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Using Math To Determine Climate Changes on Venus

By Arden Moore, arden@byarden.com

A mathematical modeling technique originally developed to count individual blood cells is being used by a French scientific researcher to provide new clues behind climate changes on the hot surface of Venus.

Pierre Moreels, a French intern at NASA's Jet Propulsion Laboratory in Pasadena, California, successfully applied the watershed transformation, a modeling technique toward analyzing patterns of cracks found on Venus's 500°-Celcius surface photographed by NASA's Magellan spacecraft during the early 1990s.

Moreels, working with his mentor, Sue Smrekar, Ph.D., a research scientist in JPL's Geophysics and Planetary Geology section, reported their preliminary findings at the recent Lunar and Planetary Science Conference in Houston.

The mathematical program filters out recurring radar noise from the radar imaging system on Magellan to identify the roughly hexagonal cracking patterns on the planet's surface. The program maps the cracks onto a graph simulating a field of mountains and fills in the valleys of the simulated landscape.

"We are looking to have more accurate climate models of Venus by doing it mathematically. The more of these areas of multi-sided sides we find, the better we can understand the history of climatic changes," Moreels says. "This kind of crackin pattern shows that the surface of Venus has heated and cooled by almost 200°C (392°F) over long periods of time."

Mapping the size and distribution of the surface cracks are expected to help scientists determine whether they occurred as a result of local or global heating. It is believed that a major resurfacing occurred on Venus about 700 million years ago at which time water and sulfur levels in the atmosphere rose.