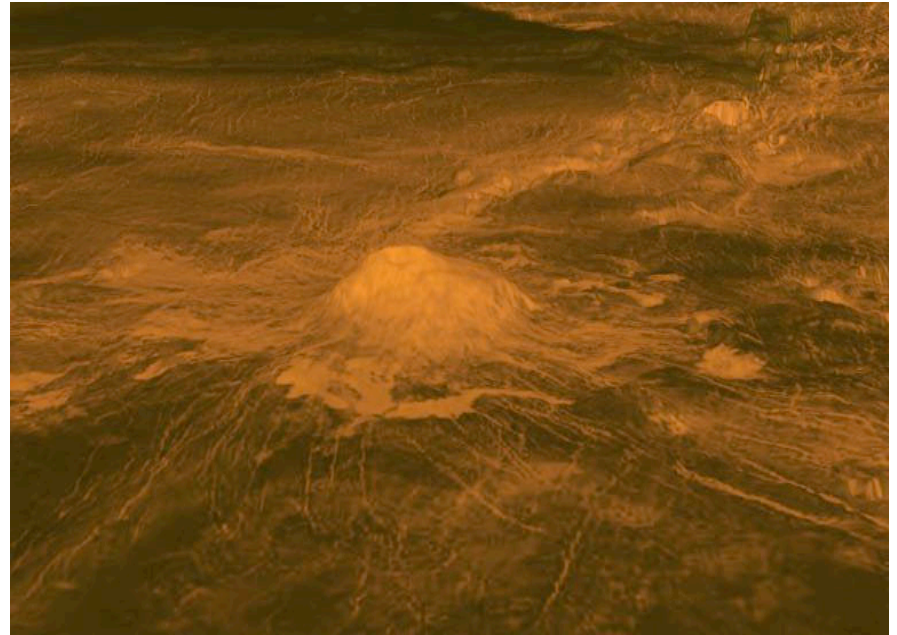


Venus May Have Active Volcanism

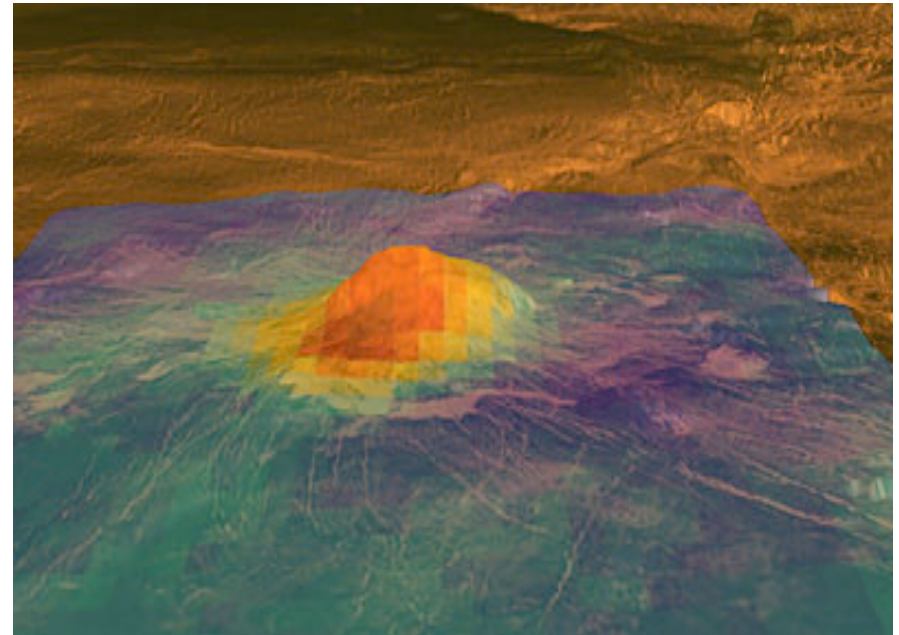
- Venus has few impact craters, suggesting the entire surface is younger than 1/2 billion years
- Venus has clouds of SO₂ (a volcanic gas) and many volcanoes - but active volcanism has not been detected
- New infrared observations indicate some regions were resurfaced in the last 100's to 10000's of years. Venus was recently (and still may be) volcanically active.
- This new evidence may help resolve a debate about how volcanism proceeded on Venus



Radar and topography “image” from the Magellan spacecraft of Idunn Mons on Venus, which was recently volcanically active. Dark regions are smooth, and bright regions are rough or steep. Elevations have been exaggerated thirty times.

Interpreting Surface ‘Hot Spots’

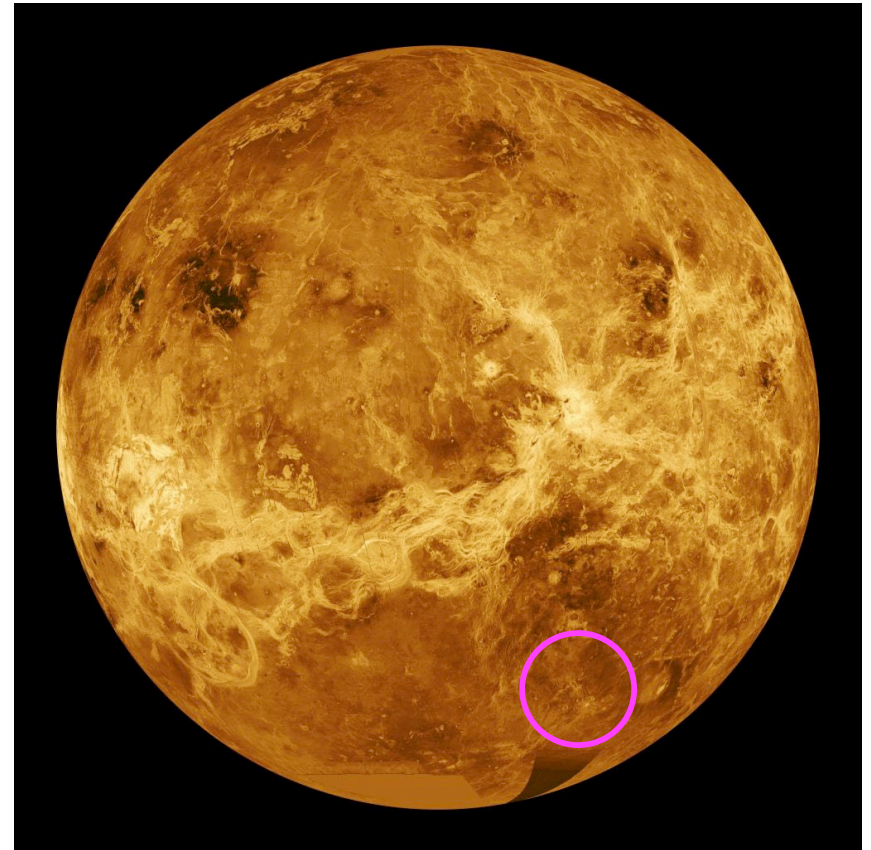
- Thermal *emissivity* indicates how efficiently a material radiates heat
- Some volcanic regions of the Venus surface have higher emissivity than their surroundings
- Lower emissivity regions have reacted chemically with CO₂ and SO₂ in the atmosphere, forming a thin crust over the lava
- High emissivity indicates younger material that has not been substantially weathered by Venus’ thick atmosphere



Infrared observations from the Venus Express spacecraft overlaid on the image from the Slide 1 show that Idunn Mons (red) has higher thermal emissivity than its surroundings (blue). This indicates a compositional difference between the two regions.

The Big Picture

- Scientists debate whether the entire planet was resurfaced in a large *global* event, or *gradually* over time
- The new observations of localized recent volcanism suggest that the global hypothesis can not be the entire story. Some scientists believe the results strongly support the gradual hypothesis
- The three regions in this study are all geologically similar to Hawaii, where hot material from deep inside the planet causes uplift and volcanism at the surface.



Global radar image of Venus from Magellan. The approximate location of Idunn Mons, from previous slides, is indicated.

For More Information...

Press

- Space.com - 04/08/10 - “Volcanoes on Venus May be Young and Active”
<http://www.space.com/scienceastronomy/venus-volcano-hotspot-100408.html>
- Planetary Society Blog - 04/09/10 - “Venus Express evidence for recent hot-spot volcanism on Venus”
<http://www.planetary.org/blog/article/00002434/>
- BBC - 04/09/10 - “ Venus 'still volcanically active' ”
<http://news.bbc.co.uk/2/hi/science/nature/8611195.stm>

Images

- Slide 1 image courtesy NASA / JPL-Caltech / ESA
<http://photojournal.jpl.nasa.gov/catalog/PIA13001>
- Slide 2 image courtesy NASA / JPL-Caltech / ESA
<http://photojournal.jpl.nasa.gov/catalog/PIA13001>
- Slide 3 image courtesy Magellan / JPL / NASA
<http://antwarp.gsfc.nasa.gov/apod/ap050903.html>

Source Articles (on-campus login may be required to access journals)

- Smrekar et al., ‘Recent Hot-Spot Volcanism on Venus from VIRTIS Emissivity Data’, *Scienceexpress*, 8 April 2010, 10.1126/science.1186785, 2009.
<http://www.sciencemag.org/cgi/content/abstract/science.1186785>

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