Mapping the Sedna-Lavinia Region of Venus.

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Overview. Geologic mapping of Venus at 1:5 M scale has shown in great detail the flow complexes of volcanoes, coronae, and shield fields, and the varying structural patterns that differentiate tesserae from corona rims and isolated patches of densely lineated terrain. In most cases, however, the lower-elevation plains between the higher-standing landforms are discriminated only on the basis of potentially secondary features such as late-stage lava flooding or tectonic overprinting. This result, in which volcanoes and tesserae appear as "islands in the sea," places weak constraints on the relative age of large upland regions and the nature of the basement terrain. In this work, we focus on the spatial distribution and topography of densely lineated and tessera units over a large region of Venus, and their relationship to apparently later corona and shield flow complexes. The goal is to identify likely connections between patches of deformed terrain that suggest earlier features of regional extent, and to compare the topography of linked patches with other such clusters as a guide to whether they form larger tracts beneath the plains.

Mapping Approach. We are mapping the region from 57S to 57N, 300E-60E. Since the 1:5 M quadrangles emphasize detail of tessera structure and corona/edifice flows, we simply adopt the outlines of these features as they relate to the outcrops of either "densely lineated terrain" or tessera (Fig. 1). The densely lineated material is mapped in many quadrangles based on pervasive structural deformation, typically with a single major axis (in contrast to the overlapping orthogonal patterns on tesserae). This unit definition is often extended to include material of corona rims. We do not at present differentiate between plains units, since earlier efforts show that their most defining attributes may be secondary to the original emplacement (e.g., lobate or sheet-like flooding by thin flow units, tectonic patterns related to regional and localized stress regimes) [1].

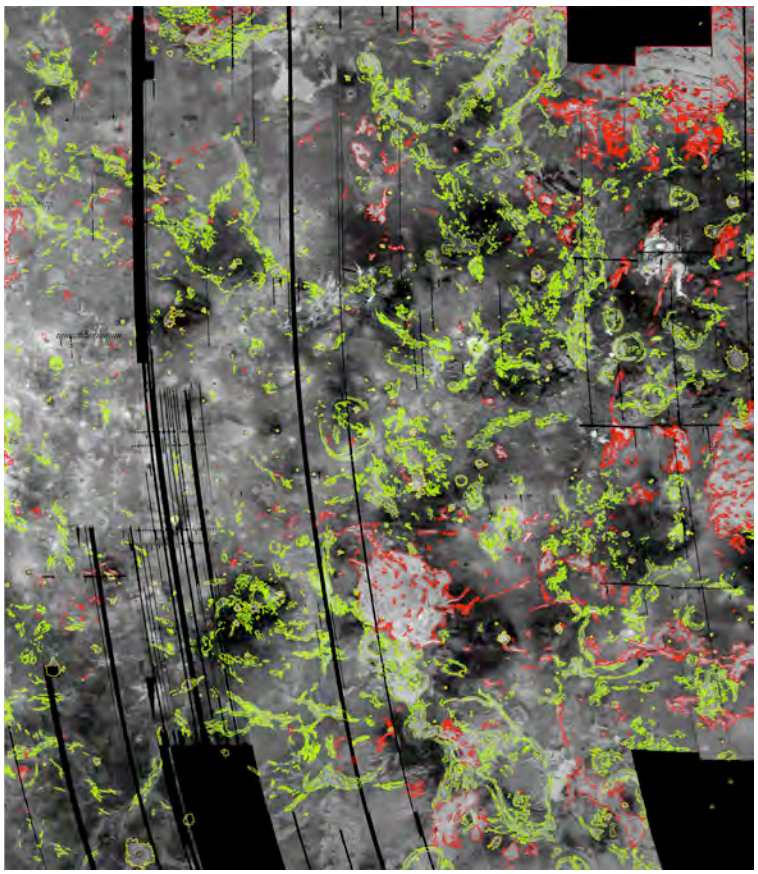

Fig. 1. Radar base map of the Sedna-Lavinia region in Cylindrical projection. Tessera terrain outlined in red, densely lineated terrain shown in green, and craters shown in yellow.

Preliminary Results. In maps for quads V-9 and V-20 [2,3], we suggested that a pattern of SW-NE trending tessera fragments might reflect an earlier, contiguous regional fabric. We are using Magellan topography data linked with the mapped unit boundaries to study the relationship of these fragments (Fig. 2).

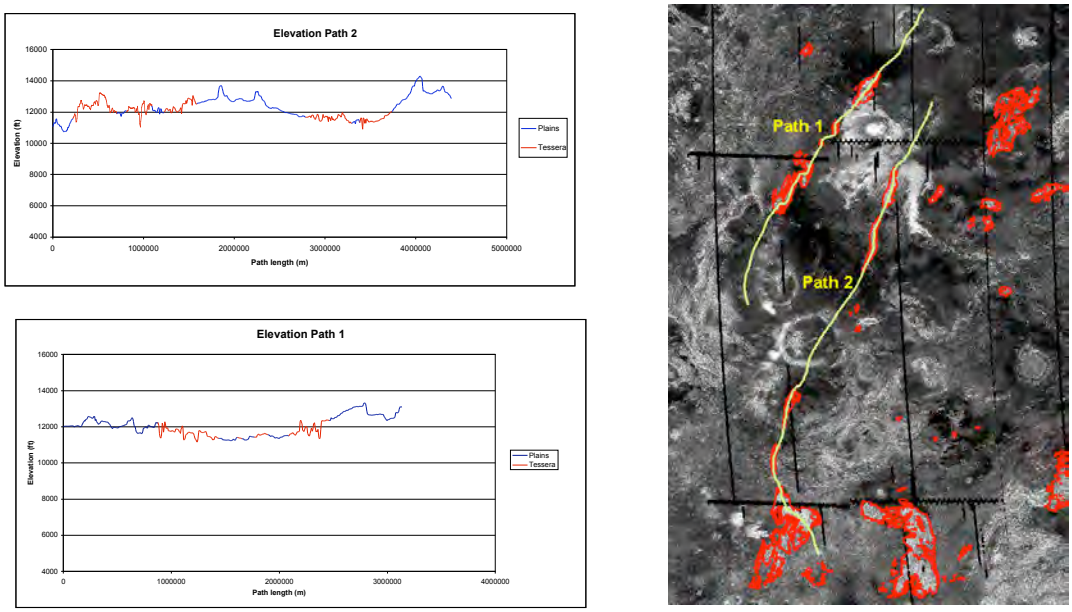

Fig. 2. Two elevation charts for profiles across Bell Regio (at north) and a cluster of coronae west of Mead crater to the south. Green traces show paths through tessera fragments outlined in red.

Tessera terrain along Path 1, west and north of Tepev Mons, has relatively similar elevation to the two linear fragments, south of Tepev, shown in Path 2. The northern outcrops on Path 2 also appear to lie in a topographic saddle between the volcanic constructs of Bell Regio and eastern Eistla Regio. The large outcrop and smaller fragments south of eastern Eistla, however, are ~1 km above those surrounding Bell Regio, and abut (or are superposed by) materials of Calakomana Corona. If there is a regional tessera background that links the two sets of outcrops, this basement must slope downwards toward the north. There are other areas, such as northeast of Alpha Regio, where fragments of tessera terrain appear to link larger outcrops. The densely lineated terrain also forms chains of apparently associated patches, sometimes in a roughly parallel distribution to outcrops or larger blocks of tessera. Further work will attempt to map these connections to develop a model for the extent of highly deformed terrain and possible age relationships among the major upland regions.

References. [1] Hansen, V.L., 2000, Geologic mapping of tectonic planets, Earth and Planetary Science Letters, v. 176, p. 527-542. [2] Campbell, B.A., and D.A. Clark, Geologic map of the Mead Quadrangle (V-21), Venus, U.S. Geological Survey Atlas of Venus, *Sci. Inv. Map 2897,* 2006. [3] Campbell, B.A., and P.G. Campbell, Geologic map of the Bell Regio (V-9) Quadrangle, Venus, *U.S. Geological Survey, I-2743*, 2002.