GEOLOGIC MAPPING OF THE GUINEVERE PLANITIA QUADRANGLE (V-30) OF VENUS. David A. Crown[1], Ellen R. Stofan[2], and Leslie F. Bleamaster III[1], [1]Planetary Science Institute, 1700 E. Ft. Lowell Rd., Suite 106, Tucson, AZ 85719, [2]Proxemy Research, P.O. Box 338, Rectortown, VA 20140, crown@psi.edu.

Introduction. The Guinevere Planitia (V-30) quadrangle of Venus (0-25°N, 300-330°) covers a lowland region east of Beta Regio and west of Eistla Regio and includes parts of Guinevere and Undine Planitiae. This quadrangle is dominated by low-lying plains interpreted to be of volcanic origin and which exhibit numerous wrinkle ridges. Using Pioneer Venus, Goldstone, and Arecibo data, previous investigators have described radar bright, dark, and mottled plains units in the Guinevere Planitia region, as well as arcuate fracture zones and lineament belt segments that define the Beta-Eistla deformation zone [1-5].

Magellan SAR images reveal that volcanic landforms compose the majority of the surface units in the V-30 quadrangle [6-7]. The quadrangle contains parts of four major volcanoes: Atanua (9°N, 307°), Rhpisunt (3°N, 302°), Tuli (13°N, 314°), and Var (3°N, 316°) Montes, and three coronae: Hulda (12°N, 308°), Madderakka (9°N, 316°), and Pölöznitsa (1°N, 303°). Seymour crater, located at 18°N, 327°, is associated with extensive crater outflow deposits.

Scientific Objectives. Scientific objectives for mapping the V-30 quadrangle include investigations of: 1) the geologic evolution of venusian plains, 2) styles of volcanism within venusian plains, including the formation of shield volcanoes, lava flows and flow fields, lava channels, and small volcanic constructs, and 3) the geologic context for steep-sided dome formation. Mapping provides a synthesis of the geologic and volcanic histories of Guinevere Planitia and constraints on styles of venusian volcanism. Previous research related to geologic mapping has included morphologic and radar remote sensing analyses of venusian steep-sided domes and terrestrial silicic domes as potential analogues [8-10], as well as analyses of the morphologic and radar backscatter properties of lava flows associated with volcanoes in Guinevere Planitia [11].

Data Sets. Preparation of the 1:5M-scale geologic map of the Guinevere Planitia quadrangle includes analysis of Magellan data, including synthetic aperture radar (SAR) images and altimetry, roughness (RMS slope), reflectivity, and emissivity data sets. Full-resolution Magellan image mosaics (FMAPs) and synthetic parallax stereo images produced by the U.S. Geological Survey are key mapping products for unit characterization and determination of stratigraphic relationships.

Mapping Results. Mapping completed to date [6-7, 12] has defined four main types of geologic units in the Guinevere Planitia quadrangle: flow materials, plains materials, upland terrain, and crater materials. Scattered throughout the map area are embayed remnants of intensely deformed materials; some of these show two or more tectonic fabrics (*tessera*) and others show one dominant orientation of lineaments (*lineated upland material*). Tesserae are locally high-standing and always embayed by the surrounding units. Within lineated uplands, patches of plains units are observed.

The extensive volcanic plains evident across the V-30 quadrangle have been divided into two units. *Mottled, lineated plains* are generally large expanses of rolling topography that contain a variety of small volcanic domes, cones, shields, and flows. Zones of tectonic disruption are common. Mottled, lineated plains are typically embayed by the regional plains but flows apparently sourced within mottled, lineated plains also locally superpose regional plains. *Guinevere regional plains* form low-lying regions that exhibit uniform radar brightness over large distances and are generally radar dark. Flow margins can be identified, but small volcanic edifices are not abundant. Fractures and ridges are common, and several canali are evident. Guinevere regional plains frequently embay exposures of upland terrain and mottled, lineated plains. Typically, volcanic flows are superposed on the regional plains. Locally plains embay the flanks of the major volcanoes in the map area.

Volcanic flow materials in the V-30 quadrangle have been divided into two major morphologic types. *Plains-forming flow materials* are extensive, radar bright or dark, relatively flat-lying sheets and can extend for hundreds of kilometers from their apparent source vents; some plains-forming flows are associated with coronae. *Lobate flow materials* are narrow, sinuous, overlapping radar bright and dark deposits with lobate margins that form radial patterns around their source vents; lobate flow materials have accumulated to form the surfaces of the major volcanoes in the map area. Numerous small domes, cones, and shields are observed in association with lobate flow materials on these large volcanoes. Flow materials superpose exposures of upland terrain and the plains. Flows associated with the major volcanoes are locally the youngest geologic features across the quadrangle.

Brian et al. [13] recently defined a new topographic rise, Laufey Regio, that includes Var and Atanua Montes and a series of coronae and their

associated flow materials. Laufey Regio, 0.5 km high and 1000 x 2000 km across, is considered to be a volcano-dominated rise in a late-stage of evolution; a complex, nondirectional geologic history was described, with protracted and overlapping episodes of volcanic and tectonic activity.

Crater materials mapped in the V-30 quadrangle include the ejecta, rim, and floor deposits of nine recognized impact craters, several of which exhibit prominent crater outflow deposits. Both bright and dark splotches are found in association with impact craters. Crater materials are observed to superpose plains and the four major volcanoes in the quadrangle.

Structural features observed in Guinevere Planitia include wrinkle ridges, fractures, and lineaments found primarily in plains units, coronae and corona-like structures, and tesserae and other highly tectonized units. In the plains, structures exhibit a diversity of orientations and occur in sets of features with similar trends. Prominent E-W and SE-NW trends are observed in the regional plains at the eastern margin of the V-30 quadrangle.

Future Work. Evaluation of the mapped geologic units and landforms continues in combination with assessment of spatial and temporal patterns. A detailed map of structural features will be integrated with unit mapping to further constrain the geologic evolution of the Guinevere Planitia quadrangle.

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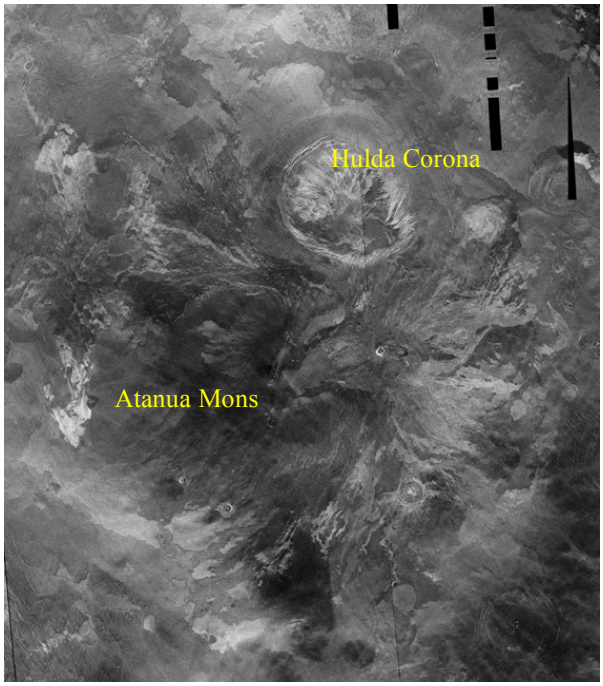

Figure 1. a) Part of Magellan SAR image base map of Guinevere Planitia quadrangle showing Atanua Mons and Hulda Corona. Atanua Mons is ~1000 km across and exhibits ~1400 m of relief. It has an elongate, oval trough at its summit and extensive flow fields characterize its flanks. The flows are lobate and there is clear topographic control on the dimensions and orientations of the flows. b) Part of geologic map of V-30 quadrangle corresponding to area shown in a. Atanua Mons flow materials are divided into two main members, based on superposition relationships. *Atanua* Mons flow materials, member 2 (orange) inundate Hulda Corona plains-forming flows (tan) and member 1 flows (light orange) which remain preserved on the southwestern flank of the volcano.