

SCATTERING PROPERTIES OF VENUS SURFACE
DERIVED FROM VENERA-15,16 DATA

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Each Venera orbiter carried synthetic-aperture radar system (radar mapper-RM) and radar altimeter (RA). Electric axis of RA antenna was directed normally to the surface, electric axis of RM antenna was directed by 10° to the RA antenna axis.

Reflectivity and roughness (rms slope in dekameter scale) could be derived from comparison of RA and RM signals level measurements for the same sections of surface. Hagfors' model of back scattering properties of the surface [1] and real energetic properties of RA and RM channels were used.

Spacecraft orbit inclination was about 87° , therefore radar tracks crossed in polar area. Signal's level measurements of the same sections of surface varied in different tracks. Coordinating procedure for measurements of separate scans was offered to get corrected levels of RA and RM received signals. Constant correction for the whole scan was calculated using the difference in the cross-points.

Then data for other surface sections were derived as a result of interpolation between tracks. Maps of level of received signal in both channels were calculated for the whole area of Venus surface, which was scanned. These maps were used to derive data for maps of radar roughness and reflectivity (fig. 1, 2). Maps have surface resolution of 50-70 km, rms errors were about 8%.

Difference between these maps and similar maps based on Pioneer-Venus data is conditioned both by the difference of used wave length and by significant difference of methods. According to the Venera data mean value of rms slope in the zone of data overlap appeared to be 1.4 higher than according to Pioneer-Venus data. Mean value of reflectivity appeared to be 0.04 lower. Correlation coefficients appeared to be 0.64 for maps of rms slope and 0.42 for maps of reflectivity.

REFERENCE: [1] Hagfors. J. Geophys. Res. 69, 1964

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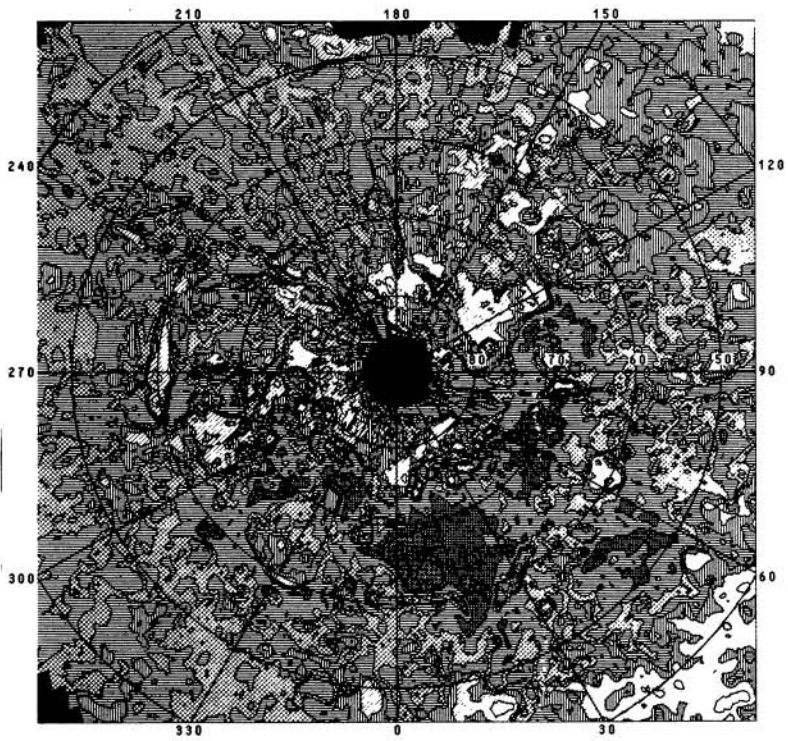


Fig 1.
RMS SLOPE, degree

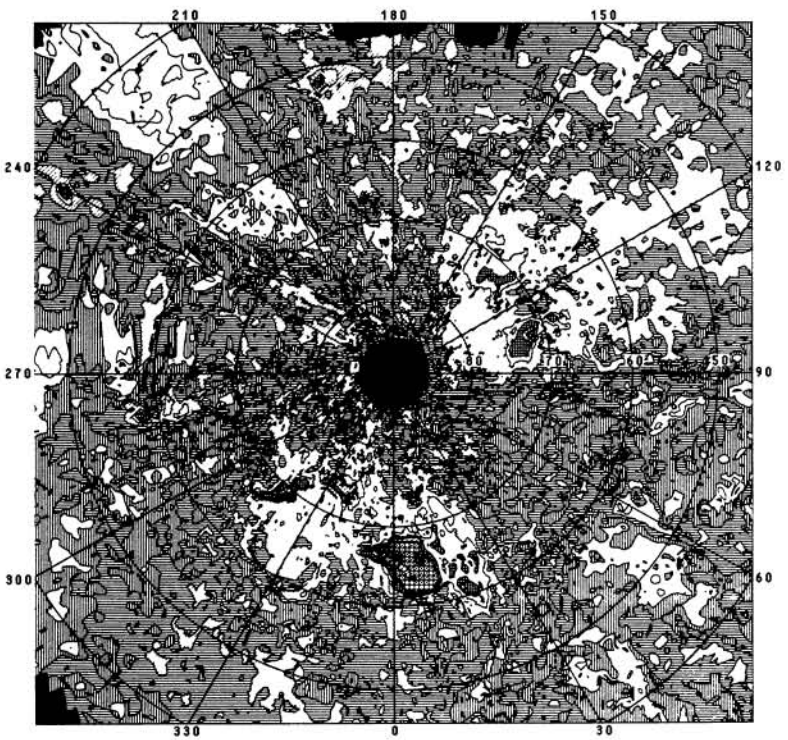


Fig 2.
REFLECTIVITY

