GEOLOGIC MAPPING OF THE GREENAWAY QUADRANGLE (V24), VENUS. N.P. Lang[1] and V.L. Hansen[1], [1]Department of Geological Sciences, University of Minnesota-Duluth, Duluth, MN, 55812 (lang0604@tc.umn.edu)

Introduction: The V24 quadrangle (120-150E; 0-25N) comprises parts of the Aphrodite plains region and Aphrodite Terra and displays evidence of volcanic and tectonic processes at multiple scales. Coronae and small shields source volcanic flows that interact with tectonic elements of the planitiae including broad scale topographic basins, ribbon-bearing tessera terrain, spaced lineaments, wrinkle ridges, and penetrative fractures resulting in a geologically complex and interesting region. Detailed mapping of this region may help constrain models of plains evolution.

Methodology: Geological mapping, according to standard guidelines [1, 2], is conducted digitally using a 225-m/pixel Magellan SAR base. Synthetic stereo, Magellan altimetry data, and full-resolution (75-m/pixel) normal and inverted Magellan SAR framelets are used in mapping. Use of ENVI software allows additional image processing to aid in detailed mapping.

Results: Although more detailed mapping is warranted, preliminary mapping (~80% complete) allows for the following delineation of map units:

Ribbon-bearing tessera terrain: Tessera terrain may be the oldest deformed crust in V24; it occurs predominantly as inliers in the western and southern parts of the quadrangle.

Tessera structures include ribbons, folds, intratessera basins, and graben. Ribbons trend dominantly NW, with local NE trends. Timing between the two ribbon trends is indeterminate. Folds, although not common, trend generally NW. Intratessera basins are topographic depressions filled with smooth, radar dark material presumed to be volcanic in origin and to have formed concurrently with tessera fabrics [3]. Graben, having a general NNW trend, crosscut tessera fabrics and are most likely associated with Rosmerta Corona.

Contacts between tessera and adjacent units are sharp to gradational. Sharp contacts commonly occur in areas that we interpret as steep topography whereas gradational contacts occur where tessera grades into small kipukas or where tessera structures continue into surrounding units and are partially covered. Gradational contacts associated with kipukas are most likely due to corona and/or shield sourced flows flooding low lying areas of tessera. Reactivation of some tessera structures is most likely responsible for their continuation from tessera inliers into surrounding units.

Pervasively fractured terrain (PFT): Tightly spaced NW to W-striking fractures characterizes this unit. PFT has a low topographic expression and is commonly embayed by volcanic flows typically comprised of small shield-sourced flows that post-date fracture formation. This unit, which is present as a >1000 km^2 patch in eastern V24 and as several smaller (<100-300 km^2) patches in western V24, may be spatially related to tessera terrain.

Slightly veiled lineaments with trends parallel to PFT lineaments occur in close proximity (~100 km) to PFT, and are interpreted to be flooded PFT; if this interpretation is correct, PFT could be widespread beneath thin (~several meters?) surficial deposits.

Coronae: Abundia, Kamadhenu, Kubebe, and Rosmerta coronae occur within V24. Each is marked by a low circular to quasi-circular topographic ridge and concentric fractures. Rosmerta also exhibits radial fractures.

Kamadhenu Corona is partially obscured by a dark halo associated with the Ban Zhao impact structure to the east making identification of associated volcanic flows difficult. Rosmerta boasts the most extensive flows in V24 with multiple flows that may continue for over 1000 km. Abundia and Kubebe have localized and extremely subdued flows. An unnamed, subdued corona-like feature ~100 km east of Kubebe contains two localized flows that embay a tessera inlier.

Small shields: Small shields (<1-15 km diameter, <<1 km high) are low circular to quasi-circular features with or without a central pit. Shields have a wide range of morphologies (cone, shield, dome, flat-topped, or flat) and may have local flow material extending up to several kilometers suggesting a wide range of melt viscosity. The shields typically coalesce forming an ultra-thin volcanic layer or 'shield-paint' [4] across the planitia stemming from countless shallow point sources.

Conservative estimates of shield density across V24 are between 3,550-10,500 shields/10^6 km^2, but actual shield density could be higher suggesting that formation of small shields may be a major resurfacing mechanism. Many shields occur in spatial association with tessera and PFT.

Impact structures: 17 impact structures are identified in V24. Two craters have rough floors and are surrounded by dark haloes, three craters have a smooth floor but have highly degraded haloes, and 12 craters have smooth floors and no surrounding halo. All craters have a raised rim and visible ejecta blanket. Some ejecta materials continue for over a hundred kilometers from the rim and some are likely fluidized deposits.

Ejecta from Crater Wilder, which sits on Gegute Tessera, may be embayed and partially covered by shield flows.

Lineaments: NNW-to NNE-trending lineaments representing predominantly the traces of fractures and/or faults in V24 occur as individual lineaments and suites of lineaments cutting plains materials.

Wrinkle ridges: A suite of E-to ENE-trending wrinkle ridges stretches across V24. Some wrinkle ridges may exist locally as inversion structures where earlier formed fractures were filled by lava and later contracted [4].

Conclusions: Geologic mapping indicates that ribbon-bearing tessera terrain represents the locally oldest deformed crust in V24. PFT may be as old or older than tessera, but timing between the two is indeterminable. Further mapping may resolve the issue, though. Plains materials that lack distinctive deformation features could be equally old or older than tessera as well. After tessera and PFT formation, volcanism, principally in the form of small shields, was the dominant process, though shields may have also formed during and/or before tessera and PFT formation. Shields are present on some corona flows and are absent on others suggesting that some corona-related activity may have coincided with shield volcanism. Lineaments and wrinkle ridges probably formed after tessera and PFT formation, but more specific timing of these structures is difficult as they crosscut and are covered by corona and shield-sourced flows.

References: [1] Tanaka, K.L., et al., (1994) *The Venus Geologic Mapper's Handbook 2nd ed.*, USGS Open-file Report 94-438, 68p. [2] Hansen, V.L., (2000) *EPSL*, 176, 527-542. [3] Banks, B.K. and Hansen, V.L., (2000) *JGR*, 107, 17655-17667. [4] Hansen, V.L. et al., (2002) *LPSC XXXIII* #1121.