

NOTES ON BASE

This sheet is one in a series of maps of Venus at nominal scales of 1:50,000,000 and 1:10,000,000 (Planetary Cartography Working Group, 1984, 1993; Balson and others, 1994). It is based on data from the Magellan Synthetic Aperture Radar (SAR) and radar altimetry instruments. The Magellan Mission was described by Saunders and Pettengill (1991). Magellan radar characteristics were described by Pettengill and others (1991).

ADOPTED FIGURE

The figure of Venus used for the construction of the map projection is a sphere with a mean radius of 6,051.0 km, consistent with the preliminary gravity figure reported by Phillips and others (1979) that was used for previous maps of Venus. Slightly larger values of the mean radius of Venus have subsequently been reported based on Pioneer Venus (Pettengill and others, 1980) and Magellan altimetry (Ford and Pettengill, 1992).

PROJECTION

The polar stereographic projection is used for this sheet. The scale is 1:9,145,190 at  $\pm 56.0^\circ$  latitude, and 1:10,000,000 at  $90^\circ$  latitude. Due to the retrograde rotation of Venus, longitude increases from west to east in accordance with usage of the International Astronomical Union (1971).

CONTROL

Planimetric control is derived from the radio-tracked position of the spacecraft. The first meridian passes through the central peak of the crater Ariadne, at lat  $43.8^\circ$  N, according to current International Astronomical Union convention. (Ariadne replaces the feature "Ew," which, at the same longitude, originally fixed the location of the prime meridian (Davies and others, 1986).) The Venusian cartographic coordinate system was described by Davies and others (1992).

MAPPING TECHNIQUES

This map image base is compiled from the synthetic aperture radar (SAR) image mosaic (sheet 1) overlaid upon the relief image used as a relief base in sheet 4. Magellan SAR datasets were originally produced by the Jet Propulsion Laboratory. Full-resolution (75 m/track) image strips were compressed and mosaicked to produce C1-MDR's (Compressed Data Mosaicked Image Data Records; 225 m/track) (Pettengill and others, 1991). C1-MDR's were assembled and reprojected. Cycles 1 and 2 left (west-looking) and Cycle 2 right (west-looking) data records were used in the (SAR) image mosaic. (Cycle 1 radar operations commenced September 15, 1990, and ended May 1, 1991; Cycle 2 began May 16, 1991, and ended January 17, 1992; Cycle 3 began January 17, 1992, and ended September 13, 1992).

The underlying relief image was compiled by interpretation and digital manipulation of computer-generated relief images from the Magellan altimetry data. Topographic information obtained from Magellan radar altimeter measurements was rendered as a shaded relief image by converting the slope segments between elevation values to reflectance values, using methods described by Edwards (1987). All landforms were shown as if illuminated from the west. Data for shaded relief were derived from computer processing of radar altimetric information provided by the Massachusetts Institute of Technology (Pettengill and others, 1991). Interpretive image-processing was then used to remove artifacts and to enhance the digital image details, by use of portrayal and photo-interpretive methods described by Inge and Bridges (1976). Synthetic aperture radar (SAR) imagery was used to confirm geographic features and control as well as to aid in adding distinctive surface features revealed by the sharper resolution of the SAR images. Gaps in coverage by the Magellan radar altimeter were filled by lower resolution image data from the Pioneer Venus Mission, precluding uniform portrayal of detail.

SAR mosaic processing was done by Robert M. Sucharski; creation of the shaded relief base and image compilation were done by Ralph Aeschliman.

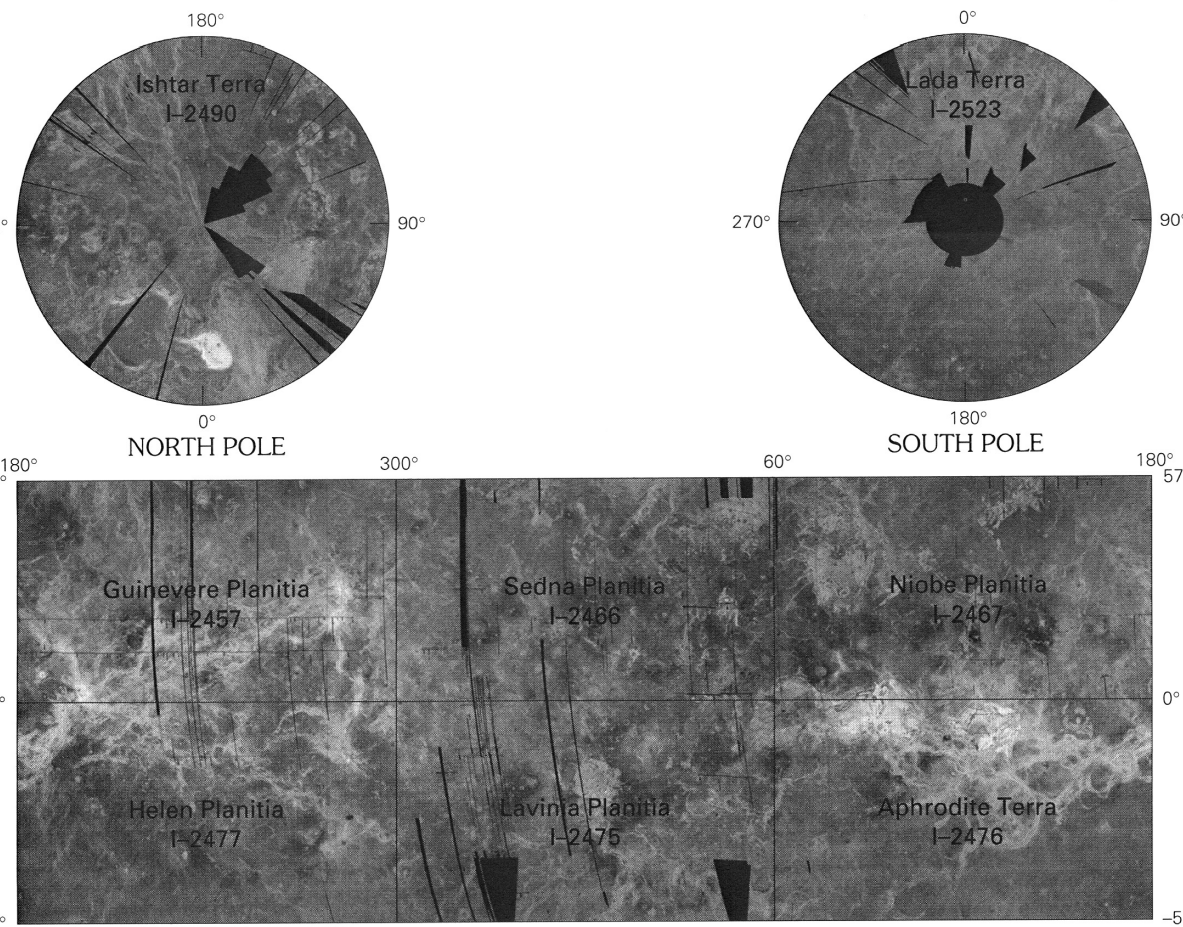
NOMENCLATURE

Names on this sheet are approved by the International Astronomical Union (1983, 1992, 1996, 1998).

V 10M -90/0 CMRN: Abbreviation for Venus; 1:10,000,000 series; center of map, lat  $90^\circ$  S, long  $0^\circ$ ; controlled mosaic (CM) with shaded relief (R) and nomenclature (N).

REFERENCES CITED

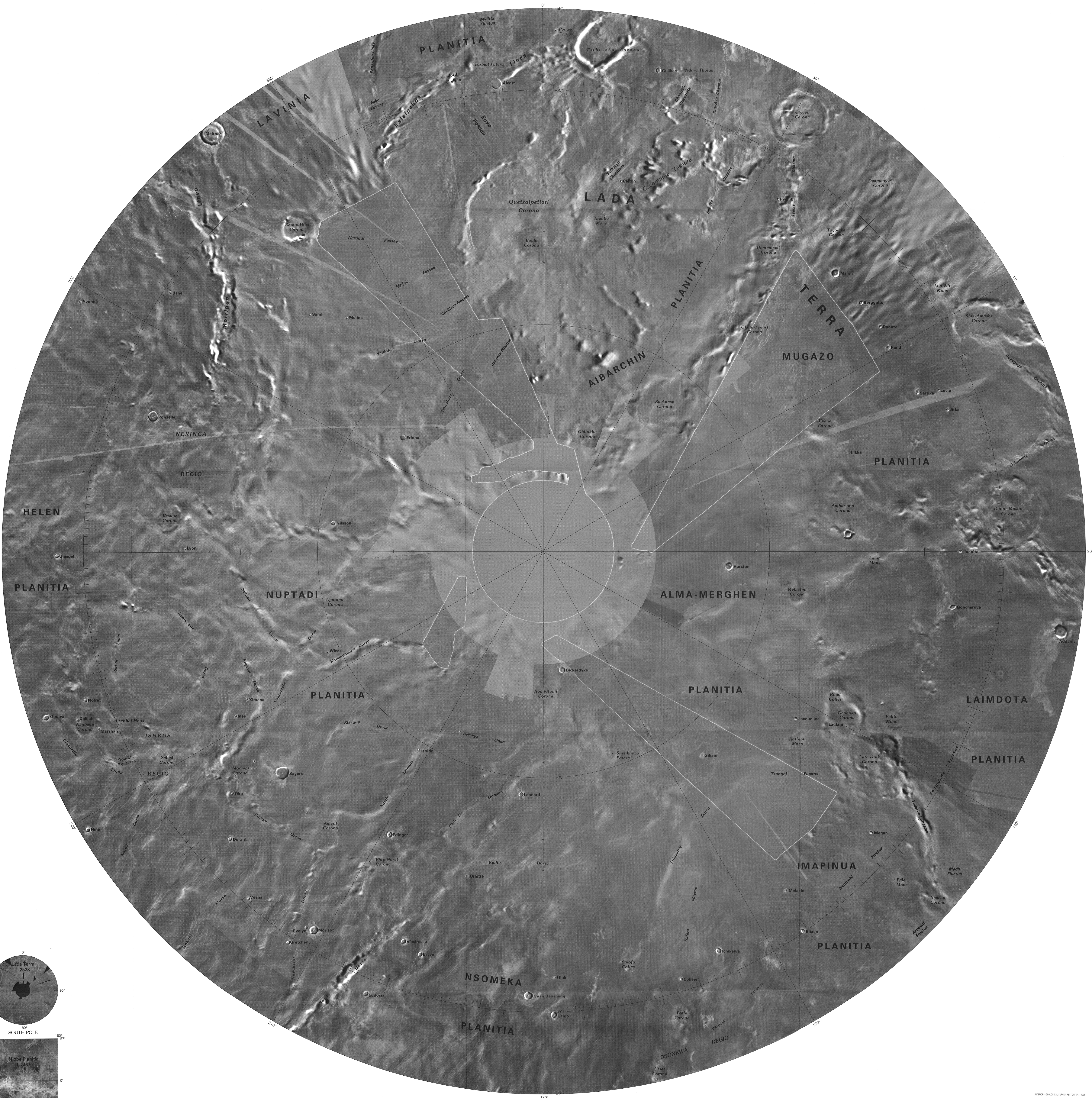
- Balson, R.M., Kirk, R.L., Edwards, K.F., and Morgan, H.F., 1994, Venus cartography, *Journal of Geophysical Research*, v. 99, p. 21,173-21,182.
- Davies, M.E., and nine others, 1986, Report of the IAU/IAU-COSPAR Working Group on Cartographic Coordinates and Rotational Elements of the Planets and Satellites: *Celestial Mechanics*, no. 39, p. 103-113.
- Davies, M.E., and eight others, 1992, The rotation period, direction of the north pole, and geodetic control network of Venus, *Journal of Geophysical Research*, v. 97, no. E8, p. 13,141-13,151.
- Edwards, Kathleen, 1987, Geometric processing of digital images of the planets, *Photogrammetric Engineering and Remote Sensing*, v. 53, no. 9, p. 1219-1222.
- Ford, P.G., and Pettengill, G.H., 1992, Venus topography and kilometer-scale slopes, *Journal of Geophysical Research*, v. 97, p. 13,103-13,114.
- Inge, J.L., and Bridges, P.M., 1976, Applied photointerpretation for airphoto cartography, *Photogrammetric Engineering and Remote Sensing*, v. 42, no. 6, p. 749-760.
- International Astronomical Union, 1971, Commission 16, Physical study of planets and satellites, in *Proceedings of the 14th General Assembly*, Brighton, 1970: Transactions of the International Astronomical Union, v. 14B, p. 129-137.
- 1983, Working Group for Planetary System Nomenclature, in *Proceedings of the 18th General Assembly*, Paris, 1982: Transactions of the International Astronomical Union, v. 18B, p. 332-334.
- 1992, Working Group for Planetary System Nomenclature, in *Proceedings of the 21st General Assembly*, Buenos Aires, 1991: Transactions of the International Astronomical Union, v. 21B, p. 360-363.
- 1996, Working Group for Planetary System Nomenclature, in *Proceedings of the 22nd General Assembly*, The Hague, 1994: Transactions of the International Astronomical Union, v. 22B, p. 226-229.
- 1998, Working Group for Planetary System Nomenclature, in *Proceedings of the 23rd General Assembly*, Kyoto, 1997: Transactions of the International Astronomical Union, v.23B (in press).
- Pettengill, G.H., and five others, 1980, Pioneer Venus radar results: Altimetry and surface properties, *Journal of Geophysical Research*, v. 85, no. A15, p. 82,261-82,270.
- Pettengill, G.H., and four others, 1991, Magellan Radar performance and data products, *Science*, v. 252, no. 5003, p. 260-265.
- Phillips, R.J., and five others, 1979, The gravity field of Venus: A preliminary analysis, *Science*, v. 205, no. 4401, p. 93-96.
- Planetary Cartography Working Group (Strom, R.G., and ten others), 1984, Planetary cartography in the next decade (1984-1994), National Aeronautics and Space Administration Special Publication 475, 71 p.
- Planetary Cartography Working Group (Zimbleman, J.R., and sixteen others), 1993, Planetary cartography 1993-2003: National Aeronautics and Space Administration, Planetary Cartography Working Group, 50 p.
- Saunders, R.S., and Pettengill, G.H., 1991, Magellan: Mission summary, *Science*, v. 252, no. 5003, p. 247-249.



INDEX OF THE 1:10,000,000 SCALE MAP SERIES OF VENUS  
Number preceded by "I" indicates published map.

NOTE TO USERS

Users noting errors or omissions are urged to indicate them on the map and to forward to U.S. Geological Survey, Building 4, Room 451, 2205 R. Capitol Drive, Flagstaff, AZ 86001. A replacement copy will be returned.



SCALE 1:9,145,190 (1 mm = 9.14 km AT  $\pm 56^\circ$  LATITUDE)  
1:10,000,000 AT  $90^\circ$  LATITUDE  
POLAR STEREOGRAPHIC PROJECTION

RADAR IMAGE AND SHADED RELIEF MAP OF THE LADA TERRA REGION OF VENUS

V 10M -90/0 CMRN