

Ash, airplanes: Simple recipe for disaster

By 1st Lt. Amy Hansen
3rd Wing Public Affairs

(Editor's note: This is the third part of a three-part series.)

"A dense haze was impending at our backs, following us like a stream flowing on land ... and the night fell on us, not like a night with clouds or without stars, but like the night in a closed place without a lamp," wrote Pliny the Younger in 79 A.D. after witnessing the eruption of Mount Vesuvius that buried Pompeii, Italy.

Pliny the Younger's description is the first detailed written account of a volcanic eruption, yet nearly 2,000 years later, it still portrays an accurate picture of the airborne effects of an ash cloud from an exploding volcano.

According to the U.S. Geological Survey, Alaska has more than 40 historically-active volcanoes. Any one of those, including the recently-active Mount Spurr, could erupt in the near future, spewing thousands of pounds of fine ash and rock particles into the air.

With its flying mission, Elmendorf will have a unique challenge protecting its aircraft from the hazards of airborne ash if a nearby volcano erupts.

"You don't want to be near volcanic eruptions," said Lt. Col. Colin Wright, 3rd Operations Support Squadron director of operations. Colonel Wright was stationed at Clark Air Base, Philippines, leaving just before Mount Pinatubo erupted in 1991. "If you fly into or near a volcanic ash cloud, it will destroy your turbine engines. It's like throwing sand down the intakes."

The harmful effects of ash on an airplane include damage to the engine, damage to the external surfaces, and contamination of the plane's ventilation system.

Ash is part silica, which melts into glass when it comes into contact with the hot components inside an engine. Melted ash can coat the turbines, combustors, and fuel nozzles, leading to engine surges, flame outs, and a loss of thrust, according to the USGS.

Volcanic ash is also very abrasive and damages external surfaces on contact, including engine parts, the leading edges of the wings and rudder, the radar nose cone, and virtually all other forward-facing surfaces. According to the USGS, it can abrade windshields to the point where pilots can no longer see through them.

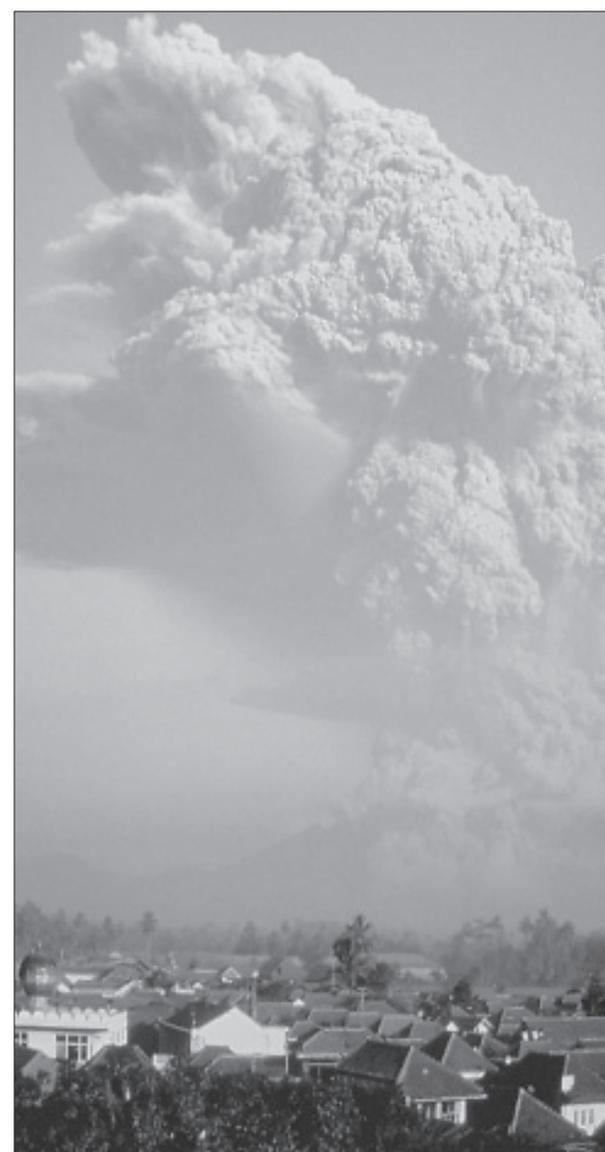
According to the Michigan Tech Department of Geological and Mining Engineering and Sciences, ash with a particle size of about six micrometers will infiltrate an airplane's ventilation system and electronics cabinets. This can damage power generators, navigation instruments and cabin fixtures.

"There have been well-documented cases of commercial airliners flying into ash clouds and all their engines cutting off," said Colonel Wright.

One of the most famous of those cases was a Boeing 747 flying from Kuala Lumpur, Malaysia, to Perth, Australia, in 1982. The plane had about 270 people on board. It was cruising at 37,000 feet, 80 nautical miles from the nearest land, when the cabin filled with what seemed to be smoke and all four engines went out. The plane descended at 2,000 feet per minute until about 13,000 feet, when the number four engine restarted. The plane made it to an airport on three engines and landed safely. After landing, it was determined that Galunggung volcano in Java, Indonesia, had erupted and dispersed an ash cloud that caused the engine problems.

According to Air Force Handbook 11-203, *Weather for Aircrews*, and the Aeronautical Information Manual, flying in volcanic ash should

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J.P. LOCKWOOD

The Galunggung volcano in Java, Indonesia, which erupted in 1982, sends ash into the skies. The ash caused engine problems on unsuspecting airliners.