

# Science Focus

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#### Venus

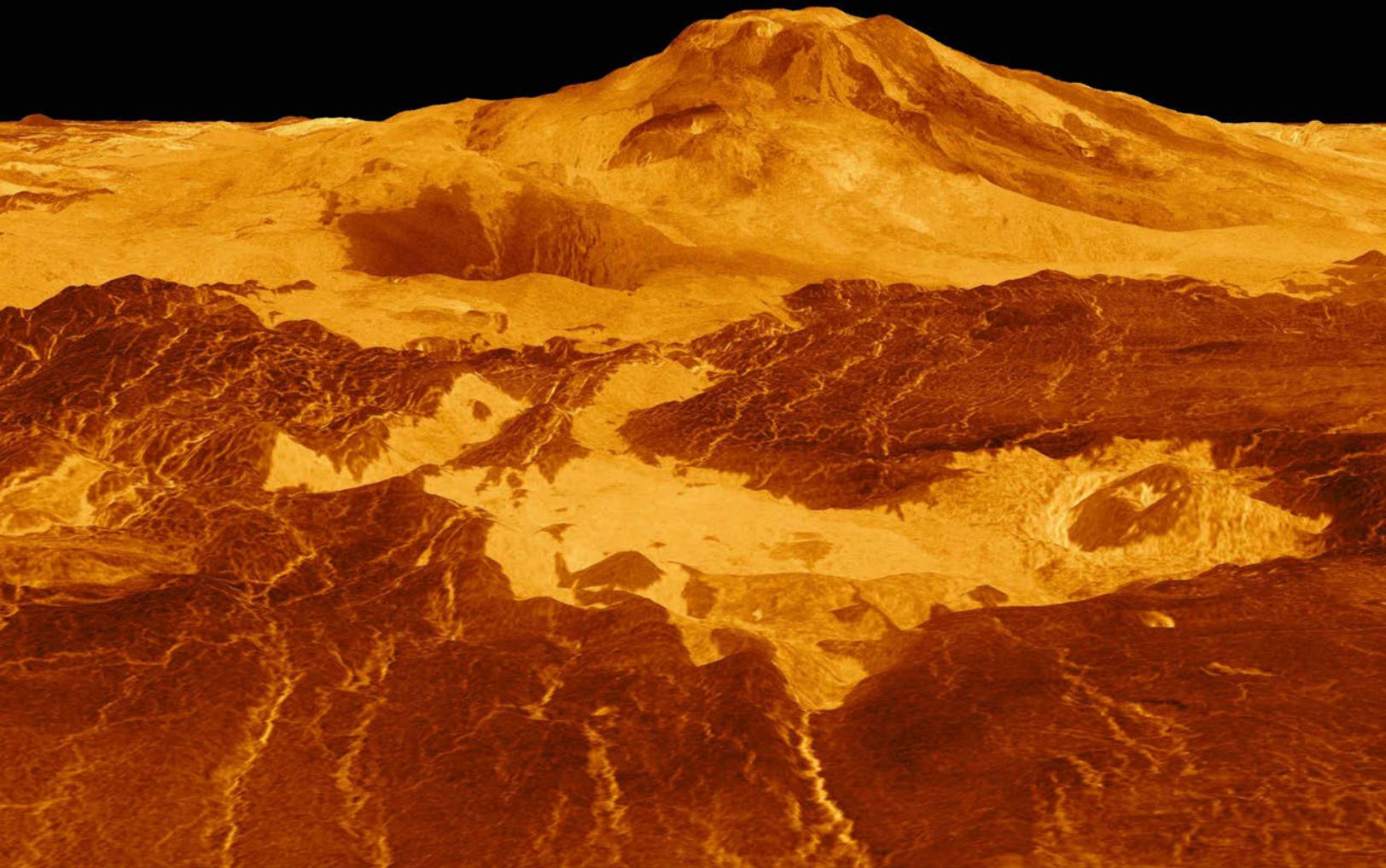
How scientists discovered an active volcano on another planet

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**SPACE**

# SIGNS OF VOLCANIC ACTIVITY FOUND ON VENUS FOR THE FIRST TIME

Images taken by the Magellan space probe in the 1990s could show evidence of eruptions or magma flow

**ABOVE** Computer-generated 3D model of Maat Mons on Venus, where there is evidence of volcanic activity

**V**olcanic eruptions and magma flows could be taking place on the surface of Venus, researchers from the University of Alaska Fairbanks Geophysical Institute have found.

The team studied data collected by NASA's Magellan space probe in the 1990s, taking advantage of new techniques that allow them to compare digital images more efficiently.

Their analysis focused on an area containing two of Venus's largest volcanoes, Ozza Mons and Maat Mons. They discovered a roughly 2.5km<sup>2</sup> volcanic vent that changed shape and altered in size over a period of eight months in 1991 on Maat Mons. On Earth, changes of this magnitude are often indications of volcanic activity.

"It is really only in the last decade or so that the Magellan data has been available at full resolution, mosaicked and easily manipulable by an investigator with a typical personal workstation," said Robert

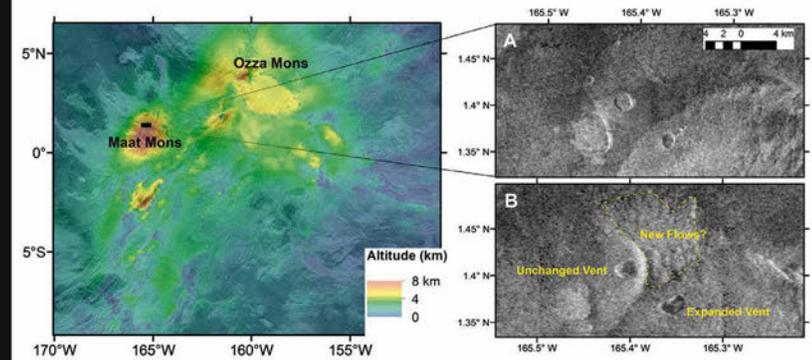
## Ask the expert

### Was this discovery unexpected?

This is big. We've long suspected that Venus is volcanically active, but we've not had any direct evidence of such activity – until now. I think it's fair to say that this finding isn't unexpected. This kind of collapse/eruption takes place on Earth regularly, at least geologically speaking. And Venus has lots and lots and lots and LOTS of volcanic landforms – volcanoes, calderas, vents – and flows. But it's one thing to expect something and quite another to then actually see it.

### Does this discovery mean we are more likely to find volcanic activity on other planets or moons?

This finding doesn't have any bearing on finding active volcanism on any other body. What it does do is make it very likely that we'll see more evidence for ongoing volcanic activity elsewhere on Venus, either by continuing to look through the Magellan data, or with the new radar data we'll get from the VERITAS and EnVision missions in the 2030s.



### What other research is ongoing in this area?

Right now, I expect that people are starting to look at maps of Venus themselves to see if they can spot additional evidence for changes in Magellan data. There's other work to calculate how volcanic activity works on Venus, along with modelling to figure out what we might see with the higher-resolution data we'll get from those future missions.

### What can we expect to discover in the future?

Going forward, we're going to learn a lot more about how active Venus is – not just volcanically, but also tectonically, and in terms

of wind-blown erosion, landslides, you know it. There has long been a view that Venus isn't all that active a place, even though it's almost the same size as Earth, which is a very active world. This new view of an active Venus is becoming more and more prevalent, and this new paper has definitely moved the needle in that direction in a huge way.

#### PROF PAUL BYRNE

*Paul is an associate professor of earth and planetary science at Washington University in St Louis. His research focuses on what makes planets behave and look the way they do. He uses remotely sensed data, fieldwork here on Earth, and numerical and physical models to build a better understanding of our planet and alien worlds.*

## “Venus is volcanically active in the sense that there are at least a few eruptions per year”

Herrick, a research professor at the University of Alaska Fairbanks, who led the research. “Ozza and Maat Mons are comparable in volume to Earth's largest volcanoes, but have lower slopes and thus are more spread out.”

The researchers compared two images of the northern side of a domed shield volcano that is part of Maat Mons, one taken in February 1991, and one taken in October 1991. Over this period, the vent had changed

from a circular shape of around 2.5km<sup>2</sup> to a wobbly shape of around 3.75km<sup>2</sup>. This later image shows that the walls of the vent became shorter, indicating an eruption, and that the irregular shape was formed by magma flows during the eight months between the images.

There is one small caveat: the shape of the vent's walls may have been caused by an earthquake, the researchers say. However, on Earth, vent collapses on this scale are always accompanied by nearby volcanic eruptions.

“We can now say that Venus is presently volcanically active in the sense that there are at least a few eruptions per year,” said Herrick. “We can expect that the upcoming Venus missions will observe new volcanic flows that have occurred since the Magellan mission ended three decades ago, and we should see some activity occurring while the two upcoming orbital missions are collecting images.”