CHARACTERIZATION OF VENUS SUBDUED TERRAINS WITH GROUND-BASED RADAR-DERIVED DATA

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Surface properties of Venus are studied on the basis of data derived from ground-based radar observations at two wavelengths. These data were obtained at X- and S-band (3.5 and 12.5 *cm*, respectively) at the Goldstone Solar System Radar Facility in 1980 (1). The area of coverage extended from -70 to 100 degrees within a few degrees of the equator. This region is dominated by occurrences of lowland (planitia) and rolling hills (regio) terrane (2).

Radar-derived data products which were studied include topography profiles, *rms* slope, and reflectivity. Observation periods for which these data were obtained are listed in Figure 1. The software developed for the processing of Mercury ranging data (3,4,5) was considerably generalized and improved (1) for the processing of these Venus data. Data from an entire observation period (one day's runs) can now be summed with a resolution (in this case, about 10 *km*) limited by the frequency resolution. Spectral analysis and determination of bulk scattering properties was possible for most of the data obtained in 1980. Signal to noise ratios of greater than 100 to 1 were obtained for data from which profiles could be easily derived. These data were obtained at observation periods closest to inferior conjunction. Reflectivity images, with a twofold ambiguity due to the monostatic nature of the data, were formed from each set of S- and X-band observations.

As indicated (Figure 1), topography is considerably subdued in this region. Elevations range from approximately -1.5 to 1.5 *km*: the total relief is 3 *km*, but generally does not exceed 2 *km* within the 20 or so degrees of coverage for any given profile. Overlapping portions of profiles agree in trend. Profiles derived at S-band have inherently less noise.

Rms slopes were derived from estimates of the Hagfors *C* parameter obtained at both wavelengths. (See Figure 1.) The *C* parameter at X-band is consistently about 2/3 the Hagfors *C* parameter at S-band on days when both bands were observed. Not surprisingly, Venus's plains are systematically rougher at X-band. *Rms* slopes vary from 6 to 2 degrees at 12.5 *cm*, and from 7 to 3 degrees at 3.5 *cm*.

The relationship between *rms* slope and topography is apparently not simple in the study region, which borders Aphrodite on the east, but which is dominated by Guinevere Planitia. A basin-like feature is centered at 317 degrees on the edge of Navka Planitia. The highest *rms* slopes are recorded for this area, which borders Phoebe Regio. Observations taken to the west, in the higher elevation area around Phoebe Regio, have lower *rms* slopes. Low relief features can be seen at 339 and 342 degrees, in the middle of Guinivere Planitia. Overall relief there is apparently small, and the *rms* slopes are the lowest in this region. A subdued low relief feature is associated with Hengo Chasma. Elevation increases insignificantly as Eisela Regio is approached. Once again, the *rms* slopes increase in the area bordering the Regio. Further east, as Aphrodite Terra is approached, rms

slope values are more intermediate in nature.

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Figure 1: 1980 Venus Ground-based Radar Observations

Subradar Point Long.	Lat.	Band	Profiles	Height Variation Meters	RMS Slope S-Band	X-Band
273.	-4.5	S	?		3.4	
311.	-1.6	S	?		4.4	
320.	0.4	S,X	Yes	-250 to 1000	5.6	6.7
338.	3.5	X	Yes	-1500 to 500		3.2
342.	4.0	S,X	Yes	-500 to 1250	2.2	2.7
352.	4.0	S,X	Yes	-750 to 750	2.3	2.9
4.	4.5	S	Yes	-500 to 1000	4.1	
10.	4.5	S	?			
24.	4.5	S	?			
40.	4.0	S	?		2.8	
48.	4.0	S	?			
64.	3.5	X	No			4.4
65.	3.5	X	No			3.4