

**PHOTOGEOLOGIC MAPPING OF THE THETIS REGIO QUADRANGLE (V-36), VENUS.** E.N. Guseva<sup>1</sup>, A.T. Basilevsky<sup>1,2</sup>, J.W. Head<sup>2</sup>, <sup>1</sup>Vernadsky Institute, RAN, Moscow 119991, Russia; <sup>2</sup>Brown University, Providence, RI, 02912, USA.

**Introduction.** Results of photogeologic mapping of the Thetis Regio quadrangle (V-36), 0°N-25°S, 120°E-150°E, based on analysis of the Magellan data are presented, following earlier results of [1, 2]. Three physiographical provinces can be distinguished within the study area: 1) old plateau, 2) lava plains that embay the old plateau, and 3) a vast rift zone cutting both the plateau and plains. Each province is composed of areas of different morphologies representing different geologic units.

**The mapped units.** Within the study area 13 material and 3 structural units were mapped. The material units include (from older to younger): tessera terrain material (tt), material of densely fractured plains (pdf), material of fractured and ridged plains (pfr), material of shield plains (psh), material of plains with wrinkle ridges (including the lower unit (pwr<sub>1</sub>), upper unit (pwr<sub>2</sub>) and undivided unit (pwr)), material of lineated plains (pli), material of rift plains (rp), material of mottled plains (pm), material of lobate plains (plo), material of crater having no radar-dark haloes (c<sub>1</sub>) and material of crater having clear dark haloes (c<sub>2</sub>). Structural units of the area include (also from older to younger): tessera transitional terrain (ttt), fracture belts (fb) and rifted terrain (rt). Most of the mapped units are also described and mapped in other regions of Venus [e.g., 3, 4, 5] and only two are specific to the V-36 quadrangle. These are lineated plains (pli) and rift plains (rp). The lineated plains (pli) unit is identified by presence of numerous regularly spaced (spacing 1 to 3 km, mean 1.7 km) parallel lineaments, probably fractures [2]. Material of the pli unit embays and covers plains with wrinkle ridges (pwr) and the older units and is embayed and covered by materials of mottled plains (pm) (Figure 1) and lobate plains (plo).

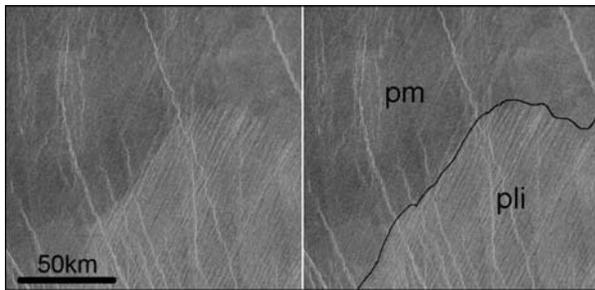


Figure 1. Lineated plains (pli) embayed by the mottled plains (pm). Magellan SAR image.

Lineated plains tend to neighbor the major rift zones of the area, implying some association with rift-forming tectonics. However, the very regular geometry of this unit's lineation may suggest strike-slip faulting deformation rather than extensional.

The rift plains (rp) unit is identified by its smooth surface and its localization inside major rift depressions. Material of the rift plains (rp) covers and embays the rifted terrain (rt) (Figure 2).

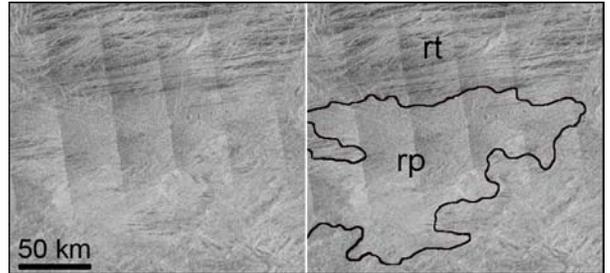


Figure 2. Rift plains (rp) surrounded by the faulted rifted terrain (rt). Magellan SAR image.

However, locally the rift faults are seen through the rp unit and at the available spatial resolution of the Magellan images it is not clear if the faults are indeed seen through the plains or they deform the rp plains. The rp plains surface looks rather radar-bright, implying high surface roughness at the decimeter-meter scale. These plains may be formed by young lava flows or alternatively be accumulations of the rather fine debris.

**Geological history.** The results of geologic mapping suggest (see Figures 3 and 4) four major stages of the geological history of this region: 1) formation of the tessera terrain material of unknown nature and its heavy tectonic deformation, 2) formation of the material of old, probably volcanic, plains and its deformation to tessera transitional terrain, 3) formation of the complex of volcanic plains of middle and young age and their deformation, 4) formation of the rift zone as well as syn-rift and post-rift volcanic plains.

**Summary.** The results of this work permitted us to identify and map 13 material and 3 structural units, two of which (material of lineated plains and material of rift plains) are specific to this region.

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**References.** [1] Basilevsky A. T. and Head J. W. Abstracts of the Annual Meeting of Planetary Geologic Mappers, Flagstaff, AZ, 2008; [2] Guseva E.N., Basilevsky A.T., Head J.W. LPSC-42, abs#1350, 2011; [3] Basilevsky A.T. Geologic Map of the Beta Regio, Quadrangle (V-17) Venus: USGS Scientific Investigation Map 3023 and Pamphlet (34 p). USGS, 2008; [4] Ivanov, M.A., Head, J.W., JGR, 106, 2001, 17515–17566; [5] Ivanov, M.A., Head, J.W. PSS, 59, 2011, 1559-1600.

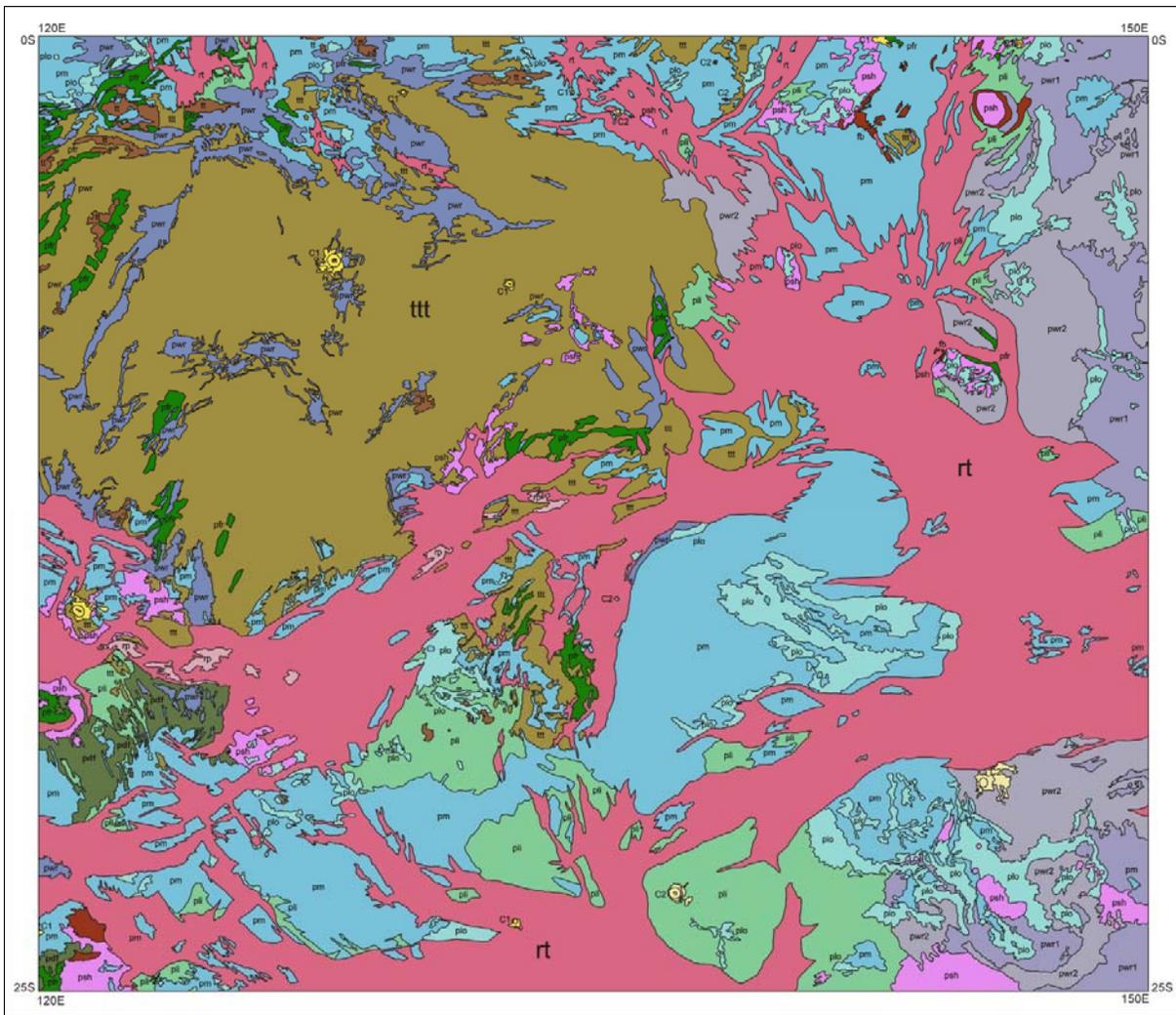


Figure 3. Geologic map of the Thetis Regio quadrangle (V-36).

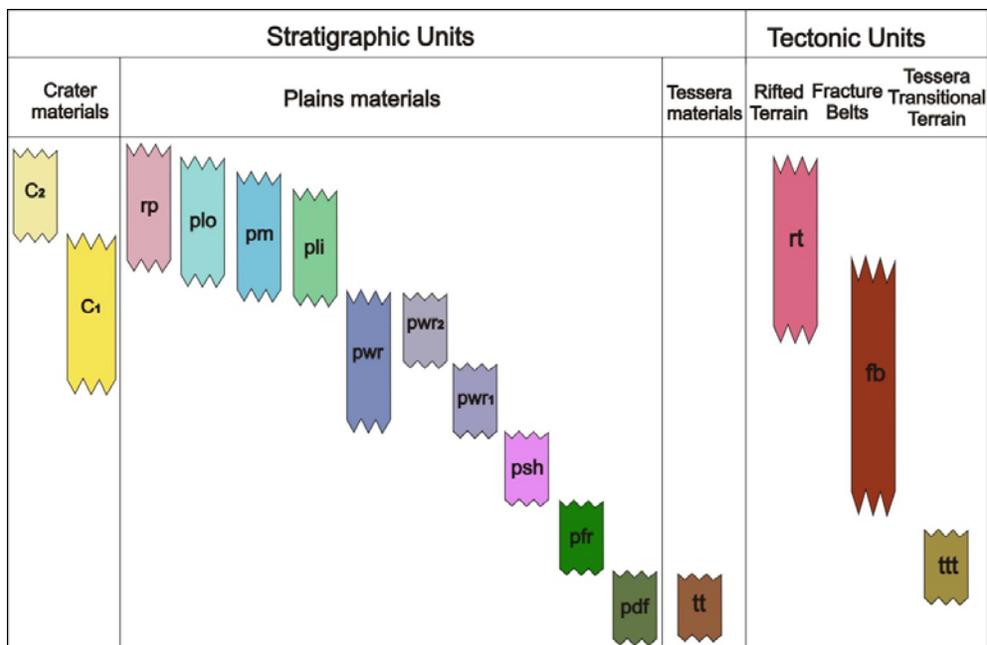


Figure 4. Correlation chart of the mapped units.