

Why volcanoes are likely to continue to cause chaos in Europe



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By Dr Andy Hooper. *The opinions expressed are his own.*

Within the space of just over a year, aircraft have now been grounded in Europe twice by ash blowing in from Iceland. This has caused many millions of pounds of disruption.

A key question uppermost in many minds is whether the frequency of eruptions in Iceland is increasing. The short answer here is 'yes, probably'. But, it is not just the frequency of eruptions that matters. To

impact the airspace of the United Kingdom and continental Europe, the ash has to be ejected high enough, and be fine enough that it can remain airborne for days. Then the winds have to conspire to push it towards Europe, and the winds blow over Iceland from the north only a small fraction of the time.

Studies by researchers at the University of Iceland have noted that the frequency of eruptions from volcanoes beneath the Vatnajökull ice cap (including Grímsvötn, which erupted in May this year) seems to wax and wane with a cycle of about 140 years.

Prior to the 1980s, there were no such eruptions from these volcanoes for over 40 years and there have now been four within 15 years. The reason for the apparent cyclicity is not established but, in any case, we appear very likely to have entered a phase of more eruptions.

The volcanoes beneath the Vatnajökull ice cap are not, of course, the only ones in Iceland — Eyjafjallajökull, for instance, which erupted last year, is not covered by the Vatnajökull ice cap — and the same patterns may not apply elsewhere. However, perhaps more importantly than the number of eruptions, the University of Iceland study also noted that the intensity of eruptions increases in times of high activity, meaning that the height of the ash, and therefore the chances of it reaching Europe, also increases.

Perhaps of even greater concern is that the major fissure eruptions have also occurred during periods of high volcanic activity, although with only two of these within the last 800 years, this could be coincidence. Here the concern is not so much for air traffic, but for something far worse.

The Laki fissure eruption in 1783-1784 killed a quarter of the Icelandic population and led to the deaths of thousands throughout Europe, due to poisoning and extreme cold. In the twenty-first century, we might be able to mitigate the direct effects of poisoning somewhat, but the climatic effects would still be devastating for susceptible portions of the population and for agriculture.

On top of this pattern of variable eruption frequency, the ice caps in Iceland have been shrinking since the late nineteenth century. Vatnajökull, for instance, has lost an estimated 400 billion tonnes of ice over this time period. This has decreased the pressure on the hot

mantle material beneath the crust, which feeds Icelandic eruptions, leading to increased magma generation.

As the last ice age ended, volcanism in Iceland was some 30 times higher than usual. The current rate of ice loss is now much less, but it is likely that on the order of two cubic kilometres of extra magma have been generated since the recent ice retreat began — equivalent to more than ten 2010 Eyjafjallajökull eruptions!

Perhaps our one saving grace, in the short term, at least, is that it may take quite some time for this extra magma to find its way to the surface. Trying to assess more fully the impact of the melting ice on future eruptions is something that colleagues and I continue to work on.

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Image — The Moderate Resolution Imaging Spectroradiometer (MODIS) on NASA's Terra satellite captured this natural-colour image at 13:00 UTC on May 22, 2011 and shows the ash plume from the Grimsvotn volcano, under the Vatnajökull glacier in southeast Iceland. Picture taken May 22, 2011. REUTERS/NASA/GSFC/MODIS Land Rapid Response Team/Handout