

Rapid analysis could cut health risks of volcanic ash

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A new, rapid and cheap way of estimating the potential risk posed to human health by volcanic ash has been devised by a Durham University expert.

Dr Claire Horwell, of the University's Institute of Hazard and Risk Research, has developed a sieving technique which analyses the grain size of volcanic ash to determine its possible threat to many thousands of humans affected by the estimated 70 volcanic eruptions which happen worldwide each year.

Her research, funded by the UK Natural Environment Research Council (NERC) and published in the Journal of Environmental Monitoring, could help shape emergency response plans following a volcanic eruption and cut the possible risk to human health posed by breathing in fine particles of ash.

Although medical research is on-going, volcanic ash is thought to trigger attacks of acute respiratory diseases, such as asthma and bronchitis, in people who already have the diseases. It also has the potential to cause chronic diseases such as the lung disease silicosis.

Medical studies to assess the risk from the ash following an eruption can take years, but if ash is too large to enter the lung it cannot be a hazard.

In many countries only basic sieves are available for assessing the grain size of volcanic ash, but until now sieving could not determine if

particles were fine enough to enter the lung.

To solve this problem Dr Horwell used state-of-the-art laser technology to analyse the grain size of samples from around the world.

She found there was a strong link between the ratios of different-sized particles present. She then used this link to develop a formula so the amount of breathable particles could be estimated by sieving.

This sieving technique could allow emergency response teams to quickly and cheaply measure the potential risk to health without the need for high-tech equipment. Depending on the risk, measures could be put in place to protect people living close-by.

Volcanic ash can be present in the air following an eruption for many months, often being remobilised by wind or human activities such as driving.

A number of volcanic eruptions are reported worldwide each year. Last week a volcano on the Yemeni island of Jabal al-Tair, in the Red Sea, erupted for the first time since the nineteenth century sending ash 1,000ft into the air as well as spewing out lava.

In September an eruption of Ol Doinyo Lengai, in Tanzania, eastern Africa, produced ashfall which lasted about 12 hours in the village of Engare Sero, while the eruption of the Soufriere Hills volcano on the Caribbean island of Montserrat, which began in 1995, continues today.

Dr Horwell, who is also co-ordinator of the International Volcanic Health Hazard Network, said: “We need a rapid way to assess the hazard to human health from volcanic ash.

“This technique means that scientists can sieve the ash then very quickly

work out what percentage of the material could enter the lung.

“If only a very small percentage of the ash is capable of entering the lung then it is unlikely to present a health hazard, but if there is a high percentage then you would want to issue dust masks or think about evacuating people from the surrounding area.”

Dr Horwell is also recommending that a network of ash collection sites be set up prior to an eruption so that a rapid assessment of health hazards can be made across a region.

Dr Peter Baxter, at the Institute of Public Health, University of Cambridge, said: “Volcanologists have traditionally reported on the coarser grain sizes of volcanic ash for their particular purposes rather than the finer material which is the most important for assessing the hazard to respiratory health of populations affected by ash falls in a volcanic eruption.

“This paper will encourage volcanologists to provide a fuller profile of the grain sizes of erupted ash on a routine basis and, most importantly, to be more able to support multi-disciplinary responses to the human impacts of ash falls in future volcanic eruptions, especially in developing countries.”

Source: Durham University

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