Scientists develop a new method for predicting volcanic eruptions

October 29 2015

Researchers from the Department of Earth Sciences at Royal Holloway, University of London, have developed a new method which could more accurately determine the conditions needed for a volcano to erupt. The study was published today (28 October) in *Scientific Reports*.

The team composed of PhD students John Browning and Sandy Drymoni and Professor Agust Gudmundsson used newly collected geological data and historical data on previous eruptions of the Santorini volcano in

Greece, to work out the capacity of the volcano's magma-chamber. They were then able to build a model which allowed them to estimate the pressure increase in the magma-chamber when it's being refilled and therefore forecast when it's likely to rupture and potentially cause an eruption.

The team travelled to island of Santorini in Greece to collect data on the type of magma which feeds eruptions. They took measurements of magma-filled fractures (dykes) which are exposed in impressive form along the northern wall of the Santorini caldera. Using geodetic data from 2012, when the volcano was thought to be close to an eruption, the team determined, using their new method, that the magma chamber did, in fact, not rupture at that time. Thus, while great volume of new magma was received by the Santorini chamber in 2012, so that it came close to rupture (and possible eruption), the chamber did not quite reach the rupture stage.

The new model has the potential to forecast when magma chambers in other volcanoes could rupture and potentially lead to eruptions, which should aid emergency planning and risk assessments.

John Browning, said: "We have been able to provide constraints on the volume of magma stored in a shallow magma chamber underneath Santorini Caldera. We believe our new model can be used to forecast the timing of magma-chamber rupture at Santorini and, eventually, at well-monitored volcanoes worldwide. Whilst this is an important step towards reliable prediction of volcanic eruptions, a number of challenges still exist. For example, even if the magma chamber were to rupture we currently have no way of predicting whether the magma-filled fracture (the dyke) injected from the chamber will make it to the surface. In most cases the magma stalls or stops before it reaches the surface. Under which conditions magma stalls in volcanoes (preventing eruption) is among the most important unsolved problems in volcanology."

More information: John Browning et al. Forecasting magma-chamber rupture at Santorini volcano, Greece, *Scientific Reports* (2015). DOI: 10.1038/srep15785