists sometimes list *caldera*, *lava domes*, *maars*, *craters*, and *cinder cones* as additional kinds of volcanoes. Yet, although they are types of volcanic landforms, they do not create volcanic mountains like shield and composite volcanoes do. All these different landforms cover a spectrum of sizes. As shown in Figure 6.1, shield volcanoes are much larger than stratovolcanoes, but they vary in size with most having a diameter of 100s of kilometers. In contrast, most composite volcanoes have diameters of 15-30 kilometers. Caldera, such as the caldera at the top of Kilauea Volcano can be small, only 1 to a few kilometers across. But, some, like the Yellowstone Caldera are huge and up to 100 kilometers across. Smaller features, including domes, maars, craters, and cinder cones are typically 100-1,000 m across, but some cinder cones have diameters less than 100 m.



6.1 Comparing the sizes of stratovolcanoes and shield volcanoes

6.2 Shield Volcanoes

Shield volcanoes are the largest kind of volcano. The name derives from the shape, which, supposedly, resembles a warrior's shield lying concave on the ground. We find shield volcanoes in many places and in several different settings. Most are found on ocean islands above hot spots, including the hot spots beneath the Hawaiian Islands and the Galapagos Islands. Others, such as Nyamuragira Volcano in the East African Rift Zone, are associated with continental rifts. Less commonly shield volcanoes are found at subduction zones. These volcanoes are made exclusively from basaltic magma.

6.2 Mt. Wrangell, in Alaska

In the United States, shield volcanoes are found in the western states, and in Alaska and Hawaii. Figure 6.2 is a view of Mt. Wrangell, a shield volcano northeast of Anchorage in Alaska’s interior. Mt. Wrangell is the only active volcano in the Wrangell Volcanic Field. Small eruptions were reported in 1760, 1784, and 1884-85. Since then minor amounts of ash have emanated from its summit.

Wrangell is exceptional – Alaska contains more than 40 active volcanoes but Wrangell is the only shield volcano. The others are composite volcanoes of the Aleutian Islands. In the United States, besides Wrangell, only two Hawaiian volcanoes (Mauna Loa and Kilauea) are considered active shield volcanoes today. But Kilauea is really a high point on the southern side of Mauna Loa and does not form a separate volcanic mountain.

6.3 Mauna Loa Volcano, Hawaii

The view above (Figure 6.3) shows Mauna Loa Volcano, Hawaii, seen from halfway up Mauna Kea, 40 kilometers away. [Figure 4.13](#) shows another view of this volcano. Mauna Kea and Mauna

Loa make up most of the Big Island of Hawaii. Both volcanoes are huge with shallow slopes. The slopes are gentle because the basaltic magma that was extruded had low viscosity and so spread out quickly after eruption. The parts of Mauna Kea and Mauna Loa above water are only 40-50 kilometers across, but both volcanoes extend beneath the sea a much greater distance. They are so large that it is hard to see them in their entirety.

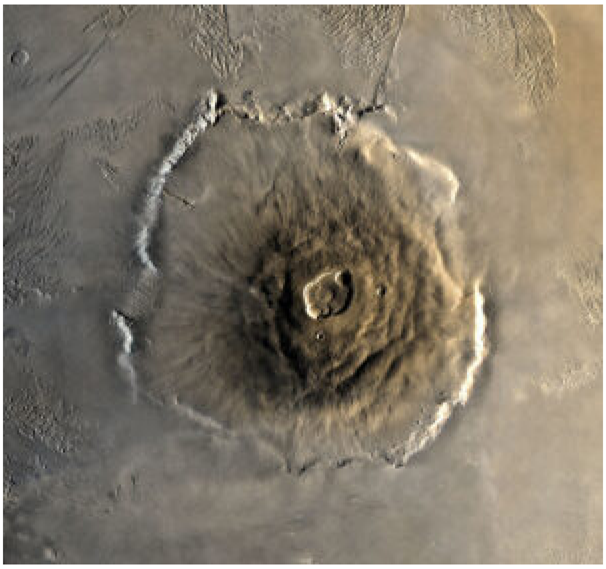
Hawaiian and other shield volcanos form over long periods of time, thousands of years or much more, generally from many individual eruptions that involve multiple basalt flows. Mauna Loa has been erupting for at least 700,000 years and emerged above sea level about 400,000 years ago. Since 1843, this volcano has erupted more than 30 times. Although no eruptions have occurred at its summit since 1984, eruptions away from the summit have occurred more recently.

Eruptions of shield volcanos commonly occur at a central vent, but *flank eruptions* are common on the slopes or even near the base of a volcano. Flank eruptions may produce cinder cones, called *parasitic cones*, like the one seen in Figure 6.4 Some flank eruptions, *fissure eruptions*, are associated with long cracks or with rift systems. Fissure eruptions, such as the eruptions of Kilauea during the past decade, may occur many kilometers away from the main summit. Figure 6.5 shows a fissure eruption on the south side of Kilauea Volcano in 2011

6.4 Parasitic cinder cone on the flanks of Piton de la Fournaise Volcano, Reunion Island; people on the cone give scale

6.5 Kamoamoa fissure eruption in Kilauea’s East Rift Zone in 2011

● Box 6.1 Extraterrestrial Shield Volcanoes



6.6 Composite photo of Olympus Mons, on Mars; width of the photo is 800 km

Shield volcanoes are not just on Earth; Olympus Mons on Mars is an example (Figure 6.6). It is a huge volcano, and is the largest volcano in the Solar System. It has been described by NASA as being the size of Arizona. Mars contains many shield volcanoes, but like Olympus Mons, they are all dormant or extinct.

Venus, too, contains many volcanoes. The range from small volcanoes, only a few kilometers across, to huge shield volcanoes 100s of kilometers in diameter. Most of Venus' volcanoes are shield volcanoes.

Many basaltic lava flows are found on the Moon and on Mercury. On the Moon, they form *lunar maria* – large basaltic plains similar to flood basalts on Earth. The moon also contains a few shield volcanoes and some igneous deposits that are thought to be made of pyroclastic debris. The Mariner 10 spacecraft collected images of nearly a dozen shield volcanoes on Mercury between 1973 and 1975.

6.2.1 Shield Volcanoes, Craters, and

Crater Lakes

6.7 Summit craters on Mt. Etna, Sicily

Most shield volcanoes have craters at their summits. These craters, small to large circular depressions, are places where eruptions have occurred. Figure 6.7 shows craters at the summit of Mt. Etna on the Island of Sicily. Etna, a popular tourist destination, is the tallest (3,326 m) and most active volcano in Europe. Since 2000, Etna has produced four flank eruptions and at least half-a-dozen summit eruptions; the last was in 2021.

The photo in Figure 6.7 shows craters at a volcano's summit. But, as noted above, craters are also commonly found on the sides of volcanoes where flank eruptions have occurred. And they may occur in rift zones, such as Kilauea's rift zones in southeastern Hawaii (see the map in Chapter 4).

6.8 Blocky lava in front of

spatter Cones in Craters of the Moon National Monument, Idaho

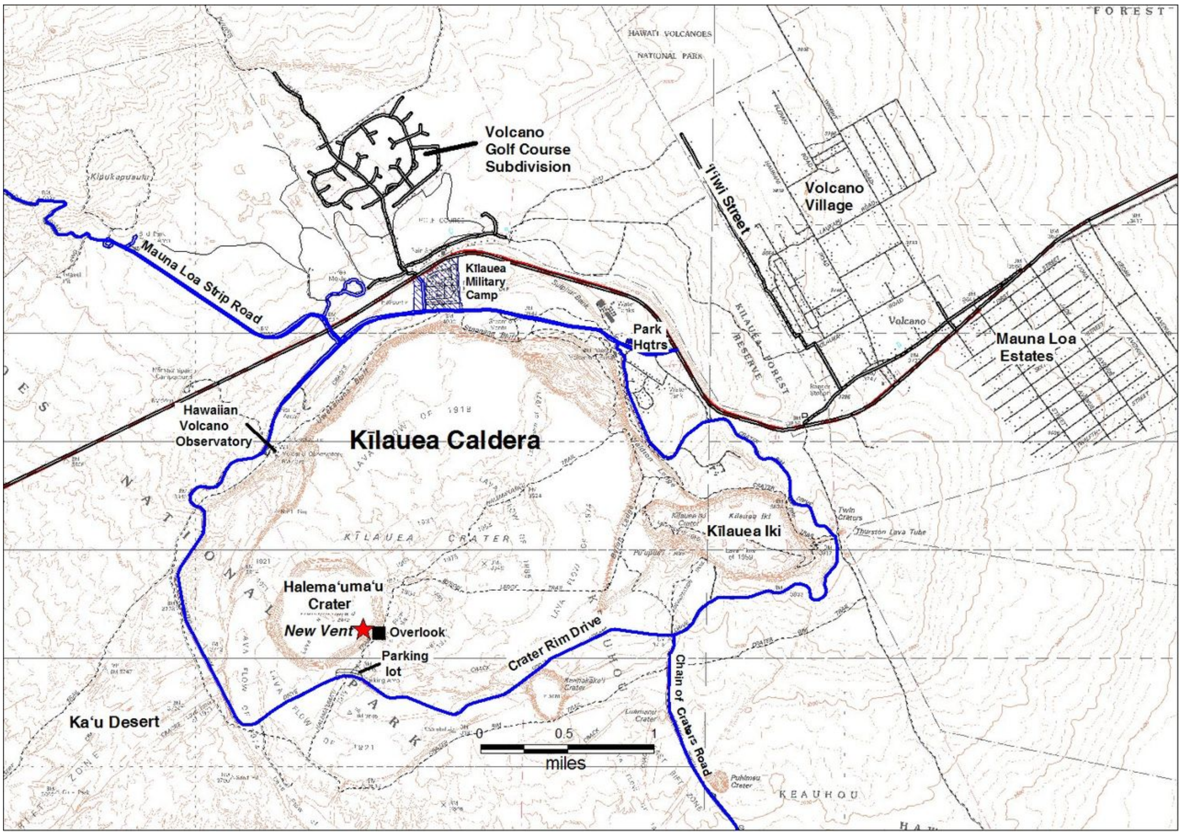
Craters can develop in several ways, and the term crater encompasses a range of features. They may form when lava fountains deposit material in *spatter cones* around a vent. Figure 6.8 shows some examples of small cones in Craters of the Moon National Monument; each cone has a crater at its top. They can form from pyroclastic material, and they may form when an area collapses downward because a volcano's magma chamber has emptied. (Craters of this sort are more specifically called *caldera*.) And still other craters form when phreatic eruptions blast a hole in the ground. Although the basalt at Craters of the Moon looks quite fresh, the last eruptions in the region occurred about 2,100 years ago.

6.9 Lake Toba, Indonesia

No matter where they are or how they form, after eruptions cease, craters often fill with water to produce crater lakes. Figure 6.9, Lake Toba in Indonesia, is a large caldera filled with water. It is the largest crater lake in the world – about 100 by 30 kilometers in area and more than 500 meters deep. We talked about Toba Volcano extensively in Chapter 4 (Section 4.1.2).

6.10 Summit crater at Irazú Volcano, Costa Rica

Figure 6.10 shows a crater lake at the summit of Irazũ Volcano. This volcano, a stratovolcano, is one of the most active volcanoes in Central America. Irazũ is part of a chain of volcanoes extending north-south in Costa Rica. This volcano last erupted in the early 1960s. The eruptions produced ash but no lava.



6.11 Map of the regions around the 3.2 kilometer wide Kilauea Caldera

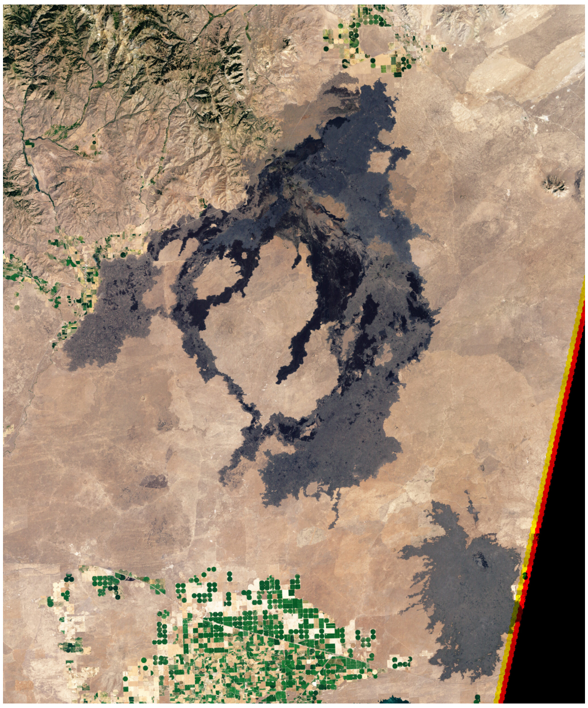
Many volcanoes contain multiple craters, and some contain *nested craters* within larger craters*.* Figure 6.11 is a map of Kilauea’s summit region. A large summit crater, the Kilauea

Caldera, is almost 6 kilometers wide. Kilauea Iki and Halemaʻumaʻu, two prominent smaller nested craters lie within the caldera. Eruptions at Kilauea Iki last occurred several decades ago, but Halemaʻumaʻu is the site of eruptions as I write this chapter (in November, 2021).

6.3 Lava Fields

6.12 Hell’s Half Acre lava field in Idaho

Some basaltic eruptions occur without creating a volcanic peak. Instead, lavas emanate from fissures and spread laterally. Multiple basaltic flows in the same area can produce large *lava fields*, sometimes called *lava plains*, that may extend up to several to hundreds of kilometers in long dimension. These fields, typically next to stratovolcanoes, comprise mostly horizontal flows but may include cinder cones, maars, and pyroclastic deposits. Figure 6.12 shows a lava field at Hell’s Half Acre on the Snake River Plain 40 kilometers west of Idaho Falls, Idaho. This volcanic field is actually larger than a half-acre, it covers 390 square kilometers.



6.13 Black basalts in Craters of the Moon National Monument

Figure 6.13 is a satellite image of black lava fields in Craters of the Moon National Monument 100 kilometers west of Hell's Half Acre. The irrigated fields in the bottom of the image are near Minidoka, Idaho. Although not discernible from this image, Craters of the Moon contains 60 different flows. In total, they cover an area of 1,600 square kilometers. Many of these flow are relatively flat lava plains, like the plains in Hell's Half Acre seen above. Earlier in this chapter (Figure 6.8), we saw a different view of the volcanic features at Craters of the Moon, a photo of blocky lava and cinder cones.

6.4 Cinder Cones

6.14 The SP Crater in the San Francisco Volcanic Field, Arizona

The opening photo in this chapter showed the large cinder cone that makes up Mexico's Parcutin Volcano. *Cinder cones*, also called *scoria cones*, can range from being a few meters to 100s of meters high. They are steep cone-shaped hills composed of pyroclastic fragments including cinders (fragments of solidified magma), ash, and scoria. Most cinder cones have a prominent crater at their summit. Figure 6.14 is a view of the SP cinder cone and crater near Flagstaff, Arizona. This is a basaltic cinder cone, and solidified basalt flows can be seen in the top of the photo. The cone, about 250 meters high, has the typical features of young cinder cones – steep sides and a large bowl-like crater at its summit.

6.15 Craters of the Moon National Monument, Idaho

Figure 6.15 shows some of the many cinder cones associated with the eruptions that produced the flows at Craters of the Moon National Monument. These cones first formed about 15,000 years ago; the last developed 2,000 years ago. See also Figures 6.8 and 6.13 for other views of this Monument.

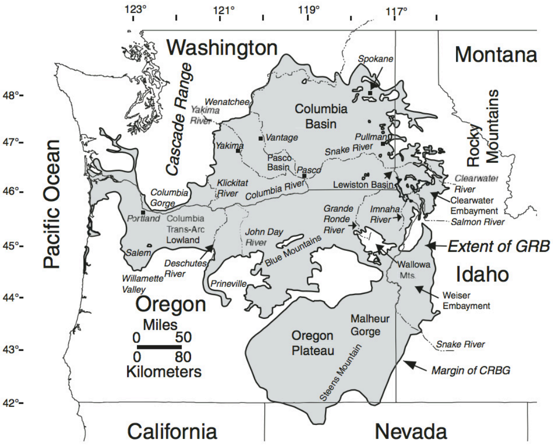
6.16 Cinder cones and lava flows in northern Harrat Lunayyir, Saudi Arabia

Typical volcanic fields contain 10 to 100 separate volcanic cones. Some of the cones may have formed during a single eruption, but most derive from many eruptions over many years. Commonly lava flows fill valleys between cones. Figure 6.16 is a view of several cinder cones in northern Harrat Lunayyir, Saudi Arabia. Dark colored lava flows (black) wrap around the large cone in the background.

6.5 Lava Plateaus and Flood Basalts

Small volcanic fields are commonplace. Much larger, hundreds to thousands of square kilometer sized *lava plateaus* can form from a succession of fissure eruptions related to crustal rifting. In these plateaus, individual volcanic cones are sometimes present, but often not. The largest lava plateaus are on the floors of the oceans, and we cannot visit them. On continents, lava plateaus contain *flood basalts* that are many tens of meters thick and that extend hundreds of kilometers. Flood basalt terranes develop over long times and are products of many eruptions in the same area. The eruptions produce multiple flows that stack one on top of another.

6.5.1 The Columbia River Flood Basalts



6.17 Location of the Columbia River Flood Basalts

6.18 Columbia River Flood Basalt

The Columbia River Basalts, classic examples of flood basalts, were deposited mostly between 16.7 and 15.5 million years ago. These basalts cover 200,000 square kilometers – most of southeastern Washington, a large part of northern Oregon, and part of Idaho (Figure 6.17). Most of the magma came from fissures up to 100 kilometers long near where Washington, Oregon, and Idaho meet. The photograph in Figure 6.18 shows outcrops of the Columbia River Basalt near Wenatchee, Washington.

6.5.2 The Deccan Traps

6.19 T

g6i.02n0sSsahtoewlsitihteepvairetwsoofftlhnedDieacccoavneTrreadpbsy,blansdailat s of the Deccan Traps

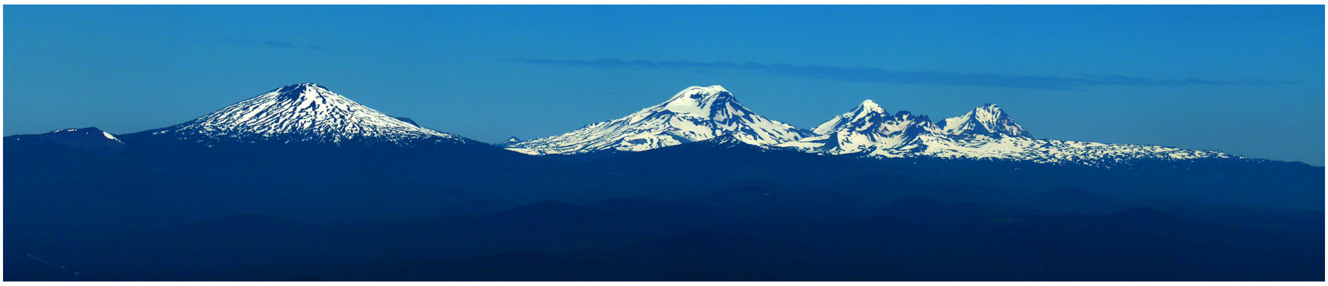
The basalts of Washington, Oregon, and Idaho cover a large region, but an even larger flood basalt terrane is found in India. India's ancient (66 million years old) Deccan Traps, on the Deccan Plateau of west-central India, is one of the largest volcanic features on Earth (Figure 6.19). The term *trap* comes from a Swedish word for *stairs*, in reference to the step-like hills created by multiple lava flows like those seen in Figure 6.20 (and in Figure 2.34, another view of the Deccan Traps). The Deccan flows consist of many layers of solidified basalt that together are more than 2,000 meters thick. Today, the Deccan basalts covers more than 500,000 square kilometers – an area slightly larger than California – and have a volume of 512,000 cubic kilometers. Geologists have determined that the flows may have been three times larger when they originally formed, with large amounts of basalt later removed by erosion or covered by younger rocks.

6.5.3 The Giant's Causeway


6.21 Giant's Causeway, Northern Ireland, with people for scale

Cooling flood basalts often shrink and develop columnar fractures, and so become *columnar basalts* such as the ones shown in the photograph of the Columbia River basalts, above (Figure 6.18). Erosion has uncovered the vertical columns to leave steep cliffs called *palisades*. Perhaps the world's most famous columnar basalts are those of the Giant's Causeway – shown in Figure 6.21. The Causeway is part of a lava plateau on the north coast of Northern Ireland. The basalt is part of a large volcanic plateau, the *Thulean Plateau,* that formed about 60 million years ago. In this view, the tops of columns can be seen, contrasting with the side view of the Columbia River basalts shown in Figure 6.18.

6.6 Stratovolcanoes



6.22 Mount Bachelor, Broken Top, and the Three Sisters, Oregon, July 2010

The panoramic image above (Figure 6.22) was taken from the top of Paulina Peak, Oregon, looking northwest. The photo shows Mount Bachelor (left), Broken Top, and the Three Sisters (right) in Oregon. These are three of the more than 80, some quite small, *stratovolcanoes* in the Cascade Mountain Range of British Columbia, Washington, Oregon, and California (Box 6.2). The volcanoes shown in Figure 6.22 have not erupted for more than 1,000 years, but other cascade volcanoes have.

● Box 6.2 Cascade Range Stratovolcanoes

6.23 Stratovolcanoes of the Cascade Range

The *Cascade Volcanoes* are a chain of stratovolcanoes that extends more than 1,100 kilometers from southwestern British Columbia to northern California. Figure 6.23 shows the major volcanoes of the chain, which takes its name from the Cascade Mountain Range of Washington and Oregon. Cascade volcanism began 35-40 million years ago, but most of volcanoes are younger than 2 million years old. The highest peaks in this chain, Mount Rainier and Mount Shasta, are more than 4,000 meters tall, and the average height is just under 3,000 meters.

Although the three volcanoes shown above in Figure 6.22 have not erupted for a long time, other cascade volcanoes have been active more recently. St. Helens, Lassen Peak, Hood, Rainier, and Baker have all erupted during the past 300 years.

6.24 Lassen Peak in northern California

Lassen Peak and Mt. St. Helens are the only two Cascade volcanoes that have erupted in the 20th and 21st centuries. Lassen Volcano, shown in Figure 6.24, erupted intermittently from 1914 to 1917 after being dormant for 27,000 years. An especially explosive eruption, in May 1915, caused a great deal of local devastation, but Lassen is in a remote part of California, and the eruption had no direct effect on people. The summit region of Lassen Peak, seen in Figure 6.24, is somewhat bleak because little soil developed since the last eruption and vegetation is generally absent.

6.25 Mt. St. Helens, with a small steam plume coming off the lava dome in its summit crater

Mount St. Helens, the stratovolcano near Seattle that is well known for its May 18 eruption in 1980, is about 3,000 meters tall and 20 kilometers in diameter. It is a medium-sized stratovolcano; others are sometimes twice as large. Figure 6.25 is a view of the mountain and its prominent summit crater. Part of the crater walls (behind the clouds) blew away during the explosive 1980 eruption.

As discussed in earlier chapters, since the 1980 eruption, lava has created a lava dome near the center of the St. Helens' crater. The dome has grown and been modified during many small eruptive events. In this photo (Figure 6.25) it has a small cloud of steam coming off its top. The photo on the right in Figure 4.62 is a larger view of the dome.

Both shield volcanoes and stratovolcanoes form during multiple eruptions. However, in contrast with most shield volcanoes, stratovolcanoes consist of combinations of lava flows and pyroclastic debris of variable composition. Mount St. Helens, for example, is made of many layers (strata) of flows alternating with ash and other pyroclastic material that accumulated during multiple eruptions. Because they contain multiple layers of varying compositions, we commonly refer to stratovolcanoes as *composite volcanoes*.

6.26 Kronotsky Volcano on the Kamchatka Peninsula, Russia

Most stratovolcanoes are found at subduction zones associated with continental margins. In these settings, they create volcanic mountain chains such as North America's Cascades or South America's Andes. Stratovolcanoes are also common where oceanic lithosphere subducts under other oceanic lithosphere, creating volcanic island arcs. Figure 6.26 shows an example, Kronotsky Volcano in Kamchatka, a Russian Peninsula containing a chain of subduction zone volcanoes. We find similar volcanoes in island arcs of the Aleutian Islands, Philippines, and Japan. Vesuvius, Pinatubo, Toba, and Tambora, discussed previously, are all stratovolcanoes.

Stratovolcanoes, including all those listed at the end of the previous paragraph, are known for their violent explosive eruptions. The dominant magmas that create stratovolcanoes are silicic, containing high- or intermediate- amounts of silica.

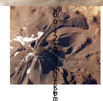
They typically produce rhyolitic, dacitic, or andesitic rocks. Basaltic magmas are usually absent or a minor component. Because silicic magmas have high viscosity, lavas from stratovolcanoes generally do not flow far before hardening. This explains why the volcanoes have such steep sides. The viscous nature of silicic magmas also explains why stratovolcanoes are associated with explosive eruptions. Fluid magma, such as basalt, easily creates lava flows but viscous magmas have a harder time. All magmas contain gases which may create gas bubbles as magma nears the surface. But, if the magma is runny enough, the gas can escape like air bubbles escape from boiling water. In contrast, if a magma is thick, bubbles cannot easily escape and pressure can build up until eventually powering an explosive eruption. This is what happens when you boil sugar syrup to make candy. Large gas bubbles may form which pop and spatter hot syrup in many directions, including on your arms.

6.7 Lava Domes

6.27 Volcanic dome at the Mono Craters, California

We have previously discussed lava domes. Domes, usually rounded with steep sides, form during slow extrusion of viscous lava that cannot flow easily away from where it erupts. Domes are common and, although most are made of silicic or intermediate lavas, rare mafic domes occasionally form. Mafic rocks, however, weather and decompose quite quickly, so most of the domes we see have intermediate or silicic compositions. Figure 6.27 is a dome in the Inyo Craters chain on the eastern side of the Sierra Nevada Mountains near Mono Lake. Figure 2.14 provides a closer view of this outcrop. The dome is made mostly of intermixed obsidian and pumice.

As discussed in previous chapters, domes may develop within summit craters, like the dome in Alaska's Novarupta Volcano discussed in Chapter 5, or the dome at the top of Mt. St. Helens seen in Figure 4.62. Domes at a volcano's top may disintegrate, producing pyroclastic flows that move rapidly down a volcano's side with disastrous consequences. This is what happened at Mt. Mt. Pelée in Martinique, in 1902 (Figure 5.30).



Some lavas of intermediate viscosity form flows that are so sluggish they have characteristics of domes. We call such flows *coulees*. Figure 6.28 shows two good examples from South America – Llullaillaco Volcano and the Chao Domes. In Figure 6.28, the long skinny flow emanating from Llullaillaco’s summit is called a *levee*. The levee becomes a *coulee*, *sensu stricto*, when it splits into several lobes in the upper right of the photo. The satellite view of the Chao dacite dome (Figure 6.29) shows a rippled surface just left of center that is a coulee -a dacite composition dome/flow. It is 14 kilometers long and about 400 meters wide. The photo in Figure 6.30 is a view of the Chao coulee.

6.8 Caldera

Previously, we talked about caldera resulting from magma withdrawal and subsequent ground collapse. Such caldera typify Kilauea and other shield volcanoes, but Hawaiian caldera are relatively small features. In contrast with Kilauea, some volcanoes, including Toba and Tambora, have huge associated caldera, formed when ground collapses due to emptying of a magma chamber below. These caldera may be created quickly during explosive eruptions, but also over longer times during effusive eruptions. In either case, when enough magma has been ejected, the empty magma chamber may be unable to support the weight of the ground above. The total area that collapses may be a few tens of square kilometers or much larger, up to thousands of square kilometers. If a caldera is very large it is generally difficult to identify the specific volcanoes that caused the caldera to form because there may have been many. For example Toba Caldera (Figures 4.3 and 6.9) is very large and formed during multiple eruption events. Besides terrestrial occurrences, caldera have also been identified on Venus, Mars, the Moon, and on IO (one of Jupiter’s most volcanically active moons).

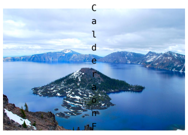
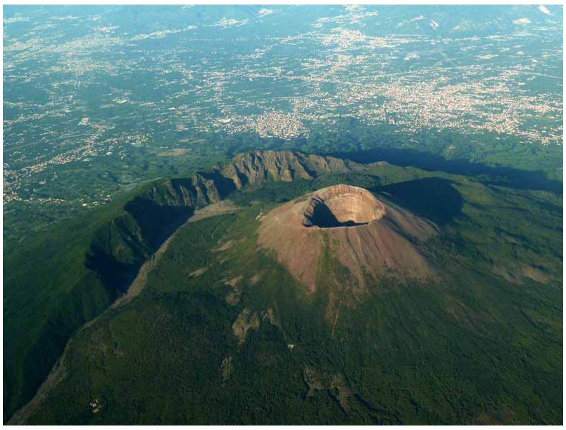


Figure 6.31 is Crater Lake in southern Oregon. The lake is nearly circular, 8 to 10 kilometers across, and covers 55 square kilometers. It is the deepest lake in the United States (594 meters) and ranks as one of the top ten deepest lakes worldwide. The lake waters, which come from snowmelt and rain, occupy a relatively small caldera. This lake formed about 7,700 years ago when Mount Mazama, a Cascade Range volcano, erupted and the ground subsided after 50 cubic kilometers of silicic magma was expelled. Mount Mazama’s eruptive history, however, extends back at least 400,000 years, and the volcano is still considered active today. Within a few hundred years after the last major eruption, smaller eruptions created Wizard Island (shown in the center of this photograph) and several other small cones in the caldera. Figure 6.32 shows a

slightly smaller caldera on an island in the Galapagos.

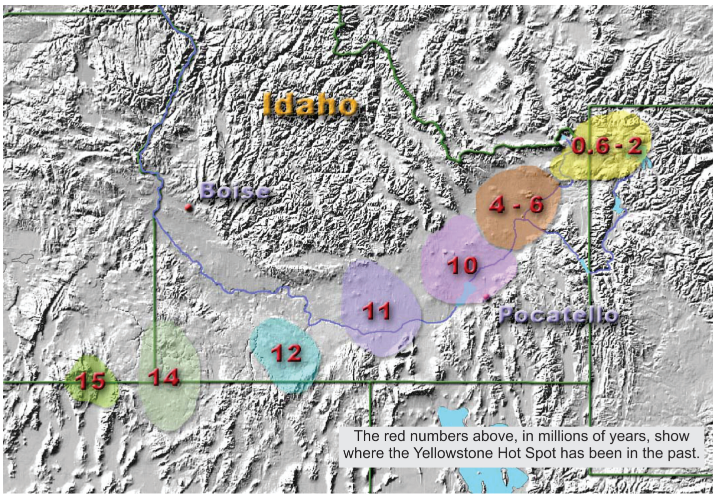


6.33 Somma Caldera and the Mt. Vesuvius crater within it

Some caldera are large enough that new volcanoes can form within them. We call such volcanoes *somma volcanoes*, or sometimes *sommian volcanoes*. The name comes from *Mount Somma*, a stratovolcano in southern Italy with a summit caldera that contains the main cone of Mount Vesuvius. Figure 6.33 shows the prominent Visuvius crater surrounded by the rim of the larger Somma Caldera. Mt. Mazama caldera at Crater Lake contains the smaller Wizard Island Volcano, and is also a somma volcano.

6.34 View of the Yellowstone River in the Yellowstone Caldera just north of Yellowstone Lake

Crater Lake, Vesuvius, and Hawaiian volcanoes have relatively small associated caldera. The Yellowstone Caldera, in northwest Wyoming, is another story (Figure 6.34). It is 55 by 72 kilometers, and is the site of several huge eruptions between 2.1 million and 640 thousand years ago. The eruptions spread thick ash over much of the western United States. The earliest event, called the *Huckleberry Ridge eruption*, was one of the largest ever to occur on Earth. The last three major eruptions created calderas near and west of present day Yellowstone Park: The Henry's Fork Caldera, the Island Park Caldera, and the Yellowstone Caldera. These caldera are so large that they are difficult to identify as caldera and cannot be seen from the ground. They can, however, be traced in aerial views due to slightly elevated topography at their rims. Today, Yellowstone is the site of many hot springs and geysers, fueled by heat from magma below. Although there have been no major eruptions in more than half a million years, Yellowstone is still active and has potential to erupt again in the future.



6.35 Path of the Yellowstone Hot Spot

Yellowstone's volcanism stems from a hotspot under the North American continent – the same hotspot as the one that led to the Columbia River flood basalts and Craters of the Moon National Monument, discussed earlier. As shown in Figure 6.35, the Yellowstone hotspot has caused volcanic activity for more than 15 million years. As the continent has moved southwest over the hotspot, the site of eruptions has migrated northeast to its present day location. The numbers in Figure 6.33 show where the hot spot was in the past, from 15 million years ago to the present.

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6.17 Columbia River flood basalt map, USGS
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6.26 Kronotsky Volcano, peakvisor.com
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6.34 View of the Yellowstone Caldera, NPS
6.35 Yellowstone Hot Spot, Kevin Case, Wikimedia Commons