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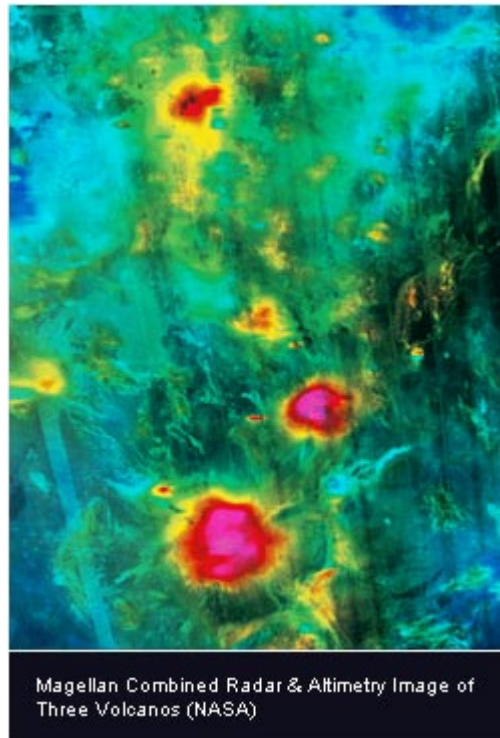
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Magellan Combined Radar & Altimetry Image of
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Math Program Cracks the Cause of Venus Climate Change

March 13, 2001 08:00 CDT

A mathematical model of the surface of Venus could possibly display how changes in temperature throughout the planet's history have affected its scorching, dry surface. In the early 1990's, NASA's Magellan spacecraft found Patterns of cracks on Venus' 500-degree surface.

Using an analysis technique by Pierre Moreels, a French intern at NASA's Jet Propulsion Laboratory, Pasadena, Calif., the patterns were found to be somewhat hexagonal. A cracking pattern of this type

tells us that over long periods of time, the surface has heated and cooled by almost 392 degrees Fahrenheit.

Moreels turned to a modeling technique called the watershed transformation. It was first created for medical imaging to discern individual blood cells, promising an accurate count. It has also been used in Earth- observing satellite images of fields.

"The program uses an analogy to the Earth's watershed process to filter out the noise from the radar imaging system on Magellan," Moreels said. "It finds the regions in the surface covered with patterns of multi-sided shapes. The more of these areas of multi-sided shapes we find, the better we can understand the history of climactic change on Venus."

Moreels and his mentor, Dr. Sue Smrekar, a research scientist in JPL's Geophysics and Planetary Geology section, reported their results yesterday at the Lunar and Planetary Science Conference in Houston, Texas.

The Magellan spacecraft photographed large areas of fissures, analogous to cooling basalt fractures on Earth, but on a much larger

scale. The mathematical program filters out recurring radar noise by mapping the cracks into a graph simulating a field of mountains - the rougher the surface, the higher the peak.

The program fills in the valleys of the simulated landscape, much as rain fills in a lake. With this, small peaks of radar noise are blanketed, and only the drastic changes in the surface's roughness remain. The program then smoothes the edges and ties them together.

Once this process is done, a map of the surface cracks that can easily sort out the number and orientation of the cracks and the area between them is created. The shapes usually have six sides of different lengths, covering an area more than 39 square miles.

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Global heating and cooling could have formed large areas of cracks on Venus' surface. A major episode of resurfacing occurred on Venus about 700 million years ago when water and sulfur levels in the atmosphere rose. Mapping the size and distribution of the cracks will help determine whether they are the result of local or global heating.

Original Source: Press Release

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