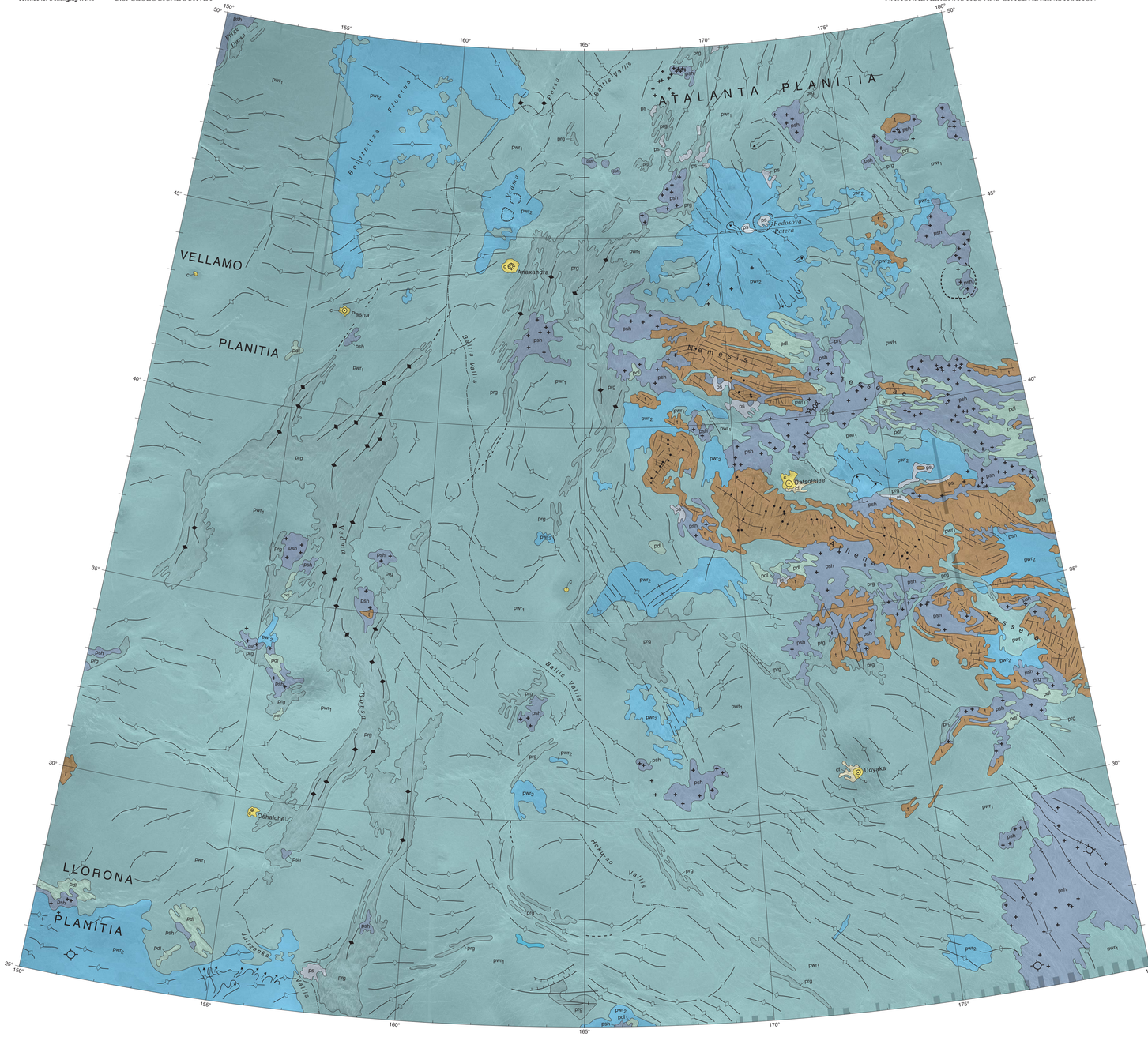
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Prepared for the
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

SCIENTIFIC INVESTIGATIONS MAP 2870
ATLAS OF VENUS: NEMESIS TESSERAE QUADRANGLE (V–13)
Pamphlet accompanies map



Descriptions of nomenclature used on map are listed at http://planetarynames.wr.usgs.gov/

SCALE 1:4 711 886 (1 mm = 4.712 km) AT 25° LATITUDE
1:5 000 000 AT 34° and 72° LATITUDES
LAMBERT PROJECTION

500 400 300 200 100 0 100 200 300 400 500 KILOMETERS

75° 70° 65° 60° 55° 50°

Prepared on behalf of the Planetary Geology and Geophysics Program, Solar System Exploration Division, Office of Space Science, National Aeronautics and Space Administration
Edited by Jan L. Zigler
Cartography by Darlene A. Ryan and Beatrice C. Landavazo
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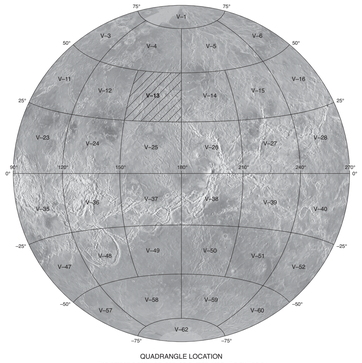
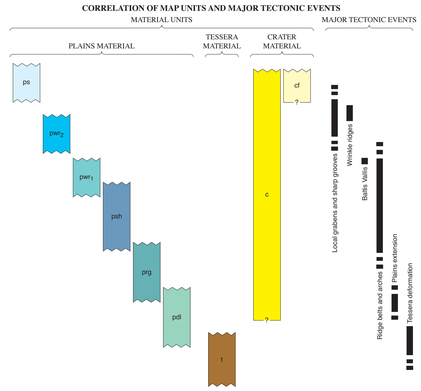


QUADRANGLE LOCATION
Photomosaic showing location of map area. An outline of 1:5,000,000-scale quadrangles is provided for reference.

CORRELATION OF MAP UNITS AND MAJOR TECTONIC EVENTS



DESCRIPTION OF MAP UNITS

[Map units are defined, characterized, and interpreted on the basis of radar backscatter; surface texture and morphology; associated features of apparent volcanic and tectonic origin; and roughness, reflectivity, emissivity, and topography. Although most map units are rock materials, some are defined on the basis of pervasive tectonic structure that tends to obscure the underlying materials and becomes part of the characteristics of the surface morphology. Type localities are indicated for units previously defined (Basilevsky and Head, 1995b) and reference localities are indicated for units in the quadrangle]

PLAINS MATERIAL

ps **Smooth plains material**—Smooth plains material of uniform, generally low to intermediate backscatter. Boundary of unit is gradational in places; superposed on wrinkle ridged plains. *Type locality*: lat 3.5° N., long 198.2° E. *Reference locality*: lat 35.8° N., long 164° E. *Interpretation*: Volcanic plains material unmodified by subsequent deformation; wind-blown material in places

Wrinkle ridged plains material—Homogeneous plains material of intermediate-low to intermediate-high radar backscatter complicated by narrow linear to anastomosing wrinkle ridges in parallel lines or intersecting networks. *Type locality*: lat 8° N., long 177° E. *Interpretation*: Regional plains material of volcanic origin deformed by wrinkle ridges; sources of plains not obvious

pwr2 **Upper unit**—Plains material of generally relatively high radar backscatter commonly with lobate boundaries. Embays lower unit of wrinkle ridged plains (unit **pwr1**) and modified by wrinkle ridges. *Reference locality*: lat 47° N., long 157° E. *Interpretation*: Lava flows subsequently deformed by wrinkle ridges

pwr1 **Lower unit**—Plains material of generally relatively low radar backscatter; commonly mottled locally. Modified by wrinkle ridges. Embays shield plains. *Reference locality*: lat 35° N., long 162° E. *Interpretation*: Lava flows subsequently deformed by wrinkle ridges

psh **Shield plains material**—Plains material of intermediate radar backscatter characterized by abundant small shield-shaped features (from a few kilometers to 10–20 km diameter) commonly with summit pits. Shields occur in clusters, giving unit a locally hilly texture, and as isolated outcrops in relatively smooth plains. Unit commonly occurs on densely lineated plains material; in places crossed by wrinkle ridges; superposed on ridged and grooved plains. *Reference locality*: lat 35.5° N., long 158.5° E. *Interpretation*: Shields are interpreted to be of volcanic origin and are likely to be the sources of adjacent plains material

prg **Ridged and grooved plains material**—Characterized by relatively smooth plains having generally densely spaced, sinuous ridges up to 5–10 km wide and several tens of kilometers long; embays both tessera and densely lineated plains. *Type locality*: lat 37.7° N., long 396.6° E. *Reference locality*: lat 40° N., long 157.5° E. *Interpretation*: Volcanic plains material deformed into ridgelike belts (up to 1,500 km long and 50–200 km wide) by compression

pdl **Densely lineated plains material**—Flat plains-like material intensely lineated by closely spaced narrow parallel lineaments 10–20 km long and less than 1 km wide, anastomosing patterns in places; radar bright due to dense fractures; at contact with tessera, embays tessera structures. *Type locality*: lat 48.5° N., long 15° E. *Reference locality*: lat 42° N., long 172° E. *Interpretation*: Volcanic plains material very highly modified by fractures of probable extensional origin. Local changes in fracture density suggest either some resurfacing during formation or uneven distribution of fracturing or both

TESSERA MATERIAL

t **Tessera material**—Radar bright and dominated by closely spaced ridges and grooves oriented in at least two directions, commonly orthogonally; terrain typically elevated. Embayed by plains units. *Type locality*: lat 67.5° N., long 20° E. *Reference locality*: lat 41.5° N., long 170° E. *Interpretation*: Material deformed by closely spaced contractional and extensional structures

CRATER MATERIAL

c **Undivided crater material**—Crater formation features of various diameters including central peaks, floor, walls, rim, and ejecta but lacking a dark paraboloid. *Reference locality*: lat 44.2° N., long 162.3° E. *Interpretation*: Impact crater and associated ejecta that has lost the parabola through erosion or formed without one

cf **Impact crater flow material**—Characterized by high radar backscatter; lobate margins common. *Reference locality*: lat 30.9° N., long 155.5° E. *Interpretation*: Outflows from impact craters.

Contact—Dashed where approximately located or gradational

Lava channel

Sharp groove

Subdued groove

Flow front—Arrow indicates flow direction

Ridge

Wrinkle ridge

Tessera structures—Ridges (thick lines), grooves (narrow lines), wide grooves (narrow lines with dot)

Topographic trend continuing ridge belts

Scarp

Coronalike feature

Calderalike depression

Steep-sided dome (>5 km diameter)

Small shield (<10 km diameter)

Rim of impact crater (>10 km diameter)

Rim of impact crater (<10 km diameter)

Central peak of impact crater

GEOLOGIC MAP OF THE NEMESIS TESSERAE PLANITIA QUADRANGLE (V–13), VENUS

By
Mikhail A. Ivanov[1, 2] and James E. Head, III[2]

2005

[1]Vernadsky Institute of Geochemistry and Analytical Chemistry, Russian Academy of Sciences, Moscow, Russia
[2]Department of Geological Sciences, Brown University, Providence, RI 02912

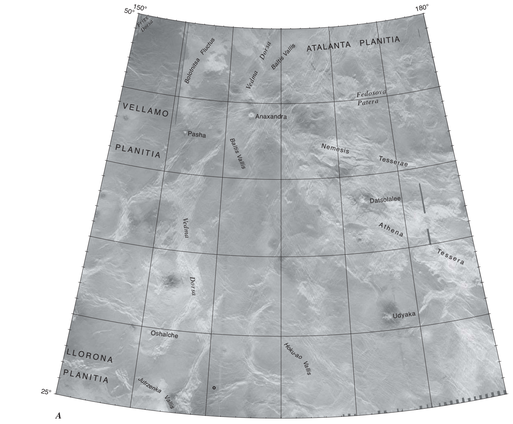


Figure 1. Map showing major physiographic (*A*) and topographic (*B*) features within the Nemesis Tesserae quadrangle, Venus. Contour interval is 1 km.

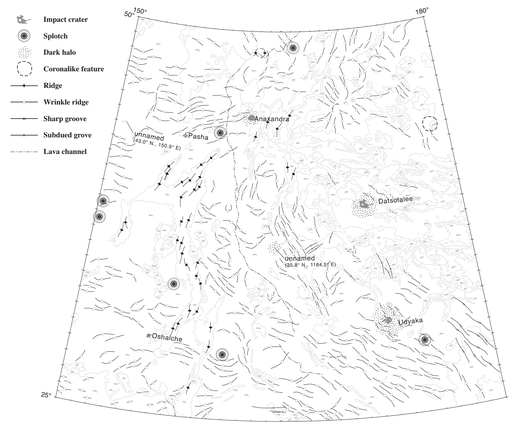


Figure 2. Map showing location of impact craters, splotches, and coronae and distribution of ridges in the Nemesis Tesserae quadrangle, Venus. See table 1 (pamphlet) for impact crater descriptions.

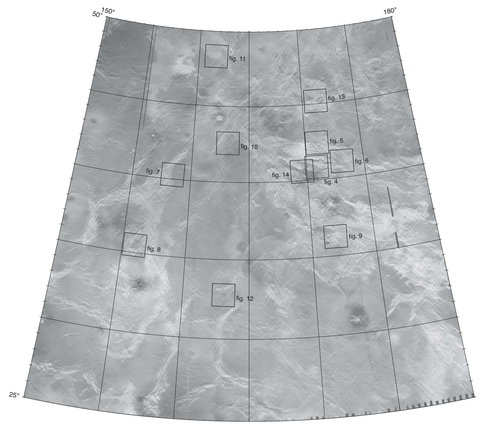


Figure 3. Map showing locations of areas enlarged to show unit relations (figs. 4–14), Nemesis Tesserae quadrangle, Venus.

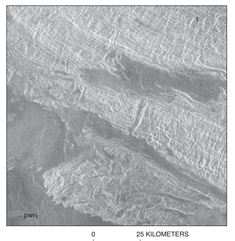


Figure 4. SAR image showing example of tessera material (unit t). Tessera (upper and right portions of image) is characterized by radar bright surface deformed by numerous tectonic structures such as ridges and grooves. In this fragment of Nemesis Tesserae, ridges are oriented in west-northwest direction parallel to the elongation of the tessera massif. Extensional structures are orthogonal to the strike of the ridges. Fragment of C1-MIDR.45N180, cycle 1; image centered at about lat 42.5° N., long 171° E.; look direction, left; image size about 115 x 115 km.

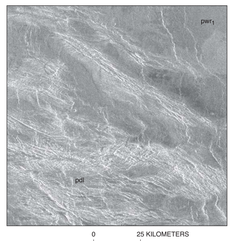


Figure 5. SAR image showing example of densely lineated plains material (unit pdl, lower half of image). The radar bright surface of unit is characterized by dense sets of lineaments (mostly narrow fractures) that almost completely obscure underlying material. Fragment of C1-MIDR.45N180, cycle 1; image centered at about lat 42.5° N., long 171° E.; look direction, left; image size about 115 x 115 km.

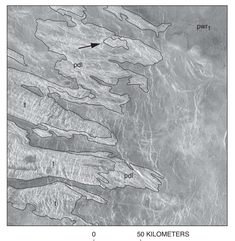


Figure 6. SAR image showing relations between tessera material (unit t, left side of image) and densely lineated plains material (unit pdl, center and top portions of image). Structures of tessera material at contact with unit pdl appear to be truncated and disappear. In places, outliers of tessera material (arrow) are seen within fields of unit pdl. Fragment of C1-MIDR.45N180, cycle 1; image centered at about lat 41.5° N., long 173° E.; look direction, left; image size about 230 x 230 km.

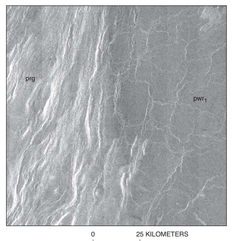


Figure 7. SAR image showing example of ridged and grooved plains material (unit prg, left side of image). The relatively bright surface of the unit hosts numerous contractional ridges that are arranged parallel to the elongation of the unit occurrences. Fragment of C1-MIDR.45N159, cycle 1; image centered at about lat 40.5° N., long 158° E.; look direction, left; image size about 115 x 115 km.

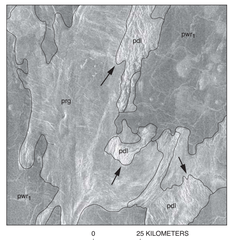


Figure 8. SAR image showing relations between ridged and grooved plains material (unit prg) and densely lineated plains material (unit pdl). Within an elongated occurrence of unit prg (central portion of the image) small outliers of unit pdl are seen. Structures that deform the surface of densely lineated plains material are abruptly terminated at the boundary with ridged and grooved plains material (arrows), providing the evidence for embayment of unit pdl by material of unit prg. Fragment of C1-MIDR.30N153, cycle 1; image centered about lat 35.5° N., long 156° E.; look direction, left; image size about 115 x 115 km.

Figure 9. SAR image showing example of shield plains material (unit psh, central and right portions of image). The surface of unit psh is slightly brighter than surrounding wrinkle ridged plains material (unit pwr1, upper left portion of image), modified by wrinkle ridges, and populated by small shield- and cone-like features interpreted as small volcanic constructs. In places, outliers of unit psh are seen within surrounding wrinkle ridged plains material (arrow) suggesting embayment of shield plains material. Fragment of C1-MIDR.30N171, cycle 1; image centered about lat 36.5° N., long 172° E.; look direction, left; image size about 115 x 115 km.

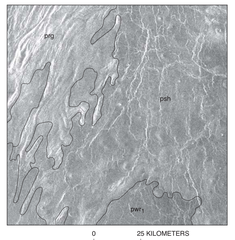


Figure 10. SAR image showing relation of ridged and grooved plains material (unit prg, upper left portion of image) with shield plains material (unit psh, lower right portion of image). Broad curvilinear ridges that deform the surface of unit prg are truncated and terminated by shield plains material, meaning that unit psh postdates emplacement and deformation of ridged and grooved plains material. Fragment of C1-MIDR.45N159, cycle 1; image centered about lat 42.5° N., long 162.5° E.; look direction, left; image size about 115 x 115 km.

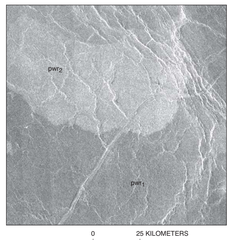


Figure 11. SAR image showing relation between two members of wrinkle ridged plains material (units pwr1 and pwr2). Both units are deformed by a dense network of wrinkle ridges and, thus, are older than the ridges. The lava channel of Baltis Vallis (extending from lower left to upper right) cuts unit pwr1 but is partly filled with material of unit pwr2 (center of image). Fragment of C1-MIDR.45N159, cycle 1; image centered about lat 48.5° N., long 162° E.; look direction, left; image size about 115 x 115 km.

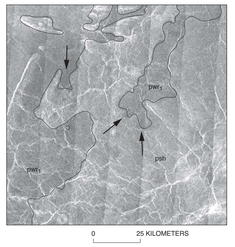


Figure 12. SAR image showing relations between shield plains material (unit psh, lower right) and wrinkle ridged plains material (unit pwr1, upper left). Contrast in albedo between two units produces a clear boundary, the configuration of which suggests penetration of wrinkle ridged plains material into occurrences of unit psh (arrows). Fragment of C1-MIDR.30N171, cycle 1; image centered about lat 33° N., long 163° E.; look direction, left; image size about 115 x 115 km.

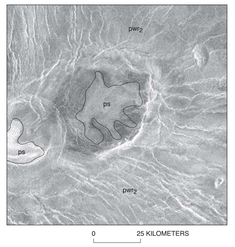


Figure 13. SAR image showing relation of regional wrinkle ridged plains material (unit pwr2) with smooth plains (unit ps). Regional plains form the background material that is deformed by narrow structures of wrinkle ridges. Smooth plains (center and left side of image) are tectonically undeformed and appear to embay the ridges. Fragment of C1-MIDR.45N180, cycle 1; image centered about lat 45° N., long 171° E.; look direction, left; image size about 115 x 115 km.

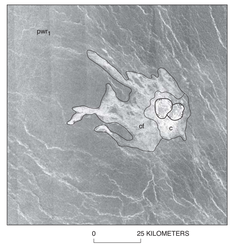


Figure 14. SAR image showing double crater Udyaka (about 7.7 km diam) demonstrates two facies of the crater materials, continuous ejecta (unit c) and crater outflow (unit cf). The surface of wrinkle ridged plains material (unit pwr1) near the crater is darkened due to a crater-related halo. Crater rim shown as line with hachures. Fragment of C1-MIDR.30N171, cycle 1; look direction, left; image size about 115 x 115 km.

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