Volcanoes of the Alaska Peninsula and Aleutian Islands —Selected Photographs

By Christina Neal, Robert McGimsey, and Michael F. Diggles

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INTRODUCTION

Alaska is home to more than 40 active volcanoes, many of which have erupted violently and repeatedly in the last 200 years. This compact disc (CD-ROM) contains 97 digital images created from 35-mm slides scanned by a Kodak PIW film scanner. These pictures are but a small fraction of thousands taken by Alaska Volcano Observatory scientists, other researchers, and private citizens. Photographs were selected for inclusion in this collection to portray Alaska's volcanoes, to document recent eruptive activity, and to illustrate the range of volcanic phenomena observed in Alaska.

To facilitate viewing the photographs on the CD-ROM, they have been incorporated into a Portable Document Format file (DDS_40.pdf), which combines images, brief captions, and an index map. Underlined terms appear in the glossary. Hyperlinks (text outlined in blue) lead to a new image or page of text when clicked. To move back to the previous view, click the Go Back button  in the tool bar. A slide show (slideshow.pdf) is also available that cycles through the 97 photographs at three-second or other user-defined intervals. Press the "Escape" key to exit the slide show. To return to the main document, close the slide-show window. Click here to begin the side show.

The images in this PDF file (DDS_40.pdf) have a resolution of 300 dots per inch (dpi), which allows acceptable printing at about 4"x6" on most color printers; the resolution on the slide show is only 72 dpi, which is adequate only for its intended viewing on a computer screen. Links to the World Wide Web (WWW) will access the user's connection to the Internet and browser software, if available. This CD-ROM contains a full-text index (index.pdx), that is for use in searching the .PDF files for words or sets of words using the search tool available with some .PDF readers. For more information, please see the 1_README.TXT file.

Each photograph is also stored as a Photo CD (.PCD) Image Pac in five resolutions ranging from 192x128 pixels to 3072x2048 pixels. The .PCD Image Pac, located in the \IMAGES directory, allows users to choose the appropriate file size for print or electronic media applications. For each photograph, a single file contains all five resolution versions of the image. The file name corresponds to the photograph numbers in the .PDF file (for example, the file named "IMG0019.PCD;1" is the .PCD version for photograph 19). To view, manipulate, or print these images, the user must have a computer platform with software capable of reading .PCD files. When opening a .PCD file, compatible software will prompt the user to choose one of the five resolutions. Please see http://www.kodak.com/go/photocd for more information.

[1]The Alaska Volcano Observatory (AVO) was established in 1988 to carry out volcano monitoring, eruption notification, and volcano-hazard assessments in Alaska. The cooperating agencies of the Alaska Volcano Observatory (http://www.avo.alaska.edu/) are the U.S. Geological Survey (http://www.usgs.gov/), the University of Alaska Fairbanks Geophysical Institute (http://www.gi.alaska.edu/), and the Alaska Division of Geological and Geophysical Surveys (http://wwwdggs.dnr.state.ak.us).

OBTAINING COPIES OF ORIGINAL IMAGES

35-mm slide reproductions of images contained on this CD-ROM may also be obtained by contacting:

U.S. Geological Survey Photographic Library
Box 25046, MS 914, Federal Center
Denver, CO 80225-0046
Telephone: (303) 236-1010
http://www.usgs.gov/fact-sheets/photographic-library/photographic-library.html

SELECTED REFERENCES

For additional information on the volcanoes represented in this collection, users are referred to the following sources:

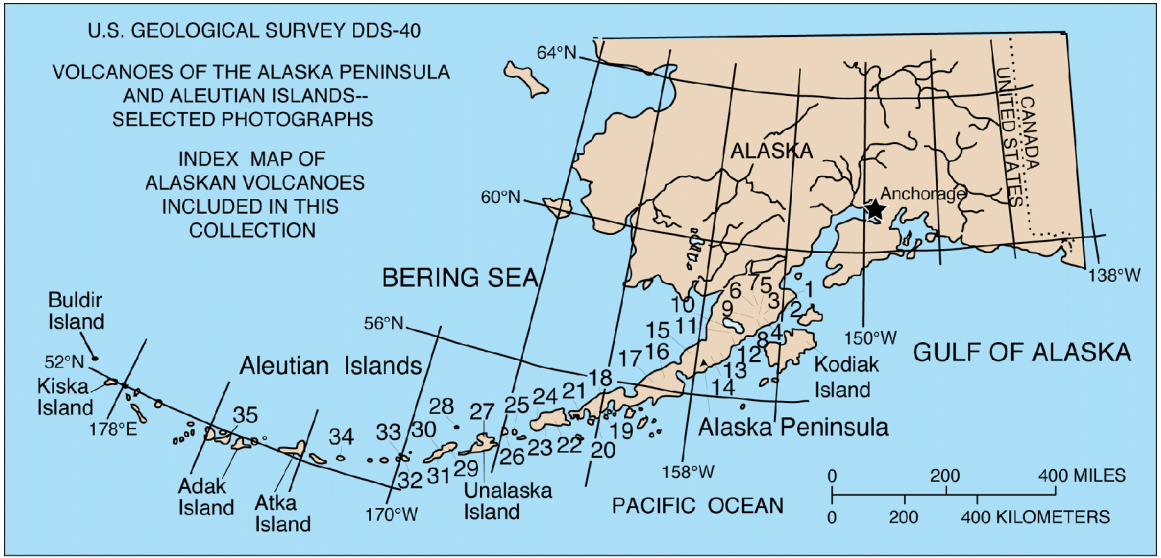
McGimsey, R.G., and Miller, T.P., 1995, Quick reference guide to Alaska's historically active volcanoes: U.S. Geological Survey Open-File Report 95-520, 13 p.

Simkin, T., and Siebert, L., 1994, Volcanoes of the World: Tucson, Geoscience Press, 349 p.

Wood, C.A., and Kienle, J., eds., 1990, Volcanoes of North America: Cambridge, England, Cambridge University Press, 354 p.

ACKNOWLEDGMENTS

Compiling a set of images from the AVO collection onto CD-ROM was first proposed by Joe Dorava. The authors have benefited greatly from the technical assistance, tenacity, and enthusiasm of John Nakata and Evelyn Newman. Reviews of caption text by Chris Nye, John Nakata, Jim Smith, Lee Siebert, and Jim Hendley improved their content. The map figure was generated by Anne Vanderpool and Kathy Lemke. Bernadette Johnson painstakingly labeled several sets of duplicate 35-mm slides. Mark Lohnes ably scanned the images. Mary Jane Coombs designed the map figure's hyperlink feature. Bobbie Myers designed the volcanoes banner. We thank all the photographers who shared their work with us.



1. MOUNT DOUGLAS
2. KAGUYAK VOLCANO
3. KATMAI CALDERA
4. TRIDENT VOLCANO
5. NOVARUPTA VOLCANO
6. THE VALLEY OF TEN THOUSAND SMOKES
7. MOUNT GRIGGS
8. MOUNT MAGEIK
9. MOUNT MARTIN
10. UKINREK MAARS
11. PEULIK VOLCANO
12. UGASHIK CALDERA
13. CHIGINAGAK VOLCANO
14. YANTARNI VOLCANO
15. ANIAKCHAK CALDERA
16. BLACK PEAK
17. VENIAMINOF VOLCANO
18. PAVLOF SISTER AND PAVLOF VOLCANOES
19. EMMONS LAKE CALDERA
20. MOUNT DUTTON
21. COLD BAY VOLCANO
22. SHISHALDIN VOLCANO
23. FISHER CALDERA
24. WESTDAHL VOLCANO
25. MOUNT GILBERT
26. AKUTAN VOLCANO
27. MAKUSHIN VOLCANO
28. BOGOSLOF ISLAND
29. OKMOK CALDERA
30. MOUNT RECHESHNOI
31. MOUNT VSEVIDOF
32. MOUNT CLEVELAND
33. CARLISLE VOLCANO
34. SEGUAM ISLAND
35. KANAGA VOLCANO

Figure 1. Map showing volcanoes represented in this collection and other place names referred to in captions.

SELECTED PHOTOGRAPHS

Mount Douglas

1. Mount Douglas, a dissected and largely ice-covered, 2,135-m (7,005 ft)-high stratovolcano at the northeastern tip of the Alaska Peninsula. View is to the south. Photograph by C. Nye, Alaska Division of Geological and Geophysical Surveys, August, 1991.

Mount Douglas

2. At the summit of 2,135-m (7,005 ft)-high Mount Douglas volcano on the northeastern tip of the Alaska Peninsula is a warm and highly acidic crater lake approximately 160 m (525 ft) wide. Photograph by C. Neal, U.S. Geological Survey, June 4, 1990.

Mount Douglas

3. Steam rises from active fumaroles on the north side of the crater lake (left center) at Mount Douglas volcano on the northeastern tip of the Alaska Peninsula. In 1992, the lake had a pH of 1.1 and a temperature of 21 ^{o}C (70 ^{o}F). Photograph by C. Nye, Alaska Division of Geological and Geophysical Surveys, August, 1982.

Mount Douglas

4. Active fumaroles deposit sulfur near the margin of the crater lake at Mount Douglas volcano on the northeastern tip of the Alaska Peninsula. Area of view is approximately 20 cm (8 in) across. Photograph by C. Nye, Alaska Division of Geological and Geophysical Surveys, August, 1982.

Kaguyak Volcano

5. The 2.5-km (1.5 mi)-diameter, lake-filled caldera of Kaguyak volcano truncates a former stratovolcano. Postcaldera lava domes form a prominent peninsula (right center) and a small island. Photograph by C. Nye, Alaska Division of Geological and Geophysical Surveys, August, 1982.

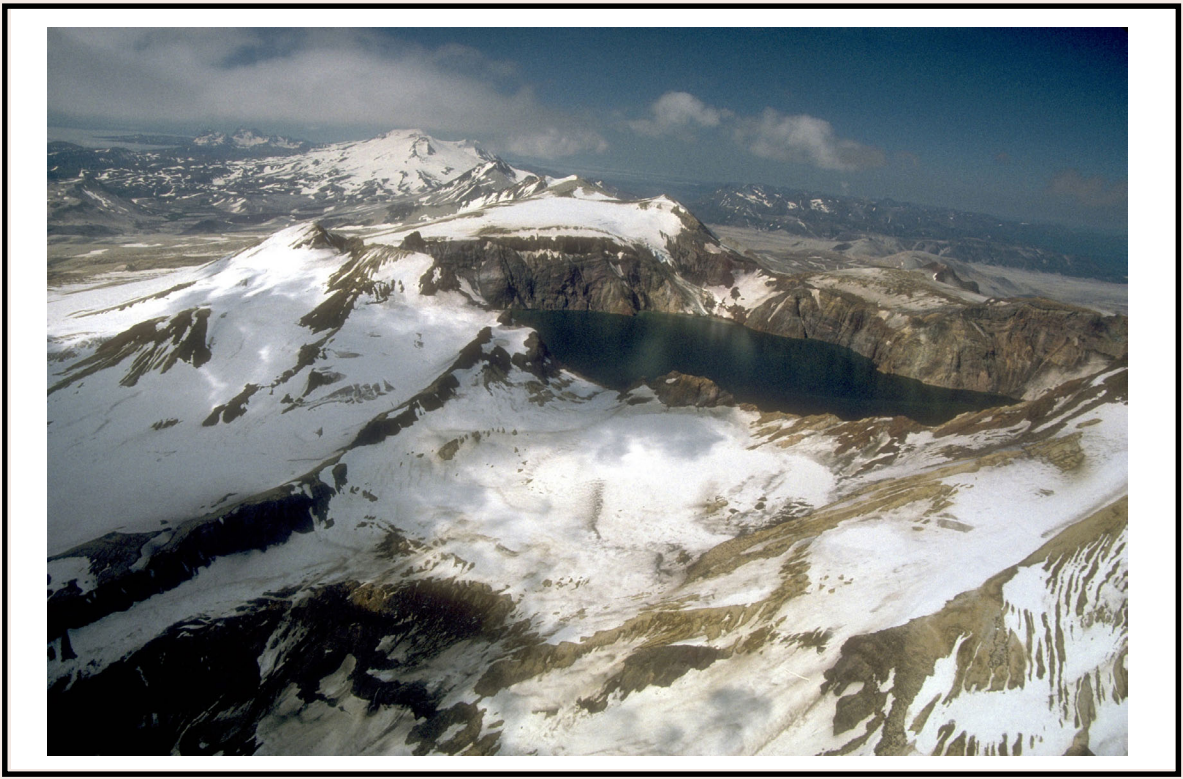
Kaguyak Volcano

6. Kaguyak volcano is lake-filled caldera, 2.5-km (1.5 mi) in diameter, that truncates a former stratovolcano. Postcaldera lava domes form a prominent peninsula and a small island. Fourpeaked Mountain, a little-studied volcano, is on the skyline at left. Photograph by C. Nye, Alaska Division of Geological and Geophysical Surveys, August, 1982.

Kaguyak Volcano

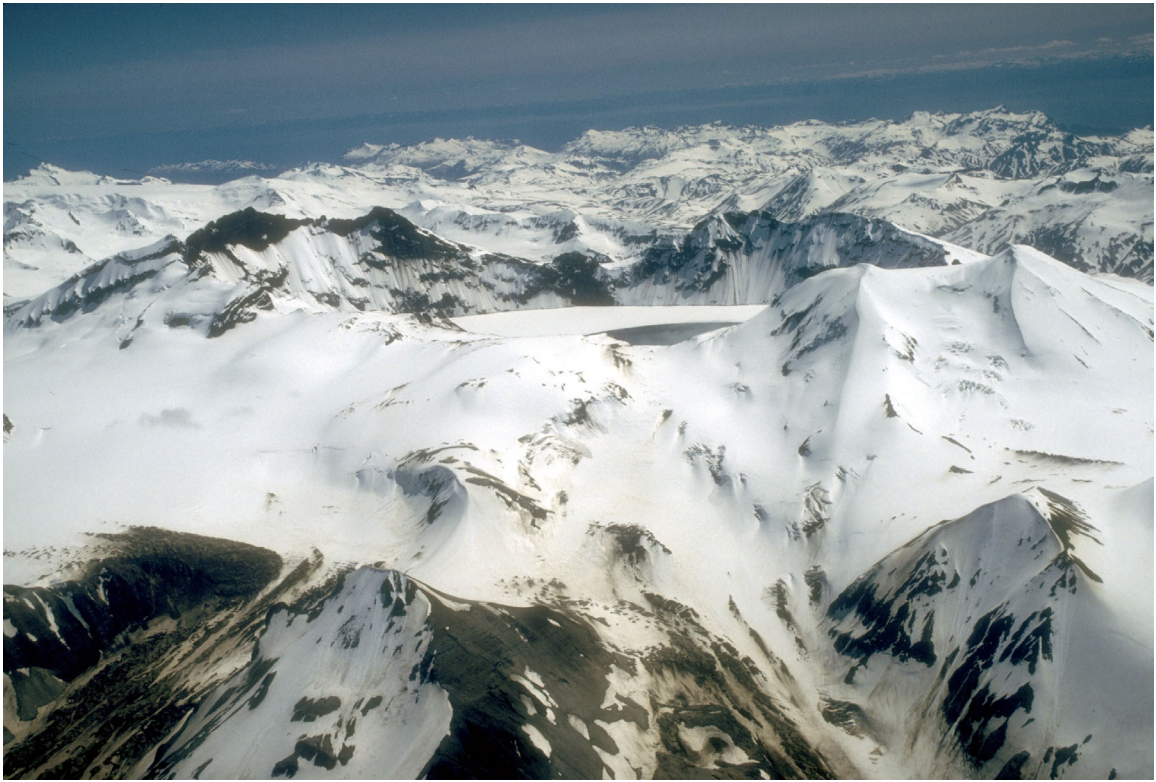
7. Kaguyak volcano is lake-filled caldera, 2.5-km (1.5 mi) in diameter, that truncates a former stratovolcano. Postcaldera lava domes form a prominent peninsula (center) and a small island. Photograph by C. Neal, U.S. Geological Survey, June 4, 1990.

Katmai Caldera



8. Katmai Caldera, a collapse feature that formed during the catastrophic eruption of nearby Novarupta volcano in June, 1912. Katmai Caldera is a steep-walled, 1.5-km (1 mi)-diameter crater that truncates a formerly 2,290-m (7,513 ft)-high stratovolcano. The caldera is partially filled by a blue-green lake about 250 m (820 ft) deep. The lake level was still rising when last measured in the mid-1970's. Beyond the caldera are the multiple peaks of Trident Volcano; Mount Mageik volcano is the snow and ice-covered cone on the skyline. View is to the northeast. Photograph by C. Nye, Alaska Division of Geological and Geophysical Surveys, August, 1991.

Katmai Caldera



9. Katmai Caldera, a collapse feature that formed during the catastrophic eruption of nearby Novarupta volcano in June, 1912, is a steep-walled, 1.5-km (1 mi)-diameter crater which truncates a formerly 2,290-m (7,513 ft)-high stratovolcano. The caldera is partially filled by a blue-green lake about 250 m (820 ft) deep. The lake level was still rising when last measured in the mid-1970's. Photograph by C. Neal, U.S. Geological Survey, June 4, 1990.

Katmai Caldera

10. Katmai Caldera, a collapse feature that formed during the catastrophic eruption of nearby Novarupta volcano in June, 1912, is a steep-walled, 1.5-km (1 mi)-diameter crater that truncates a formerly 2,290-m (7,513 ft)-high stratovolcano. The caldera is partially filled by a blue-green lake about 250 m (820 ft) deep. The lake level was still rising when last measured in the mid-1970's. The multiple peaks of Trident Volcano are at top left. The lava dome of Novarupta volcano, which marks the site of the 1912 eruption, is visible at top, center. Photograph by C. Neal, U.S. Geological Survey, June 4, 1990.

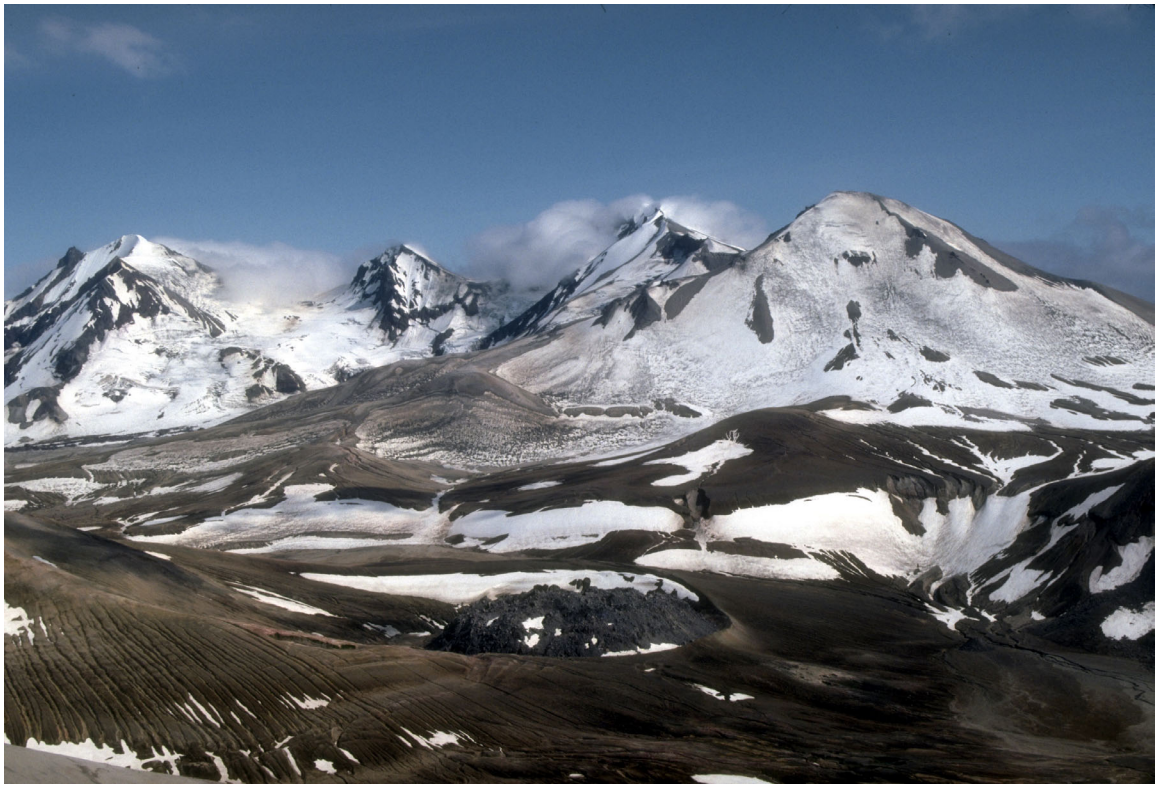
Katmai Caldera

11. View from the north rim of Katmai Caldera, a collapse feature that formed during the catastrophic eruption of nearby Novarupta volcano in June, 1912. Katmai Caldera is a steep-walled, 1.5-km (1 mi)-diameter crater that truncates a formerly 2,290-m (7,513 ft)-high stratovolcano. The caldera is partially filled by a blue-green lake about 250 m (820 m) deep. The lake level was still rising when last measured in the mid-1970's. The south interior wall of the caldera is visible in this view. Photograph by R. McGimsey, U.S. Geological Survey, July 16, 1990.

Katmai Caldera

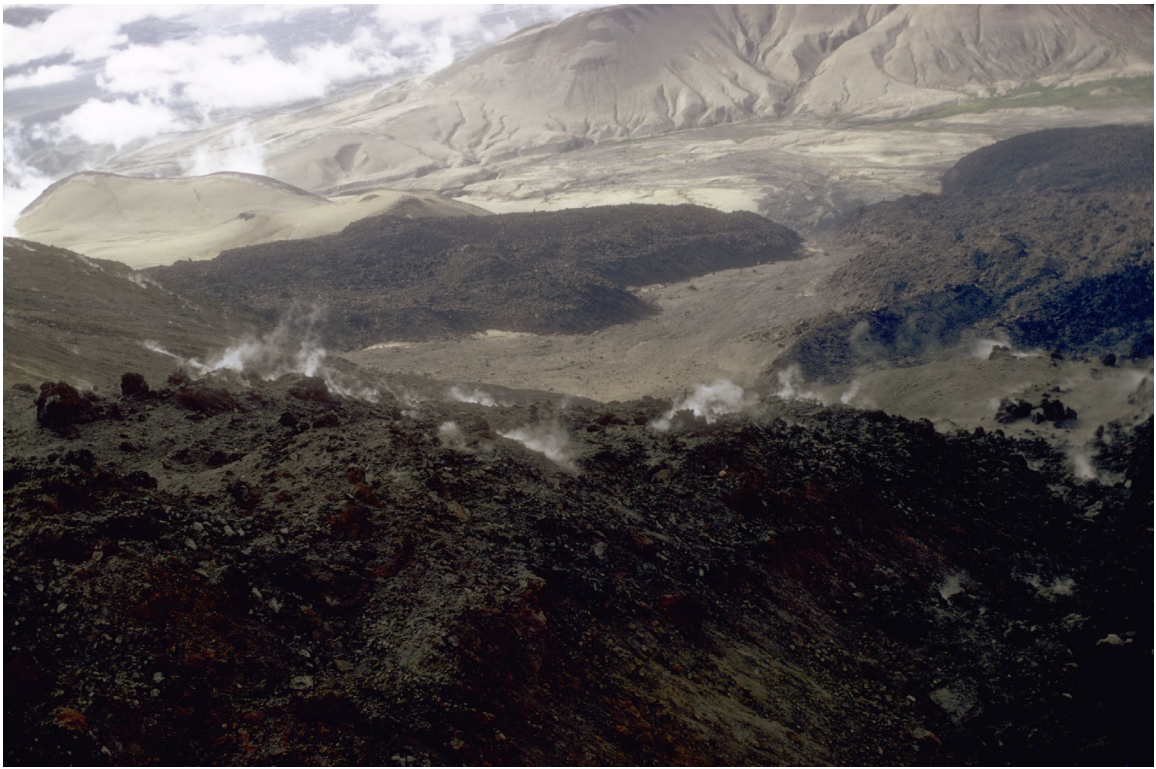
12. View from the west rim of Katmai Caldera, a collapse feature that formed during the catastrophic eruption of nearby Novarupta volcano in June, 1912. Katmai Caldera is a steep-walled, 1.5-km (1 mi)-diameter crater that truncates a formerly 2,290-m (7,513 ft)-high stratovolcano. The caldera is partially filled by a blue-green lake about 250 m (820 ft) deep. The lake level was still rising when last measured in the mid-1970's. The east interior wall of the caldera is visible in this view. Photograph by R. McGimsey, U.S. Geological Survey, July 16, 1990.

Trident Volcano



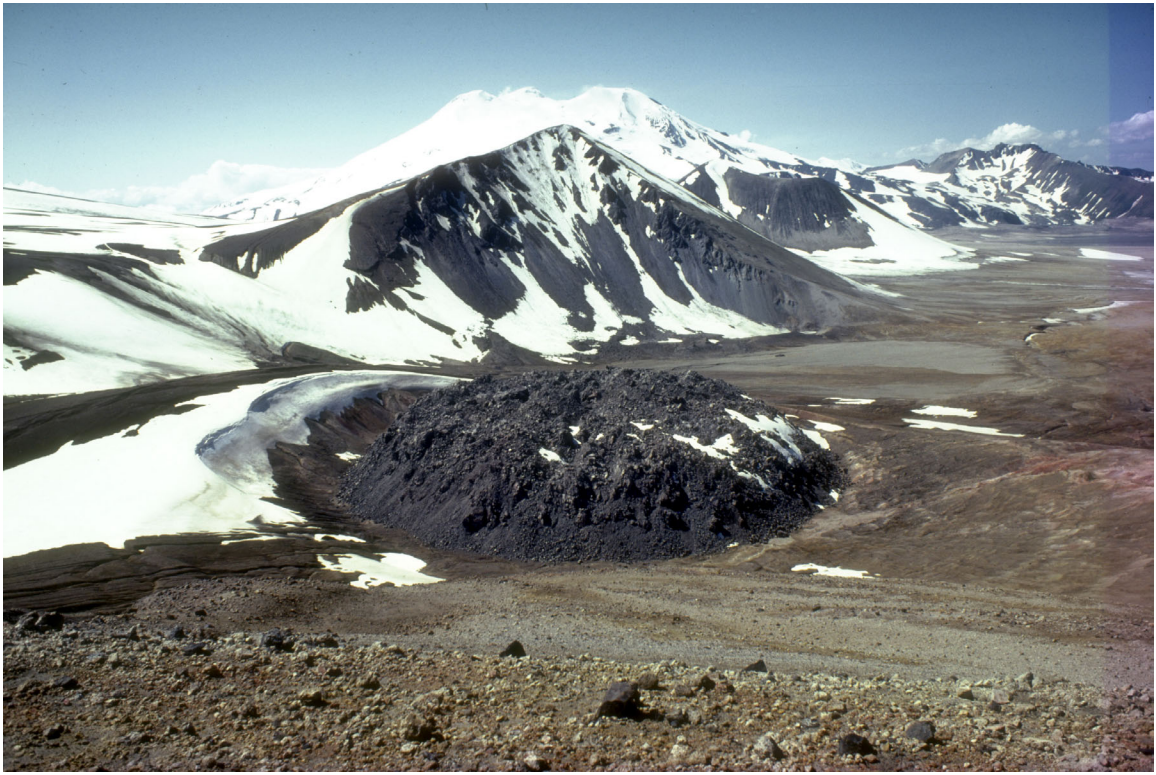
13. The multiple peaks of Trident Volcano as viewed from the top of Baked Mountain in the Valley of Ten Thousand Smokes, Alaska. Trident Volcano is composed of a cluster of andesite and dacite cones and is the only Katmai group volcano other than Katmai and Novarupta to have had historical activity. The Novarupta lava dome is visible at bottom, center. Photograph by R. McGimsey, U.S. Geological Survey, July 12, 1990.

Trident Volcano



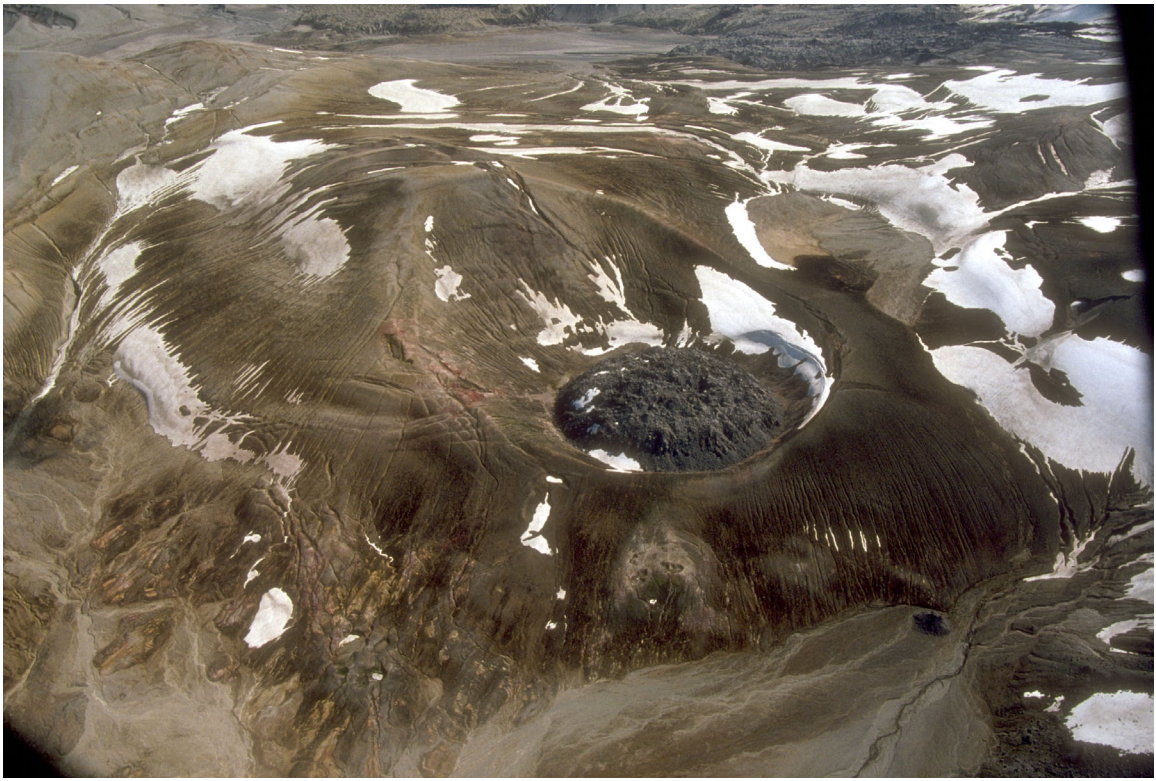
14. These blocky andesite lava flows from Trident Volcano were emplaced during an extended eruptive period between 1953 and the mid-1960's. Trident Volcano is composed of a cluster of andesite and dacite cones and is the only Katmai group volcano other than Katmai and Novarupta to have had historical activity. Photograph by T. Miller, U.S. Geological Survey, July, 1974.

Novarupta



15. Aerial view of 80-m (260 ft)-high Novarupta, a blocky rhyolite lava dome that marks the vent for the 1912 eruption that created the Valley of Ten Thousand Smokes in Katmai National Park and Preserve, Alaska. This eruption was the most voluminous on Earth in the 20th century, ejecting nearly 30 cubic kilometers (7 cubic miles) of material in 60 hours. Falling Mountain, a lava dome truncated by the 1912 eruption, is visible behind the Novarupta dome; snow-capped Mount Mageik volcano can be seen at top of the photograph. Photograph by T. Miller, U.S. Geological Survey, June, 1979.

Novarupta



16. Aerial view of 80-m (260 ft)-high Novarupta, a blocky rhyolite lava dome that marks the vent for the 1912 eruption that created the Valley of Ten Thousand Smokes in Katmai National Park and Preserve, Alaska. This eruption was the most voluminous on Earth in the 20th century, ejecting nearly 30 cubic kilometers (7 cubic miles) of material in 60 hours. Surrounding the dome is an oval-shaped ring of coarse tephra that accumulated during the waning explosive phases of the 1912 eruption. Photograph by C. Nye, Alaska Division of Geological and Geophysical Surveys, August, 1991.

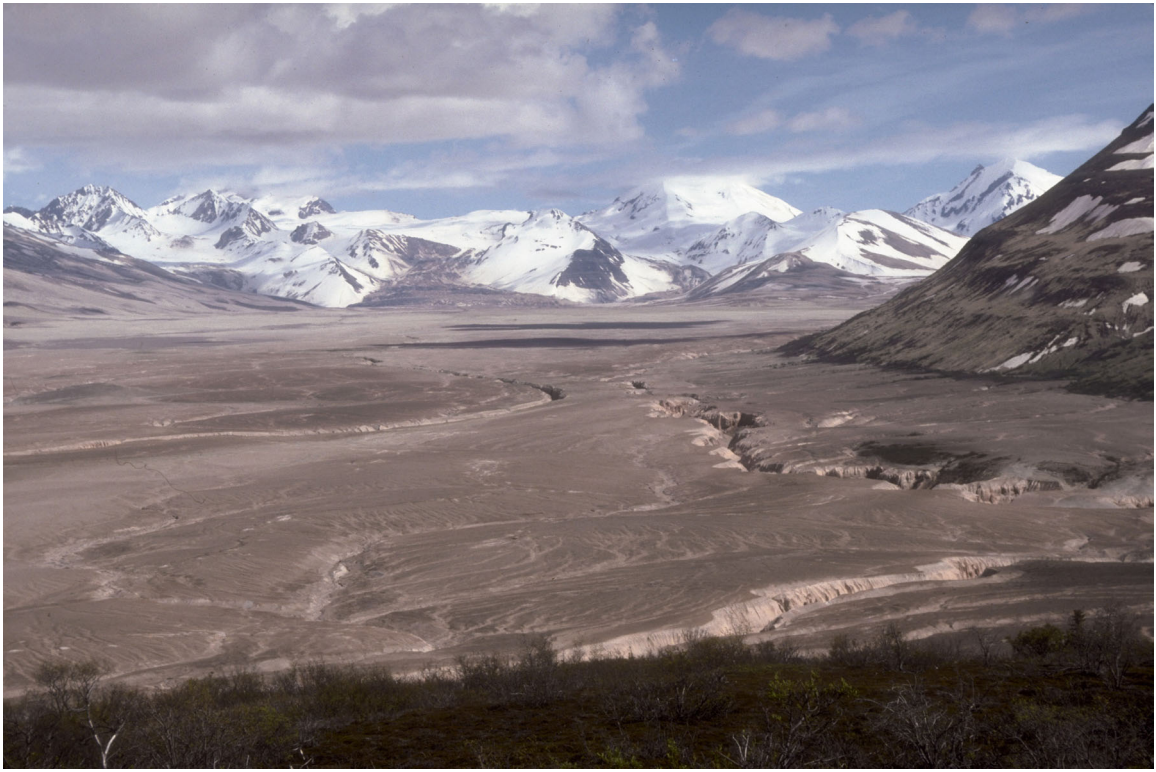
Novarupta

17. View from Mount Katmai of Novarupta lava dome (dark, rounded feature in center), which is surrounded by (clockwise from upper left) Falling, Baked, and Broken Mountains. The Valley of Ten Thousand Smokes (upper right), Katmai National Park and Preserve, Alaska, was created by the 1912 eruption of Novarupta volcano. Photograph by C. Nye, Alaska Division of Geological and Geophysical Surveys, August, 1991.

The Valley of Ten Thousand Smokes

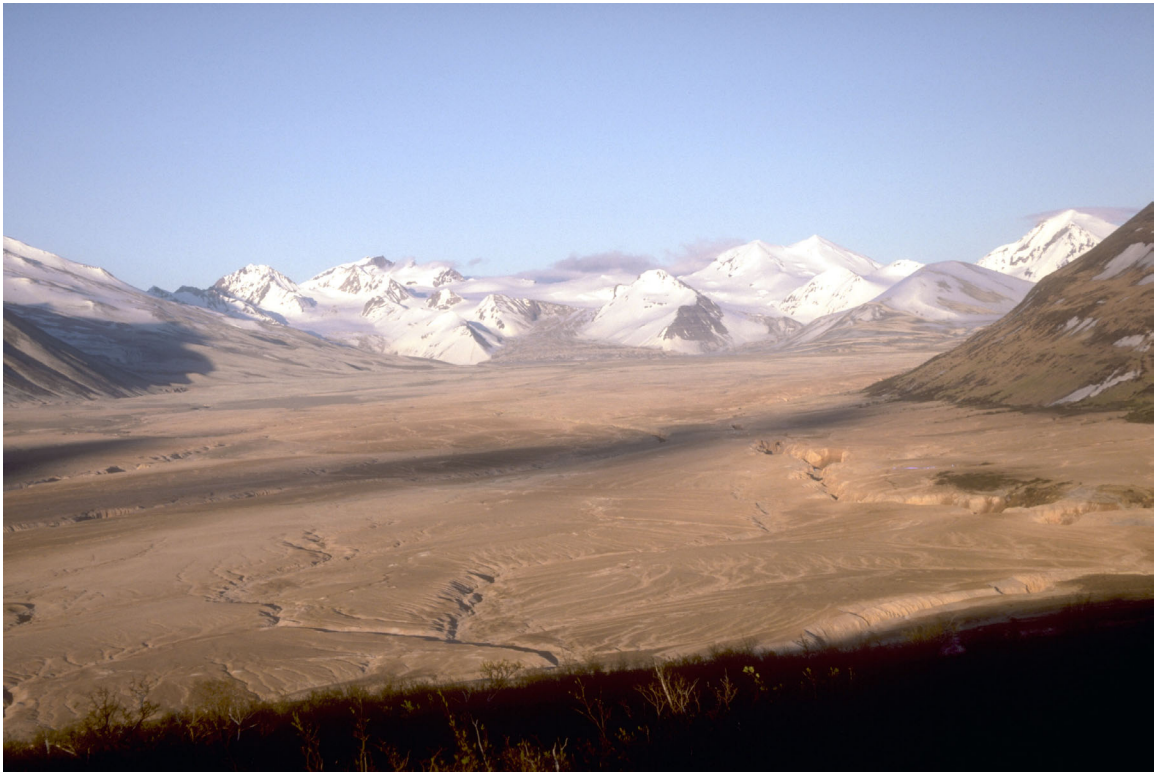
18. A cross section of the 1912 ash flow exposed by the River Lethe in the Valley of Ten Thousand Smokes, Katmai National Park and Preserve, Alaska. In places the ash flow is up to 200 m (660 ft) thick. Photograph by S. McNutt, Geophysical Institute, University of Alaska Fairbanks, July, 1993.

The Valley of Ten Thousand Smokes



19. View southeast up the Valley of Ten Thousand Smokes from the Overlook Cabin in Katmai National Park and Preserve, Alaska. The valley is filled with up to 200 m (660 ft) of ash-flow deposits from the 1912 eruption of Novarupta volcano. The rim of Katmai Caldera is on the skyline at left. Photograph by R. McGimsey, U.S. Geological Survey, June 10, 1991.

The Valley of Ten Thousand Smokes



20. View southeast up the Valley of Ten Thousand Smokes from the Overlook Cabin in Katmai National Park and Preserve, Alaska. The valley has been filled with up to 200 m (660 ft) of ash-flow deposits from the 1912 eruption of Novarupta volcano. The rim of Katmai Caldera is on the skyline at left. Photograph by R. McGimsey, U.S. Geological Survey, June 8, 1991.

Mount Griggs

21. Mount Griggs volcano, 2,317-m (7,602 ft)-high, lies 10 km (6 mi) behind the volcanic arc defined by other Katmai group volcanoes. Although no historical eruptions have been reported from Mount Griggs, vigorously active fumaroles persist in a summit crater and along the upper southwest flank. The slopes of Mount Griggs are heavily mantled by fallout from the 1912 Novarupta eruption. View is to the northeast. Photograph by R. McGimsey, U.S. Geological Survey, July 11, 1990.

Mount Griggs

22. Mount Griggs volcano, 2,317-m (7,602 ft)-high, here seen from the west rim of Katmai caldera, lies 10 km (6 mi) behind the volcanic arc defined by other Katmai group volcanoes. Although no historic eruptions have been reported from Mount Griggs, vigorously active fumaroles persist in a summit crater and along the upper southwest flank. The slopes of Mount Griggs are heavily mantled by fallout from the 1912 eruption of Novarupta volcano. View is to the northwest. Photograph by R. McGimsey, U.S. Geological Survey, July 16, 1990.

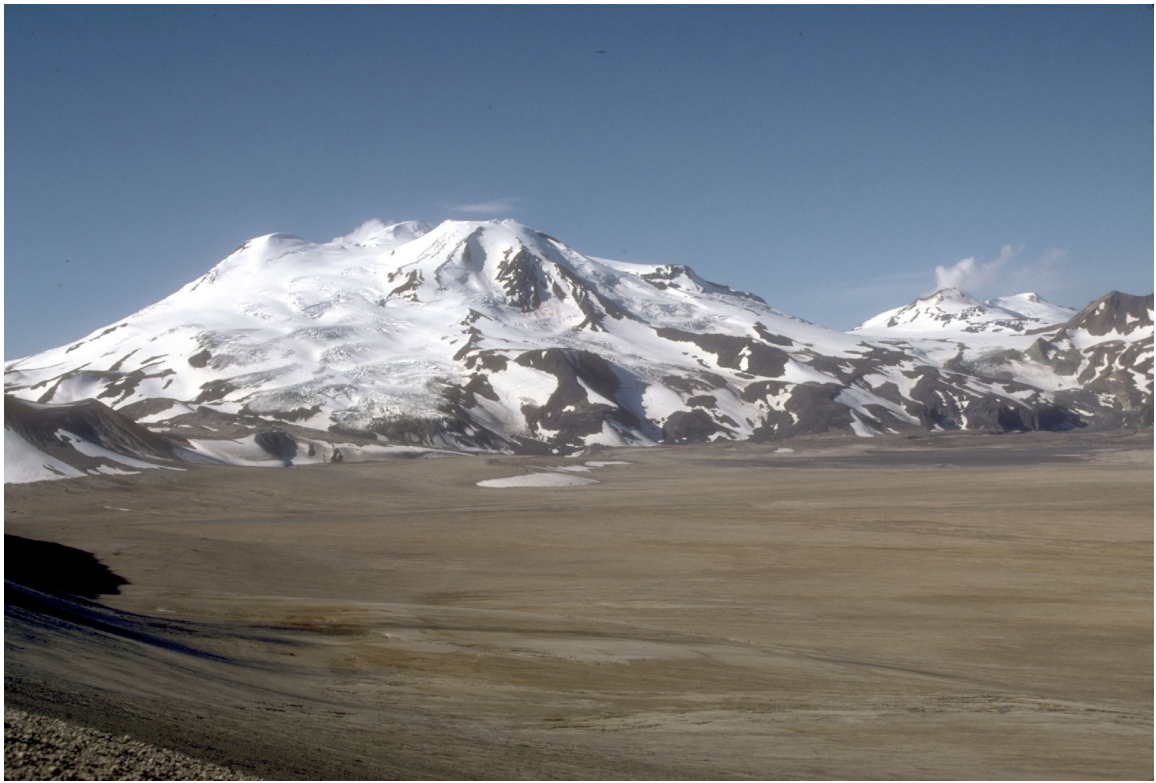
Mount Griggs

23. Geologists walk toward 2,317-m (7,602 ft)-high, Mount Griggs volcano from the base of Knife Creek Glacier at the base of the northwest flank of Mount Katmai. Mount Griggs volcano lies 10 km (6 mi) behind the volcanic arc defined by other Katmai group volcanoes. Although no historical eruptions have been reported from Mount Griggs, vigorously active fumaroles persist in a summit crater and along the upper southwest flank. The slopes of Mount Griggs are heavily mantled by gray fallout from the 1912 eruption of Novarupta volcano. View is to the north. Photograph by R. McGimsey, U.S. Geological Survey, July 16, 1990.

Mount Mageik

24. Aerial view of the four-peaked, 2,165-m (7,103 ft)-high Mount Mageik volcano at the head of the Valley of Ten Thousand Smokes. Lava flows from Trident Volcano are ponded against the base of Mount Mageik at lower right. Martin volcano, with a gaping summit crater, is visible beyond and to the left of Mount Mageik along the topographic crest. View is to the west. Photograph by C. Neal, U.S. Geological Survey, June 4, 1990.

Mount Mageik



25. Mount Mageik (2,165 m [7,103 ft] high) and Mount Martin (1,863 m [6,112 ft] high; on skyline at right) volcanoes, both emitting steam plumes from their summits, as viewed to the southwest from across the Valley of Ten Thousand Smokes, Katmai National Park and Preserve, Alaska. Photograph by R. McGimsey, U.S. Geological Survey, July 15, 1990.

Mount Mageik

26. Nestled within a summit depression of 2,165-m (7,103 ft)-high Mount Mageik volcano is an acidic, hot (70 °C [158 °F]) crater lake. Persistent, vigorous fumaroles are present. No historical eruptions from Mount Mageik have been confirmed. Photograph by C. Neal, U.S. Geological Survey, June 4, 1990.

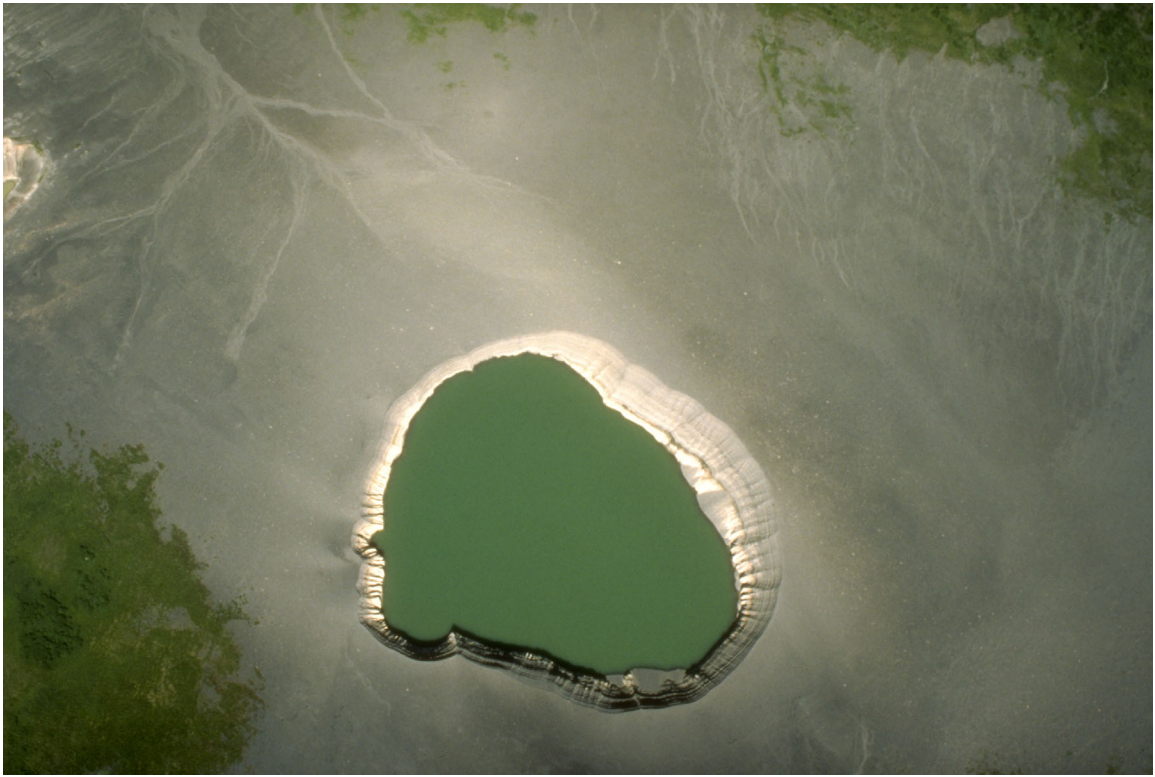
Mount Martin

27. View of the summit crater of 1,863-m (6,112 ft)-high Mount Martin volcano, a largely ice-covered stratovolcano at the southern end of the Katmai group. Note the sulfur (yellow) that has been deposited on the snow- and ice-covered crater walls. Photograph by C. Neal, U.S. Geological Survey, June 4, 1990.

Ukinrek Maars

28. Aerial view, looking north, over the Ukinrek Maars on the south shore of Becharof Lake on the Alaska Peninsula. The maar craters formed during a 10-day eruption in March and April of 1977. In the distance (center) are the Gas Rocks, an older volcanic center. Photograph by C. Nye, Alaska Division of Geological and Geophysical Surveys, May 9, 1994.

Ukinrek Maars



29. Near-vertical view of the east Ukinrek Maar crater, 300 m (980 ft) across, that formed in 1977 during a 10-day phreatomagmatic eruption. Part of smaller west Ukinrek Maar crater is visible at upper left. Photograph by D. Dewhurst, U.S. Fish and Wildlife Service, July 8, 1990.

Ukinrek Maars

30. Southeast wall of the eastern Ukinrek Maar crater. The rhythmically layered, dark gray material visible in the wall consists of more than 15 m (50 ft) of phreatomagmatic tephra. The 1977 tephra sits on an exposure of glacial till capping ash-flow deposits from Ugashik Caldera. The lake has filled the original crater to a depth of more than 30 m (100 ft). In the distance at very top of photograph are debris-avalanche hummocks from an unknown source near the current site of Peulik volcano. Photograph by C. Neal, U.S. Geological Survey, June 4, 1990.

Ukinrek Maars

31. Phreatomagmatic eruption column rising from the east Ukinrek Maar crater at about 5:00 PM on April 6, 1977. View is to the southeast. Photograph by R. Russell, Alaska Department of Fish and Game, April 6, 1977.

Ukinrek Maars

32. Phreatomagmatic eruption column rising from the east Ukinrek Maar crater at about 5:00 PM on April 6, 1977. View is to the east. Photograph by R. Russell, Alaska Department of Fish and Game, April 6, 1977.

Peulik Volcano

33. Peulik volcano, a 1,474-m (4,836 ft)-high stratovolcano, as viewed at sunset from the south shore of Becharof Lake on the Alaska Peninsula. Photograph by C. Neal, U.S. Geological Survey, June, 1993.

Peulik Volcano

34. Peulik volcano, a 1,474-m (4,836 ft)-high stratovolcano, as viewed from the Ukinrek Maars on the south shore of Becharof Lake on the Alaska Peninsula. In the middle distance is hummocky ground that probably represents debris-avalanche deposits from an older Peulik stratovolcano. Photograph by C. Neal, U.S. Geological Survey, June 25, 1993.

Ugashik Caldera

35. Aerial view, looking southwest, of Ugashik caldera adjacent to Peulik volcano. At least five lava domes (snow-covered in this view) presently occupy the floor of the 5-km (3 mi)-diameter caldera. Photograph by M.E.. Yount, U.S. Geological Survey, April 11, 1984.

Chiginagak Volcano

36. View, looking southeast, of 2,067-m (6,781 ft)-high Chiginagak volcano on the Alaska Peninsula. U.S. Geological Survey photograph, date unknown.

Chiginagak Volcano

37. Aerial view of a vigorous fumarole at about 1,600 m (5,249 ft) elevation on the north flank of 2,067-m (6,781 ft)-high Chiginagak volcano. Steam emitted from this fumarole commonly produces a small plume and may be the source of the few questionable reports of historical eruptions from this volcano. Photograph by C. Nye, Alaska Division of Geological and Geophysical Surveys, May 9, 1994.

Yantarni Volcano

38. Yantarni volcano, a 1,336-m-high (4,383 ft) andesite stratovolcano with no known historical activity, is located on the Alaska Peninsula. Photograph by T. Miller, U.S. Geological Survey, September, 1985.

Aniakchak Caldera

39. Aerial view, looking east, of Aniakchak caldera, one of the most spectacular volcanoes on the Alaska Peninsula. Formed during a catastrophic ash-flow producing eruption about 3,400 years ago, Aniakchak caldera is about 10 km (6 mi) across and averages 500 m (1,640 ft) in depth. Voluminous postcaldera eruptive activity has produced a wide variety of volcanic landforms and deposits within the caldera. The volcano is located in Aniakchak National Monument and Preserve, Alaska, which is administered by the National Park Service. Photograph by M. Williams, National Park Service, 1977.

Aniakchak Caldera

40. View, looking southwest, into Aniakchak caldera from its north rim. Surprise Lake, which drains into the Aniakchak River, is visible on the caldera floor. The prominent steep-sided intracaldera stratovolcano in the distance is Vent Mountain. Photograph by C. Neal, U.S. Geological Survey, June 29, 1992.

Aniakchak Caldera

41. Geologists on the rim of Vent Mountain, an intracaldera stratovolcano, look northwest towards Half Cone, a prominent vent on the caldera floor and the source of the most explosive postcaldera eruptions at Aniakchak caldera. Photograph by C. Neal, U.S. Geological Survey, June 23, 1992.

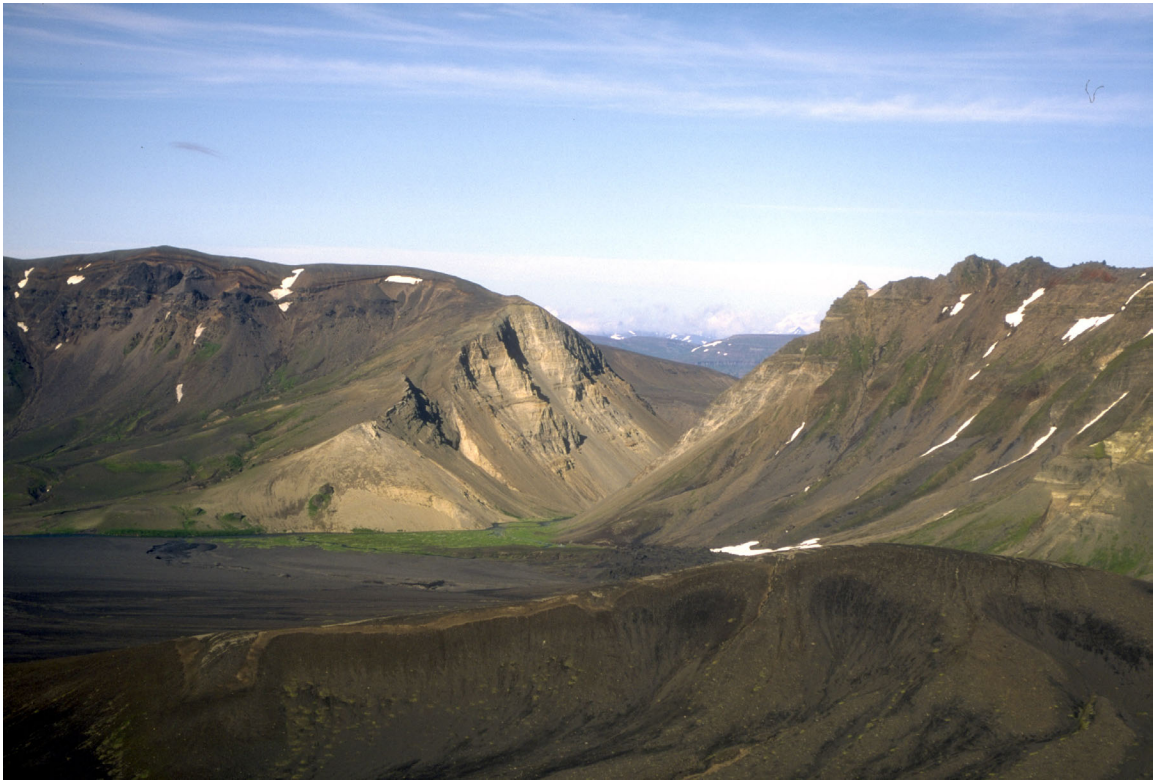
Aniakchak Caldera

42. View, looking south, across Aniakchak caldera from its north rim. Surprise Lake and its outlet are visible at upper left. The prominent dark peak on the left skyline is Black Nose, a high standing remnant of precaldera volcaniclastic rocks. Hummocky ground in the distance against the caldera wall is a pumice-covered glacier and associated moraine. Photograph by T. Miller, U.S. Geological Survey, August, 1985.

Aniakchak Caldera

43. Geologists walking across the pumice-covered floor of Aniakchak caldera en route to Vent Mountain, a prominent intracaldera stratovolcano. In the middle ground is a breached tuff cone informally known as “Surprise Cone.” Photograph by R. McGimsey, U.S. Geological Survey, June 23, 1992.

Aniakchak Caldera



44. The Gates, a v-shaped notch in the eastern wall of Aniakchak caldera, is the outlet for Surprise Lake, which is visible at left. This view is from within the caldera looking northeast. Photograph by C. Neal, U.S. Geological Survey, July 19, 1994.

Aniakchak Caldera

45. Geologist examining pyroclastic deposits (above hand) from a violent eruption of Half Cone less than 500 years ago. The deposits unconformably overlie dark gray phreatomagmatic material (below hand) from Surprise tuff cone in Aniakchak caldera. Photograph by R. McGimsey, U.S. Geological Survey, July 23, 1993.

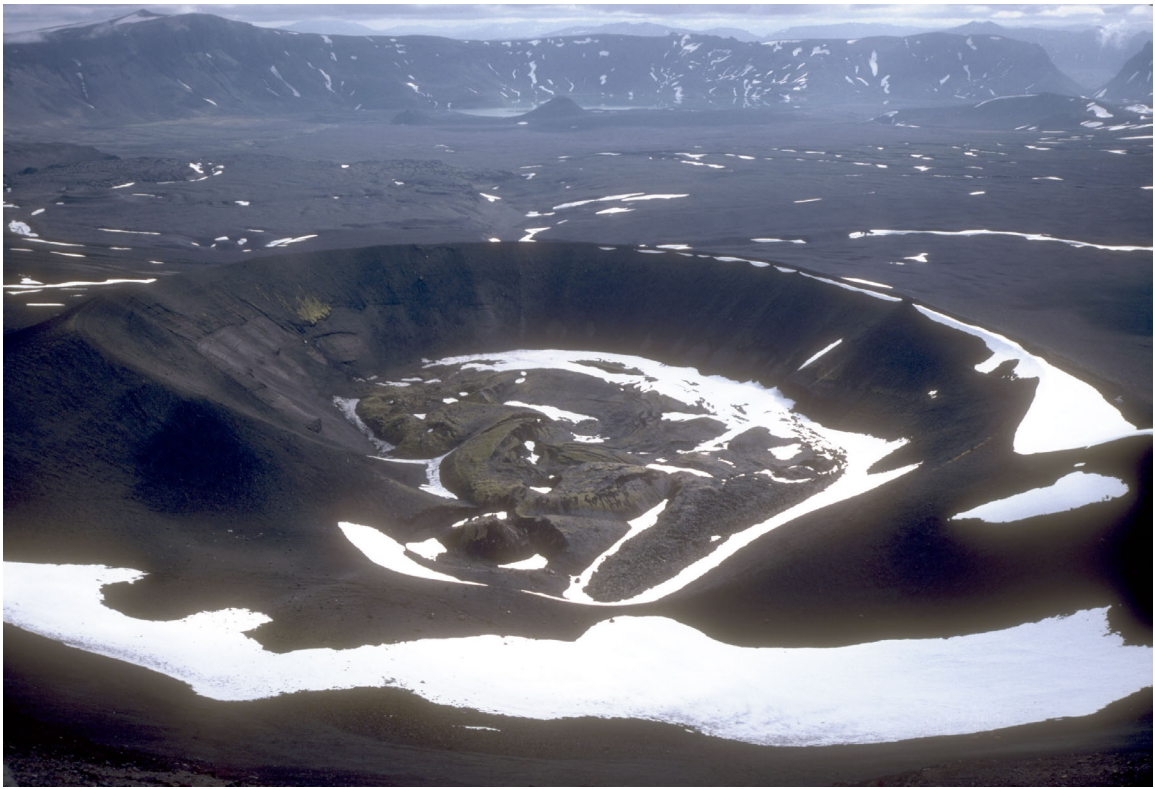
Aniakchak Caldera

46. Jet contrails over Aniakchak caldera. The proximity of explosive volcanoes of the Aleutian volcanic arc to North Pacific air routes is one of the principal hazards associated with volcanoes in Alaska. View is to the south. Photograph by C. Neal, U.S. Geological Survey, July 19, 1994.

Aniakchak Caldera

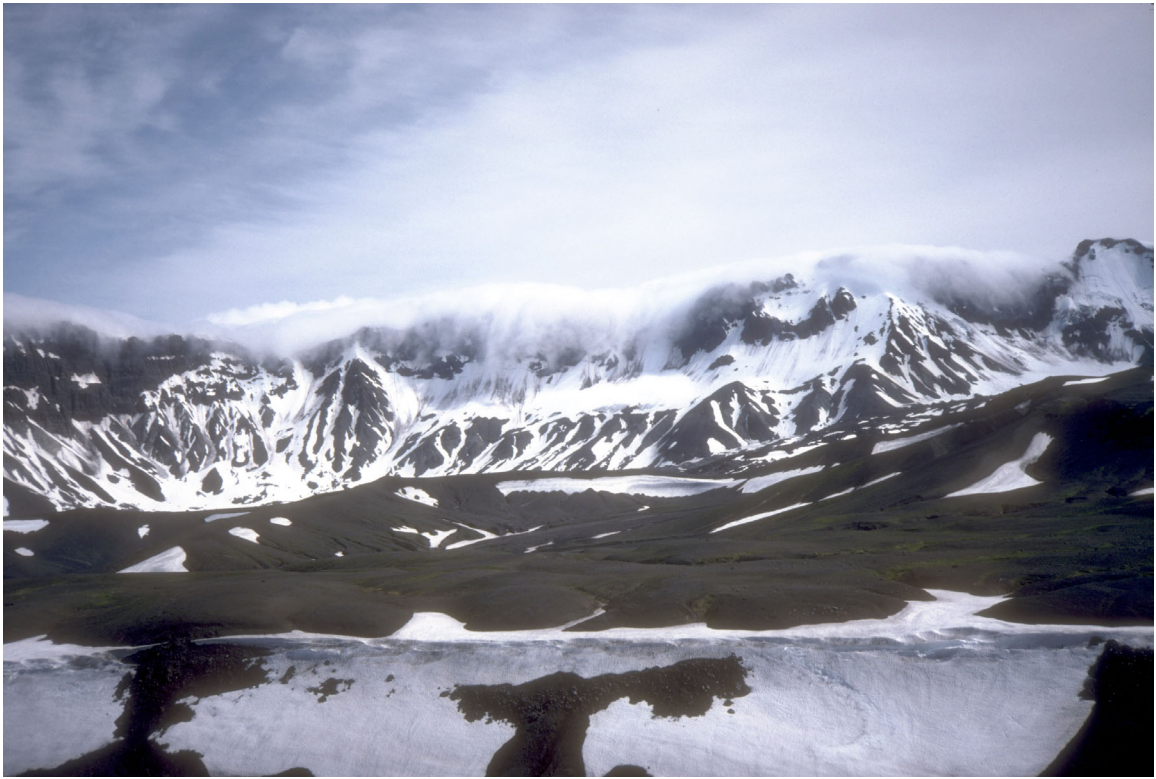
47. View onto the floor of the caldera from the southeast rim of Aniakchak caldera. Two explosion craters (maar craters) partially filled with seasonal meltwater are visible. The craters were formed by explosions through older lava flows from Vent Mountain, an intracaldera stratocone. Photograph by R. McGimsey, U.S. Geological Survey, June 29, 1992.

Aniakchak Caldera



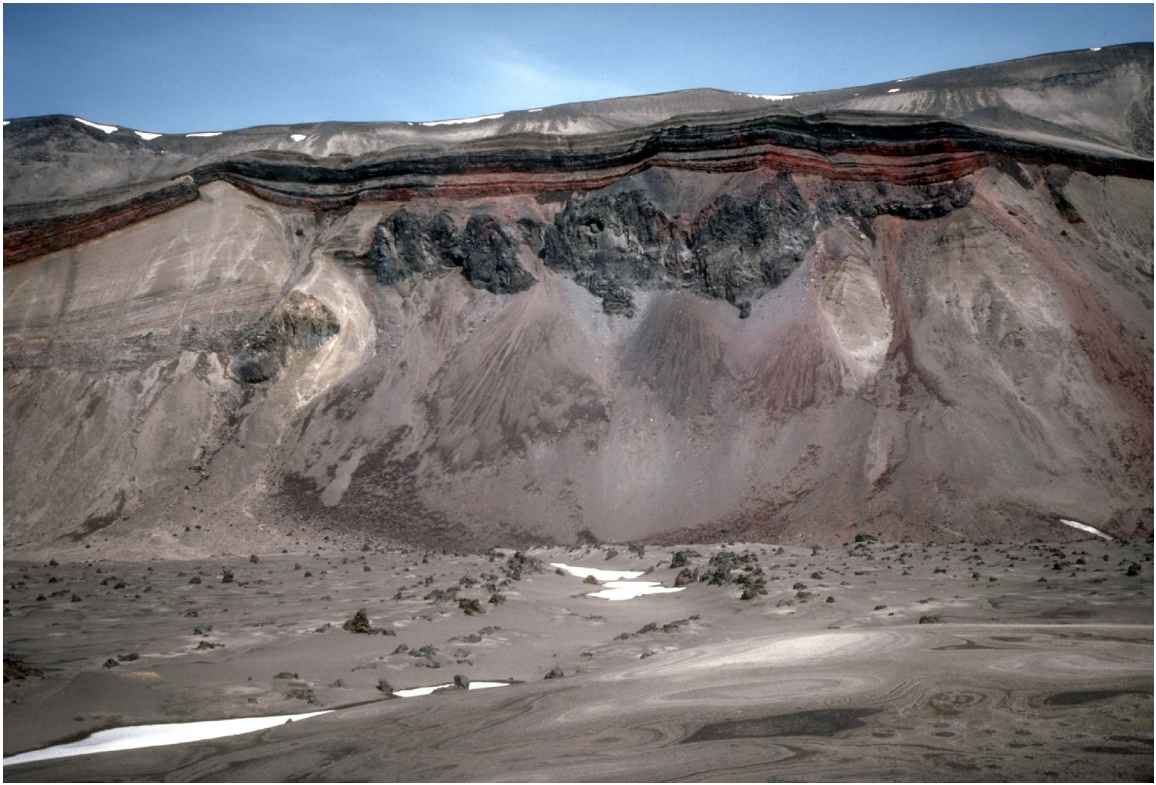
48. View, looking northeast, of the primary site of the 1931 eruption. The site is at the base of the northwest caldera wall. This crater, about 600 m (1970 ft) across, was the site of intermittent explosions of pumice-lithic tephra over the course of several weeks in May and June, 1931. During the final phases of the eruption, a small lava flow and spatter field formed in the bottom of the crater. Photograph by R. McGimsey, U.S. Geological Survey, June 30, 1992.

Aniakchak Caldera



49. Weather clouds cascade over the south wall of Aniakchak caldera, a common occurrence that can portend bad weather. Photograph by C. Neal, U.S. Geological Survey, July 3, 1992.

Aniakchak Caldera



50. View of the cross section of Half Cone, a postcaldera vent now exposed against the north wall of Aniakchak caldera. Within this cliff face are recorded several episodes of lava flows (dark rock outcrops), plinian eruption (lighter colored deposits at left), and spatter-fed-flow accumulation (reddish layers). Photograph by R. McGimsey, U.S. Geological Survey, July 1, 1992.

Black Peak

51. Ash flows from an eruption that formed a small caldera between 3,600 and 4,700 years ago. The caldera is on the eastern edge of the Black Peak volcanic center on the Alaska Peninsula. Photograph by T. Miller, U.S. Geological Survey, October, 1985.

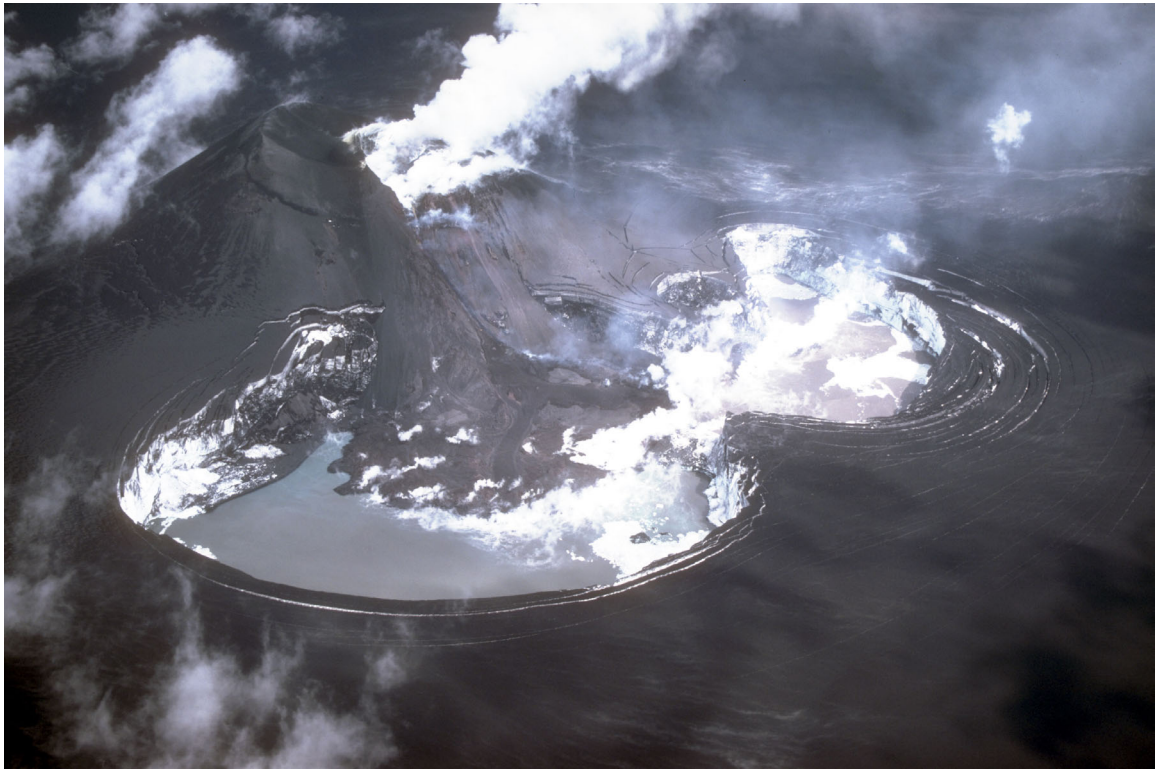
Veniaminof Volcano

52. Strombolian burst of incandescent lava fragments from the intracaldera cinder cone at Veniaminof volcano on the Alaska Peninsula. Veniaminof volcano is a 2,507-m (8,225 ft)-high stratovolcano with a summit caldera that formed about 3,700 years ago. The caldera is now ice-filled. View is to the northwest. Photograph by M.E. Yount, U.S. Geological Survey, July 13, 1983.

Veniaminof Volcano

53. Strombolian burst of incandescent lava fragments from the intracaldera cinder cone at Veniaminof volcano on the Alaska Peninsula. Veniaminof volcano is a 2,507-m (8,225 ft)-high stratovolcano with a summit caldera that formed about 3,700 years ago. The caldera is now ice-filled. View is to the northwest. Photograph by M.E. Yount, U.S. Geological Survey, July 13, 1983.

Veniaminof Volcano



54. Eruptive activity from the intracaldera cinder cone at Veniaminof volcano melted about 0.15 km^3 (0.04 mi^3) of the summit ice-cap. View is to the northeast. Photograph by M.E. Yount, U.S. Geological Survey, July 26, 1983.

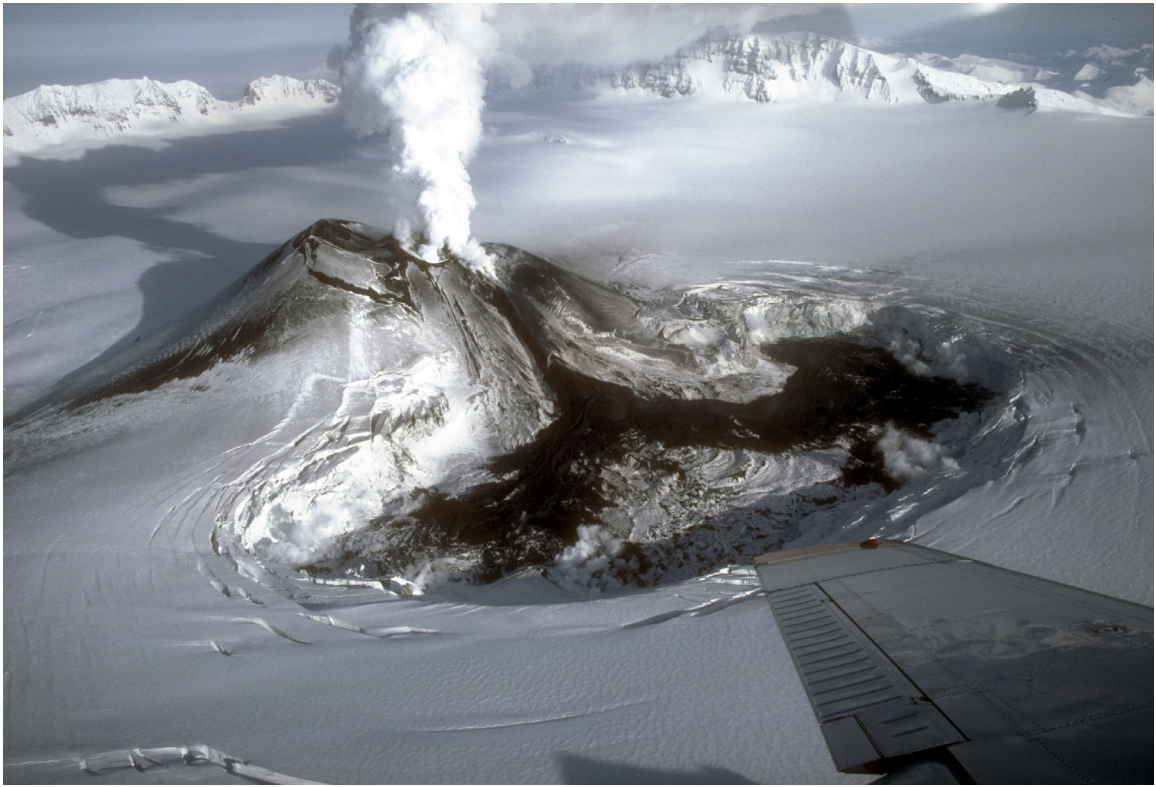
Veniaminof Volcano

55. Incandescent lava flows down the flank of the intracaldera cinder cone at Veniaminof volcano on the Alaska Peninsula. Photograph by M.E. Yount, U.S. Geological Survey, October 7, 1983.

Veniaminof Volcano

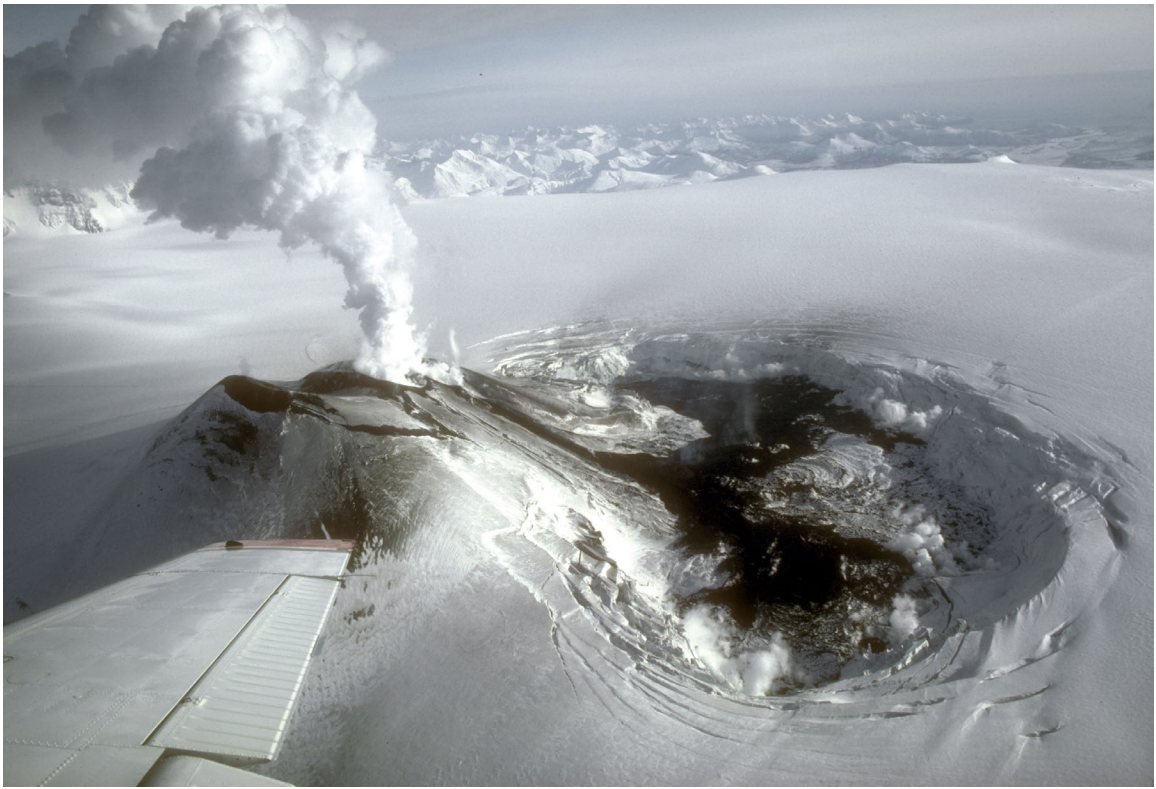
56. A pulsing, gray ash plume rising from the intracaldera cinder cone at Veniaminof volcano on the Alaska Peninsula. View is to the north. Photograph by M.E. Yount, U.S. Geological Survey, October 7, 1983.

Veniaminof Volcano



57. Steam rising from the intracaldera cinder cone at Veniaminof volcano in the waning stages of the 1983 to 1984 eruption. Cooling lava flows fill a pit about 2.3×1.0 km (1.4×0.6 mi) that has been melted in the summit ice cap. Aerial view looking northeast. Photograph by M.E. Yount, U.S. Geological Survey, January 23, 1984.

Veniaminof Volcano

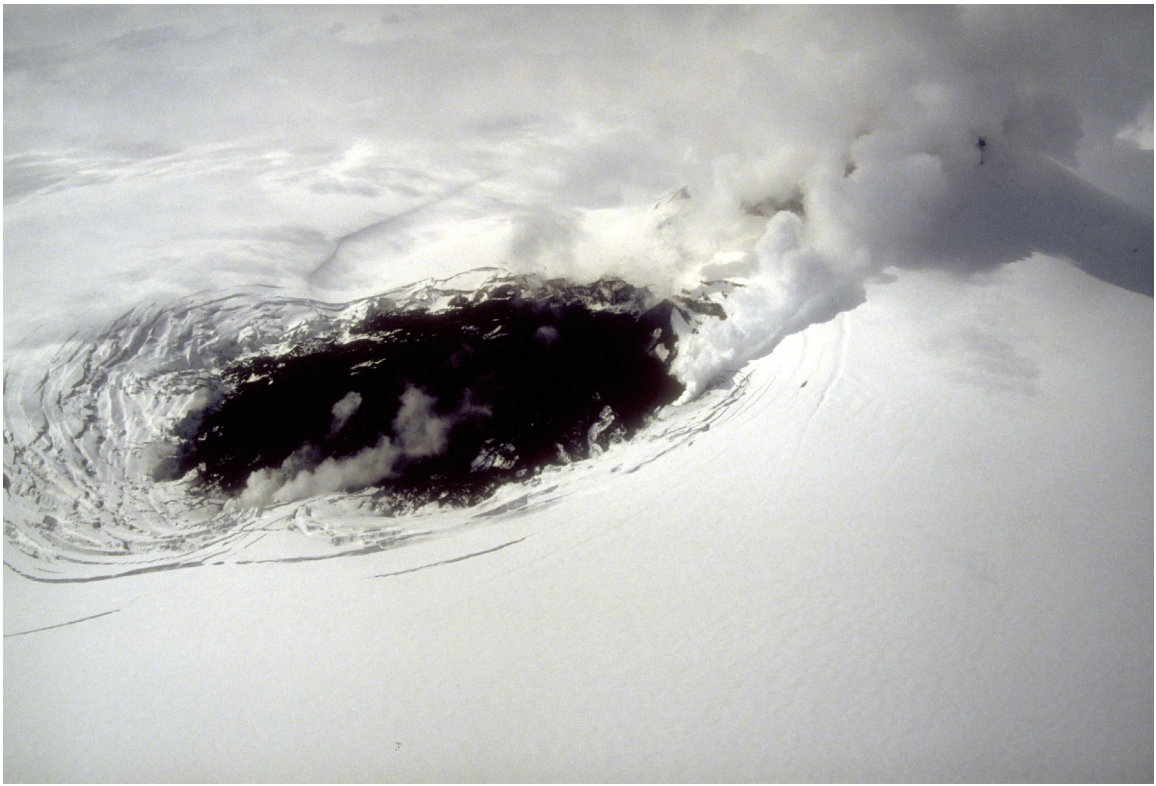


58. Steam rising from the intracaldera cinder cone at Veniaminof volcano in the waning stages of the 1983 to 1984 eruption. Cooling lava flows fill a pit about 2.3×1.0 km (1.4×0.6 mi) that has been melted in the summit ice cap. View is to the southeast. Photograph by M.E. Yount, U.S. Geological Survey, January 23, 1984.

Veniaminof Volcano

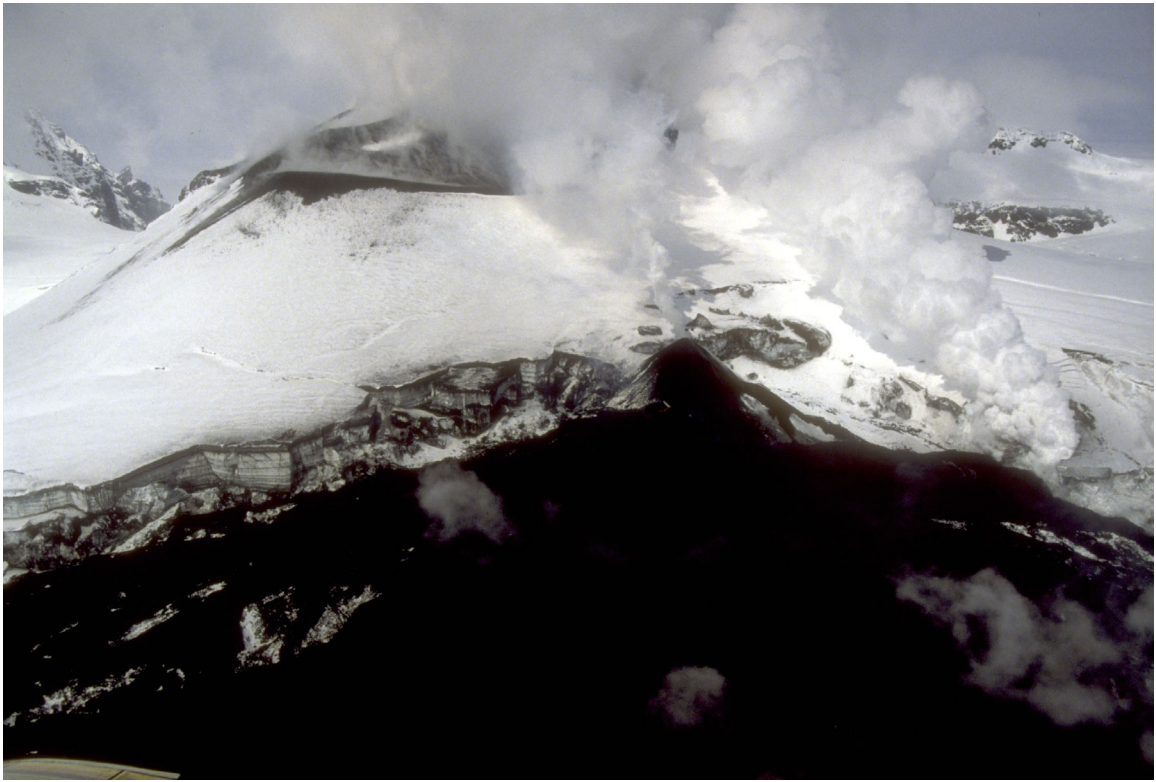
59. A burst of gray ash rising from the intracaldera cinder cone at Veniaminof volcano on the Alaska Peninsula. Photograph by D. Sellers, Alaska Department of Fish and Game, August 3, 1993.

Veniaminof Volcano



60. A new lava flow accumulates at the base of the intracaldera cinder cone (obscured by steam at right) at Veniaminof volcano on the Alaska Peninsula. View is to the south. Photograph by C. Nye, Alaska Department of Geological and Geophysical Surveys, May 9, 1994.

Veniaminof Volcano



61. A new lava flow accumulates at the base of the intracaldera cinder cone at Veniaminof volcano on the Alaska Peninsula. View is to the west. Photograph by C. Nye, Alaska Department of Geological and Geophysical Surveys, May 9, 1994.

Pavlof Sister and Pavlof Volcanoes

62. Steam and volcanic gas rising from the summit crater of 2,519-m (8,264 ft)-high Pavlof Volcano on the Alaska Peninsula. Pavlof is one of the most active of Alaska's volcanoes with nearly 40 historical eruptions. Photograph by T. Miller, U.S. Geological Survey, November, 1973.

Pavlof Sister and Pavlof Volcanoes

63. Pavlof (2,519-m [8,264 ft]-high, right) and Pavlof Sister (2,143-m [7,031 ft]-high, left) are a pair of symmetrical stratovolcanoes on the Alaska Peninsula. Pavlof Volcano is one of the most active of Alaska's volcanoes with nearly 40 historical eruptions. View is to the northwest. Photograph by T. Miller, U.S. Geological Survey, July, 1975.

Pavlof Sister and Pavlof Volcanoes

64. Pavlof Volcano on the Alaska Peninsula is one of the most active of Alaska's volcanoes with nearly 40 historical eruptions. Photograph by S. McNutt, Lamont-Doherty Geological Observatory, 1979.

Pavlof Sister and Pavlof Volcanoes

65. Pavlof Volcano on the Alaska Peninsula is one of the most active of Alaska's volcanoes with nearly 40 historical eruptions. Photograph by S. McNutt, Lamont-Doherty Geological Observatory, 1979.

Emmons Lake Caldera

66. View, looking southeast, of a portion of the Emmons Lake caldera on the Alaska Peninsula. The most recent of several caldera-forming eruptions at Emmons Lake occurred more than 10,000 years ago. No historical eruptions have occurred at Emmons Lake. Photograph by T. Miller, U.S. Geological Survey, July, 1987.

Emmons Lake Caldera

67. View, looking northeast, of 1,436-m (4,711 ft)-high Mount Emmons, a postcaldera stratovolcano within the Emmons Lake caldera on the Alaska Peninsula. The most recent of several caldera-forming eruptions at Emmons Lake occurred more than 10,000 years ago. No historical eruptions have occurred at Emmons Lake. Photograph by T. Miller, U.S. Geological Survey, July, 1987.

Mount Dutton Volcano

68. Mount Dutton, a 1,506-m (4,941 ft)-high stratovolcano, lies 14 km (9 mi) north of the community of King Cove on the Alaska Peninsula. The summit of Mount Dutton is composed of a cluster of lava domes. Mount Dutton has had no historical eruptions. However, seismic swarms beneath the volcano were recorded in 1984 to 1985 and again in 1989. View is to the southwest. Photograph by M.E. Yount, U.S. Geological Survey, July, 1986.

Cold Bay Volcano

69. Cold Bay volcano, a 1,920-m-high (6,299 ft) stratovolcano at the southwest end of the Alaska Peninsula. Photograph by S. McNutt, Lamont-Doherty Geological Observatory, July, 1980.

Shishaldin Volcano

70. Often compared to Mount Fuji, Japan, the symmetrical Shishaldin volcano located on central Unimak Island in the Aleutian Islands rises 2,857 m (9,373 ft) above sea level. The volcano has had several historical eruptions. A summit crater emits a nearly continuous plume of steam. Photograph by C. Nye, Alaska Division of Geological and Geophysical Surveys, May 10, 1994.

Shishaldin Volcano

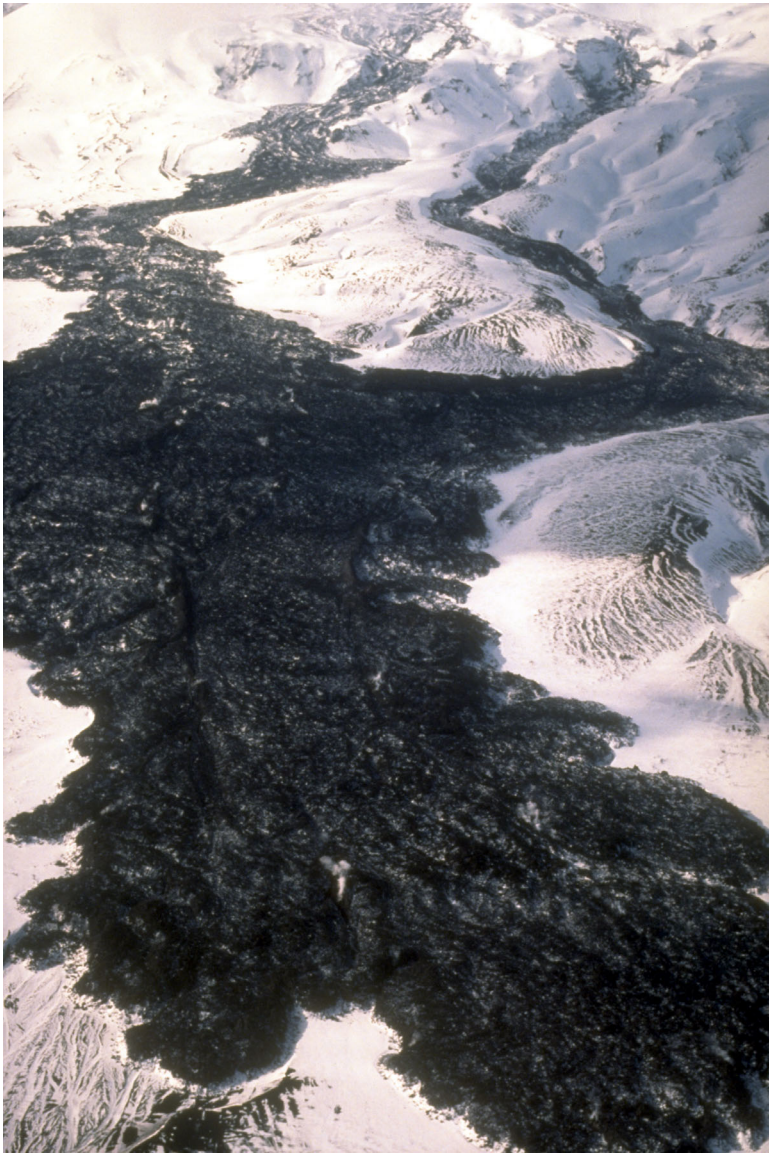
71. Sunset view to the southwest silhouetting Roundtop, Isanotski, and Shishaldin volcanoes on Unimak Island in the eastern Aleutian Islands. Photograph by J. Davies, Geophysical Institute, University of Alaska Fairbanks, August, 1983.

Fisher Caldera

72. View of part of the interior of Fisher caldera on Unimak Island in the eastern Aleutian Islands. Fisher is an 11×18 km (7×11 mi) caldera that formed about 9,100 years ago producing compositionally zoned ash flows that overtopped topographic barriers more than 500 m (1,640 ft) in elevation. There was one poorly documented historical eruption from Fisher caldera in 1826. Photograph by T. Miller, U.S. Geological Survey, August, 1974.

Westdahl Volcano

73. Summit area of Westdahl volcano located on the southwest part of Unimak Island in the eastern Aleutian Islands. The topographic peaks in the distance are Westdahl Peak (left) and Faris Peak (right). The cinder cone in middle ground marks the principal vent for the 1991 to 1992 eruption. Note the snow-mantled lava flow emanating from cinder cone. The sinuous fissure cutting the ice cap formed in the opening phases of the eruption and was the location of spectacular lava fountaining. Photograph by C. Zeillemaker, U.S. Fish and Wildlife Service, February 2, 1993.



Westdahl Volcano

74. View, looking west, of the east flank of Westdahl volcano located on the southwest part of Unimak Island in the eastern Aleutian Islands (top to right). Dark, blocky lava flows are from the 1991 to 1992 eruption; note wisps of steam scattered across the lava flow surface. Photograph by C. Dau, U.S. Fish and Wildlife Service, March 12, 1992.

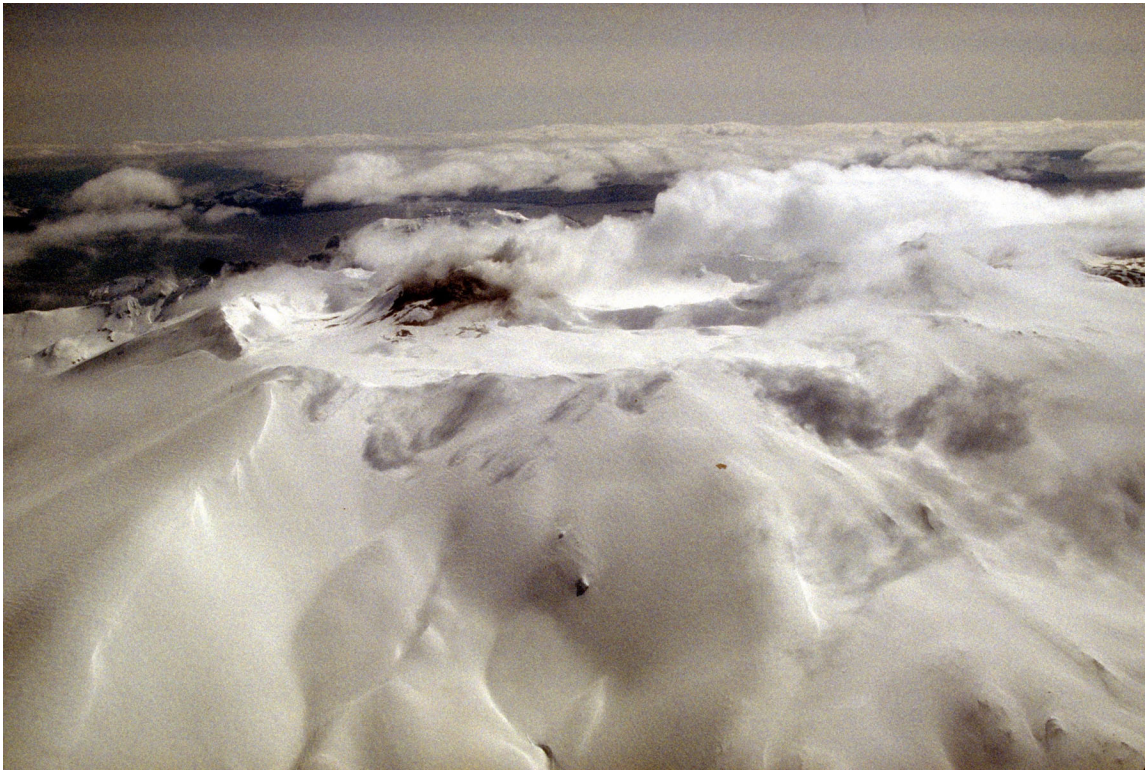
Mount Gilbert

75. Mount Gilbert is a poorly known 818-m-high (2,684 ft) volcano which forms the north part of Akun Island in the eastern Aleutian Islands. Active fumaroles were documented 1.5 km (1 mi) northeast of the summit in the early 1900's. Photograph by C. Nye, Alaska Division of Geological and Geophysical Surveys, May 10, 1994.

Akutan Volcano

76. Akutan volcano forms the west part of Akutan Island in the eastern Aleutian Islands. The volcano's summit is truncated by a 2-km-wide (1.2 mi) caldera that contains a cinder cone visible here through a breach in the caldera rim as a dark, steaming hill. This cinder cone has been the site of frequent historical eruptions. View is to the south. U.S. Geological Survey photograph, date unknown.

Akutan Volcano



77. Aerial view of Akutan volcano that forms the west part of Akutan Island in the eastern Aleutian Islands. The volcano's summit is truncated by a 2-km-wide (1.2 mi) caldera that contains a cinder cone that has been the site of frequent historical eruptions. View is to the southeast. Photograph by C. Nye, Alaska Division of Geological and Geophysical Surveys, May 10, 1994.

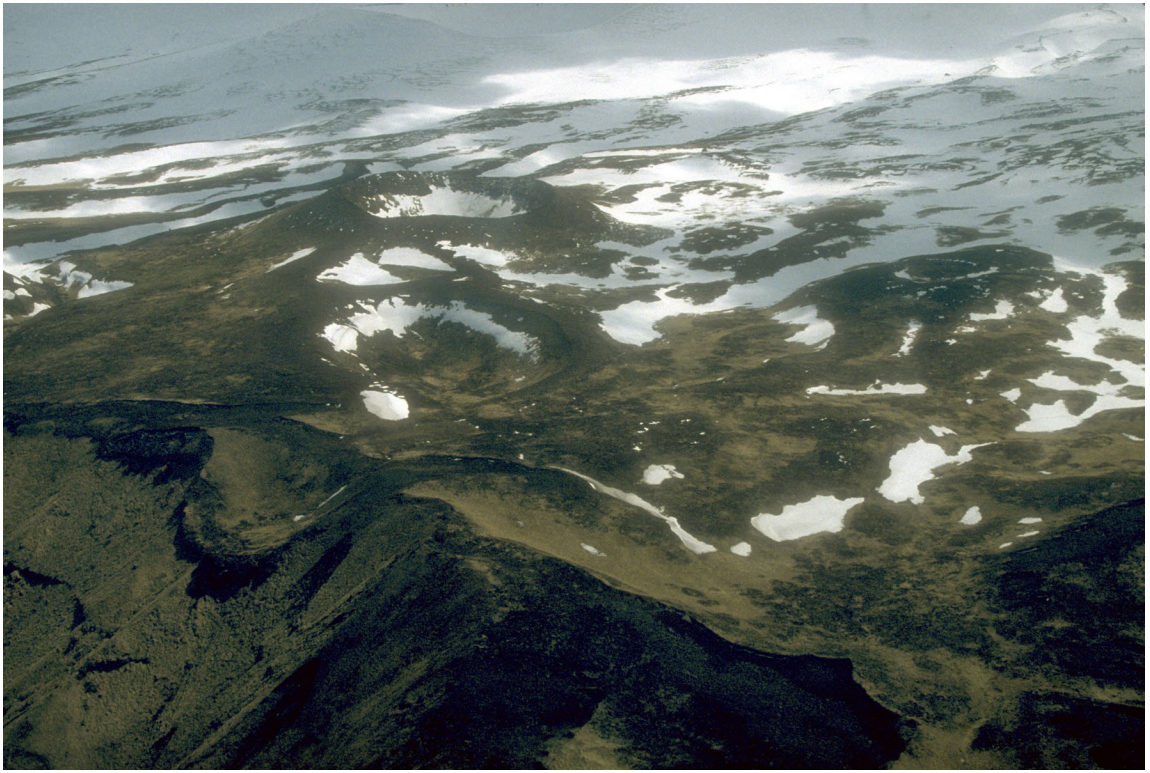
Akutan Volcano

78. Aerial view of Akutan volcano that forms the west part of Akutan Island in the eastern Aleutian Islands. The volcano's summit is truncated by a 2-km-wide (1.2 mi) caldera that contains a cinder cone that has been the site of frequent historical eruptions. View is to the southwest. Photograph by C. Nye, Alaska Division of Geological and Geophysical Surveys, May 10, 1994.

Makushin Volcano

79. Aerial view of the summit area of Makushin Volcano, a 2,036-m (6,680 ft) -high strato-volcano in the northern part of Unalaska Island in the eastern Aleutian Islands. Photograph by C. Nye, Alaska Division of Geological and Geophysical Surveys, August, 1982.

Makushin Volcano

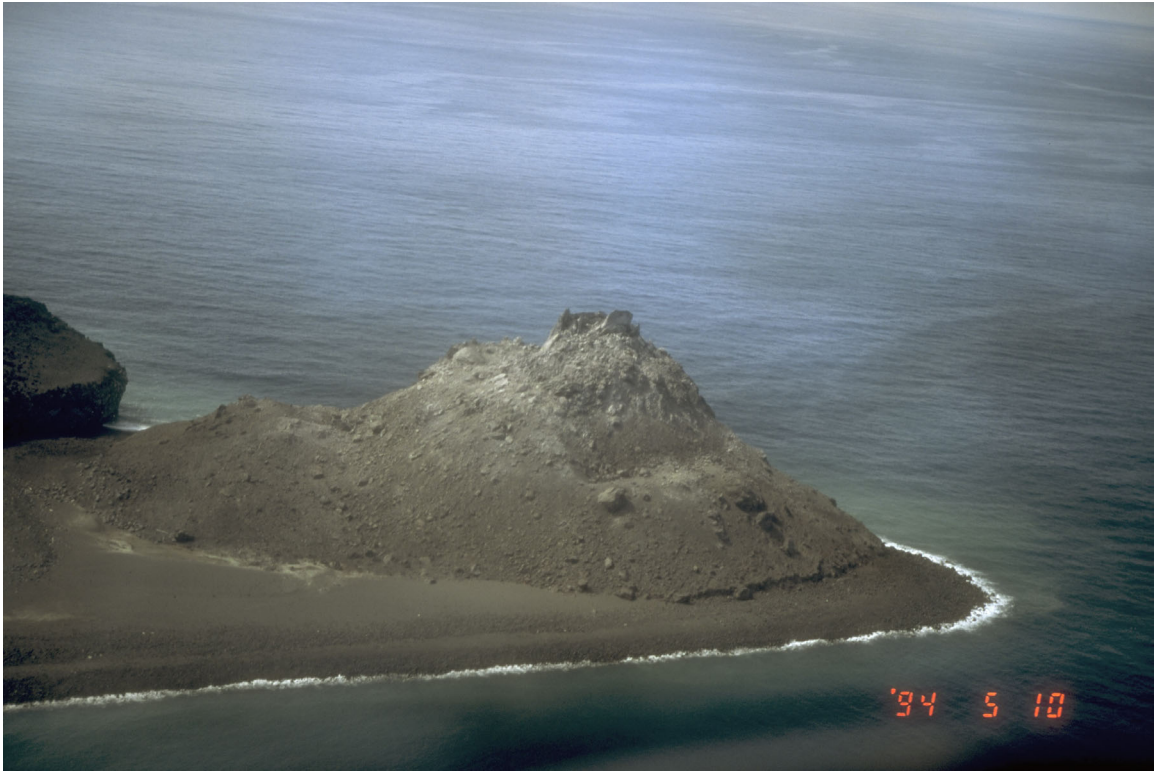


80. Aerial view of the Point Kadin vents, a series of post-glacial explosion pits and small cinder cones that occur along a fracture zone northwest of the summit of Makushin Volcano, a 2,036-m (6,680 ft)-high stratovolcano in the northern part of Unalaska Island in the eastern Aleutian Islands. Photograph by C. Nye, Alaska Division of Geological and Geophysical Surveys, May 10, 1994.

Bogoslof Island

81. Aerial view, looking northwest, of Bogoslof Island, which is the summit of a largely submarine stratovolcano located in the Bering Sea 50 km (31 mi) behind the main Aleutian Volcanic arc. The island is about 1.5×0.6 km (1×.4 mi) across and, due to energetic wave action and frequent eruptive activity, has changed shape dramatically since first mapped in the late 1700's. Its most recent eruption, in 1992, produced the light-colored conical lava dome (150 m [492 ft] high) that forms the tip of the island at upper right. Photograph by C. Nye, Alaska Division of Geological and Geophysical Surveys, May 10, 1994.

Bogoslof Island



82. Aerial view, looking west, of the new lava dome (150 m [492 ft] high) erupted in 1992 at Bogoslof Island, which is the summit of a largely submarine stratovolcano located in the Bering Sea 50 km (31 mi) behind the main Aleutian volcanic arc. The island is about 1.5×0.6 km (1×.4 mi) and, due to energetic wave action and frequent eruptive activity, it has changed shape dramatically since first mapped in the late 1700's. Photograph by T. Miller, U.S. Geological Survey, May 10, 1994.

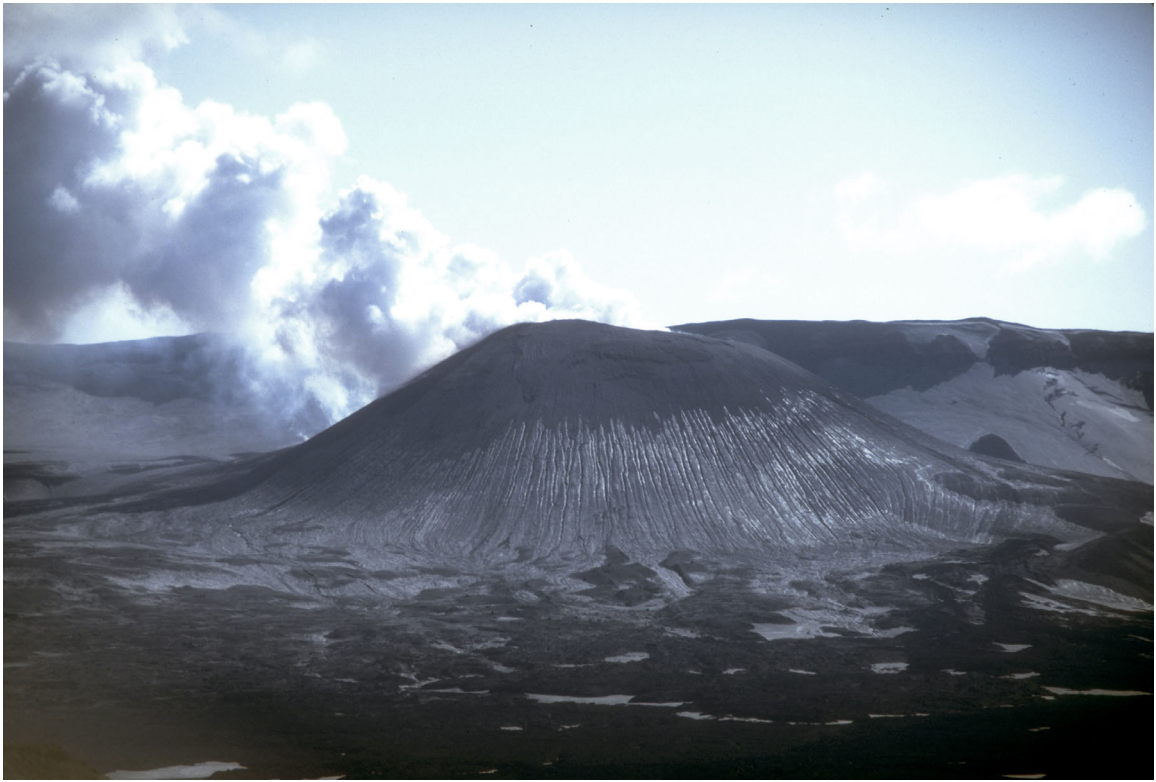
Bogoslof Island

83. Aerial view, looking south, of Bogoslof Island, which is the summit of a largely submarine stratovolcano located in the Bering Sea 50 km (31 mi) behind the main Aleutian volcanic arc. The island is about 1.5×0.6 km (1×.4 mi) and, due to energetic wave action and frequent eruptive activity, it has changed shape dramatically since first mapped in the late 1700's. Its most recent eruption, in 1992, produced the conical, rubbly lava dome (150 m [492 ft] high)and offshore spire at bottom center. Photograph by T. Keith, U.S. Geological Survey, May 10, 1994.

Okmok Caldera

84. View into Okmok caldera, a 9.3-km (5.8 mi)-diameter circular crater that truncates the top of a large shield volcano on the northeastern part of Umnak Island in the eastern Aleutian Islands. The most recent caldera-forming eruption at Okmok occurred about 2,400 years ago. Since then, numerous intracaldera eruptions have occurred, including the eruption that extruded these blocky lava flows onto the caldera floor. Photograph by C. Nye, Alaska Division of Geological and Geophysical Surveys, September, 1980.

Okmok Caldera



85. View of the steaming cinder cone that marks the site of the most recent eruptive activity at Okmok caldera, a 9.3-km (5.8 mi)-diameter circular crater that truncates the top of a large shield volcano on the northeastern part of Umnak Island in the eastern Aleutian Islands. Eruptions from this cone in 1945 and 1958 produced lava flows that extruded onto the caldera floor. Photograph by C. Nye, Alaska Division of Geological and Geophysical Surveys, September, 1980.

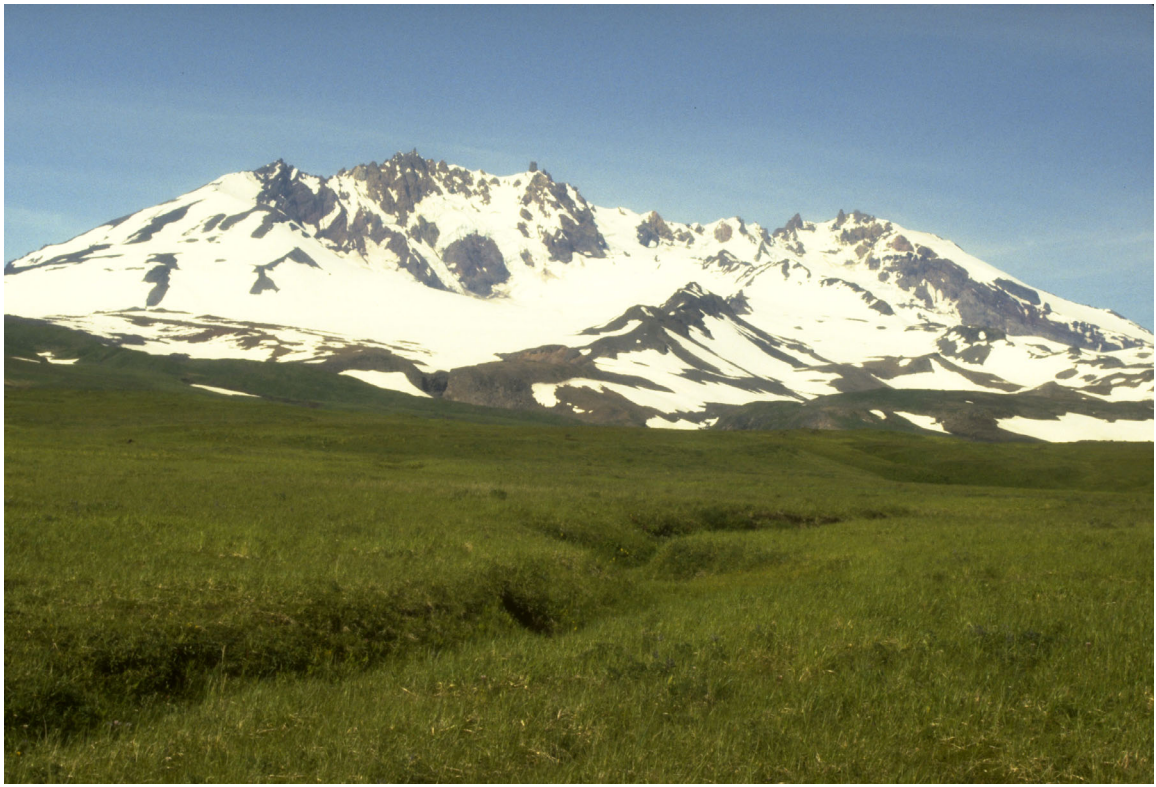
Okmok Caldera

86. Aerial view looking north of Okmok caldera, a 9.3-km-diameter (5.8 mi) circular crater that truncates the top of a large shield volcano on the northeastern part of Umnak Island in the eastern Aleutian Islands. Photograph by J. Reeder. Alaska Division of Geological and Geophysical Surveys, date unknown.

Mount Recheshnoi

87. View, looking west, at the head of the Russian Bay valley of Mount Recheshnoi, a deeply dissected, 1,984-m (6,510 ft)-high stratovolcano on central Umnak Island in the eastern Aleutian Islands. Unlike Vsevidof volcano, its neighbor to the west, Recheshnoi volcano has had no documented historical eruptions. Photograph by C. Nye, Alaska Division of Geological and Geophysical Surveys, August, 1985.

Mount Recheshnoi



88. View, looking north, of Mount Recheshnoi, a deeply dissected, 1,984-m (6,510 ft)-high stratovolcano on central Umnak Island in the eastern Aleutian Islands. Unlike Vsevidof volcano, its neighbor to the west, Recheshnoi volcano has had no documented historical eruptions. Photograph by C. Nye, Alaska Division of Geological and Geophysical Surveys, August, 1985.

Mount Recheshnoi

89. View of an active fumarole near Russian Bay on Mount Recheshnoi, a deeply dissected, 1,984-m (6,510 ft)-high stratovolcano on central Umnak Island in the eastern Aleutian Islands. Photograph by C. Nye, Alaska Division of Geological and Geophysical Surveys, August, 1985.

Mount Vsevidof

90. Distant view, looking north, of symmetrical Vsevidof volcano, a historically active, 2,149-m (7,050 ft)-high stratovolcano on central Umnak Island in the eastern Aleutian Islands. Mount Recheshnoi is on skyline at right. U.S. Geological Survey photograph, July, 1975.

Mount Vsevidof

91. View, looking north, of symmetrical Vsevidof volcano, a historically active, 2,149-m (7,050 ft)-high stratovolcano on central Umnak Island in the eastern Aleutian Islands. Photograph by C. Nye, Alaska Division of Geological and Geophysical Surveys, August, 1985.

Mount Vsevidof

92. View, looking north, of symmetrical Vsevidof volcano, a historically active, 2,149-m (7,050 ft)-high stratovolcano on central Umnak Island in the eastern Aleutian Islands. Photograph by C. Nye, Alaska Division of Geological and Geophysical Surveys, August, 1985.

Mount Vsevidof

93. View, looking north, of symmetrical Vsevidof volcano, a historically active, 2149-m (7,050 ft)-high stratovolcano on central Umnak Island in the eastern Aleutian Islands. Photograph by C. Nye, Alaska Division of Geological and Geophysical Surveys, August, 1985.

Mount Cleveland

94. Mount Cleveland forms the western half of Chuginadak Island in the central Aleutian Islands. This symmetrical, 1,730-m (5,676 ft)-high stratovolcano and has been the site of numerous eruptions in the last two centuries; the most recent eruption occurred in 1994. In 1944, a U.S. Army serviceman was reportedly killed by an eruption from Mount Cleveland. Photograph by M. Harbin, University of Alaska Fairbanks, July 24, 1994.

Carlisle Volcano

95. View of steep-sided, symmetrical Carlisle volcano on Carlisle Island in the central Aleutian Islands. The 1,620-m (5,315 ft)-high stratovolcano has erupted several times since the late 1700's. Photograph by M. Harbin, University of Alaska Fairbanks, July 24, 1994.

Seguam Island

96. Incandescent lava fountaining from a fissure eruption near Pyre Peak on 1,054-m (3,458 ft)-high Seguam Island in the central Aleutian Islands. U.S. Coast Guard photograph, March 8, 1977.

Kanaga Volcano

97. View, looking west, of 1,312-m (4,304 ft)-high Kanaga Volcano in eruption. Kanaga is located about 25 km (16 mi) west of the U.S. Navy installation and port on Adak Island in the Aleutian Islands. The volcano erupted intermittently through much of 1994, dusting the community of Adak at least once with fine ash. Photograph by E. Klett, U.S. Fish and Wildlife Service, January 27, 1994.

GLOSSARY OF SELECTED TERMS

ash:

Fine fragments (less than 2 mm [1/16 in.] across) of lava or rock formed in an explosive volcanic eruption.

ash flow:

A dense, hot, chaotic avalanche of rock fragments, gas, and ash that travels rapidly away from an explosive eruption column, often down the flanks of the volcano (synonymous with pyroclastic flow).

andesite :

Volcanic rock containing about 52 to 63 percent SiO_2, which is an essential constituent of most minerals found in rocks.

basalt:

Volcanic rock containing about 45 to 52 percent SiO_2, which is an essential constituent of most minerals found in rocks.

bombs:

Fragments of lava or rock larger than 64 mm (2.5 in.) across ejected during a volcanic eruption.

caldera:
A large, roughly circular depression usually caused by volcanic collapse or explosion.

cinder cone:
A steep-sided volcanic vent composed of loose, frothy ejecta.

crater lake:
A lake formed by the accumulation of groundwater, rainwater, or snowmelt in a volcanic crater or caldera. Sometimes the lake water is highly acidic.

dacite:
Volcanic rock containing about 63 to 70 percent SiO_2, which is an essential constituent of most minerals found in rocks.

debris avalanche:
Rapid downslope movement of a large mass of unconsolidated rock (for example, down the flank of a volcano); resulting deposits are often characterized by a hummocky surface.

dissected:
Sculptured by erosion due to the action of wind, water, or ice.

eruption cloud :
A cloud of gas and ash that forms during an explosive volcanic eruption and is carried away from the volcano with the prevailing wind.

eruption column:
The portion of the eruption cloud that rises vertically above a volcanic vent.

ejecta:
General term for anything thrown into the air from a volcano during an eruption; synonymous with "pyroclast," which means "fire" and "broken piece."

fallout:
A general term for debris which falls to the Earth from an eruption cloud.

fissure:
A roughly linear or sinuous crack or opening on a volcano; a type of vent that commonly produces lava fountains and flows.

fumarole:
A small opening or vent from which hot gases are emitted.

glacier:
Compacted mass of ice formed from accumulation, compaction, and recrystallization of snow. Glaciers often move downslope under the influence of gravity and are powerful erosive agents.

glacial till:
Unsorted and unconsolidated debris ("till") deposited by a glacier; consists of a wide variety of particle sizes.

groundwater :
Water that is below the Earth's surface (for example, water contained within the porous rock of a volcano).

incandescent:
Glowing red or orange as a result of high temperature.

intracaldera:
Refers to something within a caldera.

lava:
Molten rock that reaches the Earth's surface.

lava dome:
A steep-sided mass of viscous and often blocky lava extruded from a vent; typically has a rounded top and roughly circular outline.

lithic:
Synonym for "rock;" in volcanic deposits, it refers to fragments of preexisting rock as opposed to newly erupted juvenile material.

maar, maar crater:
A low-relief volcanic crater formed by the explosive interaction of rising magma and water, usually shallow groundwater.

magma:
Molten rock beneath the Earth's surface; molten rock that erupts onto the Earth's surface is called "lava."

moraine:
An accumulation of debris deposited by glaciers; may have a distinctive shape such as a hill or ridge.

pH:
A measure of the acidity or basicity of a solution (neutral is 7; the lower the number, the more acidic the solution).

phreatomagmatic:
Refers to the explosive interaction of groundwater or other available water with hot volcanic deposits or magma.

plinian:
A type of explosive eruption that produces a vertical eruption column that may extend as high as 30 km (100,000 ft) above the volcano; usually results in widespread fallout of tephra and possibly ash flows.

postcaldera:
Refers to the period of a volcano's history after the formation of a caldera.

precaldera:
Refers to the period of a volcano's history prior to the formation of a caldera.

pumice:
Highly vesicular volcanic ejecta. It is often buoyant enough to float on water.

pyroclastic:
A general term applied to volcanic products or processes that involve explosive ejection and fragmentation of erupting material.

pyroclastic flow:
A dense, hot, and chaotic avalanche of rock fragments, gas, and ash that travels rapidly down the flanks of a volcano.

rhyolite:
Volcanic rock containing about 70 to 77 percent SiO_2, which is an essential constituent of most minerals found in rocks.

seismic swarm:
A flurry of closely spaced earthquakes that often precedes an eruption.

shield volcano:
A broad, gently sloping volcano usually built up by many fluid lava flows of basalt or andesite composition (for example, Mount Wrangell, Alaska, or Mauna Loa, Hawaii).

spatter:
Fluid ejecta from a volcanic eruption, usually accumulates around a vent.

spatter-fed flow:
A type of lava flow that forms as a result of remobilization of spatter that has accumulated around a vent.

stratovolcano:
A steep-sided volcano (also called a “stratocone” or “composite cone”),usually conical in shape, built of lava flows and tephra from explosive eruptions.

strombolian:
A type of volcanic eruption characterized by intermittent bursts of fluid lava, usually basalt, from a vent or crater.

tephra:
A general term for all fragmental volcanic material (for example, ash and bombs).

tuff cone:
A moderately-steep to steep-sided volcanic vent composed of ejecta formed during explosive interaction of magma with groundwater or other shallow water, often breached or punctuated at the top by a crater.

vesicular:
The texture of a volcanic rock characterized by abundant holes or cavities that result from escaping gas (pumice is very vesicular).

vent:
An opening in the Earth's surface through which magma erupts or volcanic gases are emitted.

volcaniclastic:
A general term for either unconsolidated deposits or rocks composed of particles that are volcanic in origin.