

**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; Batson, 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 computation 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 Mercator projection is used for this sheet. The scale is 1:16,354,349 at 0° latitude; it is 1:9,145,190 at ±56.0° latitude, as is the scale at this latitude in the polar stereographic projection. 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° N, according to current International Astronomical Union convention. (Ariadne replaces the feature "Eos", which, at the same longitude, originally fixed the location of the prime meridian (Davies and others, 1986).) The venesian cartographic coordinate system was described by Davies and others (1992).

**CONTOURS**

Because Venus has no surface water and hence no sea level, the topographic datum (the 0 km contour) is defined as a sphere with a radius of 6,051.0 km. Data for topographic contours were derived from computer processing of Magellan radar altimetric data provided by the Massachusetts Institute of Technology (Pettengill and others, 1991). These contours were then vectorized and brought into accord with the relief image (see Mapping Techniques, below).

**MAPPING TECHNIQUES**

Topographic information obtained from Magellan radar altimeter measurements has been shown as shaded relief by converting the slope segments between elevation values to reflectance values, using methods described by Edwards (1987). All landforms are 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 used to remove artifacts, to enhance the digital-image details, and to add distinctive surface features taken from SAR images by use of portraiture and photointerpretive methods previously used in airbrush cartography described by Inge and Bridges (1976). Gaps in coverage by the Magellan radar altimeter were filled by lower resolution image data from the Pioneer Venus and Venera 15 and 16 missions, precluding uniform portraiture of detail. Contours were generated at one kilometer elevation intervals from the altimetry data and matched to the new relief image. From these modified contours the color slice was generated.

Colors were chosen to lead the viewer to intuitively accept elevation information, that is, the colors help the viewer automatically see one elevation as higher or lower than other elevations. Also, colors selected suggest a rocky landscape rather than water or vegetation. A deliberate color contrast between a molochite green and a sienna brown was chosen to demarcate the 0 km contour boundary (radius of 6,051.0 km). The color slice was then merged with the relief image.

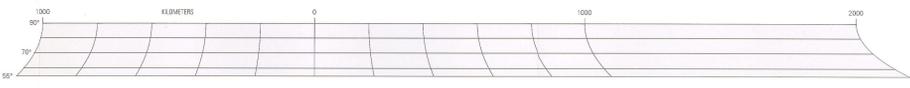
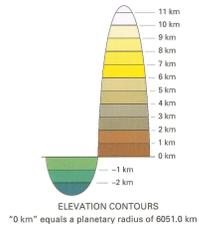
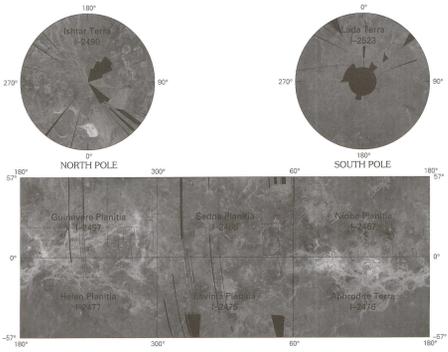
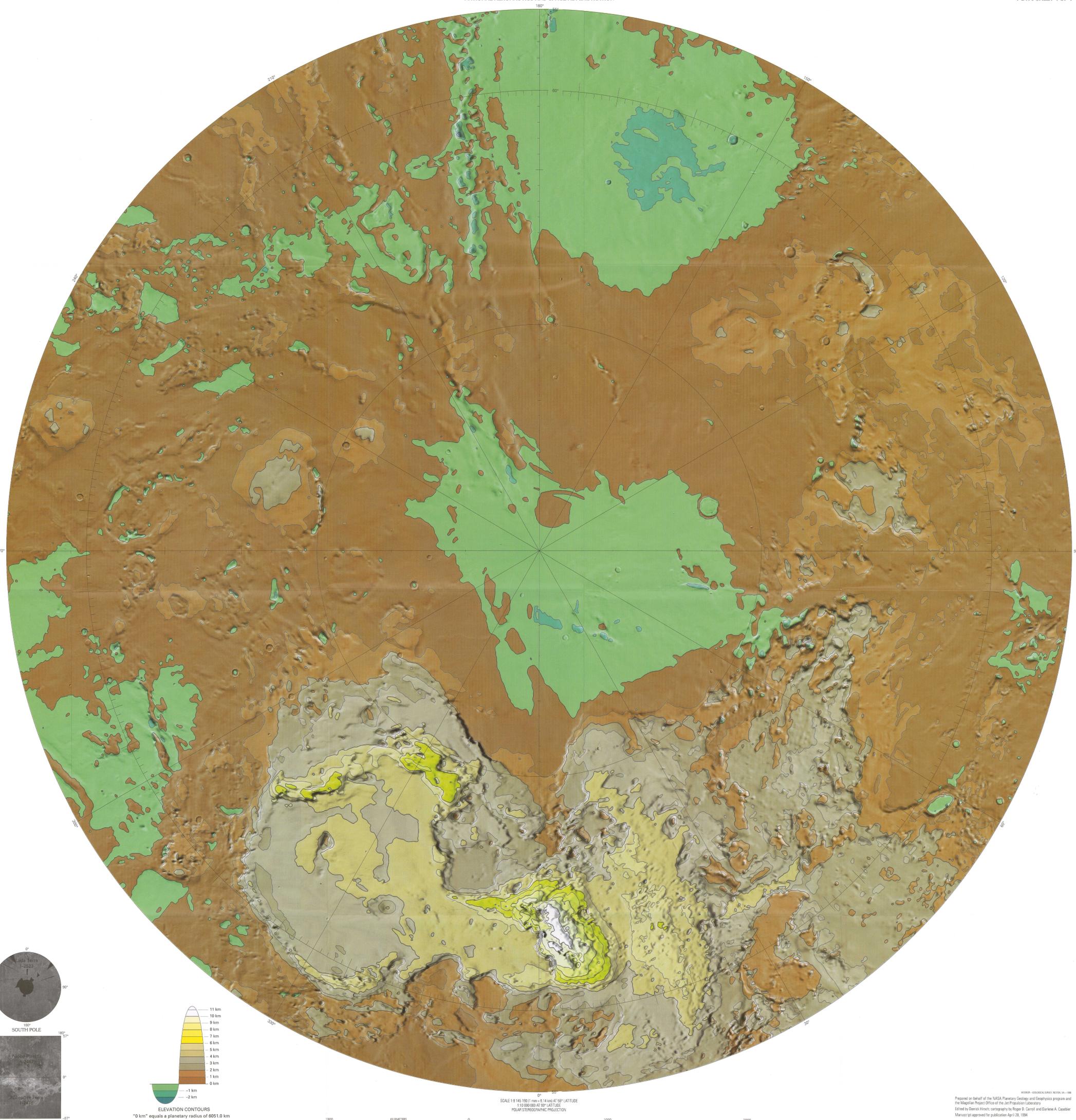
Shaded relief image (interpretation and portraiture), elevation contours, and cartographic processing by Ralph Aeschliman.

**NOMENCLATURE**

V 10M 90/0 RTK: Abbreviation for Venus: 1:10,000,000 series; center of map, lat 90° N, long 0°; shaded relief (R) with contours (T) and color slice (C).

**REFERENCES CITED**

Batson, 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/AGU/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 airbrush 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. 128-137.  
 Pettengill, G.H., and five others, 1980, Pioneer Venus radar results: Altimetry and surface properties: *Journal of Geophysical Research*, v. 85, no. A13, 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.



**TOPOGRAPHIC MAP OF THE ISHTAR TERRA REGION OF VENUS  
V 10M 90/0 RTK  
1998**

**NOTE TO USERS**  
Users noting errors or omissions are urged to indicate them on the map and to forward it to U.S. Geological Survey, Building 4, Room 451, 2206 N. Gemini Drive, Flagstaff, AZ 86001. A replacement copy will be returned.

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