Key facts

- The Met Office is home to the London Volcanic Ash Advisory Centre (VAAC), which covers the North Atlantic region.
- The London VAAC issues Volcanic Ash Advisories (VAA) and Volcanic Ash Graphics (VAG) to air traffic control and civil aviation authorities to warn aviation about the presence of volcanic ash following eruptions in its region.
- Atmospheric dispersion model output and observations are used to forecast the location and concentration of volcanic ash out to 18 hours ahead of the present time for the advisories.
- The Met Office produces additional five day forecasts, which are used by airlines and the UK Government to assess the long-term situation and develop contingency plans.
- During the 2010 and 2011 eruptions in Iceland, Met Office scientists provided direct interpretation and advice to Government.

Key customer(s)

- Civil Aviation Authority (CAA)
- Scientific Advice Group in Emergencies (SAGE)
- Cabinet Office Briefing Room (COBR)

References


Case study of the Iceland eruptions in 2010 and 2011

The eruption of Eyjafjallajökull volcano in Iceland on 14 April 2010 led to the widespread dispersion of volcanic ash across UK and European airspace. Flights to and from affected countries were grounded as the ash cloud crossed Europe.

The subsequent eruption of Grimsvötn in May 2011 ejected ash to much higher altitudes, but led to considerably less disruption. This was due to improvements in the forecast procedure, a differing weather situation and a shorter eruption duration.

The Met Office’s atmospheric dispersion model NAME was used during both eruptions to help forecast the location and concentration of volcanic ash to provide guidance to civil aviation.

Since the end of the Eyjafjallajökull eruption three concentration levels are required to be forecast in the European region (see image). These levels are set by the aviation community and have enabled the more flexible use of airspace in the event of a volcanic eruption.

How NAME was used

NAME is the operational dispersion model of the London Volcanic Ash Advisory Centre (VAAC). Volcanic ash is modelled in NAME using a representative size distribution and density for the ash particles. Ash is released at the volcano over a height range between the volcano’s summit and the maximum observed height of the eruption plume. The eruption height is critical for estimating the mass of ash erupted under the current procedure. The level of confidence in this maximum height depends on the availability of observations of the plume.

During eruptions, the Met Office is in close contact with the Icelandic Meteorological Office and other observers to ensure that the best information about the eruption is being used in the model.

Ash is removed from the atmosphere in NAME by gravitational settling and wet deposition, through interaction with clouds and rainfall.

NAME forecasts for volcanic ash are produced out to five days ahead for the whole North Atlantic and European region using weather data from the Met Office’s global Numerical Weather Prediction model. These forecasts are verified against a wide-range of observations including those from the ground, aircraft and satellites.

How NAME aided the UK government

In both events, Met Office scientists from the Atmospheric Dispersion Group developed and used the Met Office’s atmospheric dispersion modelling capabilities and their knowledge to provide expert advice to key partners across a range of government and non-departmental government bodies. This advice enabled appropriate planning, action and monitoring to be carried out.

“The scientific support the group provided both to HPA and to other government departments and agencies throughout ... the Icelandic volcano eruption formed an essential component of the UK response.

The group’s support was always given in a timely manner and to the highest professional standards.”

Mary Morey, Deputy Director, Centre for Radiation, Chemicals and Environmental hazards, Health Protection Agency

In recognition of the Met Office’s response to these eruptions and other incidents, the Atmospheric Dispersion Group was awarded the 2011 Civil Service Award for Science, Engineering and Technology.