We Told You So! Reflections on the 'Ashpocalypse'

Clive Oppenheimer

It was when my niece rang for advice on whether to cancel or reschedule a holiday that it struck home why the Eyjafjallajökull eruption was such a big news story. Air travel has become so much a part of leisure and commerce that relying on alternative transportation harkens back to the era of steamships and trains. A survey carried out in the UK in February 2010 found nearly half its respondents had travelled by plane at least once in the previous year[1]. In 2009, UK airports handled well over 200 million passengers and more than 2 million tonnes of freight[2]. In that light, it is not surprising that the events of last spring threw the spotlight on the intersection between geology, meteorology and aviation. At the height of the ash-cloud crisis in April, it was indeed ships that came to the rescue. A British Royal Navy warship repatriated hundreds of grounded passengers, while another two thousand sailed home to the UK more luxuriously on a cruise liner diverted ahead of its inaugural voyage.

I followed the Eyjafjallajökull episode closely as I have been interested in the long-range impacts of Icelandic volcanism for some time. Several members of our research team traveled to Iceland to record the eruption, while others operated spectrometers and photometers in the UK to sense the volcanic clouds. With such huge media demand for volcanological comment and perspective, I also gave my share of radio and TV interviews (eventually daring to pronounce 'Eyjafjallajökull'). What with keeping in touch with colleagues in the UK and Iceland and racing between broadcasting studios, the second half of April was a busy time. What it must have been like for the Icelandic volcanological and meteorological communities and European aviation authorities I can only guess at.

To recap the events briefly, the eruption began on March 20, 2010, almost a month before the aviation chaos. This initial activity consisted of spectacular basaltic fire fountains and lava flows. One of my doctoral students hails from Iceland, and I contacted a colleague at the Nordic Volcanological Center in Reykjavík to see if she might join efforts to monitor the eruption. She gathered up gas and aerosol sampling equipment and was at the volcano two days later. During that week, two more PhD students from Cambridge joined her to measure sulphur emissions and to collect thermal images of the fire fountains. I spent many hours trying to spot them (while enjoying the pyrotechnics) in transmissions from one of the popular webcams set up near the volcano.

Then, on April 14, a swarm of earthquakes presaged a much more vigorous stage of the eruption, focused at the glaciated summit crater of Eyjafjallajökull and involving trachyandesite magma. Its interaction with the ice cover yielded extremely fine-grained ash that was blasted violently into the middle and upper troposphere. The prevailing synoptic meteorology dispersed the floury tephra towards Europe. As civil aviation administrations closed down European airspace, residents near airports such as London Heathrow heard birdsong in their gardens for the first time. The supermarkets ran out of Guatemalan *mange tout*, and the Tanzanian tulip harvest went to waste. Meanwhile, other dark clouds loomed above the UK Government's last month of campaigning ahead of a general election.

Among the most commonly used expressions in the media at the time, especially by aerospace commentators, were 'unforeseen' and 'unprecedented circumstances'. Having tried and failed nearly a decade ago to secure funding to investigate the downwind hazards of Icelandic volcanism (including impacts on aviation), I admit that this irked me. I had also responded a few years ago to a call for comments on the UK Cabinet Office's first National Risk Register of Civil Emergencies[3]. I recommended consideration of the Icelandic volcanic threat. This was not followed up, although I understand that volcanism will feature in the next edition.

So, was the 'ashpocalypse' avoidable? The threat of volcanoes to aviation has been widely known since 1982, when Captain Eric Moody rescued his British Airways 747 from a stall in ash clouds over Java. A similar near catastrophe struck a KLM 747 that flew into ash blasted from Redoubt volcano, Alaska, in 1989. That led, two years later, to the first international symposium on volcanic ash and aviation safety (held in Seattle), and the establishment, through the 1990s, of Volcanic Ash Advisory Centers (VAAC) worldwide tasked with monitoring the threat of ash clouds to aviation. But while geologists, meteorologists and the International Civil Aviation Organization were taking the issue seriously, it seems the aviation industry was reluctant to acknowledge the risk, or even, behind the scenes, to look seriously at how it might be managed. Clearly, destroying an engine in a test facility just to determine tolerable ash concentrations is an expensive business, but I wonder why so little research seems to have been conducted on this crucial point before Eyjafjallajökull's display. There have certainly been comparable experiments with desert dust and assorted supermarket fowl. During the Icelandic crisis, KLM was vocal among airlines clamouring for changes to the civil aviation administrations' 'zero tolerance to ash' stance. That seemed particularly surprising for a company that knows better than most the risks of encountering a volcanic cloud.

As the flight restrictions continued, the blame game escalated. Ryanair's chief executive said it was "frankly ridiculous" that flight plans were being disrupted by what he termed "an outdated, inappropriate and imaginary computer-generated model", presumably referring to the UK VAAC's atmospheric dispersion model[4]. British Airway's boss was only somewhat less inflammatory in his criticism of the VAAC's efforts. Ryanair went on to disclaim legislation that requires European Union airlines to compensate passengers for flight cancellations within Europe. Their spokesman described the eruption as an 'act of God' and thus beyond the scope of the law, and blamed the UK Government for the flight chaos. This barrage of criticism struck me as particularly unreasonable given that the aviation industry surely appreciates better than anyone the consequences of a mid-air loss of engine power. Neither, at this point, was it coming up with thresholds for tolerable ash concentrations, nor explaining how they could be measured accurately throughout airspace.

It has taken the economic impacts of the flight bans and the immense publicity of the Eyjafjallajökull episode to put this matter firmly on the industry's agenda. This September, an 'Atlantic Conference on Eyjafjallajökull and Aviation' will review what has been learned from the crisis. While it is a shame, as ever, that risk management appears reactive rather than proactive[5], it is good to see substantial research and policy development opportunities being seized in the aftermath of the Eyjafjallajökull episode. This particular intersection of volcanic and technological hazards offers a rich arena to explore, improve and integrate monitoring, modelling, risk assessment, engineering and emergency management procedures that have much wider significance. Finally, if anyone is still wondering how to pronounce the volcano's name, I am assured by my Icelandic student that saying "I forgot the yogurt" comes close enough.

Clive Oppenheimer
Le Studium Institute for Advanced Studies, Orléans

1 http://www.dft.gov.uk/pgr/statistics/datatablespublications/trsnstatsatt/attitudestoairtravel

2 http://www.caa.co.uk/airportstatistics

3 http://www.cabinetoffice.gov.uk/intelligence-security-resilience/civil-contingencies-uk-resilience/national_risk_register.aspx

4 Witham CS, Hort MC, Potts R, Servranckx R, Husson P, Bonnardot F (2007) Comparison of VAAC atmospheric dispersion models using the 1 November 2004 Grimsvötn eruption. Meteorological Applications 14: 27-38

5 Donovan AR, Oppenheimer C (2010) Eyjafjallajökull and the reconstruction of geography. The Geographical Journal, in press