

Crystal movement under Mount St. Helens may have indicated 1980 eruption was likely

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Mount St Helens volcano (Washington State, USA) in 2003 Credit: Jon Blundy

A study of how crystals moved in magma under the Mount Saint Helens

volcano before the 1980 eruption may have signalled that an eruption was probable. Scientists say that similar measurements may indicate the possibility of eruption in some other, well-studied volcanoes, but caution that this is not a technique which could be applied to every volcano.

The [eruption](#) of Mount St Helens in Washington State, on 18th May 1980, was the most significant volcanic eruption in the contiguous United States in the last 100 years. The eruption column rose to 80,000 feet (24km) and deposited ash in 11 states. 57 people were killed as a direct result of the eruption. Since then, Mount Saint Helens has become one of the most studied volcanoes in the world, as scientists have tried to understand what caused the eruption.

Now a group of international researchers studying the movement of crystals in magma believes that they may have found signs that could indicate a risk of future eruptions at Mount St Helens, and possibly some other volcanoes. The work is presented at the Goldschmidt geochemistry conference in Yokohama, Japan.

According to lead researcher, Jon Blundy (University of Bristol):

"We looked for signs in the way zoned feldspar crystals grew and moved beneath Mount St Helens in the build-up to the 1980 eruption. Crystals in erupted volcanic rocks are made up of concentric layers, like rings of a tree. The crystal layers, just a few hair's breadths across, have a distinct chemical composition that reflects the conditions under which they grew in the underground magma system prior to eruption. In other words, they can show where they were formed and the pressure and temperature conditions at the time of formation.

If you can read the record preserved in the zoned crystals, you can learn where and when molten magma has moved under the volcano. Rapid upwards movement of magma at depths of several km is a pretty good

indication that something significant is happening. We have found a way of correlating the crystal composition to where they came from".

The researchers found that in the 3 years immediately before the eruption, there was a significant movement of magma under Mount St Helens, which carried the crystals from 12km below the volcano to around 4 km below the volcano.

"This indicates that the magma system beneath the volcano had become destabilised, probably in the months to years before the eruption", said Professor Blundy. "What we are doing is not a real-time monitoring, but a retrospective study of what happened prior to the last eruption. Now we have found this movement, it's reasonable to assume that similar movement will precede any further eruptions from this and perhaps many other volcanoes".

The researchers will continue to monitor Mount St Helens, but they hope to be able to begin to monitor the record of zoned feldspar crystals in the magma of other well-studied volcanoes, such as Uturuncu in Bolivia, Mt Pinatubo (Philippines), and Bezymianny (Russia). As Jon Blundy said: "There is probably no single factor which can predict when a volcano erupts. What we have found, namely destabilisation of deeply-stored [magma](#) and its ascent to shallow levels in the crust, may be one key factor, which may be especially useful in circumstances where we can monitor a volcano closely over a period of years".

Commenting, Associate Professor Georg Zellmer (Massey University, New Zealand), said: "The study of chemical variations in [crystals](#) has become a key indicator of magmatic processes under active and dormant volcanoes. Refining the pressure-temperature-time resolution of this record is at the forefront of ongoing research in this field. The critical next step towards real-time volcanic hazard mitigation will be to link such data with geophysical [volcano](#) monitoring efforts".

This paper is presented at the Goldschmidt conference on Thursday June 30, 2016.

Provided by Goldschmidt Conference

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