NERC SCIENCE OF THE ENVIRONMENT

# Setting safe flying limits in ash clouds

The eruption of Iceland's Eyafyallajökull volcano in April 2010 caused the largest closure of European airspace since World War II, with losses estimated at between €1.5 and 2.5bn (£1.3-2.2bn). Criticism following the shutdown led the Civil Aviation Authority (CAA) to introduce more sophisticated rules to allow planes to fly in areas with a low density of volcanic ash. NERC's National Centre for Atmospheric Science (NCAS) supported the CAA in developing these new rules, limiting the eruption's impact on the aviation industry and saving it an estimated $400m per day.

**Partners**:
NERC's National Centre for Atmospheric Science (NCAS)
NERC's Facility for Airborne Atmospheric Measurements (FAAM)
NERC's British Geological Survey (BGS)
Civil Aviation Authority (CAA)
International Civil Aviation Organisation (ICAO)
Volcanic Ash Advisory Centres (VAACs)
Scientific Advisory Group in Emergencies (SAGE)
UK Met Office
BAE Systems
Directflight Ltd
Avalon Aero
Icelandic Meteorological Office (IMO)

## The collaboration

On 20 March 2010, Icelandic volcano Eyafyallajökull started to erupt. On Wednesday 14 April the eruption suddenly intensified and large amounts of ash were ejected into the atmosphere up to altitudes of 30,000ft. The ash reached UK airspace on the morning of 15 April. At the time, International Civil Aviation Organization (ICAO) guidance, based on a zero threshold for ash in air, resulted in much of European airspace being closed. This shutdown was estimated to cost the airline industry worldwide $400m per day with a total loss of revenue to the industry of $1.7b.

NCAS – world leaders in airborne and ground-based aerosol measurements – joined other organisations nationally and internationally to help the UK CAA establish new procedures for flying close to or in volcanic ash. The resulting agreement allowed UK airspace to be substantially re-opened six days after the eruption. NCAS provided the instruments and scientists to make airborne observations of the ash plume, ground-based LIDAR measurements of the ash, and independently verified the dispersion forecasts of the Volcanic Ash Advisory Centre. The CAA has verified the contribution this made to the new operating agreement. NCAS further assisted in the response to the emergency by contributing to the Chief Scientist's Scientific Advisory Group in Emergencies (SAGE).

Following the Eyafyallajökull incident, NCAS has worked to improve infrastructure to limit the impact of future eruptions. This was tested in May 2011 when the Icelandic volcano Grimsvötn erupted. A LIDAR system installed and managed by NCAS was used to cut by half the time during which the international airport at Keflavík was closed.

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