Venus is alive -- geologically speaking (w/ Video)

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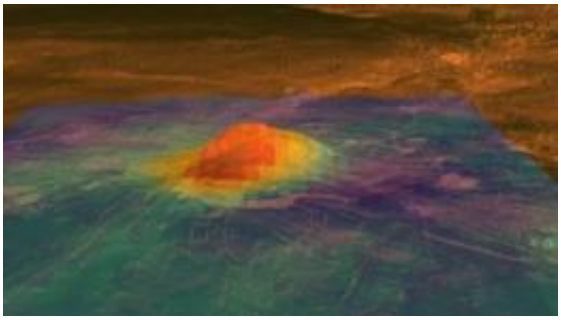

This figure shows the volcanic peak Idunn Mons (at 46°S, 214.5°E) in the Imdr Regio area of Venus. The topography derives from data obtained by NASA's Magellan spacecraft, with a vertical exaggeration of 30 times. Radar data (in brown) from Magellan has been draped on top of the topographic data. Bright areas are rough or have steep slopes. Dark areas are smooth. The colored overlay shows the heat patterns derived from surface brightness data collected by the visible and infrared thermal imaging spectrometer (VIRTIS) aboard ESA's Venus Express spacecraft. Temperature variations due to topography were removed. The brightness signals the composition of the minerals that have been changed due to lava flow. Red-orange is the warmest area and purple is the coolest. The warmest area is situated on the summit, which stands about 2.5 km above the plains, and on the bright flows that originate there. Idunn Mons has a diameter of about 200 km. The VIRTIS data was collected from May 2006 to the end of 2007. Credit: ESA/NASA/JPL

ESA's Venus Express has returned the clearest indication yet that Venus is still geologically active. Relatively young lava flows have been

identified by the way they emit infrared radiation. The finding suggests the planet remains capable of volcanic eruptions.

It has long been recognised that there are simply not enough craters on Venus. Something is wiping the planet's surface clean. That something is thought to be volcanic activity but the question is whether it happens quickly or slowly? Is there some sort of cataclysmic volcanic activity that resurfaces the entire planet with lava, or a gradual sequence of smaller volcanic eruptions? New results suggest the latter.

"Now we have strong evidence right at the surface for recent eruptions," says Sue Smrekar, a scientist at NASA's Jet Propulsion Laboratory in California.

That strong evidence comes in the form of compositional differences compared to the surrounding landscape in three volcanic regions. The data were collected by the Visible and Infrared Thermal Imaging Spectrometer (VIRTIS) on ESA's Venus Express spacecraft, which has been orbiting the planet since April 2006.

VIRTIS records the brightness of surface rocks, providing an estimate of 'emissivity'. In 2008, Jörn Helbert and Nils Müller, Institute of Planetary Research, German Aerospace Center, Berlin and co-authors on this new work, published a map of the variation of infrared emissivity across the southern hemisphere of Venus.

Dr Smrekar and her colleagues targeted three regions that geologically resemble Hawaii, well known for its active volcanism. They show that the regions on Venus have higher emissivities than their surroundings, indicating different compositions.

On Earth, lava flows react rapidly with oxygen and other elements in the atmosphere, changing their composition. On Venus, the process should

be similar, though more intense because of the hotter, denser atmosphere, chiefly of carbon dioxide.

The researchers interpret the fact that the lava flows appear to have different compositions from their surroundings as being evidence of a lack of surface weathering, indicating that the flows erupted relatively recently. They estimate that the flows are possibly as geologically recent as 2 500 000 years - and likely much less, possibly even currently active. "This is a significant result," says Hľkan Svedhem, ESA Venus Express Project Scientist.

Whilst the gradual resurfacing scenario might not be the most spectacular, it does make Venus look a little more Earth-like.

"There are some intriguing models of how Venus could have completely covered itself in kilometres of volcanic lava in a short time, but they require that the interior of Venus behaves very differently from Earth. If volcanism is more gradual, this implies that the interior may behave more like Earth, though without plate tectonics," says Dr Smrekar.

The new results are published in the 8 April issue of *Science*.

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