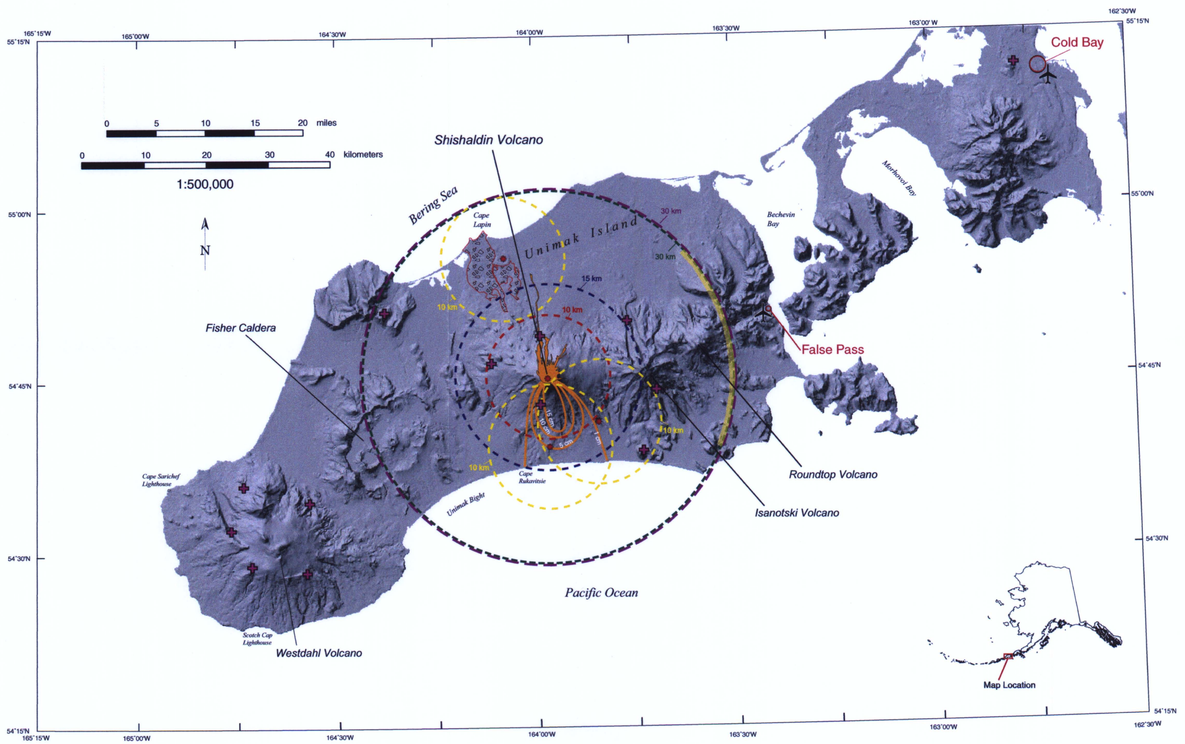
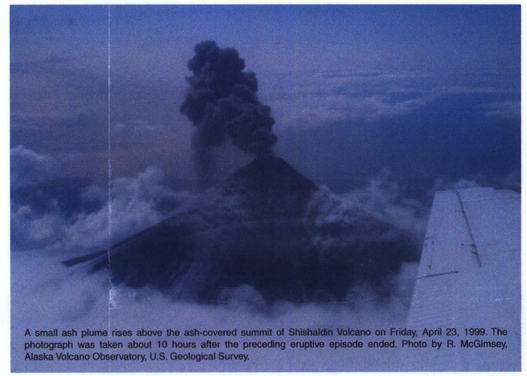


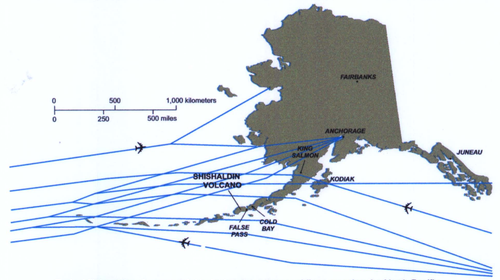
Legend

- **Airport**
- **Seismic Station**
- **Source vent for pyroclastic flows and surges**
- **Isopach lines of ash fall associated with the 1999 eruption**
  This pattern displays the thickness of the main airfall deposit of the 1999 eruption of Shishaldin Volcano.
- **Extent of lahars associated with the 1999 eruption**
  During the 1999 eruption of Shishaldin Volcano, a lahar, originating from hot volcanic material interacting with ice and snow, extended 17 kilometers from the summit down the north flank of the volcano.
- **Cape Lapin debris avalanche deposits**
  Deposits of the Cape Lapin debris avalanche exposed along the coast of the Bering Sea at Cape Lapin, about 25 kilometers northwest of Shishaldin Volcano. The debris avalanche deposit extends an unknown distance farther to the north into the Bering Sea.
- **Directed Blast Hazard Zone**
  A directed blast is a laterally directed explosion of the volcano caused by rapid release of internal pressure. Most directed blasts are caused by a slope failure of newly erupted lava domes or sector collapse of the summit edifice resulting in a debris avalanche. Directed blasts can cause destruction to distances of up to 30 kilometers from the volcano.
- **Debris Avalanche Hazard Zone**
  A debris avalanche is a rapidly moving mass of rock debris produced by a large-scale landslide from the summit area of a volcano. The potential hazard areas from debris avalanches are the volcano's flanks and the valleys draining Shishaldin Volcano for distances of 30 kilometers from the volcano. Areas east of the volcano (yellow) will be protected by the topographic barrier formed by Isanotski and Roundtop volcanoes.
- **Pyroclastic Flow Hazard Zone - large eruption from summit**
  Maximum extent of pyroclastic flows and surges that might occur during a large eruption from the summit. Hot material erupted from the volcano may travel rapidly down slopes as incandescent mixtures of volcanic gas and rock debris. Pyroclastic flows and surges similar to those of the last few thousand years would pose a significant hazard to people within 10 to 15 kilometers of the volcano, possibly reaching the coast on the south side of the volcano.
- **Pyroclastic Flow Hazard Zone - small eruption from summit**
  Area likely to be affected by pyroclastic flows during small- to moderate-sized eruptions from the summit.
- **Pyroclastic Flow Hazard Zone - maar and tuff cone source**
  Potential hazard zones surrounding postglacial maars and tuff cone. It is unlikely that these particular maars and tuff cone will be the site of another explosive eruption; however, the yellow hazard zone illustrates the approximate area surrounding the source vent that would be affected by similar flank vent eruptions that may produce explosions, pyroclastic flows, and surges.

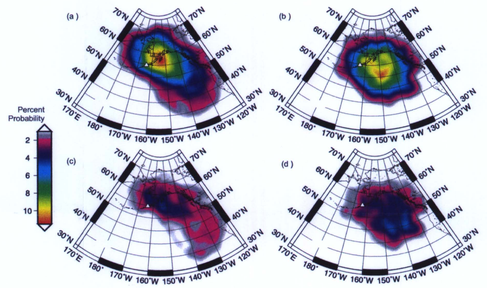
Hazard From Volcanic Ash



A small ash plume rises above the ash-covered summit of Shishaldin Volcano on Friday, April 23, 1999. The photograph was taken about 10 hours after the preceding eruptive episode ended. Photo by R. McGimsey, Alaska Volcano Observatory, U.S. Geological Survey.



Typical flight paths of commercial freight and passenger airlines crossing the North Pacific.

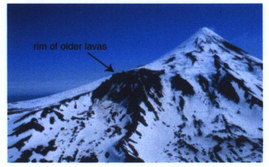


Twenty-four hour airborne ash probability distribution (AAPD) maps for Shishaldin Volcano. The maps show the regions in the North Pacific most likely to contain airborne ash 24 hours after a hypothetical eruption from the volcano, in winter (October through April) and summer (May through September) both at a low altitude (3 to 8 kilometers above sea level) and at a higher altitude (8 to 12.5 kilometers above sea level). (a) low altitude winter, (b) low altitude summer, (c) high altitude winter, and (d) high altitude summer. Probabilities are based on average wind directions from National Weather Service archives and the PUFF ash dispersion model. Figure from Papp, 2002.

Lahar deposits from the 1999 eruption on the lower flanks of Shishaldin Volcano overtopped a fan of older flood and laharic debris, and reached almost to the shore of the Bering Sea north of the volcano.

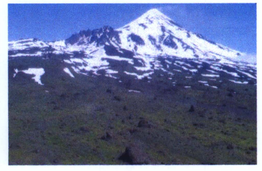
A maar crater blasted deep into older rocks on the southern flank of Shishaldin Volcano by hydromagmatic explosions accompanied by pyroclastic surges and pyroclastic flows.

Deposits of the Cape Lapin debris avalanche are exposed along the coast of the Bering Sea at Cape Lapin, about 25 kilometers northwest of Shishaldin Volcano, where they form high sea cliffs that litter the beach with large boulders as they erode. The debris avalanche deposit extends an unknown distance farther to the north into the Bering Sea.



Southwest side of Shishaldin Volcano, showing part of a truncated rim of older lavas buried by the modern volcanic cone. The buried rim appears to be part of a horseshoe-shaped crater rim that most likely formed as a consequence of the destruction of an ancestral Shishaldin cone by the Cape Lapin debris avalanche 9,500 years ago.

Steam and gas rise from the crater of Shishaldin Volcano in July 1998. This ice-free crater is almost constantly steaming, intermittently sending steam plumes 1,000 to 3,000 meters above the volcano.



Material from a large debris avalanche covers the southwest flank of Shishaldin Volcano. Volcanic debris avalanches are giant landslides that form by collapse of the upper parts of volcanoes. Debris avalanches can attain speeds of 30 to 150 kilometers per hour, and may travel up to 30 kilometers from the source volcano, burying everything they encounter beneath many meters of coarse volcanic debris.

Basemap compiled from USGS 15' DEM data for the following quadrangles:
Unimak B-1, B-2, B-3, C-1, C-2, C-3
False Pass C-4, C-5, C-6, D-4, D-5, D-6
Cold Bay A-1, A-2, A-3, A-4, A-5, A-6, B-1, B-2, B-3, B-4, C-1, C-2

Projection is UTM Zone 3
Datum is NAD 27 for Alaska

PRELIMINARY VOLCANO-HAZARD ASSESSMENT FOR SHISHALDIN VOLCANO, ALASKA

by
James E. Begét, Christopher J. Nye, Janet R. Schaefer, and Pete L. Stelling

The Alaska Volcano Observatory is a cooperative program of the U.S. Geological Survey, the University of Alaska, Fairbanks - Geophysical Institute, and the Alaska Division of Geological & Geophysical Surveys.