1:5,000,000-SCALE GEOLOGIC MAPPING OF THE KAWELU PLANITIA QUADRANGLE (V16) ON VENUS. J.R. Zimbelman, CEPS/NASM, Smithsonian Institution, Washington, D.C. 20560.

The Kawelu Planitia (V16) quadrangle covers latitudes 25° to 50°N and longitudes 240° to 270° in the northern lowlands of Venus. Photogeologic mapping of Magellan SAR images has revealed that, along with the Kawelu Planitia plains, V16 also includes several isolated blocks of Complex Ridged Terrain (also called 'tessera'), a broad zone of numerous coronae between 30° to 40°N latitude, and a truly impressive array of intermingled lobate flow fields (Fig. 1). The preliminary mapping carried out for the V16 quadrangle has identified thirteen terrain units representing the complex ridged terrain, the broad plains, the lobate flow fields, and impact-related features. An enormous complex of coalesced flow fields surrounds the volcanic construct Sekmet Mons (44.5°N, 240.5°) and two nearby fields of small domes. The three centers of volcanic activity occur at the intersection of major fracture systems trending N40E, S40E, and N-S through the flow field area. The spatial relationship between the flow fields and the coronae indicates there may a genetic link between these features. Informal discussions have begun with mappers working in other areas on Venus to improve the compatibility of unit definitions.

The V16 photobase of Magellan images at 1:5,000,000 scale was received in early July, 1993, allowing a preliminary assessment of regional units to be made [1]. Thirteen terrain units were identified in the V16 quadrangle representing complex ridged terrain, the broad lowland plains, lobate flow fields, and impact-related features. The stable map base (chronopaque) of V16 was received in mid-December, 1993, allowing revised unit contacts and structural symbols to be placed directly on a representation of the Magellan imaging. Figure 1 is a simplified version of the map; only the complex ridged terrain (black) and the lobate flow fields (lined pattern) are shown in relation to prominent fracture zones and coronae. The spatial pattern and the stratigraphic relationships between units indicates the following general geologic history; the oldest material in the map area is the complex ridged terrain preserved as isolated blocks that are embayed by adjacent units, the plains units are superposed on the complex ridged terrain but the concentric fracturing associated with coronae disrupts the plains materials, and the flow fields consisting of intermixed radar-bright and radar-dark lobate flows are superposed on the other units.

One of the more interesting results to come out of the mapping of the V16 quadrangle involves an enormous complex of coalesced flow fields associated with the volcano Sekmet Mons (44.5°N, 240.5°). Sekmet Mons is a shield volcano with about 2 km of vertical relief spread over an area from 300 to 350 km in width. However, the mapping has revealed that Sekmet Mons is only one of three volcanic centers that were the sources for the lobate flows which extend away from these centers [2]. Both Sekmet Mons and the two newly identified volcanic centers, consisting of a large concentration of small (<10 km) domes, are located at the intersections of major fracture zones which extend along S40E, N40E, and N-S trends. The close association of the fracture zones with the three volcanic centers indicates that the volcanic history of the area must include the entire complex together, rather than as isolated eruptive events. The coalesced flow fields associated with the three

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centers extends into the adjacent V15 quadrangle, covering a total area of 1,200,000 km², which is nine times larger than the area of the Columbia River basalts on Earth [2]. The lobate flows associated with the volcanic centers are surrounded by numerous coronae, which suggests that the source plume feeding the centers may also include segregated magma pods around its periphery, consistent with other observations of lava flow fields and coronae [3-4]. Geologic mapping should help to delineate relationships between volcanic and tectonic features and provide constraints to models of mantle-plume dynamics on Venus [e.g., 5].

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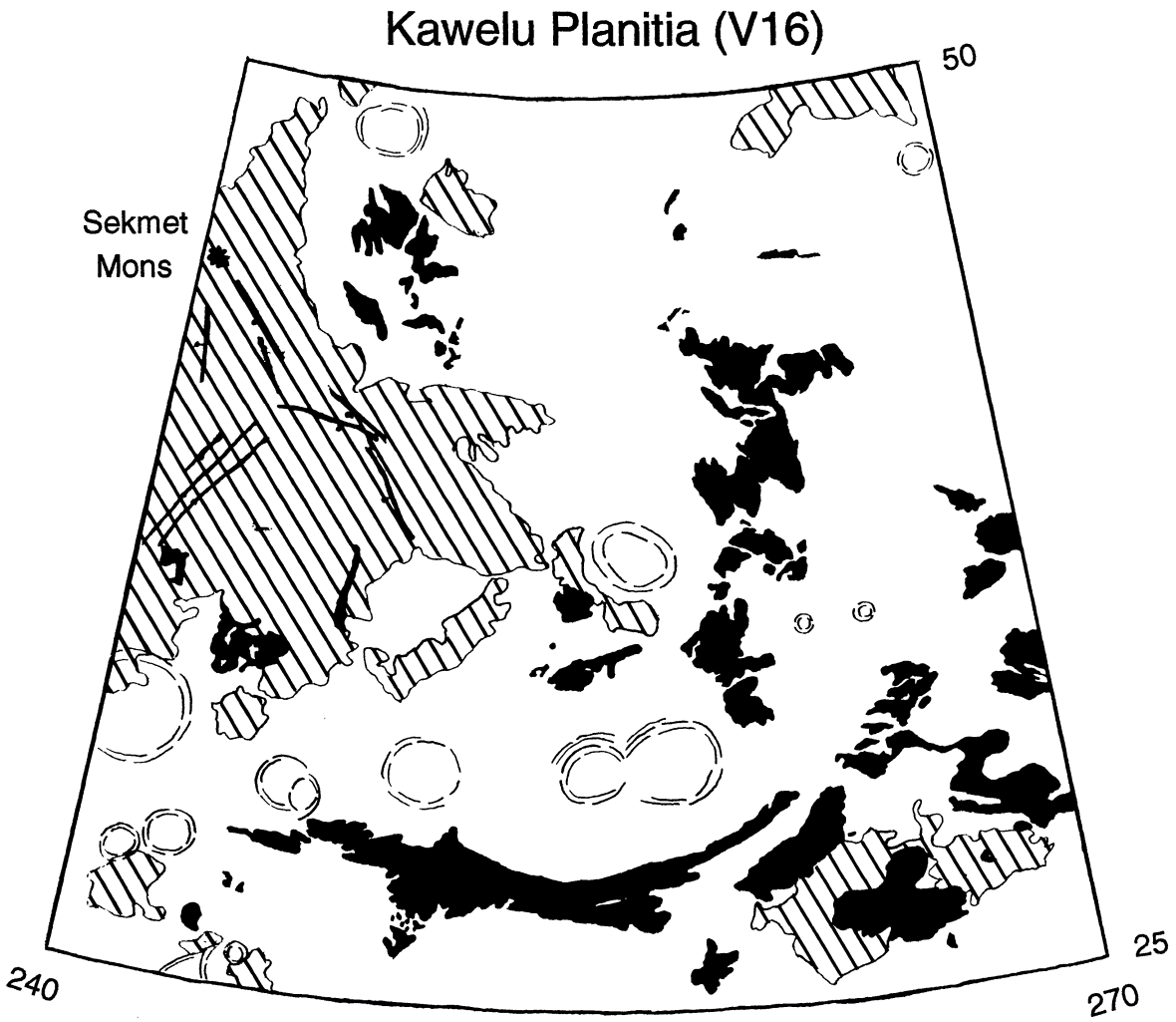

Figure 1. Simplified map of selected geologic units and features in the Kawelu Planitia (V16) quadrangle on Venus. The oldest unit exposed is Complex Ridged Terrain (black), present as isolated blocks embayed by other units. Unpatterned area consists of several types of lowland plains. Flow fields of intermixed lobate flows (lined pattern) are superposed on other units. Coronae are shown as concentric long-dashed lines located near the rim of each feature.