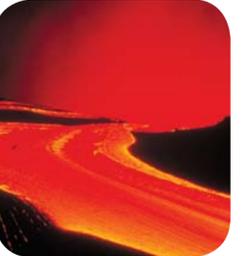
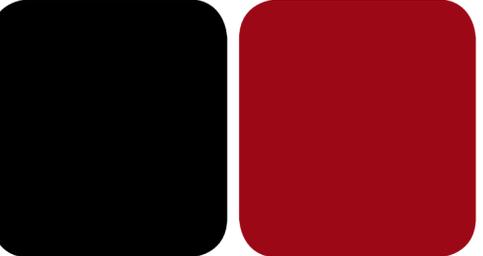
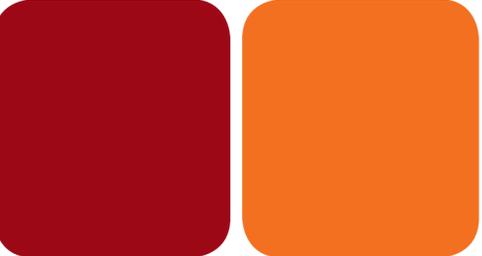
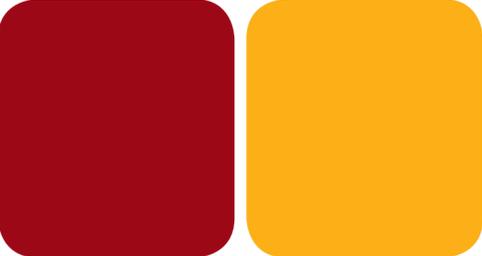
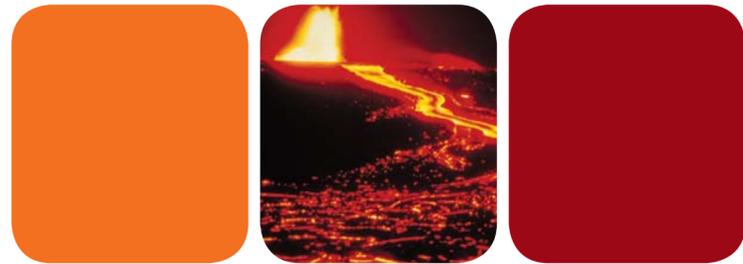


VOLCANOES OF THE NATIONAL PARKS



VOLCANIC PARKS, PRESERVES, AND MONUMENTS

- ANIAKCHAK NATIONAL MONUMENT AND PRESERVE, Alaska
- BANDELIER NATIONAL MONUMENT, New Mexico
- BIG BEND NATIONAL PARK, Texas
- CAPULIN VOLCANO NATIONAL MONUMENT, New Mexico
- CHIRICAHUA NATIONAL MONUMENT, Arizona
- CRATER LAKE NATIONAL PARK, Oregon
- CRATERS OF THE MOON NATIONAL MONUMENT AND PRESERVE, Idaho
- DEATH VALLEY NATIONAL PARK, Nevada and California
- DENALI NATIONAL PARK AND PRESERVE, Alaska
- DEVILS POSTPILE NATIONAL MONUMENT, California
- DEVILS TOWER NATIONAL MONUMENT, Wyoming
- EL MALPAIS NATIONAL MONUMENT, New Mexico
- GRAND CANYON NATIONAL PARK, Arizona
- HALEAKALA NATIONAL PARK, Hawaii
- HAWAII VOLCANOES NATIONAL PARK, Hawaii
- KATMAI NATIONAL PARK AND PRESERVE, Alaska
- LAKE CLARK NATIONAL PARK AND PRESERVE, Alaska
- LASSEN VOLCANIC NATIONAL PARK, California
- LAVA BEDS NATIONAL MONUMENT, California
- MOUNT RAINIER NATIONAL PARK, Washington
- NORTH CASCADES NATIONAL PARK, Washington
- OLYMPIC NATIONAL PARK, Washington
- PETROGLYPH NATIONAL MONUMENT, New Mexico
- PINNACLES NATIONAL MONUMENT, California
- PU'UHONUA O HONAUNAU NATIONAL HISTORIC PARK, Hawaii
- SUNSET CRATER VOLCANO NATIONAL MONUMENT, Arizona
- WRANGELL — ST. ELIAS NATIONAL PARK AND PRESERVE, Alaska
- YELLOWSTONE NATIONAL PARK, Wyoming, Montana, and Idaho

VOLCANOES OF THE NATIONAL PARKS

VOLCANIC FEATURES

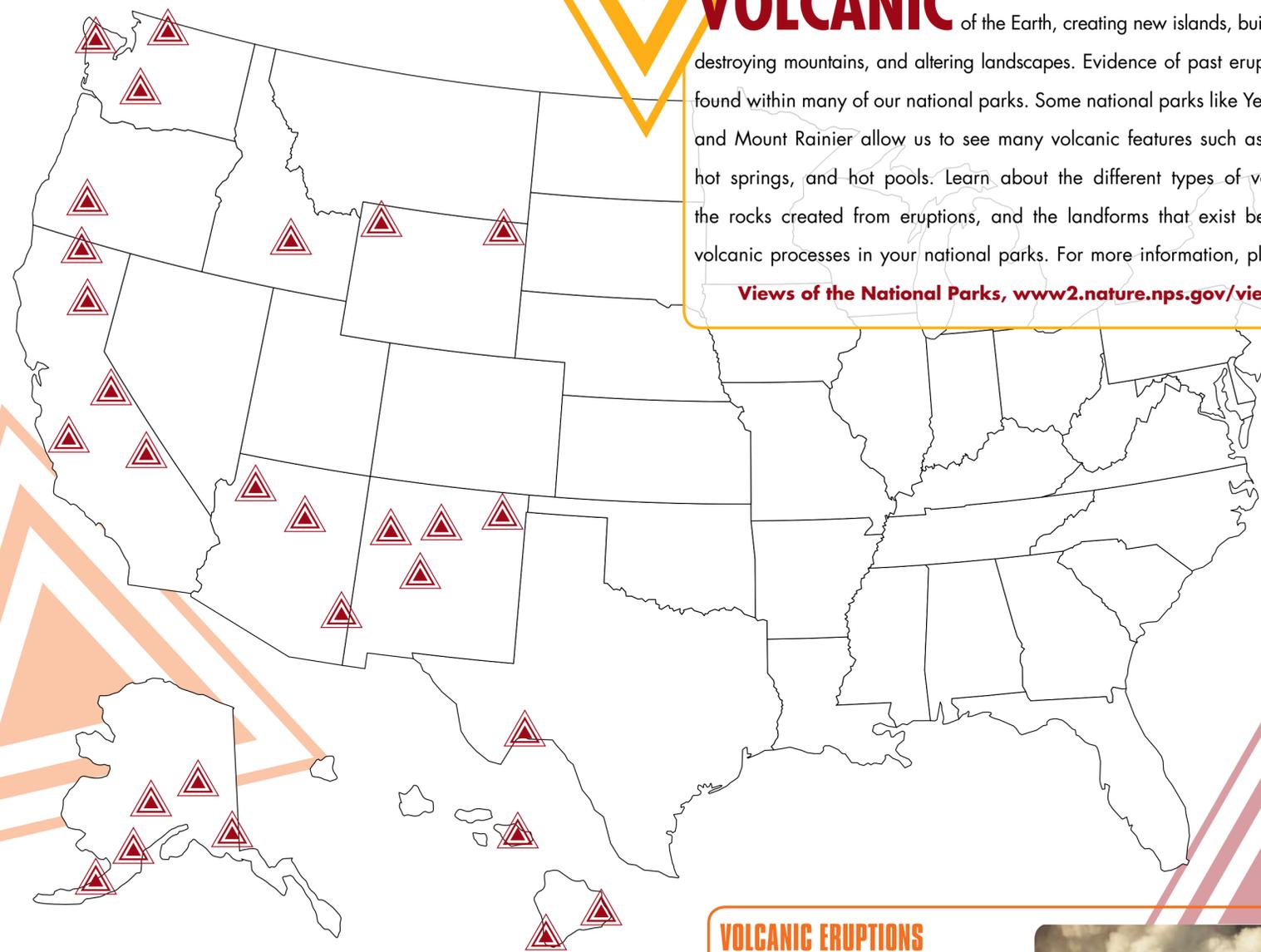
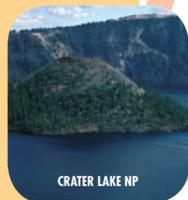
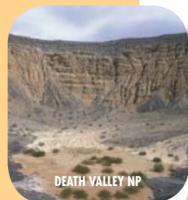
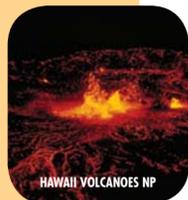
Melted or molten rock inside the Earth is called **MAGMA**. Magma is composed of elements, minerals, and gases that were present in the rock before it melted.

LAVA is the term used for magma once it reaches the Earth's surface. Basaltic lava can move down the slope of a volcano for distances over 100km (about 62 miles) and can reach speeds of 30 miles per hour. Two common kinds of basaltic **LAVA FLOWS** are Pahoehoe and 'A'a. Pahoehoe is a smooth or ropey flow. A chunkier, thick flow is called 'A'a. Good examples of both can be found in Hawaii. Some other lavas are so viscous they do not flow, but rather form domes.

CRATERS are circular depressions usually found near the top of a volcano. They are created by the collapse of the summit of the volcano, the accumulation of lava around the open vent, or an explosive eruption. Often when the volcano is active, the crater can fill with lava; this is seen most often with shield volcanoes. Domes and spines often grow in the summit of composite volcanoes. A volcanic crater can also fill with water, creating a "crater lake."

LAVA DOMES can develop in areas of previous volcanic activity, most often with composite volcanoes. The hot magma below the surface exerts high pressure creating a steep-sided bulge on the mountain. However, the high viscosity of the lava prevents an explosive eruption. Domes can grow very slowly but when they collapse, they can be explosive. Examples of lava domes are found in Aniakchak National Monument and Preserve, Lassen Volcanic National Park, and Lake Clark National Park and Preserve.

THERMAL FEATURES occur when ground water fills underground reservoirs and is heated by nearby magma, sometimes turning to steam. Steam and hot water can erupt from the ground creating a *geyser*. Old Faithful, in Yellowstone National Park, has been erupting throughout recorded history. *Hot springs* are natural springs and seeps heated by magma. *Hot pools* and *mudpots* are formed when the water from hot springs collects in pools of hot water or boiling mud. These can be quite colorful, but often have a strong sulfur smell. Lassen Volcanic National Park and Yellowstone National Park have many thermal features. To safely visit geothermal areas, you must stay on boardwalks and designated trails. Scalding water and mud beneath the thin surface crust can cause severe, possibly even fatal, burns.



VOLCANIC

processes are constantly changing the surfaces of the Earth, creating new islands, building and destroying mountains, and altering landscapes. Evidence of past eruptions are found within many of our national parks. Some national parks like Yellowstone and Mount Rainier allow us to see many volcanic features such as geysers, hot springs, and hot pools. Learn about the different types of volcanoes, the rocks created from eruptions, and the landforms that exist because of volcanic processes in your national parks. For more information, please visit

Views of the National Parks, www2.nature.nps.gov/views.

ROCKS CREATED FROM MAGMA

IGNEOUS ROCKS are formed when molten rock (magma) cools and hardens. These rocks can form inside the earth as **INTRUSIVE (PLUTONIC) IGNEOUS ROCKS**, or after an eruption as **EXTRUSIVE (VOLCANIC) IGNEOUS ROCKS**. The rate of cooling and the chemistry of the magma or lava determine what kind of rock will form. Extrusive igneous rocks typically cool very quickly and have a fine texture. For example; **OBSIDIAN**, or volcanic glass, is smooth and shiny. When magma cools under the earth's surface, it usually cools very slowly. This allows the mineral crystals time to grow. For example, **GRANITE** is an intrusive igneous rock that is usually coarse grained.



OBSIDIAN



GRANITE

VOLCANIC ERUPTIONS

A volcanic eruption occurs when the overlying surface can no longer hold the inside pressure of the volcano. Every eruption is unique and many hazards can be associated with each eruption.

EFFUSIVE ERUPTIONS pour large amounts of lava from a vent onto the ground. Each lava flow is different, varying in area covered, thickness, volume, length, and composition. Some eruptions can include incredible displays of fire and fury. Lava fountains, are a continuous vertical ejection of molten lava that falls back to the ground in a molten state. Lava fountains are impressive sights and can reach hundreds of meters into the air.



EXPLOSIVE ERUPTIONS are the most dangerous eruptions. They occur when unstable magma and volcanic gases are released. This type of eruption usually involves large volumes of ash, gases, mudflows, and many other volcanic hazards. These eruptions can cause extensive damage to the surrounding areas.

TYPES OF VOLCANOES

Volcanoes are separated into categories based on their magma type, height, shape, and eruption style:



A **SHIELD VOLCANO** has a large base and gently sloping sides. The lavas from this type of volcano are very fluid and rarely explosive. Shield volcanoes may erupt frequently producing layer after layer of fluid lava that flows out creating the broad dome-like appearance of the mountain. The lava hardens into rock called basalt. Shield volcanoes are most often found in oceanic areas as island chains or on continents as large flows. Examples of shield volcanoes are found in Hawaii Volcanoes National Park, Lava Beds National Monument, and Wrangell-St. Elias National Park and Preserve.



COMPOSITE VOLCANOES (often called **STRATOVOLCANOES**) are created from layers of rock, ash, and hardened lava. These volcanoes produce violent eruptions and are much steeper than shield volcanoes. Volcanic mudflows, called lahars, help to shape the landforms created by composite volcanoes. Usually, composite volcanoes are found near subduction zones where two tectonic plates of the Earth's crust collide and one is forced under the other. Parks with composite volcanoes include: Aniakchak National Monument and Preserve, Mount Rainier National Park, Katmai National Park and Preserve, Lake Clark National Park and Preserve, and North Cascades National Park.



A **CALDERA** can form near the end of a volcanic eruption when the pressure inside the volcano may become low enough that the volcano's summit cannot be supported and it collapses in on itself. This process creates a caldera that can be over 25 kilometers in diameter. Huge explosions followed by collapses may also form a caldera. Hot springs, steam vents, and boiling mud pots are common inside active calderas. Examples of calderas: Yellowstone National Park, Crater Lake National Park, and Aniakchak National Monument and Preserve.



CINDER CONES can occur as small features on both composite and shield volcanoes, or may occur as a field of associated cinder cones. Cinder Cones are small volcanic vents that usually erupt only once. This common cone forms when gases in the magma cause lava to be ejected into the air. While airborne, lava cools quickly into solid fragments called cinders. The cinders fall back to the ground and pile up in the shape of a cone around the vent of the eruption. Examples of massive cinder cones include Sunset Crater Volcano National Monument and Capulin Volcano National Monument.