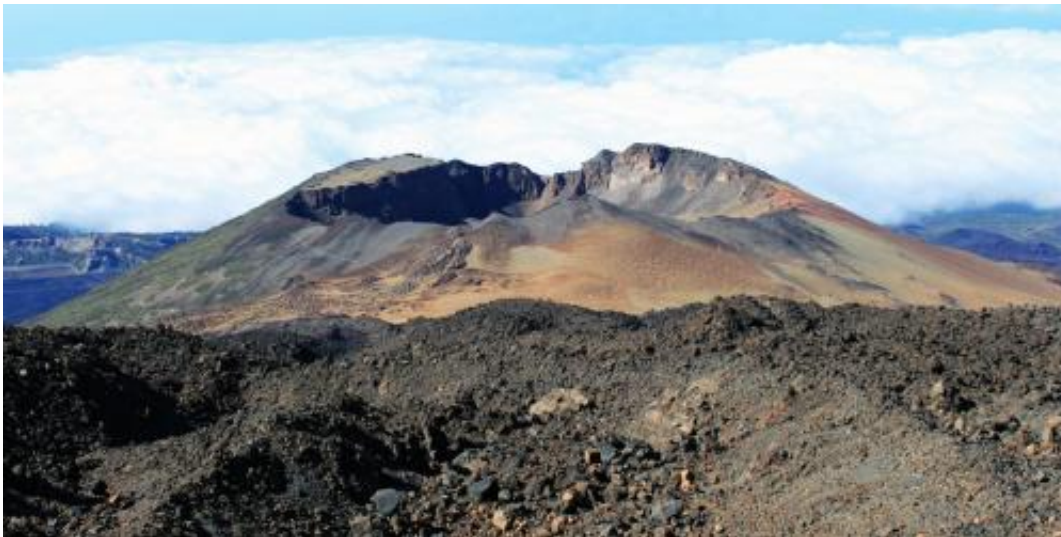


Trigger for explosive volcanic eruptions identified

October 12 2012

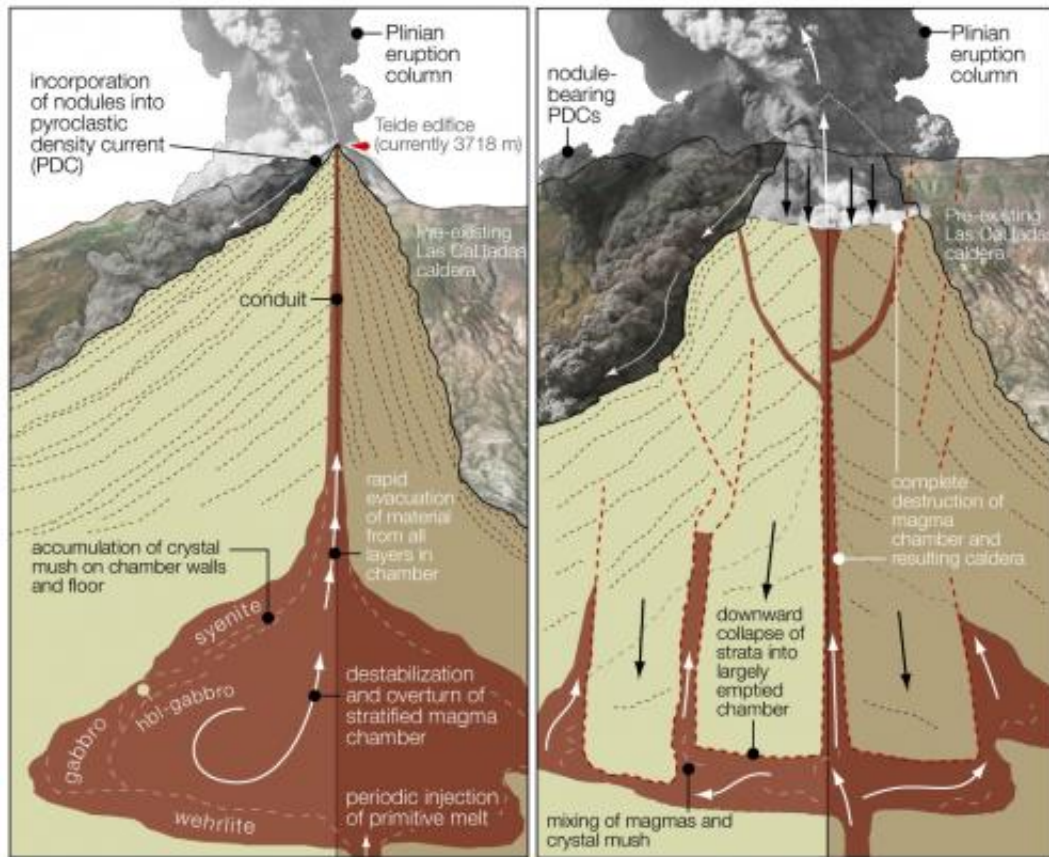


This is the Las Cañadas volcano. Credit: Barry Marsh

Scientists from the University of Southampton have identified a repeating trigger for the largest explosive volcanic eruptions on Earth.

The Las Cañadas volcanic caldera on Tenerife, in the [Canary Islands](#), has generated at least eight major eruptions during the last 700,000 years. These [catastrophic events](#) have resulted in eruption columns of over 25km high and expelled widespread pyroclastic material over 130km. By comparison, even the smallest of these eruptions expelled over 25 times more material than the 2010 eruption of Eyjafjallajökull, Iceland.

By analysing crystal cumulate nodules (igneous rocks formed by the accumulation of crystals in [magma](#)) discovered in pyroclastic deposits of major eruptions, the scientists found that pre-eruptive mixing within the magma chamber – where older cooler magma mixed with younger hotter magma – appears to be the repeating trigger in large-scale eruptions.



The diagram shows the repeating development of the Las Cañadas magma chamber. Credit: Tom Gernon

These nodules trapped and preserved the final magma beneath the volcano immediately before eruption. Dr Rex Taylor, Senior Lecturer in Ocean and Earth Science at the University of Southampton, investigated nodules and their trapped magma to see what caused the eruptions. He

found that the nodules provide a record of the changes occurring in the magma plumbing right through to the moment the volcano erupted.

Dr Taylor says: "These nodules are special because they were ripped from the magma chamber before becoming completely solid – they were mushy, like balls of coarse wet sand. Rims of crystals in the nodules grew from a very different magma, indicating a major mixing event occurred immediately before eruption. Stirring young hot magma into older, cooler magma appears to be a common event before these explosive eruptions."



These are Southampton students conducting fieldwork on the Las Cañadas volcanic caldera. Credit: Barry Marsh

Co-author of the study, Dr Tom Gernon, Lecturer in Ocean and Earth Science at the University of Southampton, says: "The analysis of crystal

nodules from the volcano documents the final processes and changes immediately prior to eruption – those triggering the catastrophic eruptions. The very presence of mushy nodules in the pyroclastic deposits suggests that the magma chamber empties itself during the eruption, and the chamber then collapses in on itself forming the caldera."

The Las Cañadas volcano is an IAVCEI (International Association of Volcanology and Chemistry of the Earth's Interior) Decade Volcano – identified by the international community as being worthy of particular study in light of their history of large, destructive eruptions and proximity to populated area.

Dr Gernon, who is based at the National Oceanography Centre at Southampton's waterfront campus with Dr Taylor, adds: "Our findings will prove invaluable in future hazard and risk assessment on Tenerife and elsewhere. The scale of the eruptions we describe has the potential to cause devastation on the heavily populated island of Tenerife and major economic repercussions for the wider European community."

More information: [www.nature.com/srep/2012/12101 ...
/full/srep00731.html](http://www.nature.com/srep/2012/12101.../full/srep00731.html)

Provided by University of Southampton

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