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Reducing the risk of volcanic ash to aviation

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European air transport infrastructure is vulnerable to disruption by volcanic ash emitted from erupting volcanoes in Iceland. This was dramatically demonstrated during the 2010 Eyjafjallajokull eruption when European airspace was closed for six and a half days. Over 95,000 flights were grounded with an estimated cost to the airline industry of £ 1.1 billion. Ash produced when a volcano erupts provides a significant risk to aircraft through temporary engine failure, permanent engine damage and visibility reduction. This risk is minimised by closing airspace and rerouting flights, both of which have financial implications for the aviation industry and impose disruption at both national and international levels.

In the event of a volcanic eruption, forecasts of the horizontal ash coverage are issued by the Volcanic Ash Advisory Centres (VAACs). The VAACs produce hazard maps of instantaneous horizontal ash coverage and then a forecast at +6, +12 and +18 hrs from the time of the forecast. Information about the future distribution of volcanic ash following an eruption is essential for planning purposes > 6 hours ahead. The hazard maps provide guidance and advice to national authorities in charge of aviation and public health. The accuracy of these forecasts is highly dependent on the availability of observations of the erupting plume (e.g. plume height, mass eruption rate and the vertical distribution of ash in the plume) as well as the meteorological input data and the assumptions made in the numerical dispersion model used to produce the forecast. Currently forecasts of volcanic ash distribution do not represent the uncertainty in the predictions and therefore provide limited information to airlines and other decision makers. The RACER (Robust Assessment and Communication of Environmental Risk) aims to quantify the uncertainty in volcanic ash forecasts for different types of volcanic eruption. These uncertainties will then be used to create probabilistic volcanic ash forecasts which will provide more information on the possible location, and therefore, risk posed by the ash.