

GVDR DATA PRODUCT: A SUMMARY OF ALL MAGELLAN OBSERVATIONS OF VENUS SURFACE CHARACTERISTICS; M. J. Maurer, R. A. Simpson, Stanford University.

Observations of Venus from all Magellan radar investigations have been combined into a single data product that summarizes the surface characteristics of the planet. The data set is presented in map form at approximately 20 km resolution, in several map projections. Each map pixel consists of a summary of all spacecraft measurements of that portion of the planet, indexed by the viewing geometry of each measurement. Measurements with similar viewing geometries have been averaged. This image-based presentation will make possible geologic studies based on surface statistics, especially when combined with the other map products already available from Magellan, the SAR image MIDRs and altimetry and radiometry GxDRs. The GVDR (Global Vector Data Record) will be distributed on a single CD-ROM through the Planetary Data System.

The GVDR is derived from two Magellan data products: the per-orbit altimetry and radiometry data produced by MIT (ARCDRs), and the per-orbit surface characteristics data produced by Stanford (SCVDRs). These in turn are derived from several data products created by JPL, including the SAR image strips (F-BIDRs and C-BIDRs) and the fairly raw data in the ALT-EDRs and SAR-EDRs.

The GVDR includes estimates of the near-nadir scattering law (out to 6-12 degrees, depending on geometry), best fit analytic scattering laws to the observed scattering law (including Hagfors, Exponential, and Gaussian scattering laws), and the rms slope and reflectivity parameters associated with these fits. Isolated samples of the scattering law at higher angles of incidence are also included, derived from the side-looking SAR observations of the same region; in some places up to three such samples are available due to different viewing geometries during the several mission cycles. Also included are surface properties reported in the ARCDR (derived from the altimeter by a different method) such as radius, rms slope and Fresnel reflectivity. Emissivity measurements are sorted by viewing geometry and polarization angle.

This data product can be used for geologic studies of the planet that require knowledge of the small- and medium-scale surface structure. Of particular interest is the combination of near-nadir scattering properties with those at high angles of incidence; the relationship between these measurements will give insight into the relative importance of quasi-specular and diffuse scattering mechanisms in different geologic units. Equally interesting is the separation of different viewing geometries. Several regions of the planet have appeared distinctly different when viewed from opposite directions, or have caused Doppler anomalies in the altimeter echo; both observations are most simply explained by a consistent anisotropy in the scattering behavior of the surface. Studies of these regions have been frustrated by the difficulty of comparing data from different mission cycles and data products. The GVDR puts all such observations in a single place, making comparison quite simple.

A test product has been released to a limited subset of the Magellan community. Pending their review of the data format and content, we plan to release an official version of the GVDR to the Planetary Data System in spring of 1994. That version will only contain SAR image data from Cycle 1+; we expect reprocessed data from cycles 2-3 to be available soon afterward and plan to release a final GVDR containing summaries of all available measurements.