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SELEX Galileo's VIRTIS discovers recent volcanic activity on Venus

Using data from the European Space Agency (ESA)'s Venus Express spacecraft, an international team of scientists from the US and Europe have detected for the first time clear signs of recent lava flows on the surface of Venus. This makes the planet one of the few worlds in our solar system that has been volcanically active in the last 3 million years. The discovery was aided by SELEX Galileo's VIRTIS (Visible and Infrared Thermal Imaging Spectrometer) which revealed that certain minerals on the planet surface were formed during recent volcanic activity.

Previous spacecraft have detected hints of geological activity on Venus, but until now there has been no information as to when the activity occurred. The recent discoveries give strong evidence that the eruptions happened recently, perhaps only a few hundred thousand years ago, showing that the planet could still be volcanically active.

SELEX Galileo's VIRTIS flies aboard the ESA's Venus Express spacecraft and looks through the thick carbon dioxide curtain surrounding Venus to detect heat emitted by hot rocks on the ground. The data provided by VIRTIS allowed for a detailed analysis of Venus' surface temperature, in particular on its 'hot spots' where NASA's Magellan spacecraft previously detected plumes of hot rising material deep under the surface.

In the data from VIRTIS, the relatively fresh, unaltered surfaces at these hot spots glowed because they radiated heat more strongly, showing clear signs of geologically active volcanism on the planet.

Venus, which orbits the Sun about 30 percent closer than the Earth, is often referred to as Earth's sister planet because of similarities in size, mass, density and volume. It is also the planet where the greenhouse effect was discovered. The rate of volcanism will help scientists to understand how the interior of the planet works and how gases emitted during eruptions affect climate.

Notes to the editors

The new findings are being published in the latest edition of the journal "Science " in a paper which is authored by S. Smrekar (JPL, Pasadena), as lead author, with a team including Italians (G. Piccioni, INAF-IASF, Rome) and Germans (J. Helbert and N. Mueller, DLR, Berlin) and other co-authors.

The ESA's Venus Express was launched 9th November 2005 and entered into final operational orbit in April 2006. Since then, VIRTIS has been studying the surface of Venus at an altitude ranging from 250 to 65,000 km.

SELEX Galileo is the prime contractor for VIRTIS, which was built and is lead by INAF-IASF (Istituto di Astrofisica Spaziale e Fisica Cosmica, G. Piccioni), Rome, Italy and LESIA (P. Drossart), Observatoire de Paris, France, sponsored by ASI, CNES, CNRS/INSU.

VIRTIS - Visible and infrared thermal spectrometer- is an hyperspectral imaging spectrometer in the visible and near-infrared regions for remote sensing in deep space missions. VIRTIS has been selected by ESA to be flown as orbiter payload for the Rosetta mission to comet 67P/Churyumov-Gerasimenko and for the Venus Express Mission.

The instrument is composed by two optical heads, VIRTIS-M (mapping spectrometer) and VIRTIS-H (single point high spectral resolution), both passively cooled to 150 K to limit background radiation. VIRTIS-M includes a visible and a single IR (infrared) channel using the same all-reflective optical system, while VIRTIS-H has a single IR channel.

The IR detectors are further cooled to 80 K by means of miniature Stirling cycle cryocoolers.

A VIRTIS-like product has been developed for the NASA Dawn Discovery mission, under an ASI-JPL agreement. VIRTIS-like spectrometers are also under development for a number of other missions;

- The Spectrometer and Imager for the ESA MPO Bepi Colombo: Integrated Observatory System (SIMBIO-SYS). The instrument will observe the surface of Mercury.
- The spectrometer and imager for NASA's New Frontiers JUNO mission, under an ASI-JPL agreement: Jovian Infrared Auroral Mapper. The instrument will observe the atmosphere and the surface of Jupiter.

Press Office Contacts

Solange Distefano Pozzuoli
Responsible for Press Office

Tel: +39 06 41883710

Mob. +39 335 7499374

email: solange.distefanopozzuoli@selexgalileo.com