GEOLOGIC MAP OF THE MESKHENT TESSERA QUADRANGLE (V-3), VENUS: EVIDENCE FOR EARLY FORMATION AND PRESERVATION OF REGIONAL TOPOGRAPHY. M. A. Ivanov[1,2] and J. W. Head[2], [1]Vernadsky Institute, RAS, Moscow, Russia (Mikhail_Ivanov@brown.edu); [2]Department of Geol. Sci., Brown University, Providence, USA (James_Head@brown.edu).

Introduction: The area of the Meskhent Tessera quadrangle (V-3, 50-75°N, 60-120°E, Fig. 1) corresponds to a transition zone from the uplands of Ishtar Terra to the west to the lowlands of Atalanta Planitia to the east. The topographic configuration, gravity signature, and presence of large tesserae [1,2] in Ishtar Terra are consistent with extensive areas of thickened crust and tectonically stabilized lithosphere representing ancient and now extinct regimes of mantle convection [3,4]. The gravity and topographic characteristics of Atalanta Planitia have been cited as evidence for large-scale mantle downwelling [5-7]. Thus, the region of Meskhent Tessera quadrangle represents an important sample for the study of the regional history of long-wavelength topography (highlands, midlands, and lowlands), interaction between the downwelling and areas of thickened crust/lithosphere, formation of associated tectonic features, and emplacement of volcanic plains.

Stratigraphy: In the area of V-3 quadrangle we have defined and mapped one structural and ten material units. In order from older to younger they are as follows.

Tessera material (t, ~1.08 10^6 km^2 or ~14.1% of the quadrangle) is heavily deformed by intersecting ridges and grooves. *Densely lineated plains material* (pdl, ~0.19 x 10^6 km^2 or ~2.4%) is characterized by a relatively flat surface that is cut by densely packed subparallel lineaments. *Ridged plains material* (pr, ~0.35 10^6 km^2 or ~4.6%) is deformed by relatively broad (5-10 km wide) ridges tens of kilometers long after its emplacement. *Groove belts* (gb, structural unit, ~0.91 10^6 km^2 or ~11.9%) consist of long swarms of extensional structures, grooves. *Shield plains material* (psh, ~2.43 10^6 km^2 or about 31.7%) is characterized by abundant small shield-shaped features ranging from a few kilometers in diameter up to about 10-20 km. *Regional plains material* (rp, ~2.37 10^6 km^2). This unit is composed of morphologically smooth, homogeneous plains material complicated by wrinkle ridges. On the basis of its typical radar backscatter, regional plains material is subdivided into two units. The lower unit (rp_1, ~27.6%) has a homogeneous and relatively low radar albedo; the upper unit (rp_2 ~3.3%) appears to have slightly higher radar albedo and, in places, is characterized by lobate boundaries. *Smooth plains material* (ps, ~0.14 10^6 km^2 or 1.8%) is characterized by uniform and preferentially low albedo. *Lobate plains material* (pl, ~0.16 10^6 km^2 or 2.1%) has internal elements arranged in parallel to sinuous to lobate radar bright and dark strips and patches, and unit boundaries are typically lobate. Impact crater material was mapped as *undivided crater material* (cu) in some cases surrounded by *crater outflow deposits* (cf).

Topographic position of the mapped units: The major part of the map area is within the topographic province of the midlands and is mostly populated with material and structural units postdating tessera and predating regional plains material. Four elevated regions separated by elongated lower-lying areas characterize the overall topography of the map area (Fig. 2). Three of them, eastern Ishtar Terra, Tethus Regio, and in the arc of Dekla Tessera, all coincide with the large tessera occurrences that make up ~14% of the map area. The fourth region is the central-eastern portion of the quadrangle and corresponds to a zone of groove belts between Fakahotu Corona and Melia Mons.

The relatively old tectonized materials and deformational belts (gb, pr) are concentrated within regional slopes predominantly near the major tessera-bearing elevated regions. An exception is the ridge belts to the N of Dekla Tessera that occur in relatively low-lying Audra Planitia. There, the belts are broadly embayed by regional plains material. The most abundant unit in the quadrangle (psh) postdates tessera and the deformational belts, predates regional plains, and is clearly concentrated on the broad slopes away from the major elevated regions. Where the psh unit occurs within relatively low areas it is embayed by regional plains material. Regional plains material occurs throughout the map area (except for the major tesserae) but preferentially occupies the elongated lowlands where it embays all previous material and structural units. The youngest and relatively non-abundant material units such as the upper unit of regional plains (rp_2) and lobate/smooth plains materials (total ~7% of the map area) are related to distinct volcanic centers and their distribution appears to be governed by local slopes of older units.

Conclusions: The material and structural units within the V-3 quadrangle reveal not only the relative age relationships that are consistent throughout the map area but also good correlation with topography on the local and regional scales. The older units generally occupy the higher topographic levels, which is consistent with embayment by progressively younger units. This suggests two important characteristics of the regional-scale topography within the quadrangle and, by implication, within the broader surroundings. First, the actual regional-scale topographic pattern appears to have formed at the earlier stages of the observable geologic history, before emplacement of the lower unit of regional plains (rp_1). The areal distribution of this unit appears to be controlled by the long-wavelength topographic features and the plains are clearly less abundant within elevated areas and concentrated in the regional lows. Second, although the vast plains units (e.g. psh and rp_1) were deformed after emplacement to some degree, the principal, regional-scale, topographic configuration of the area of the V-3 quadrangle remained stable since the time it was established prior to the regional plains. The apparent history of regional topography within the V-3 quadrangle is similar to the global-scale history of topography of Venus [8].

References: 1) Barsukov, V.L., et al., J*GR*, 91, D378, 1986; 2) Sukhanov, A.L., *in:* Venus geology, geochemistry, and geophysics, p. 82; 3) Grimm, R.E., *Icarus*, 112, 89, 1994; 4) Brown, C.D. and R.E. Grimm, *Icarus*, 139, 40, 1999; 5) Bindschadler, D.L. et al., *JGR*, 97, 13,495, 1992; 6) Konopliv, A.S. and Sjogren, W.L., *Icarus*, 112, 42, 1994; 7) Konopliv, A.S. et al., *Icarus*, 139, 3, 1999; 8) Ivanov, M.A. et al., Geology, 2008 (submitted).

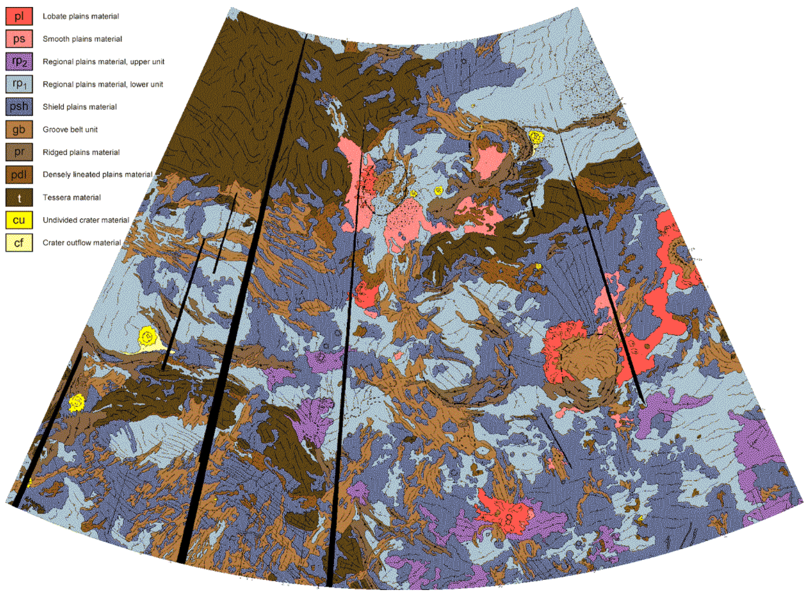

Fig. 1. Geological map of the V-3 Meskhent Tessera quadrangle

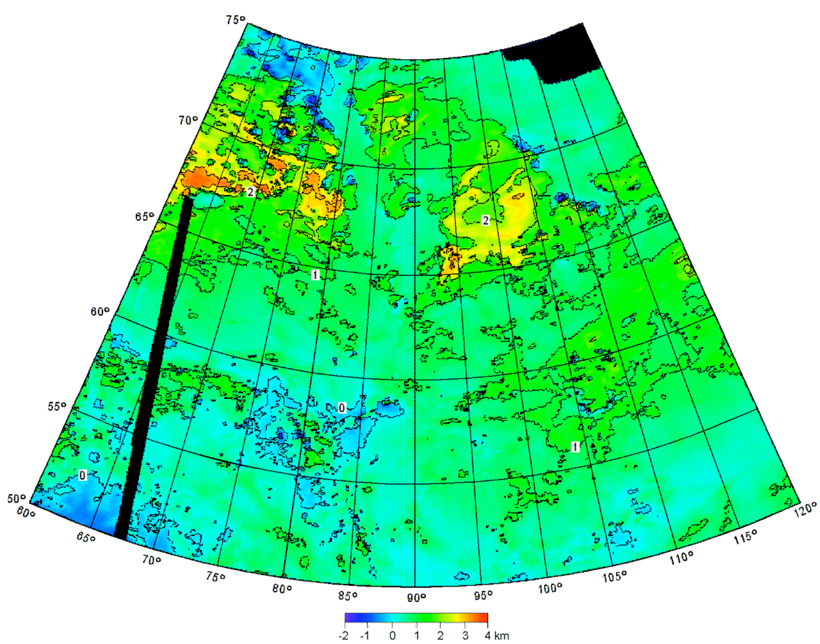

Fig. 2. Regional topography for the V-3 Meskhent Tessera quadrangle