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The Cloud That Closed A Continent

By Bryan Walsh

As volcanic eruptions go, Iceland's Eyjafjallajökull won't break the records. Icelanders dismiss the normally sleepy Eyjafjallajökull as a "weary old man," and in fact few people outside the volcanology community — or the 800 or so Icelandic farmers who needed to be evacuated — noticed when the volcano began spewing lava on March 20. Most likely it would have remained that way — a brief tourist attraction and a footnote in a few grad students' dissertations — before the earth quieted again.

But that's not quite what happened. Instead, on April 14, a new and stronger eruption on Eyjafjallajökull exploded through a glacial ice cap, throwing a vast plume of volcanic ash around 7 miles (11 km) into the atmosphere, high enough to be carried for thousands of miles. And then, as if on cue, the winds shifted, blowing to the east and south, sending the tower of ash toward northern Europe and some of the most crowded airspace on the planet. "It was an eruption at the right place at the right time," says Marcus Bursik, a volcanologist at the University at Buffalo. "Or, I guess, really, the other way around." ([See pictures of the eerie beauty of Iceland's volcano.](#))

Indeed, for anyone attempting to travel to, from or within Europe — or anyone who owns stock in an airline — it was definitely the wrong place at the wrong time. Because volcanic ash can ruin the jet engines of aircraft, European air-traffic controllers began shutting down the continent's airspace as the high-altitude cloud loomed. By April 15, planes were grounded and the skies above Europe's cities were eerily quiet. As the cloud metastasized across the continent, nervous bureaucrats kept much of its airspace closed for almost five days, resulting in the cancellation of more than 100,000 flights and the stranding of hundreds of thousands of travelers in airports around the world. With a third of the industry down, it was the worst global travel disruption since World War II, as the lifeline we'd all come to take for granted was suddenly snapped. "These are extraordinary circumstances beyond all airlines' control," says Willie Walsh, CEO of British Airways, which was losing up to \$30 million a day during the shutdown. ([See TIME's special report on the Icelandic volcano and resulting travel snafu.](#))

But the impact of the volcanic crisis went far beyond the inconvenience of stranded vacationers and the sprained tongues of newscasters trying to pronounce Eyjafjallajökull. (For the record, it's *Ey-ya-fyat-lah-yoh-kuht*.) The airline industry, already pummeled by the recession, has lost nearly \$2 billion. TUI Travel,

Europe's biggest tour operator, had 100,000 customers marooned overseas and was losing \$9 million a day as it scrambled to get them home. Kenyan farmers, who supply one-third of Europe's fresh flowers, were losing \$2 million a day as their blooms withered on Nairobi runways. Transplants of bone marrow — which needs to be implanted within 72 hours of harvesting, or else the cells will die — were delayed, putting cancer patients' lives at risk. Hundreds of runners from overseas were unable to make it to the starting line of the Boston Marathon on April 19, including Moroccan Olympian Abdellah Falil, who was stuck in Paris. Oxford University bigwigs, in New York for a biannual outreach weekend, wondered how to get back home for the summer term, and world leaders couldn't fly to Poland for the funeral of Polish President Lech Kaczynski on April 18. "It's nature," says Joy Martinez, 29, a New Yorker who shifted her wedding at the last minute from France to Bali because of the volcano. "And you can't fight nature."

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Understanding why Eyjafjallajokull has wreaked such havoc on Europe requires a little basic volcanology — which volcanologists, thoroughly enjoying their week in the spotlight, are only too happy to provide. Eyjafjallajokull means "island mountain glacier" in Icelandic, and the top of the ice cap covers the volcano's peak. The ice is the thing: the weight of the glacier atop the volcano helps the magma inside build to a higher pressure, so on April 14, when the mountain had its second eruption, it blew with enough force to send volcanic gases and ash miles into the sky. And the cold water from the melted ice quickly chilled the lava, fragmenting it into tiny glass particles that could be carried away in the plume. (That's what ash really is — not rock dust but little shreds of silica.) The ash plume reached the troposphere, some 35,000 ft. (almost 11 km) up, high enough to hang at the altitude where passenger planes cruise and high enough to be blown to northern Europe and beyond. "It's a minor eruption in the grand scheme of things," says Jon Davidson, an earth scientist at Durham University in Britain. "But there was a conspiracy of factors that made it worse." ([See the pictures of the travel chaos caused by the volcanic ash.](#))

Ice and wind were just two of those factors; our dependence on air travel was the other. If you wanted to turn a \$300 million jumbo jet into scrap metal, you couldn't find a faster way to do it than flying it through the heart of a volcanic cloud. Heavy ash can sandblast the windows, leaving them impossible to see through. But the real threat is to the jet engines: ash is sucked into the hot combustion chamber, where it melts into molten glass, clogging the machinery, degrading the fan blades and potentially causing the engine to flame out. That's exactly what happened to a 1982 British Airways flight that ran into an undetected volcanic-ash cloud off Indonesia, losing all four engines before it was able to make an emergency landing.

But even very thin, dispersed ash clouds can badly damage a plane. In 2000 a NASA research jet flew through a high-altitude ash cloud without the pilot's realizing it. The flight continued without incident, but when scientists took apart the engines later, they discovered \$3.2 million worth of damage that could have soon crippled the plane. "Ash can definitely do some real damage to your engines," says Thomas Grindle, chief of aircraft maintenance at NASA's Dryden Flight Research Center in Edwards, Calif., who wrote a

report on the incident. "And we didn't even know it was happening at the time." ([Read: "Volcano Fallout: Where's the Tuna and Pineapples?"](#))

Pilots can fly around or under an ash cloud, but it's difficult to measure the exact boundaries of the plume, and as writer and amateur pilot James Fallows puts it, flying at low altitude is "like driving cross-country in first gear." Airlines have an official zero-tolerance approach to volcanic ash, so when scientific models showed the plume spreading across Britain and much of northern Europe in the hours after the eruption, one airport after another benched its planes where they sat. And as the plume lingered over Europe and airports remained closed for two days, then three and then longer, utter travel chaos hit, with hundreds of thousands of people around the world realizing they were stranded far from home — and quite suddenly in the pre-jet era. "These kinds of eruptions happened all the time in the past," says Dougal Jerram, an earth scientist at Durham University. "But the disruption is a product of how we live today."

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And what a disruption, as stranded travelers used every means at their disposal to make it home. German Chancellor Angela Merkel, returning from San Francisco, was forced to fly to Grand Forks, N.D., then to Lisbon, then to Rome, and then travel by car and bus to Germany — an odyssey that took nearly three days. The British government sent warships from the Royal Navy to pick up stranded vacationers in Spain, while English TV host Dan Snow used Twitter to organize a second Dunkirk evacuation across the Channel for Brits stuck in Calais, France. (It didn't go as well as the first. French immigration officials put a quick stop to the rescue.) Travelers crowded train and bus stations, hoping to get scarce tickets home — or to one of the few European airports that were still operating. To make it back to New York City from London, Kate Winn, a TV executive with the A&E channel, and her colleagues chartered a car — operated by a former driver for the heavy-metal band Iron Maiden who'd never driven outside Britain — for a 22-hour trip from London to Madrid, where they were able to get a flight home, through the Dominican Republic, on April 20. What was the adventure like? "Ugh," says Winn. ([See why volcanic ash can be a hazard for air travel.](#))

By April 21, almost all of the European airspace had been reopened, although airlines cautioned that it would take days or weeks to get back to anything like normal. And there's no guarantee that another eruption and unlucky winds couldn't ground planes again. When Eyjafjallajökull last erupted, beginning in 1821, it continued to do so occasionally for two years. "This sort of eruption is one that's probably going to be on and off for a while," says Davidson. "You could see shutdowns again."

If or when that happens, Europe needs to be far better prepared to deal with it. While there's legitimate debate over just how much volcanic ash must be in the air before planes should be grounded, no one should doubt that European authorities were much too slow and uncoordinated in responding to the eruption. The European Union may have one currency, but it has more than 20 airspaces. It took European Travel Ministers five days to arrange a conference call and work out a system for gradually lifting flight restrictions. Long after airlines had done their own test flights and were calling on authorities to reconsider blanket airspace closings, national authorities dragged their feet — even as the crisis showed how quickly

Europe would flounder without air links. "In the U.S., it'd be like every state in the country having their own traffic controllers and trying to coordinate," says Steve Lott, North American spokesman for the International Air Transport Association. "No one took leadership here." ([See the top 10 news stories of 2009.](#))

Americans shouldn't feel too cocky. A major volcanic-ash cloud in the U.S. would wreak economic and logistical havoc on the country, which doesn't even have Europe's train links. And the truth is, our understanding of how volcanic ash works and how it spreads is still limited; scientists can't easily measure how dense a plume really is, nor is there any set limit for how much ash a plane can safely fly through. More research is needed — something Louisiana Governor Bobby Jindal, who once famously mocked the federal spending of millions of dollars on volcano monitoring, might want to remember. "If we spend \$100 million now, we might actually be able to prevent events that would cost billions," says Benjamin Edwards, head of the earth-sciences department at Dickinson College in Pennsylvania. But there's a deeper lesson to Eyjafjallajökull: the earth can still surprise us. As complicated as our transcontinental supply chains and holidays have become, a single shrug from the planet can disrupt everything and leave us marooned far from home. — *With reporting by Deidre Van Dyk / New York and Adam Smith / London*

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