

Limestone assimilation under volcanoes helps understand Earth's carbon cycle

August 8 2016



Vesuvius today, overshadowing the city of Naples, and a popular tourist attraction. Credit: V.R. Troll

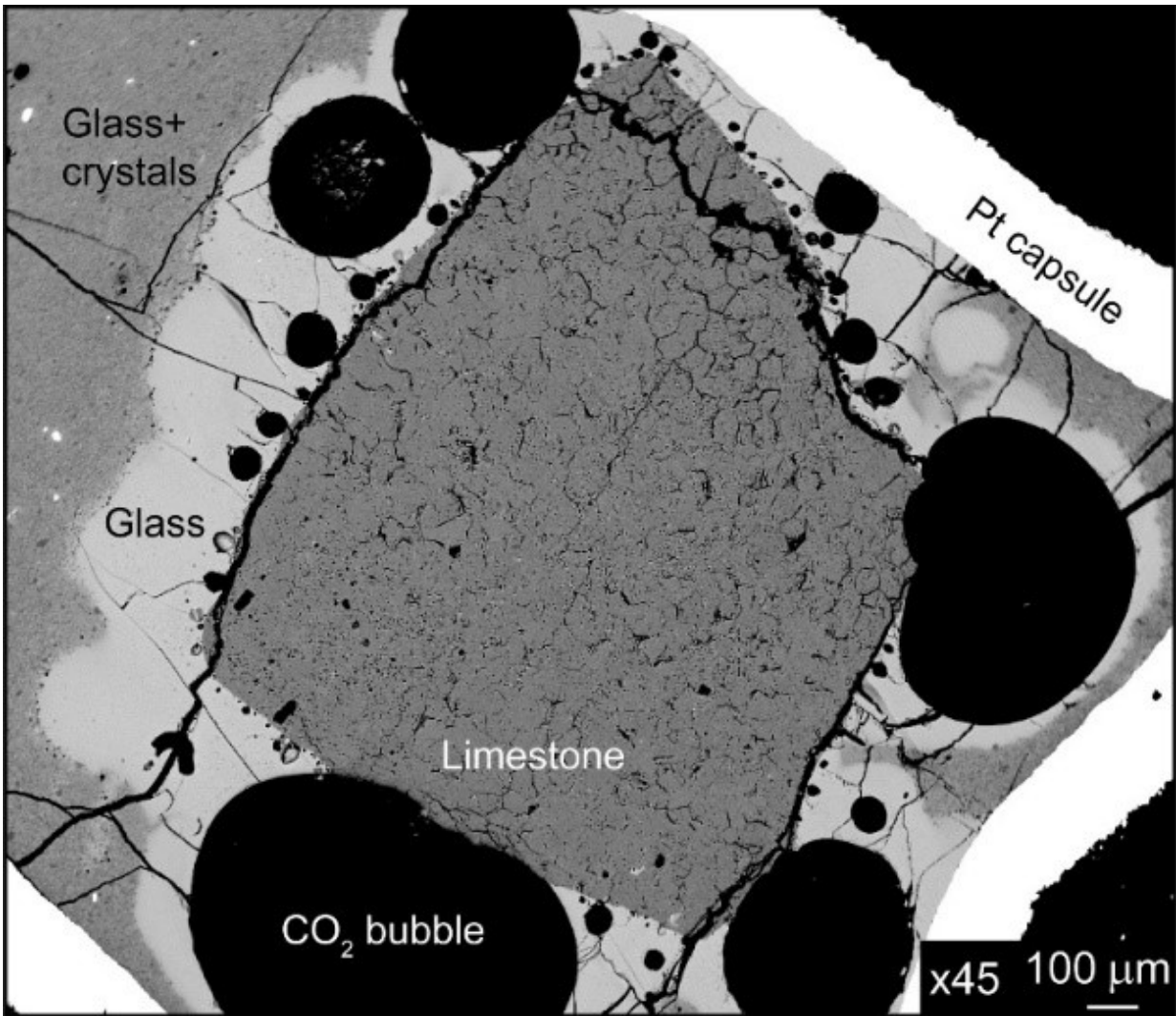
In a new study researchers from Sweden and Italy show what happens when magma meets limestone on its way up to the surface. Magma-limestone interaction might help explain why volcanoes like Vesuvius in Italy and Merapi in Indonesia are particularly explosive and, moreover, it helps us to understand another source of natural carbon released to the

atmosphere by volcanoes.

'When we find [volcanic rocks](#) in nature with particular chemical signatures, it might signal that CO₂ was released from the upper crust. These new results are exciting because in the future they may help us to identify additional pathways in the carbon cycle', says Frances Deegan, researcher at the Department of Earth Sciences at Uppsala University.

Carbon makes its way out of the Earth's interior and into the atmosphere mainly by CO₂ emissions from volcanoes. This is especially so in [subduction zones](#), where material that was once at the Earth's surface is forced downwards into the Earth's interior and is partly remobilised at depth to feed volcanoes at the Earth's surface. During this process, carbon is released from the down-going rocks and enters magma deep in the Earth, which then rises upwards and releases its carbon load as CO₂ at subduction volcanoes.

At least this has been our general picture so far. But this is not all. Researchers from Uppsala University, the Swedish Museum of Natural History, and the National Institute for Geophysics and Volcanology in Italy have recently discovered what happens when magma is on its journey upwards through the crust and encounters rocks containing large amounts of CO₂, such as limestone or marble, which rest only a few kilometres beneath the Earth's surface.



Bang! Scanning electron microscope image of an experiment showing how CO₂ bubbles are released when magma comes into contact with limestone. Credit: F.M. Deegan, Uppsala University

The team of scientists from Sweden and Italy replicated this process in the laboratory and found that when magma meets limestone the result is a very bubbly affair. They also discovered that when CO₂ is released from limestone at shallow levels in the crust it can trigger extreme behaviour in certain volatile elements. The extra CO₂ released during

magma-limestone interaction might also be a factor in driving explosive eruptions at some volcanoes like Vesuvius or Merapi, whose roots are sitting in limestone and marble rocks. Furthermore, this extra source of CO₂ may contribute to Earth's [carbon cycle](#), in the past and present.

More information: Frances M. Deegan et al. Boron isotope fractionation in magma via crustal carbonate dissolution, *Scientific Reports* (2016). [DOI: 10.1038/srep30774](https://doi.org/10.1038/srep30774)

Provided by Uppsala University

Citation: Limestone assimilation under volcanoes helps understand Earth's carbon cycle (2016, August 8) retrieved 18 April 2024 from <https://phys.org/news/2016-08-limestone-assimilation-volcanoes-earth-carbon.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.