Autopsy of a eruption: Linking crystal growth to volcano seismicity

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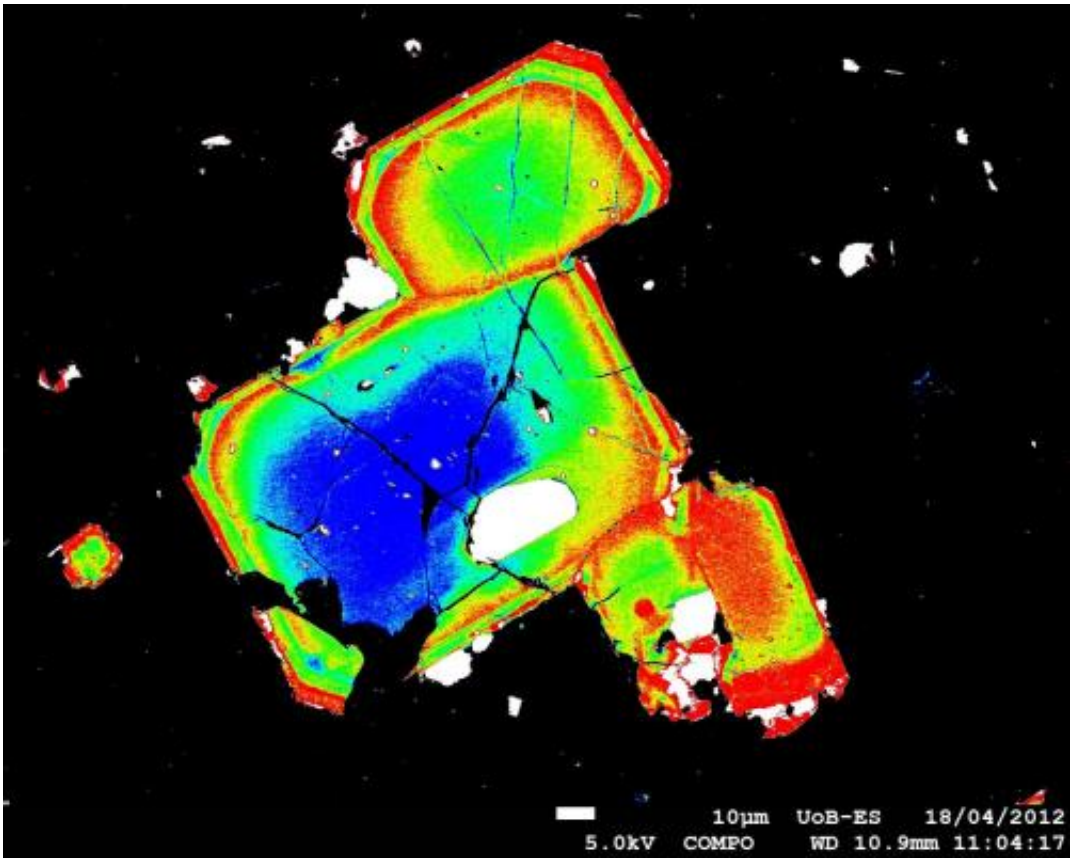

False colour image of zoned orthopyroxene crystal used in forensic-style analysis of Mount St Helens 1980 eruption. Credit: Dr Kate Saunders, University of Bristol

A forensic approach that links changes deep below a volcano to signals at the surface is described by scientists from the University of Bristol in

a paper published today in *Science*. The research could ultimately help to predict future volcanic eruptions with greater accuracy.

Using forensic-style chemical analysis, Dr Kate Saunders and colleagues directly linked seismic observations of the deadly 1980 Mount St. Helens eruption to crystal growth within the magma chamber, the large underground pool of liquid rock beneath the volcano.

Over 500 million people live close to volcanoes which may erupt with little or no clear warning, causing widespread devastation, disruption to aviation and even global effects on climate. Many of the world's volcanoes are monitored for changes such as increases in seismicity or ground deformation. However, an on-going problem for volcanologists is directly linking observations at the surface to processes occurring underground.

Dr Saunders and colleagues studied zoned crystals, which grow concentrically like tree rings within the magma body. Individual zones have subtly different chemical compositions, reflecting the changes in physical conditions within the magma chamber and thus giving an indication of volcanic processes and the timescales over which they occur.

Chemical analysis of the crystals revealed evidence of pulses of magma into a growing chamber within the volcano. Peaks in crystal growth were found to correlate with increased seismicity and gas emissions in the months prior to the eruption.

Dr Saunders said: "Such a correlation between crystal growth and volcanic seismicity has been long anticipated, but to see such clear evidence of this relationship is remarkable."

This forensic approach can be applied to other active volcanoes to shed

new light upon the nature and timescale of pre-eruptive activity. This will help scientists to evaluate monitoring signals at restless volcanoes and improve forecasting of future eruptions.

More information: 'Linking Petrology and Seismology at an Active Volcano' by Kate Saunders, Jon Blundy, Ralf Dohmen, Kathy Cashman in *Science*.

Provided by University of Bristol