

TENTATIVE ANALYSIS OF RMS MAP OF VENUS SURFACE BASED ON VENERA-15,16 MEASUREMENTS: COMPARISON WITH PIONEER VENUS DATA

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A comparison of Venera-15,16 /1/ and Pioneer Venus /2/ RMS data on Venus surface of the area of their overlapping has been made. Fig. 1 presents histograms of RMS based on V-15,16 and PV data while the table contains the means  $\pm 1\sigma$  for RMS for the total area compared as well as for plains and tesserae according to Venera-15,16 photogeologic map /3/.

	VENERA-15,16	PIONEER VENUS
Total area	3.9 $\pm$ 1.3	2.4 $\pm$ 0.9
Plains	3.6 $\pm$ 1.0	2.2 $\pm$ 0.8
Tesserae	5.4 $\pm$ 1.8	3.8 $\pm$ 1.2

A systematic increase of V-15,16 values comparing to PV ones is a natural consequence of the wave-length used in V-15,16 (8 cm) and PV (17 cm) experiments: V-15,16 measurements were partly affected by the small-scale roughness ignored by PV. Taking in mind TV panoramas of Venera-9,10,13,14 landing sites /4,5/ this small-scale (differential) roughness is evidently due to the presence of rock fragments and rock outcrops. The contribution of small-scale aelian landforms can not be excluded either.

The coefficient of cross-correlation of V-15,16 and PV maps is 0.64, the coefficient of regression of V-15,16 and PV data is 1.14. The latter is larger than 1, so the larger roughness - the more increase of V-15,16 RMS comparing with PV one. That means: the higher roughness is the larger is the small-scale part of it. This also means that small-scale (decimeter-scale) rock fragments and/or rock outcrops are significantly more abundant at tesserae comparing to plains. Rock fragments talus on the slope at Venera 9 landing site seems to be a good example of this situation.

Fig. 2 shows V-15,16 v.s. PV RMS plot. Isolines were drawn with logarithmically equal intervals. The correlation is better at low RMS values. The Rayleigh law, being the basis of the techniques of determination of RMS and reflectivity, describes better the real indicatrix of backscattering for low RMS so the different techniques used for processing V-15,16 and PV data lead to close results.

If the surface has high small-scale roughness so for the incidence angles  $\sim 10^\circ$  (like V-15,16 radars) the contribution of diffuse scattering can be more than the contribution of quasi-mirror scattering. Fig. 3 is an illustration of this case. So the procedure used in /1/ overestimates both RMS and reflectivity. The latter is approximately proportional to the area beneath the backscattering curve.

Fig. 4 presents a reflectivity v.s. RMS diagram based on V-15,16 data. One can see that anomalously high reflectivity ( $\sim 0.3$ ) is observed only at the areas with anomalously high RMS ( $\sim 6^\circ$ ) mostly at the mountain surrounding of Lakshmi plateau. This is the very area to be very bright in Arecibo images too /6/. It can be supposed that for this area having high diffuse scattering the values of RMS and reflectivity could be overestimated.

- REFERENCES: 1. Abramov A.V. et al, 8th Vernadsky/Brown Microsymposium Abstracts, 7-8, 1988; LPSC XX, 1989. 2. PV data digital tape, MIT, 1985. 3. Barsukov V.L., Basilevsky A.T. Priroda, 6, 24-35, 1986 (in Russian). 4. Florensky C.P. et al. GSA Bull., 88, 1537-1545, 1977. 5. Basilevsky et al., GSA Bull., 96, 137-144, 1985. 6. Campbell D.B. et al. Science, 221, 644-647, 1983.

