# ERUPTION OF THE EYJAFJALLAJÖKULL

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An event such as this can be studied from a wide range of perspectives: economic, political, operational, meteorological, geological, etc. This article focuses on some of them trying to point out some of the key indicators. The author is hoping the public would find this article helpful for getting some basic information and knowledge from this area.

K e y w o r d s: Volcanic ash, volcano, eruption, Eyjafjallajökull, ash cloud.

## 1 INTRODUCTION

Volcanic ash is a major hazard to aircraft. Smoke and ash from eruptions reduce visibility for visual navigation, and microscopic debris in the ash can sandblast windscreens and melt in the heat of aircraft turbine engines, damaging engines and making them shut down. While some ash fell on uninhabited areas in Iceland, most had been carried by westerly winds resulting in the shutdown of a large air space over Europe. The shut down had a knock on impact on the economy and cultural events across Europe.

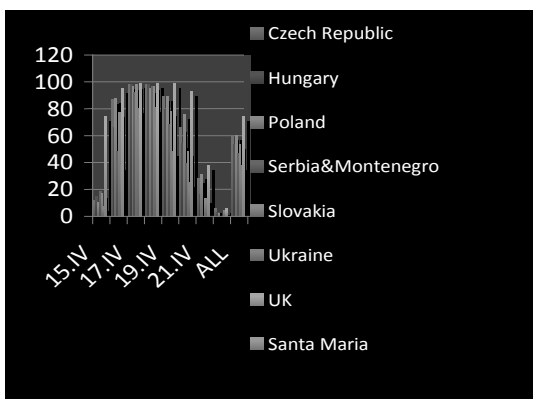



Diagram1. Summary of estimated cancellations (in % per State and per day) in April

## 2 IMPACTS ON AIR TRAFFIC MANAGEMENT

The airspace closures in Europe resulting from the eruption of the Eyjafjallajökull volcano from 14 April 2010 led to the disruption of some 100,000 flights and 10 million passenger journeys. The economic impact and the operational decisions have been addressed elsewhere. This report complements those studies. It considers the impact in terms of numbers of flights, with the principal aim of helping those who will analyze traffic statistics and their trends in the coming months and years. This draft of the report includes additional material estimating the effects of the eruptions in May, which added further 7,000 ash-cloud cancellations to the total.

| *Source* | *Outcome* | |
|---|---|---|
| ACI Europe | 313 airports | European airports totally disabled (75% of the European Airport Network) |
| IATA | 100,000 flights<br><br>19,000 flights | Flights cancelled within the EU, to/from the EU and overflying the EU<br>Peak of flights cancelled on 18 and 19 April |
| EUROCONTROL | 10 million passengers<br>1.2 million passengers<br>24% (and 9% worldwide) passengers flow reduction | Estimated passengers unable to travel<br>Average of scheduled passengers affected each day<br>Reduction of the within-Europe and Europe-rest of the world passenger flows |
| *Source* | *Economic impact* | |
| IATA<br>IATA | US$ 1.7 billion<br>US$ 400 million | Revenue loss for airlines during the period 15-21 April<br>Per day revenue lost for airlines over the peak period (17–19 April) |
| AEA | € 850 million | Loss for airlines including profitability, assistance to passengers, costs for stranded crew, parking and positioning of aircraft and other cost issues (for the period 15–23 April) |
| ERAA | € 110 million | Estimated loss for members of ERAA |
| ELFAA | € 202 million | Estimated loss for members of ELFAA |
| IACA | € 310 million | Estimated loss for members of IACA |
| ACI Europe | € 250 million | Overall European airports losses |
| IAHA | € 200 million | Direct financial loss for independent handlers pertaining to the IAHA |
| ANSPs | € 25 million | Loss per day for Air Traffic Management (ATM) |
| EC | 61% | Fall in air traffic cargo between the scheduled flight per week in the EU-27 |
| Notes: ACI: Airport Council International; IATA: International Air Transport Association; AEA: Association of European Airlines; EUROCONTROL: European Organisation for the Safety of Air Navigation; ERA: European Regions Airline Association; ELFAA: European Low-Fare Airlines Association; IACA: International Air Carrier Association; IAHA: International Aviation Handlers Association; ANSPs: Air Navigation Server Providers and EC: European Commission. | | |

Figure1. Estimated effects of the volcanic ash

The main period of the crisis was 15th-22nd April, though the effects started earlier and continued later, especially in Scandinavia and Iceland. 104,000 flights were cancelled during the 8-day crisis. That is 48% of expected traffic over 8 days, peaking at 80% on 18th April. That implies approximately 10 Million passengers unable to board their flight. Among the flights which actually took place during the crisis were more than 5,000 additional flights put on by scheduled and charter carriers (Tab 1). The additional flights were for made for three reasons: to reposition aircraft; to reposition crews; and to accelerate the

repatriation of stranded passengers. For simplicity, the estimates presented elsewhere in this report are not adjusted to eliminate the effects of these flights.

Aside from Iceland, three States saw a 90% reduction in traffic in April over 5 consecutive days: Finland, Ireland and the UK. Santa Maria (airspace of the Azores) was the only region with a net increase in flights. In May, Ireland was the most affected, but principally in a reduction of it's over flights was seen in May, but on a much smaller scale. In April, Icelandic traffic was affected for 13 rather than the 8 days as seen elsewhere.

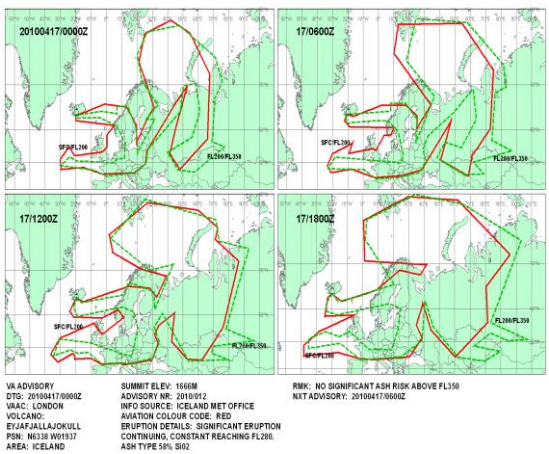



Chart1. Volcanic Ash cloud map 17th April 2010

The impact over the whole month was not quite as high as worst-affected Finland, principally because Iceland was able to maintain some flights to North America. In May, Iceland lost some arrival and departure traffic, but the main effect was the re-routing of the North Atlantic flows to the North of the ash. Low-cost traffic was the hardest hit, losing 61% of flights over the 8-day crisis, compared to 48% for all traffic. Higher exposure and a less flexible business model likely causes of this. Business aviation was least affected, with traffic 34% down.

The most affected airports naturally correspond to the most affected States: Helsinki, Dublin, Manchester and Edinburgh all had less than 25% of the expected number of flights over the 8-day period. Dublin was also the most-affected in May.

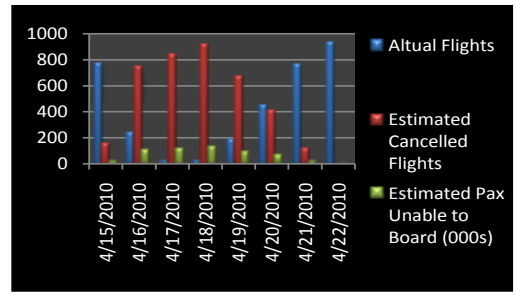
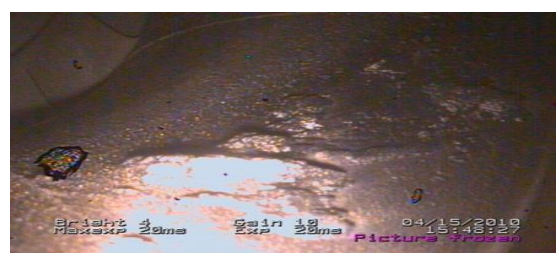



Diagram2. Ash cloud Impacts on FIR Bratislava (April 2010)

Delays in April were up compared to April 2009 (which was a historic low), though better than recent months. Unsurprisingly, there was a large increase in delays attributed to 'other' (i.e. volcanic activities). However, May saw a much bigger impact in terms of delays, with 43% of flights delayed on departure, 10 percentage points higher than in 2009.

## 3 TECHNICAL IMPACT OF ASH FALLOUT

Five of the Finnish Air Force's Hornets were involved in a training exercise on the morning of 15 April, just hours before the imposition of airspace restrictions due to the ash cloud spreading from a major volcanic eruption in Iceland. One aircraft's engines have been inspected using a boroscope, with melted ash clearly visible on its inside surface. The Finnish Air Force has released those images showing the effects of volcanic dust ingestion from inside the engines of a Boeing F-18 Hornet fighter.




Picture1. Image showing the effects of volcanic dust ingestion


Picture2. Image showing the effects of volcanic dust ingestion

The images show that short-term flying can cause substantial damage to an aircraft engine," the air force says. Continued operation could lead to overheating and potentially pose a threat to the aircraft and its pilot.

## 4 SUMMARIES OF IMPACTS

The European Aviation market is a business worth of 140 billion Euros. Air traffic control (management) costs 8 billion Euros for more than 9 million flights per year. Airlines incurred 9 billion Euro losses in 2009 because of the economic crisis. In 2007, delays generated 1.3 billion Euro of costs to airlines (prediction for 2010 is 1.7 billion Euro). Flight inefficiencies due to the volcano ash generate additional fuel burn estimated at more than 1 billion Euros per year and generate some additional 16 million tones odd CO2 per year. The volcanic ash cloud crisis cost airlines 1.26 billion Euros in a week. Solutions are at hand in three areas: rerouting both planes and passengers, establishing more facilities for caring for delaying at the airports, deploying aircraft technology more resistant to the contaminated environment, especially in terms of their survivability.

## 5 CONCLUSIONS

Even if the current crisis has passed and more tolerant contamination thresholds have been established we could still have in stock another major disruption should the volcano comes reactivated. The lesson drawn from the crisis is threefold: passengers routing and ATM, airport service extension for stranded passengers and introduction of improved aircraft technology aircraft capable of survival when flying into a contaminated area. All that is to be at hand right now. Are we ready for coping with a just a repeated or another type of crisis?

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