



Atlantic Conference on Eyjafjallajökull and Aviation 15-16 September 2010, Keflavik Airport, Iceland

Conference Summary and Conclusions

by

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The Keilir Aviation Academy Conference

This conference on **Eyjafjallajökull and Aviation** was organised by the **Keilir Aviation Academy**, Keflavik, Iceland (<http://en.keilir.net/keilir/conferences/eyjafjallajokull>) on September 15-16, 2010 in cooperation with the President of Iceland, The Icelandic Ministry of Transport, the Civil Aviation Administration, ISAVIA, the Meteorological Office, Institute of Earth Sciences, Icelandair, ICAO, IATA, ATA, AEA, IFALPA, EUROCONTROL CANSO and the Embassies of the US and Russia in Iceland. The aim of the Conference was to address the impact of the volcanic eruption of Eyjafjallajökull in April –May 2010 on air transport as well as identifying what could be done to reduce such impact during future volcano eruptions in Iceland and world-wide. For this reason the conference was called to address the many facets of this multi-disciplinary subject that has been identified as the worst disruption by far of European and global air transport since the Second World War. Some 300 participants from all over the world attended the Conference. Participation from outside of Europe, in particular the United States and Russia, was emphasized in order to take advantage of the vast experience that has been gained in these countries in handling situations like the one that was faced by Europe in the spring of 2010.

Keynote Speeches

The stage was set by two eminent keynote speakers, **Dr. Haraldur Sigurdsson**, a distinguished volcanologist, and **Mr. Daniel Calleja-Crespo**, Director of Air Transport at the European Commission.

Dr. Sigurdsson described what happened in Eyjafjallajökull in April 2010 and why so much volcanic ash was generated by this eruption. He also provided a comprehensive view of eruptions that have occurred in geological history and their climatic effects. He pointed out that the eruption of Eyjafjallajökull was very modest in comparison with other such events even within the last one hundred years. He also warned that much more powerful events of this type could occur in the not too distant future.

Mr. Calleja described how the European Commission in cooperation with Eurocontrol had responded decisively to the crisis caused by the eruption to alleviate the impact of volcanic ash that closed the busiest part of European airspace for six days and disrupted air traffic. Most important had been the significant reduction of the so-called no-fly zone that reopened a large part of European airspace and the creation of the European Aviation Crisis Coordination Cell. He also outlined the policy options that in the view of the EC are available in order to prevent the reoccurrence of this situation including the acceleration of the Single European Sky program. The European Commission in cooperation with the European Civil Aviation Conference will present their policy on the subject of volcanic ash and aviation to the 37th ICAO General Assembly in Montreal in the month of September 2010.

Overview - What happened and what needs to be done

A general overview of these events and the discussion of what needs to be done was provided in the two sessions where panel members from the International Civil Aviation Organization, air transport industry, air navigation service providers and aviation authorities addressed these issues. Clearly the response to the volcanic ash situation varied amongst the authorities in European states and was confusing. This issue was underlined later in the conference when the actions taken by the French authorities to open its airspace and certain routes were described.

Representatives of the airline industry sharply criticised the way in which governments had handled this situation which resulted in losses to the air transport industry that are estimated at 1,5 billion €. The general opinion amongst the airlines is that there was no need to adopt such drastic measures as to close down large parts of the airspace and attributed this to poor decision making by the authorities which they labeled as practicing risk aversion rather than risk management. This was also due to the excessively conservative forecasts of ash concentrations by the VAAC in the opinion of the airlines. This triggered an intervention by the Met Office of United Kingdom who felt that this criticism was based on inaccurate information and was unfair. The view was offered that the time for laying blame was over and that the aviation community should be looking to the future. ICAO emphasized the work that is being undertaken by its International Volcanic Ash Task Force (IVATF) to remedy the shortcomings that have been identified. This is focused on the methodology and guidelines that are the basis of all plans and procedures developed by the international aviation community to encounter and mitigate the threat posed to civil aviation by volcanic ash.

There was general agreement amongst the speakers for the need for thoroughly reviewing and improving all aspects of the complex system that is in place to respond to the impact of volcanic eruptions and volcanic ash in particular. This includes better understanding of the physics of volcanic ash, its effects on jet aircraft and engines as well as the modelling and measurement of its dispersion in the atmosphere. Equally important were the institutional aspects where the roles and responsibilities of all the parties needed to be more precisely defined in order to prevent confusion as to how the decision making process should function when dealing with a volcanic ash situation.

In this discussion the European Commission described the guiding principles which could be used to steer the work that lies ahead. The most important of these is that the operator should take the decision to plan a flight into airspace contaminated by volcanic ash. This should be done based on a risk assessment framework methodology that was approved by the authorities

and on the basis of high quality information from approved sources of such information. In the absence of such information flights should not be planned into airspace in which predicted ash density exceeds $4 \times 10^{-3} \text{ g/m}^3$ or the actual density exceeds $2 \times 10^{-3} \text{ g/m}^3$. This proposal appears to be a further evolution in the policy of having all decisions with respect to airspace closure taken by the authorities to allowing the operator, i.e. the airlines, to take more responsibility for such decision making based on an approved risk management system.

Economic Dimension of the Volcanic Ash Event

The economic impact of the volcanic ash from Eyjafjallajökull was explored by representatives of two renowned organizations i.e. the OECD and the UNWTO World Tourism Organisation of the United Nations. The importance of the air transport industry is very significant accounting for 0,7% of the world GDP and 35% of world trade by value. The total loss of aviation due to the 2010 eruption of Eyjafjallajökull is estimated at €1.7 billion and a similar amount is thought to have been lost by the tourist service sector. This event brought out in a clear manner how important air transport is for the modern economy.

The Safety Issues

An extensive discussion of the aviation safety issues and how this was the overriding criterion in the debate of the volcanic ash issue was extensively covered by experts from ICAO, aviation authorities and two US airlines and the IFALPA -International Federation of Airline Pilots Associations and IFALDA- International Federation of Airline Dispatchers Association. In the opinion of most of the speakers the operator should have the primary responsibility for taking the decisions where, when and how to operate. The CAA of the United Kingdom emphasized that this must be done within a risk assessment framework whereby each airlines had to establish an approved system of procedures. The view was aired that the phenomenon of volcanic ash should be treated in the same way as turbulence and icing. Speakers from U.S. airlines described how their companies dealt with volcanic ash and showed how their procedures would have lead to a smaller no-fly zone than was applied in Europe. Shifting the decision making responsibility to the airlines clearly causes concerns by some pilots organizations that fear that pilots can be put under pressure by the airlines and underlined that safety comes first. This was also underlined by an intervention from the audience which expressed the view that the authorities should have the ultimate decision role.

Technical Dimension

The technical dimension of this event was covered by four representatives of aircraft and engine manufacturers. They agreed that the response to the volcanic threat had been far too conservative and that the decision to fly should rest with the operator. However there was a need to improve the availability of accurate information on ash concentrations. It also emerged that all inspections of engines that were exposed to forecast volcanic ash had resulted in nil findings. This population consisted of 350 engines in the case of Rolls-Royce that has concluded that operation in ash concentration of 2 mg/m^3 is safe. This is manifested by a Safe-to-Fly Chart that was provided by RR in an open forum at the Keilir Conference for the first time. Although some room may exist for operation in higher concentrations this is not favored by the manufacturing industry at this time. The manufacturers still advise that operation in visible or discernable ash should be avoided.

Scientific Aspects

The scientific dimension of the Eyjafjallajökull 2010 eruption was extensively explored by volcanologists and volcanic ash forecasting and measurement experts in two sessions on the second day of the conference. It seems to be generally accepted amongst volcanologists that the probability of another volcanic eruption in Iceland or another place in the coming years is high. Katla is the primary suspect in this context. Although no two eruptions are identical the content of fine ash in the Eyjafjallajökull eruption was unusually high. The subject of volcanic ash forecasting was discussed in some detail and the importance of considering the uncertainty of input parameters and initial conditions was emphasized. A method for possible airborne detection of volcanic ash in transport aircraft was also described.

Detection and forecasting of volcanic ash was addressed by a panel made up of primarily scientists from various research institutions and Met organizations that had been involved in the monitoring and forecasting of volcanic ash during the Eyjafjallajökull eruption. One of the weaknesses of the forecasts was that the limited capabilities were available for monitoring the ash output at source. The forecasts were dependent on the estimate of ash discharge from the volcano. Airborne measurements made by various organizations clearly indicate that the predicted ash concentrations were significantly overestimated. This includes remote measurements by Lidar as well as in-situ measurements even within the ash plume in the vicinity of the volcano. This conclusion is supported by extensive test flights that were undertaken in several European countries by airlines in cooperation with aviation authorities as well as Airbus. The application of satellite imagery was also described and the need to integrate this information into the forecasting process as well as other observation data was addressed by most speakers. The importance of airborne measurements of volcanic ash in addition to a ground-based network of measurement stations was strongly supported.

Global Actions – Steps to be taken - Summary

In summarising the outcome of the deliberations of the conference the final panel addressed the question of what global action was needed and what steps should be taken in the near and long term to improve the response to volcanic eruptions. There was general agreement that the work undertaken by ICAO and the International Volcanic Ash Task Force was paramount and should be strongly supported by all stakeholders and carried out as a matter of importance if not urgency. This will establish a new methodology and procedures for dealing with volcanic ash on a global basis which is the framework for the implementation of regional structures. There is also general agreement that extensive improvements are needed in all aspects of the modeling, measurements and forecasting of the concentrations of volcanic ash. Although a certain relief has been provided by the 2 mg/m^3 ash concentration limit there is much more research required by the engine manufacturers. The question of certification of engines remains open as there are still doubts by some parties that this can be achieved.

All in all there was a general convergence of the thoughts and recommendations of the presentations and opinions offered in the conference although the emphasis on specific actions and methods varied. Thus it became clear that there is a strong movement towards shifting to the operator the responsibility for deciding whether to fly and how to conduct the flight in the case of contamination of airspace by volcanic ash. This would be done in a strictly regulated environment where the risk assessment and management procedures of airlines would be scrutinized and approved by the appropriate aviation authority. The guidelines provided by the European Commission and key national authorities are testaments

to this fact. This would include the definition of all necessary information to be used in this process be they forecasts, ground-based and airborne measurements, satellite images, pilot reports or other reliable information on the state of ash contamination.

Last but not least there was a call for institutional reform in this area in order to define precisely the roles and responsibility of the various actors in the day-to-day management of the response by the air transport system to volcanic eruptions. Clearly EASA and Eurocontrol will play key roles in this future management system in Europe.

The outcome of the conference was summed up by one of the speakers David Learmount of Flight International magazine by the statement that European air transport need not have been immobilised by the Eyjafjallajökull volcanic eruption in April because the knowledge of how to deal safely with the conditions existed. However, this knowledge had not been assembled by ICAO or any other organization at that time.

The President of Iceland Olafur Ragnar Grimsson, Patron of the Conference, addressed the audience and put the subject of the conference into the larger framework of international cooperation before declaring it closed.

Keilir Conference Program and Presentations:

The Conference Program on Eyjafjallajökull and Aviation is available as a pdf on the Conference website:

http://en.keilir.net/static/files/Aviation/PDF/Eyjafjallajokull_and_Aviation_Conference_Program.pdf

All the presentations from the eight Aviation Conference sessions as well as the CV of the speakers are also available on the conference Website:

<http://en.keilir.net/keilir/conferences/eyjafjallajokull/program>

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