EPSC Abstracts
Vol. 10, EPSC2015-613, 2015
European Planetary Science Congress 2015
© Author(s) 2015

Search for ongoing volcanic activity on Venus

E.V. Shalygin[1], W.J. Markiewicz[1], A.T. Basilevsky[1,2,3], D.V. Titov[4], N.I. Ignatiev[5], and J.W. Head[3]

[1]Max-Planck-Institut für Sonnensystemforschung, 37077 Göttingen, Germany, (shalygin@mps.mpg.de)
[2]Vernadsky Institute of Geochemistry and Analytical Chemistry, RAS, Moscow, Russia
[3]Brown University, Providence, Rhode Island 02912, USA
[4]ESA-ESTEC, 2200 AG Noordwijk, The Netherlands
[5]Space Research Institute, 117997 Moscow, Russian Federation

Abstract

We report results of systematical analysis of the whole data-set obtained by the Venus Monitoring Camera (VMC) on-board the Venus Express (VEx) spacecraft at the night side of the planet. In this data-set we searched for transient bright events which exhibit behaviour of a hot spot on the surface.

1. VMC data

VMC was designed to perform observations of the surface through 1-μm transparency "window" at the night side [1], when the spacecraft is inside of the planet' shadow. Observations were made in close to nadir geometry, and due to this the camera was able to image a given place from 3 – 5 consequent orbits before it goes out of the camera field of view. The next observational session of the same place was possible after ≈ 100 days, when the orbital configuration becomes similar.

In this mode VMC has observed equatorial regions and significant part of the northern hemisphere up to latitudes of ≈ 50°N.

2. Transient bright events

Active volcanic events, either lava or hot gas releases, have to manifest themselves via local increases of near infra-red (NIR) flux from the surface. These bright spots can be detected by the VMC [2]. However, it is impossible to distinguish occasional bright spots caused by volcanic phenomena from those caused by differences in the atmosphere opacity [3].

Only events that are observed from several orbits at the same places might be related to volcanic activity [3, 4].

From VMC observations and modelling it is possible to estimate the total flux from the bright spot, and possible combinations of hot spot size and temperature.

Such detection was made at the edges of the Ganiki Chasma rift zone, where four such events have been found, and the question of presence or absence of similar events in the other parts of Venus is of exceptional interest.

3. Conclusions

A systematic search is being undertaken by comparing all orbital mosaics automatically. The results obtained will allow us to understand whether the previously detected event was unique, or whether there are other examples that permit us to develop a more robust estimate of the range of currently active volcanism and whether one can estimate present rate of volcanic activity on Venus.

References

[1] W. J. Markiewicz et al. "Venus Monitoring Camera for Venus Express". In: *Planet. Space Sci.* 55.12 (2007). The Planet Venus and the Venus Express Mission, Part 2, pp. 1701–1711. DOI: 10.1016/j.pss.2007.01.004.

[2] E. V. Shalygin, A. T. Basilevsky, et al. "Search for ongoing volcanic activity on Venus: Case study of Maat Mons, Sapas Mons and Ozza Mons volcanoes". In: *Planet. Space Sci.* 73.1 (2012), pp. 294–301. DOI: 10.1016/j.pss.2012.08.018.

[3] E. V. Shalygin et al. "Bright transient spots in Ganiki Chasma, Venus". In: *Lunar Planet. Sci. Conf.* (The Woodlands, USA, Mar. 17–21, 2014). Vol. 45. #2556. The Woodlands, USA, 2014.

[4] E. V. Shalygin et al. "Active volcanism on Venus in the Ganiki Chasma rift zone". In: *Geophys. Res. Lett.* (). In review.