N94-16418

RELIEF OF SOME SMALL LANDFORMS ON VENUS; H.J. Moore, U.S. Geological Survey, Menlo Park, CA 94025, J.J. Plaut, and T.J. Parker, California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA 91109.

Three sets of radar images have been acquired under different viewing conditions by the Magellan synthetic aperture radar: (1) left-looking with varied incidence angles (cycle 1); (2) right-looking with nearly constant incidence angles (cycle 2); and (3) left-looking with varied incidence angles, most of which were smaller than those in (1) except for those acquired on passes across Maxwell Montes with incidence angles larger than those in (1) (cycle 3).

Image displacements in the radar images that are caused by the relief of landforms provide several methods of estimating this relief: (1) monoscopic measurements of foreshortening of landforms that are symmetrical in the plane of the look-direction of the radar (includes radial symmetry) [1], (2) stereoscopic measurements of parallax in same-side image pairs [2] (cycles 1 and 3), and (3) measurements of parallax in opposite-side image pairs [3] (cycles 1-2 and/or 2-3). Success in methods 2 and 3 (especially 3) depends on identifying conjugate image points in the two images.

Here, we report our preliminary results for five impact craters, seven small volcanic edifices, and two lava flows (Table 1). The three methods mentioned above lead to the interesting result that Venusian impact craters have depth-diameter ratios like those on Mars rather than those on Earth [4,5,6,7], but some appear partly filled [5]. Our results for de Lalande and Melba also suggest filling, but there may be other causes for their relatively small depth-diameter ratios [8].

A host of small volcanic edifices [9,10] have relief that can be crudely estimated using the above methods (fig. 1). Relief/diameter ratios for our cratered cones (Table 1) are about the same as those of Icelandic lava shields [11,12]; some Venusian cones resemble the Martian shields of Mareotis-Tempe and Ceraunius Fossae, but the Venusian relief/diameter ratios are larger, The smallest cratered dome is similar in size and profile to a Martian dome north of Uranius Patera; the smallest cratered cone resembles one in Chryse Planitia.

Lava flows on Venus that are thick enough to measure are rare, but we have applied methods 1 and 3 to the huge flow of Ovda Regio and flows of an unusual volcano, Mahuea Tholus [3] (Table 1). We know of no terrestrial analogs for the thickest of these flows, but the rhyolite flows of Yellowstone attain thicknesses of 300 m [13].

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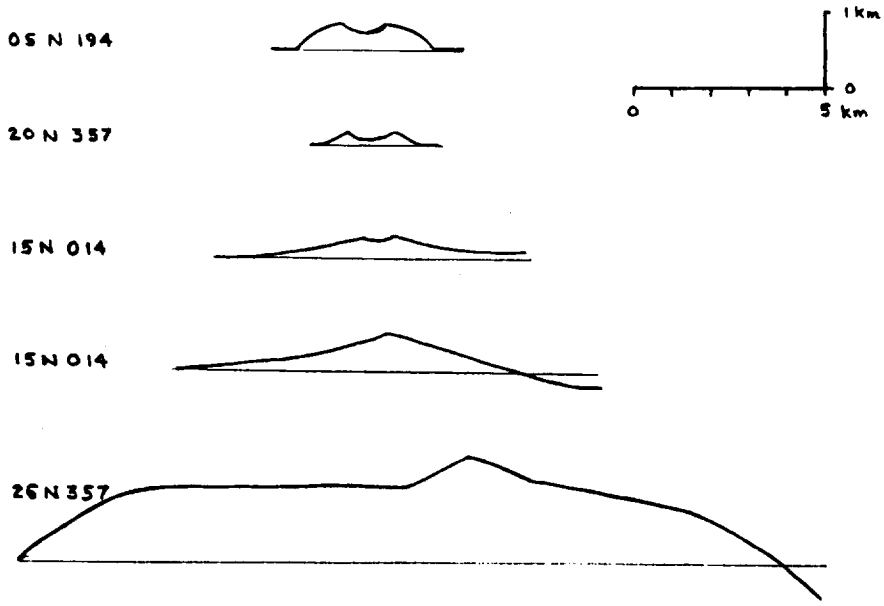

Figure 1. Profiles of small volcanic landforms on Venus. Shapes of flanks of small volcanoes appraised by visual inspection of backscatter. Image numbers shown at left.

TABLE 1. Preliminary estimates of relief of some small landforms on Venus based on relief displacements on monoscopic and paired Magellan images.

Landform	Image Number	Diameter (D) (km)	Relief (R) (km)	Ratio R/D	Method[1]
Impact Craters					
Riley[2]	14N073	24.0	1.3, 1.1, 1.2	0.050 ± 0.004	(1), (1-3), (1-2)
Chloe	06S097	18.5	1.2 - 1.5	0.068 - 0.081	(1-2)
de Lalande[2]	20N357	21.0	0.8 - 0.9	0.038 - 0.043	(1-3)
Melba	05N194	23.5	1.0, 0.9, 0.8, 1.1	0.034 - 0.047	(1), (2), (1-2)
Salika	06S097	15.0	No conjugate images of crater floor		(1-2)
Volcanoes					
cratered dome	05N194	3.5	0.34	0.095	(1-2)
cratered cone	20N357	2.4	0.16 ± 0.07	0.067 ± 0.027	(1-3)
cratered cone	15N014	8.3	0.31	0.037	(1-3)
cone	15N014	10.6	0.48 - 0.68	0.045 - 0.064	(1-3)
dome	25N357	20.9	1.4 - 1.8	0.065 - 0.089	(1-3)
cratered dome	73S101	4.7	0.24 ± 0.05	0.051 ± 0.010	(1-3)
cratered cone	73S101	3.3	0.18 ± 0.03	0.054 ± 0.010	(1-3)
Lava Flows					
Mahuea Tholus	37S165				
lobes			0.06 ± 0.03		(1)
lobes			0.12 ± 0.05		(1-2)
thick flows			0.54 ± 0.20		(1-2)
thick flows			0.09 ± 0.05		(1-2)
Ovda Regio[2]	06S097				
lobes			0.17 - 0.28		(1)
lobes			0.42 ± 0.15		(1-2)

[1] Numbers refer to cycle of image(s); methods are: monoscopic - (1), (2); same-side stereo-parallax - (1-3); opposite-side parallax - (1-2)
[2] Name formally approved by the International Astronomical Union; names of other features are provisional..