Department of Meteorology

University of Reading

Quantifying volcanic ash risks to aviation

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Summary

The 2010 eruption of the Eyjafjallajökull volcano in Iceland caused prolonged closure of European airspace, costing the global airline industry an estimated $200 million per day and disrupting 10 million passengers. Research to develop instrumentation and to develop models relevant to the dispersal of volcanic ash played a key role in lifting the flight ban. This led to new procedures being put in place across Europe to minimise economic costs and human inconvenience caused by such eruptions, while reducing risks to passengers and crew.

Background

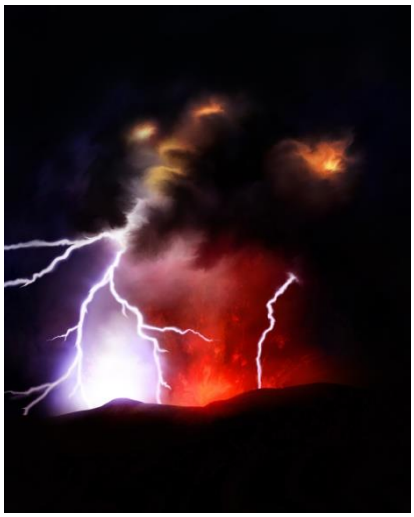
Prior to the eruption of the Eyjafjallajökull volcano, research at Reading had developed a range of science sensors to be flown on weather balloons to exploit their measurement capabilities further. The eruption in April 2010 resulted in a large plume of volcanic ash, which was subsequently blown across the UK and Europe. As volcanic ash can seriously damage aircraft engines, safety concerns resulted in the imposition of a total flight ban within UK airspace from 15 April.

How is University of Reading research contributing?

Following a request from the Cabinet Office, the systems developed at Reading were quickly brought into use to assess the properties of the ash cloud aloft, while the research team provided expert guidance on the extent, location and physical properties of the ash clouds within UK airspace. The Met Office's NAME (Numerical Atmospheric dispersion Modelling Environment) model was also used to provide information about the plume. The Met Office requested assistance to perform detailed analysis of the model output during the crisis; another strand of research focussed on analysing the output of the model alongside different measurements of the plume from a range of sources.

What impact has our research had?

The measurements made using the monitoring technology developed by the research team helped map the ash cloud and validate data derived from the NAME model, thereby providing a more accurate assessment of volcanic ash concentrations and thus airspace hazards. During the initial phase of the eruption, measurements provided by the instrumentation confirmed that, under the 'zero risk' protocols then in force, the flight ban should remain. Improved forecast capabilities meant that flight bans could be restricted to smaller regions as the eruption progressed, and by 22 April, eight days after the eruption had begun, regular flight schedules resumed. The research effort described here contributed to reducing both passenger disruption and airline industry costs during the course of the eruption.



"The London Volcanic Ash Advisory Centre, part of the Met Office, is responsible for providing advice and forecasts to aviation authorities in connection with volcanic ash. Measurements and analysis from the University of Reading played a key role in the development of our ash modelling approach, which was also deployed to good effect during the eruption of Grimsvotn in 2011."

Dr David Thomson
Atmospheric Dispersion Group, Met Office

Met Office

Find out more ...

- Department of Meteorology, University of Reading, UK
- **www.met.reading.ac.uk**