Tagada

Climatologically Botanical Stratovolcano Eruptions

CLIMATOLOGICALLY BOTANICAL STRATOVOLCANO ERUPTIONS HYDROTHERMAL DISPERSION VELOCITY ZONES

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PUNCTUATION AND SYMBOLS

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48 REGULAR

Earthquake Studies Reveal the Magmatic Plumbing System of the Katmai Volcanoes

36 REGULAR

The volcano is composed of layers of pyroclastic material, mud flows, and lava flows, and it rests on Mesozoic granitic rocks.

30 REGULAR

The interior of the caldera provides textbook examples of many volcanic features such as lava flows, cinder cones and explosion pits.

24 REGULAR

Shishaldin Volcano is the tallest of 11 known volcanoes on Unimak Island. Eruptions have been recorded from the volcano since 1775, with major eruptions occurring in 1824 and 1830. It is active today and completely unpredictable.

18 REGULAR

The volcano is composed of layers of pyroclastic material, mud flows, and lava flows, and it rests on Mesozoic granitic rocks. Extensive glaciers and ice fields cover much of the volcano. It has a history of recorded volcanic activity dating back to 1778. The most recent eruptive period occurred in March 2009. The eruption was characterized by powerful ash explosions with resulting plumes between 30,000 to 60,000 feet (9,100 to 18,200 m) above sea level.

14 REGULAR

The interior of the caldera provides textbook examples of many volcanic features such as lava flows, cinder cones and explosion pits. The volcano's most recent eruption occurred in 1931, when it hurled 15.4 cubic miles (64 km3) of debris out of its core, scattering it for 20 miles (32 km) over the surround-ing landscape. The topography and setting of the caldera make it climatologically unique in that it is able to generate its own weather. The caldera and its surroundings are in a pristine natural condition and visitation is infrequent.

12 REGULAR

Alaska is one of the most vigorously volcanic regions on the planet, and Alaska's national parks are home to many of the state's most active volcanoes. These pose both local and more distant hazards in the form of lava and pyroclastic flows, lahars (mudflows), ash clouds, and ash fall. Alaska's volcanoes lie along the arc of the Aleutian-Alaskan subduction zone, caused as the oceanic Pacific plate moves northward and dips below the North American plate. These volcanoes form as water-rich fluid from the down-going Pacific plate is released, lowering the melting temperature of rock in the overlying mantle and enabling it to partially melt. The melted rock (magma) migrates upward, collecting at the base of the approximately 25 mile (40 km) thick crust, occasionally ascending into the shallow crust, and sometimes erupting at the earth's surface.

During volcanic unrest, scientists use geophysical signals to remotely visualize volcanic processes, such as movement of magma in the upper crust. In addition, erupted volcanic rocks, which are quenched samples of magmas, can tell us about subsurface magma characteris-tics, history, and the processes that drive eruptions. The chemical compositions in the erupted magmas can reveal conditions these magmas were stored.

10 REGULAR

Studies of the products of recent eruptions of Novarupta (1912), Aniakchak (1931), Trident (1953-74), and Redoubt (2009) volcanoes reveal the depths and temperatures of magma storage, and tell of complex interactions between magmas of different compositions. One goal of volcanology is to determine the processes that drive or trigger eruptions. Information recorded in the rocks tells us about these processes. Here, we demonstrate how geologists gain these insights through case studies from four recent eruptions of volcanoes in Alaska national parks.

Investigation of the magmatic processes beneath volcanoes starts with field study of the erupted deposits. For recent eruptions, volcanologists use photographs, satellite images, seismic data, and field observations to correlate deposits with individual explosions or other types of activity such as lava-dome growth. For older eruptions, we use the order and distribution of layered deposits (stratigraphy), such as those from ash falls and pyroclastic flows, to ascertain the sequence of events.

Volcanic rocks typically contain a few to nearly 50% relatively large crystals of rock-forming minerals (phenocrysts, ≥0.04 inches/1 mm) in a finer grained matrix of glass (quenched melt) or sub-millimeter crystals called groundmass. Chemical analyses of "whole rock" geologic specimens, such as rocks or individual pumice lumps, typically are performed on finely pulverized samples. Whole-rock compositions yield information about magma source regions and tell whether new erupted ma-terial is the same or different from that previously erupted by the volcano. Often, composition will shift subtly during an eruption, heralding a new eruptive style or participation of melt from a different part of the magma system.

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