

Pavlof Volcano

Most Recent Activity: May / June, 2013

Location: Aleutian Islands Archipelago; Alaska Peninsula
Elevation: 8,261 ft (2,518 m)
Latitude: 55.4173° N
Longitude: 161.8937° W
Quadrangle: Port Moller
Nearby towns: Belkofski 23 mi (37 km) SW; King Cove 30 mi (48 km) SW;
 Cold Bay 36 mi (58 km) SW; Nelson Lagoon 48 mi (78 km) NE



The Aleutian Islands

Total Area: 6,821 square miles (17,666 sq km)
U.S. Archipelago: 14 large islands, 55 smaller islands, and innumerable islets

The Aleutian Islands is a part of the region along the Rim of the Pacific Ocean known as the Ring of Fire, which is the most volcanically active belt on earth. The islands are an archipelago that extends southwest, then northwest for about 1,100 miles (1,800 km) from the tip of the Alaska Peninsula to Attu Island, Alaska. The chain of small islands is

the partially submerged continuation of Alaska's Aleutian Range and separates the Bering Sea from the main portion of the Pacific Ocean.

Most of the islands bear marks of volcanic origin; some volcanoes—such as Pavlof Volcano (8,261 ft / 2,518 m), Redoubt Volcano (10,197 ft / 3,108 m), and Shishaldin Volcano (9,372 ft / 2,857 m) remain active.

The Geology

The Pavlof Volcano is located on the southwestern end of the Alaska Peninsula. Pavlof is a stratovolcano that rises to an elevation of 8,262 feet (2,518 m). With almost 40 historic eruptions, it is one of the most consistently active volcanoes in the Aleutian Islands Archipelago. Eruptive activity is generally characterized by sporadic strombolian fountaining of lava continuing for a several-month period.

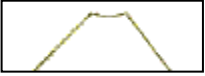


Unlike Pavlof Sister, Pavlof has been frequently active in historical time, typically producing strombolian to vulcanian explosive eruptions from the summit vents and occasional



lava flows. The active vents lie near the summit on the north and east sides. The largest historical eruption of Pavlof took place in 1911, at the end of a 5-year-long eruptive episode. During this eruption, a fissure opened on the north flank of the volcano, ejecting large blocks and issuing lava flows.

A stratovolcano, also known as a composite cone, is considered one of the most dangerous of the volcano types. The lower slope is gentle, but the rise is steep near the summit. This type of volcano is delineated by highly explosive eruptions, which produce powerful convecting plumes of ash. Mount St. Helens in Washington is another well-known stratovolcano. (See IceEarth: Mount St. Helen)

Three Main Volcano Types and Characteristics

VOLCANO TYPE	VOLCANO SHAPE	VOLCANO SIZE	VOLCANIC MATERIALS	ERUPTION TYPE
CINDER CONE	 <p>Straight sides with steep slopes; large summit crater</p>	Small less than 1 km in diameter	Basalt tephra; cinder and slightly larger pyroclastics	Explosive; large amounts of gas released
STRATOVOLCANO (composite volcano)	 <p>Gentle lower slopes, but steep upper slopes; concave upward; small summit crater</p>	Large 1 to 10 km in diameter	Alternating basaltic to rhyolitic fluid lava flows with layers of cinder	Highly variable; explosive gas releases to quieter basaltic flows
SHIELD VOLCANO	 <p>Very gentle slopes; convex upward</p>	Large Over 10s of kms in diameter	Basalt fluid lava flows	Quiet

The Eruption

On May 13, 2013, the Alaska Volcano Observatory (AVO) reported that seismic activity at Pavlof increased in the morning, along with the presence of an intense thermal anomaly at its summit. On May 14, a small lava flow at Pavlof was reported, confirming eruption onset. Elevated seismic activity, lava fountaining, and occasional steam, gas, and ash plumes to 22,000 feet (6,700 m) continued until May 24. The lava flow extended about one mile (1.5 km) down the north flank of the volcano. Trace amounts of ash fell on the nearby



community of Sand Point on the evening of May 19 and more ash was deposited on May 20, 21, and 22. Ash was reported in Nelson Lagoon 48 miles (78 k) to the northeast.

On May 21, seismicity transitioned from tremor to discrete events that faded away over the next couple of days. On May 28, there was a dramatic reduction in seismicity and surface temperatures; however, on June 4 an ash cloud to 19,000 feet (5,791 m) with weak seismicity accompanying the ash emission was observed.

The Pavlof ash cloud, at altitudes up to 25,000 feet (7,620 m), caused cancellations of more than a dozen regional air traffic flights. Although the ash plumes were too low to affect commercial airline flights between Asia and North America, it did interrupt schedules for regional carriers serving rural fishing towns, native villages, and two of Alaska's largest commercial fishing ports.

Impacts of Volcanic Ash on Air Traffic

Alaska's volcanoes are potentially hazardous to passenger and freight aircraft as jet engines sometimes fail after ingesting volcanic ash. More than 80 commercial aircraft have unexpectedly encountered volcanic ash in flight and at airports in the past 15 years. Seven of these encounters caused in-flight loss of jet engine power, which nearly resulted in the crash of the airplane. Estimates, based on information provided by the Federal Aviation Administration, are that more than 80,000 large aircraft per year, and 30,000 people per day, are in the skies over and potentially downwind of Aleutian volcanoes, mostly on the heavily traveled great-circle routes between Europe, North America, and Asia. A range of damage may occur to airplanes that fly through the eruption cloud depending on the concentration of volcanic ash and gas aerosols in the cloud, the length of time the aircraft actually spends in the cloud, and the actions taken by the pilots to exit the clouds.

Ash ingested by jet engines may lead to the immediate deterioration in engine performance and engine failure. The principal cause of engine failure is the deposition of ash in the hot sections of the engine. Glass from melting volcanic ash will coat fuel nozzles, the combustor, and turbine, which reduce the efficiency of fuel mixing and restricts air passing through the engine.

Volcanic ash is highly abrasive because it consists of hard, sharp rock fragments that easily scratch and erode plastic, glass, and metals. Any forward-facing surface of an airplane is likely to be damaged, including the cockpit and forward cabin windows, landing light covers, leading edges of wings and tail rudder, engine cowlings, and the radar nose cone. Cockpit windows may become so abraded and scratched that pilots have extreme difficulty seeing the runway on which to land the aircraft.

Air that enters an airplane's interior first passes through the engines. Some ash particles ingested through the engines will travel through the plane's ventilation ductwork. The ash may clog air-filter systems and spread throughout the cabin, contaminating cabin fixtures, carpeting, seat covers, and cushions. The ash also can damage the aircraft electronic system, including power generators and navigation instruments.

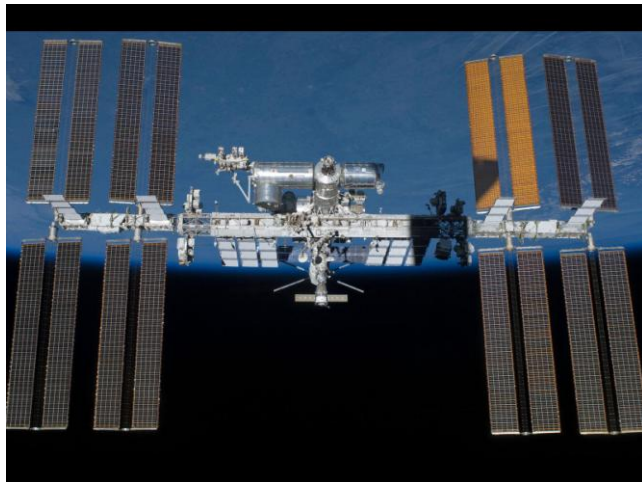
Space Station

The cover image was acquired on May 17, 2013 by one of the Expedition 36 crew members on the International Space Station. Pavlof Volcano about 625 miles (1,000 km) southwest of Anchorage, Alaska, jetted lava into the air and spewed an ash cloud 20,000 feet (6,096 m) high.

The International Space Station has had continuous human occupation since November 2, 2010. Since Expedition 1, which launched October 31, 2000 and docked November 2, the space station has been visited by 204 individuals.

As of November 2010, The space station's odometer read more than 1.5 billion statute miles (the equivalent of eight round trips to the Sun), over the course of 57,361 orbits around the Earth. The International Space Station is not only an orbiting laboratory, but also a space port for a variety of international spacecraft. As of June 2013, there have been:

- 89 Russian launches
- 37 Space Shuttle launches
- 1 test flight and 2 operational flights by SpaceX's Dragon
- 3 Japanese HTVs
- 3 European ATVs



International Space Station Size & Mass

- Module Length: 167.3 feet (51 m)
- Truss Length: 357.5 feet (109 m)
- Solar Array Length: 239.4 feet (73 m)
- Mass: 924,739 pounds (419,455 kg)
- Habitable Volume: 13,696 cubic feet (388 m³)
- Pressurized Volume: 32,333 cubic feet (916 m³)
- Power Generation: 8 solar arrays = 84 kilowatts
- Lines of Computer Code: approximately 2.3 million

A total of 168 spacewalks have been conducted in support of space station assembly totaling more than 1,061 hours, or more than 44 days.

The space station, including its large solar arrays, spans the area of a U.S. football field, including the end zones, and weighs 924,739 pounds. The complex now has more livable room than a conventional five-bedroom house, and has two bathrooms, a gymnasium, and a 360-degree bay window.

Interpretive Learning...

- 1) List types of environmental science or earth science information that can be observed from the International Space Station.
- 2) Use the Alaska Volcano Observatory website (<http://www.avo.alaska.edu>) to identify the other active volcanoes in the Aleutian Archipelago.
- 3) Use the air traffic international route map at <http://openflights.org/data.html#route> to identify the approximate location of the Pavlof Volcano in the Aleutian Archipelago. Discuss the potential impacts of active volcanic eruptions to international air travel.
- 4) Using IceEarth Mount St. Helen (icearth.cnlworld.org) discuss the relationship between the two volcanic eruptions. For example, both are on the Pacific Rim of Fire and both are stratovolcanos. Also, Mount St. Helen is an example of what a massive eruption of Pavlof could look like in the future.

Explore More...

Look at Volcanoes: <http://volcano-pictures.info/index.html>

Look at Alaska volcanoes: <http://www.avo.alaska.edu/>

Sources:

ABC News. 2013. Eruption of Alaska volcano Mount Pavlof disrupts flights. May 21, 2013. Available at:
<http://www.abc.net.au/news/2013-05-21/mount-pavlofs-eruption-disrupts-flights-in-alaska/4703750>

Encyclopedia Britannica. Aleutian Islands. Available at:
<http://www.britannica.com/EBchecked/topic/13935/Aleutian-Islands>

U.S. Geological Survey: Danger to Aircraft from Volcanic Eruption Clouds and Volcanic Ash. Available at:
<http://volcanoes.usgs.gov/hazards/tephra/ashandaircraft.php>

Image Sources:

Cover Image: Astronaut photograph ISS036-E-2105 acquired on May 18, 2013, with a Nikon D3S digital camera using 800, 400, and 50 millimeter lenses, respectively.

Space Station photo credit: NASA, May 29, 2011.

Pavlof Images: Courtesy of Brandon Wilson. Available at: www.avo.alaska.edu/images/image.php