

# To fly through ash or not? That's no easy question

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(AP) -- To fly, or not? There's no right answer about when it's safe to fly through a cloud of volcanic ash. But it'll be all too obvious if there's a wrong answer, experts say.

With the volcano in [Iceland](#), Mother Nature is giving high-flying Europe a lesson in risk, aviation technology, scientific uncertainty and economics.

And how these fields intersect is messy.

Experts aren't sure what amount of volcanic ash - made up of sand and tiny abrasive glasslike particles - is dangerous to jet engines and what density is safe. And for that matter, they can't say how much of the ash is floating in any one spot along the [air traffic](#) routes or where it is specifically going next.

But airlines know what canceled flights can do to their bottom lines. And passengers know when those canceled flights cross the line from inconvenience to pain.

So Monday night, a smattering of flights took off in northern Europe, followed by more flights on Tuesday. European Union transport ministers divided the northern skies into three areas: a "no-fly" zone immediately over the [ash cloud](#); a caution zone "with some contamination" where planes can fly subject to engine checks for damage; and an open-skies zone.

At one point Monday, the volcano's eruptions were said to be weakening, but by Monday night the plume seemed to intensify, and it was unclear how long newly reopened airports in northern Europe would be able to remain operational.

If airports do reopen, passengers may have to decide for themselves what risk is acceptable.

When people turn to science for answers, they get a lot equivocation.

"There are really no facts about risk. It's just how we interpret the information we have," said David Ropeik, an instructor in [risk perception](#) at Harvard and author of the book "How Risky Is It, Really?"

"This is a great example of how the pace of modern technological invention is making a lot more people nervous about just how sure science can be about anything," he said.

It is one of the hardest risk decisions society has faced in a while, agrees Paul Fischbeck, a risk analysis expert at Carnegie Mellon University and a former military pilot.

"With the amount of uncertainty, this now I think is a very hard decision," he said. "How much risk are you willing to accept to reduce economic hardship and inconvenience?"

It isn't a small amount of money at stake. It's billions of dollars with millions of stranded passengers, said Fischbeck. But if an airline goes down, the company would be shut down by lawsuits, he said.

When the Eyjafjallajokull [volcano](#) first spewed, the answer was simple. Authorities usually shut down airspace when there's volcanic ash. It's the precautionary principle of erring on the side of caution, Fischbeck said.

"Standard safety procedure is: Don't go there if you don't know," said Michael Fabian, a professor of mechanical engineering at Embry Riddle Aeronautical University in Prescott, Ariz.

But the days went on and the pain for airline companies and passengers increased and then people started questioning: How bad is it? How do you know?

"Hard questions reveal that the science isn't as settled as first presented," said George Gray, an expert on risk at George Washington University and former science adviser at the U.S. Environmental Protection agency.

The real question about how much risk is acceptable is personal based on the benefits we each get, Gray said.

Fischbeck believes authorities should fly more test flights into the plume to see what kind of damage occurs and at what frequency to help them make a more informed decision.

And the International Air Transport Association accused European governments of offering "no risk assessment, no consultation, no coordination, and no leadership," urging a quicker reopening of European skies.

Engineers worry about immediate catastrophic damage when the ash dust congeals in an engine turbine, blocking air flow and shutting it down, Fabian said. In 1989, when a Boeing 747 flew through volcanic ash over Alaska, all four engines failed and the plane dropped more than two miles in five minutes, before engines restarted. Ash can also cause long-term abrasive damage to planes that could lead to later disasters if not dealt with.

Fabian said the reason engineers know so little about the risks from

[volcanic ash](#) is that it would take many hours and great expense to do repeated tests. And tests would be needed for the 20 different types of engines currently flown.

And even if engineers knew how much ash a plane's engines could handle, atmospheric scientists can't say how much ash is in any one place or predict what will happen next, said Jon Davidson, a professor of earth sciences at Durham University in England. The ash becomes more diluted as it goes higher in altitude but also clumps together at times like sediments in a river, he said.

"We have built a society that's fairly sensitive to natural changes," Davidson said. "An eruption like this 100 years ago wouldn't have caused any issues in Europe. Possibly we'd not even know about it."

But the more technology and the faster the speed of travel, the more types of risks we are forced to accept, Fischbeck said.

"You can get hurt only so bad walking; you add a horse and you can hurt more," Fischbeck said.

At the same time, with improved technology "you see an evolution of the risks, not necessarily an increase of risks," he said.

Flying is a good example. In the 1950s, there were far more plane accidents than there are now.

That's good because people are less willing to accept low levels of risk, Fischbeck said.

"We set our thresholds so that things that would have been trivial risks in the past would be front page stories now," Fischbeck said. "We demand a much higher level of safety than we did in the past."

So would the risk and engine experts fly through the volcanic plume?

"Imagine being on the first flight out of Heathrow, my stomach would be turning," Gray said.

Fischbeck, a former pilot, and Fabian, an airline engine expert, said they rely on the pilot's judgment.

"To me if the pilot is willing to risk his own life, I'll go," Fabian said.

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