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Search for ongoing volcanic activity on Venus: Case study of Maat Mons, Sapas Mons and Ozza Mons

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Maat Mons volcano and its vicinities show evidence of geologically very recent volcanism. We consider Venus Monitoring Camera (VMC) night-side images of this area. Analysis of VMC images taken in 12 observation sessions during the time period from 31 Oct 2007 to 15 Jun 2009 did not reveal any suspicious high-emission spots which could be signatures of the presently ongoing volcanic eruptions.

If Maat Mons volcano had the eruption history similar to that of Mauna Loa, Hawaii, in the 20^{th} century, the probability to observe an eruption in this VMC observation sequence would be about 8%, meaning that the absence of detection does not mean that Maat is not active in the present epoch.

Blurring of the thermal radiation coming from Venus surface by the planet atmosphere decreases detectability of thermal signature of fresh lavas. We simulated near-infrared images of the study area with artificially added lava flows having surface temperature 1000 K and various areas. These simulations showed that 1 km² lava flows should be marginally seen by VMC. An increase of the lava surface area to 2 – 3 km² makes them visible on the plains and increase of the area to 4 – 5 km² makes them visible even in deep rift zones. Typical individual lava flows on Mauna Loa are a few km², however, they often have been formed during weeks to months and the instantaneous size of the hot flow surface was usually much smaller. Thus the detection probability is significantly lower than 8%, but it is far from negligible.

Our consideration suggests that further search of Maat Mons area and other areas including young rift zones makes sense and should be continued. More effective search could be done if observations simultaneously cover most part of the night side of Venus for relatively long (years) time of continuous observations.