Harmful particles in Icelandic volcanic ash fell first, says new research

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The type of particles which are most harmful to jet engines were the first to fall out of the Eyjafjallajökull ash plume following the volcano's eruption in 2010, delegates at the Goldschmidt conference will be told today.

The research, led by Dr Bernard Grobety of the University of Fribourg in Switzerland, will help to mitigate the impact of future volcanic eruptions on air travel.

Dr Grobety's team analysed samples of volcanic ash taken at different points in its journey from the volcano across Europe. They found that the two different forms of the ash particles – crystalline and glassy – behaved differently during transport. As the plume travelled through the air, the crystalline particles, which are denser and heavier, fell out of the cloud first compared to even-sized glassy particles.

"It's already known that the larger, heavier particles in an ash cloud will be the first to fall out as the cloud travels away from a volcano," explains Dr Grobety. "It is also clear that particles of equal size but higher density will fall out faster. Our research, however, is the first to evidence the faster loss of crystalline particles in a volcanic cloud and that the overall composition of the ash changes during transport. Since crystalline particles are harder and melt at higher temperatures, they are more harmful to jet engines than glassy particles. Understanding the behaviour of these different forms in the ash cloud will enable the authorities to fine tune their response should another volcanic eruption take place."

The 2010 eruption of Eyjafjallajökull caused air traffic in Europe to be grounded for six days, with widespread disruption in over 20 countries. There has been extensive research since 2010 to reduce the impact of future eruptions, but much of the research treats the ash cloud as homogenous, focusing on its concentration and the size of particles within it. Dr Grobety's research adds another layer of detail which could reduce the impact of any eruption still further.

"We're already at the point where we can say that if the ash is at a certain concentration and a certain particle size, it poses no threat to aircraft," says Dr Grobety. "However, it's possible that even at a higher concentration, if no crystalline particles are present, planes may still be safe to fly. By monitoring how quickly these particles are falling out of the cloud, it could reduce the area affected or help restrictions to be lifted sooner.

"However, there are a lot of factors which will determine the impact of any future eruptions – from the nature of the eruption itself, to the prevailing winds and the concentration of the ash. While the detail we're able to provide may be only one of many factors to take into account, anything that can limit the disruption to air travel has to be worth looking at."

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